



Faculty of Economics and Business

**The Mediating Effect of Financial Analyst Forecasts on the Relationship
between Corporate Social Responsibility Disclosure and Investment
Efficiency**

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The Mediating Effect of Financial Analyst Forecasts on the Relationship
between Corporate Social Responsibility Disclosure and Investment
Efficiency

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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ABSTRACT

This study highlights a phenomenon that has received increasing attention in recent years, namely, corporate social responsibility disclosure and investment efficiency. However, previous research rarely explores the transmission mechanism between corporate social responsibility disclosure and investment efficiency, especially how financial analyst forecasts affect this relationship, which is the primary motivation of this study. In reality, Chinese corporate investment activities exhibit high inefficiency, and information asymmetry is one of the main reasons. Corporate social responsibility disclosure provides incremental information to stakeholders. However, there are still a range of challenges to transparency in corporate social responsibility disclosure. Whether financial analysts, as external monitors, play a mediating role in the connection between corporate social responsibility disclosure and investment efficiency is worth studying. Prior research on CSR disclosure has included studies of mandatory social responsibility disclosure policies and CSR disclosure after policy implementation. Therefore, based on 25,552 observations of Chinese listed firms over the period from 2006 to 2022, divided into two samples, this study investigates the mediating role of financial analyst forecasts between corporate social responsibility (CSR) disclosure and investment efficiency. The first sub-sample of 5,442 observations, selected between 2006 and 2011, aims to examine the mediating effect of financial analyst forecasts on the relationship between mandatory corporate social responsibility disclosure and investment efficiency in the short-term effect of mandatory CSR disclosure. The second sub-sample of 24,235 observations, for the period from 2008 to 2022, is selected to investigate the effect of CSR disclosure and its quality on investment efficiency in the long-term effect of mandatory CSR disclosure predicted by financial analysts. Specifically, this sub-sample is used to investigate the mediating role of financial

analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency, and determine the mediating effect of financial analysts on the relationship between corporate social responsibility disclosure quality and investment efficiency. This study employs panel fixed effects regression modeling of mediation effects using Stata17 software to test this causal inference. The analysis includes difference-in-differences (DID), parallel trend test, placebo test, propensity score matching and difference models (PSM-DID), and bootstrap test. The theoretical foundation of this study is built upon signaling theory, reputation theory, stakeholder theory, and information asymmetry theory. The results indicate that financial analyst forecasts do not play a mediating role in the short-run effects of implementing mandatory social responsibility disclosure policy. However, analysis of the long-term effects of mandatory disclosure policy reveals that companies that disclose social responsibility information, compared to those that do not, can indirectly enhance investment efficiency through analyst forecasts. Financial analyst forecasts do not impact investment efficiency through the quality of CSR disclosure. The study provides that mandatory CSR disclosure policies are effective in the long run, supporting the need to continuously promote and strengthen CSR disclosure policies. The study also highlights the role of financial analysts as key information intermediaries, offering insights for investors, regulators, and policymakers regarding the long-term effects of CSR disclosure transparency on investment decision-making.

Keywords: Investment efficiency, corporate social responsibility disclosure, mediating effect, financial analyst forecasts

***Kesan Pengantaraan Ramalan Penganalisis Kewangan terhadap Hubungan antara
Pendedahan Tanggungjawab Sosial Korporat dan Kecekapan Pelaburan***

ABSTRAK

Kajian ini mengetengahkan fenomena yang semakin mendapat perhatian dalam beberapa tahun kebelakangan ini, iaitu tanggungjawab sosial korporat dan kecekapan pelaburan. Walau bagaimanapun, kajian terdahulu jarang mengkaji bagaimana ramalan penganalisis kewangan mempengaruhi hubungan antara tanggungjawab sosial korporat dan kecekapan pelaburan, yang merupakan motivasi utama kajian ini. Pada hakikatnya, aktiviti pelaburan korporat China menunjukkan ketidakcekapan yang tinggi, dan asimetri maklumat adalah salah satu sebab utama. Pendedahan tanggungjawab sosial korporat menyediakan maklumat tambahan kepada pihak berkepentingan. Walau bagaimanapun, masih terdapat pelbagai cabaran untuk ketelusan dalam tanggungjawab sosial korporat (CSR). Perlu dikaji jika penganalisis kewangan, sebagai pemantau luaran, berperanan sebagai pengantara dalam hubungan antara tanggungjawab sosial korporat dan kecekapan pelaburan. Penyelidikan terdahulu mengenai CSR telah memasukkan kajian tentang dasar pendedahan tanggungjawab sosial mandatori dan CSR selepas pelaksanaan dasar. Oleh itu, berdasarkan 25,552 pemerhatian firma tersenarai di China dari 2006 hingga 2022, kajian ini menyiasat peranan pengantara ramalan penganalisis antara pendedahan tanggungjawab sosial korporat (CSR) dan kecekapan pelaburan. Sub-sampel pertama terdiri daripada 5,442 pemerhatian yang dipilih antara 2006 dan 2011 bertujuan untuk mengkaji kesan perantaraan ramalan penganalisis kewangan terhadap hubungan antara pendedahan tanggungjawab sosial korporat mandatori dan kecekapan pelaburan dalam kesan jangka pendek pendedahan CSR mandatori. Sub-sampel kedua sebanyak 24,235 pemerhatian dari 2008 hingga 2022 dipilih untuk menyiasat kesan pendedahan CSR dan kualitinya terhadap kecekapan pelaburan dalam

jangka panjang. Khususnya, sub-sampel ini digunakan untuk menyiasat peranan pengantara ramalan penganalisis kewangan tentang hubungan antara pendedahan tanggungjawab sosial korporat dan kecekapan pelaburan, dan menentukan kesan pengantaraan penganalisis kewangan terhadap hubungan antara kualiti pendedahan tanggungjawab sosial korporat dan kecekapan pelaburan. Kajian ini menggunakan pemodelan regresi kesan tetap panel kesan pengantaraan melalui perisian Stata¹⁷ untuk menguji inferens kausal ini. Analisis tersebut termasuk perbezaan-dalam-perbezaan (DID), ujian trend selari, ujian plasebo, padanan skor kecenderungan dan model perbezaan (PSM-DID), dan ujian bootstrap. Asas teori kajian ini dibina atas teori isyarat, teori reputasi, teori pemegang kepentingan, dan teori ketidaksamaan maklumat. Keputusan menunjukkan bahawa ramalan penganalisis tidak memainkan peranan pengantara dalam kesan jangka pendek pelaksanaan dasar pendedahan tanggungjawab sosial mandatori. Namun, analisis kesan jangka panjang menunjukkan bahawa syarikat yang mendedahkan maklumat tanggungjawab sosial boleh meningkatkan kecekapan pelaburan secara tidak langsung melalui ramalan penganalisis, berbanding syarikat yang tidak mendedahkannya. Ramalan penganalisis tidak mempengaruhi kecekapan pelaburan melalui kualiti CSR. Kajian ini mencadangkan bahawa dasar pendedahan CSR mandatori adalah berkesan dalam jangka panjang, menyokong keperluan untuk terus menggalakkan dan mengukuhkan dasar pendedahan CSR. Kajian itu juga menekankan peranan penganalisis kewangan sebagai pengantara maklumat utama, menawarkan pandangan untuk pelabur, pengawal selia dan penggubal dasar mengenai kesan jangka panjang ketelusan CSR terhadap pembuatan keputusan pelaburan.

Kata kunci: *Kecekapan pelaburan, tanggungjawab sosial, kesan pengantara, ramalan penganalisis kewangan*

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LIST OF ABBREVIATIONS

MCSR	Mandatory Corporate Social Responsibility Disclosure
MCSR	Mandatory Corporate Social Responsibility
CSRDQ	Corporate Social Responsibility Disclosure Quality
CSR	Corporate Social Responsibility Disclosure
CSR	Corporate Social Responsibility
FDI	Foreign Direct Investment
SZSE	Shenzhen Stock Exchange
SSE	Shanghai Stock Exchange
CEO	Chief Executive Officer
IPO	Initial Public Offerings
PSM	Propensity Score Matching
PSM-DID	Propensity Score Matching - Difference-in-Differences
DID	Difference-in-Differences
BRICS	Brazil, Russia, India, China, and South Africa
OLS	Ordinary Least Squares
UNDP	United Nations Development Program
ST	Special Treatment
PT	Particular Transfer
EPS	Earnings Per Share
GRI	Global Reporting Initiative
IIRC	International Integrated Reporting Committee
CSMAR	Chinese Stock Market Accounting Research

CSRC	China Securities Regulatory Commission
ESG	Environmental, Social, and Governance

CHAPTER 1

INTRODUCTION

1.1 Study Background

The pace and scale of economic transformation in Asia have been unprecedented in recent decades, with an increasing number of domestic and foreign investors participating. According to the World Investment Report 2022, outward investment from developing Asia reached a record high of \$619 billion in 2021, with 80% of foreign direct investment (FDI) flows going into China. Investment in companies plays a vital role in modern business development. Effective corporate investment is a crucial driver of economic growth and productivity, with significant consequences for national and international economic development (Song et al., 2021; Suprpto et al., 2022). Investment efficiency may signal strong governance, effective internal control, and high-quality management systems (Simonov, 2020). In addition, lower information asymmetry is often associated with higher levels of investment efficiency (Elberry & Hussainey, 2020).

In a perfect financial market, where investment decisions are independent of economic circumstances, businesses should undertake all positive net present value projects and avoid those with negative net present value (Modigliani & Miller, 1958). When faced with an investment choice, a systematic analysis and decision-making process are typically employed to ensure that investment objectives are maximized and returns on investment are optimized. Previous studies have shown that businesses are highly concerned with how investments relate to profitability, risk, and innovation (Settembre-Blundo et al., 2021; Wen

et al., 2022). However, firms may encounter various investment challenges, including economic policy uncertainty (Akron et al., 2020; Hu et al., 2023; Xie et al., 2021), political issues (Chen, 2022; Pan & Tian, 2020), managerial capacity constraints (He et al., 2019), and noisy stock price (Dessaint et al., 2019). These studies demonstrate the presence of information asymmetry and agency issues in the stock market.

Firms may deviate from optimal investment levels due to agency issues and information asymmetry, which are common frictions. Due to knowledge asymmetry, investors may discount recently issued assets (Stein, 2003). To address information asymmetry and enhance transparency and fairness in economic activities, it is crucial for firms to disclose information about their operations through public channels. Numerous studies in the accounting literature have noted that high-quality financial reporting improves investment efficiency by reducing information asymmetry and agency cost problems caused by adverse selection and moral hazard (Ball & Shivakumar, 2005; Bushman & Smith, 2001; Healy & Palepu, 2001). Financial reporting is an essential source of firm-specific information for investors and contributes to reducing market friction associated with adverse selection problems (Kanodia & Lee, 1998). However, as investors' demand for firm-specific information increases, traditional financial disclosures often fall short of meeting their decision-making needs. Governments and agencies have taken various measures to encourage listed companies to disclose information that is material to investment decisions, especially those containing information on future developments. Non-financial information plays an increasingly important role in investing.

Corporate social responsibility disclosure (CSRD) is frequently used as a proxy for non-financial transparency. In the current economic climate, CSRD is considered a crucial management tool for firms seeking to attract investment (Håbek, 2019). Improvements in

CSRD strategies and management practices have contributed to the emergence of non-financial reporting as a key channel for informing stakeholders about a company's social, economic, and environmental performance (Bychkova et al., 2021). Proponents of corporate social responsibility view the development and implementation of CSRD strategies as a significant business opportunity. When approached strategically, CSRD reflects senior management vision and principles and is seen not as an expense but as an initiative or strategy that firms use to distinguish themselves from competitors (Beji et al., 2021). Corporate social responsibility disclosure is recognized as a valuable source of information on sustainable development challenges (Veronica et al., 2020).

Many of the world's major corporations not only invest significant resources in corporate social responsibility disclosure but also strive to communicate their CSR activities to various stakeholders and potential investors through multiple channels, including annual reports (Wang et al., 2018). Since the mid-twentieth century, an increasing number of firms globally have started to provide non-financial information about social responsibility, such as details related to customers and the environment. Economic and environmental concerns have driven a trend where firms are required to disclose additional social responsibility information, with China being no exception.

Chinese corporate social responsibility disclosure has evolved through four distinct stages, culminating in a phase characterized by both mandatory and voluntary social responsibility reporting. Both types of disclosure impact corporate value. Companies that voluntarily disclose their social responsibilities may incur higher costs to attract long-term investment (Xue et al., 2023). Meanwhile, Gosselin and Berthelot (2023) found that the credibility of voluntary CSR disclosures can be undermined by 'greenwashing' practices, leading to limited trustworthiness of this information for investors and stakeholders.

Consequently, nations around the world have begun promoting corporate social responsibility through legislative and policy measures. These concerns over voluntary CSR disclosures have prompted regulatory authorities to take action, transitioning from a voluntary to a mandatory reporting framework to enhance transparency and credibility.

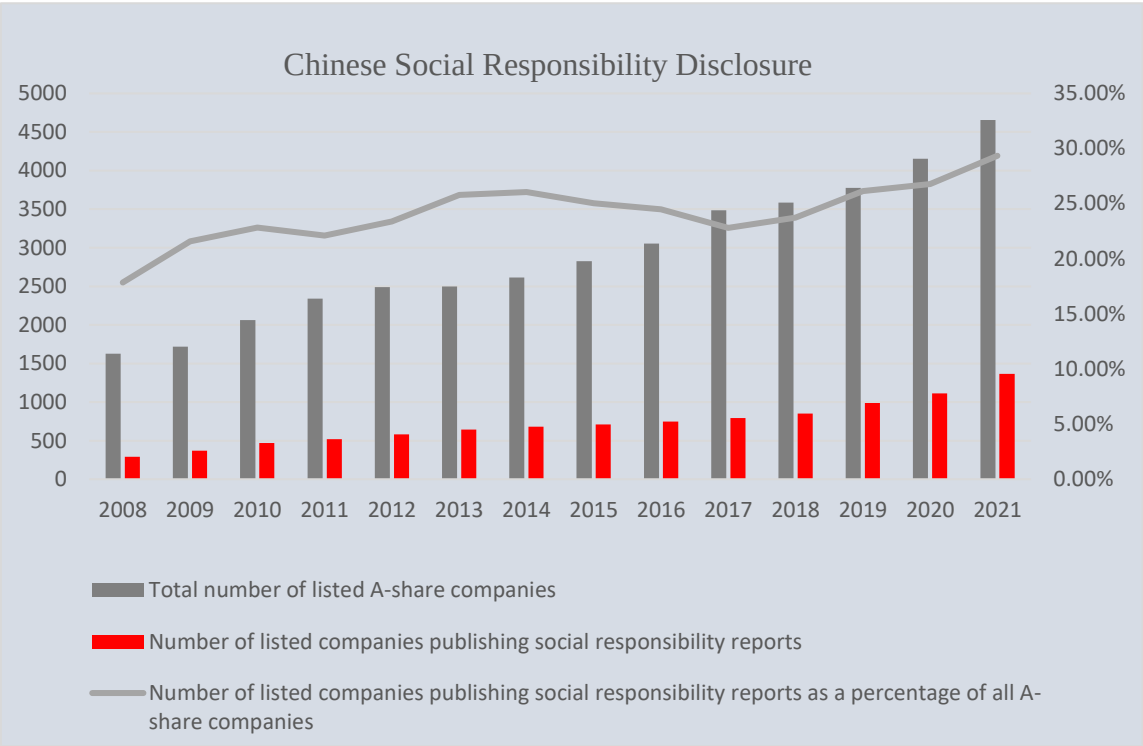


Figure 1.1: Chinese Social Responsibility Disclosure (Data source: R&L Global Database)

On December 31, 2008, the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE) issued a notice encouraging the inclusion of exemplary work in listed companies' annual statements for 2008. From 2008 to 2021, the number of Chinese listed firms that provided social responsibility information increased from 290 to 1,366, showing a consistent upward trend. As the volume of social responsibility disclosures grew, the reporting method of disclosure shifted from voluntary to mandatory. The SZSE mandates that companies in the SZSE 100 Index disclose social responsibility reports, while the SSE requires corporate governance boards, overseas-listed foreign shares, and financial listed

companies to disclose these reports and encourages voluntary disclosure by other listed firms. This trend has drawn attention from regulators, mediators, and stakeholders alike.

Corporate social responsibility disclosure is crucial for reducing information asymmetry and improving transparency. First, it enhances information transparency, as CSR disclosure improves financial transparency in a mandated disclosure environment (Nair et al., 2019). CSR disclosure helps reduce information asymmetry and increase corporate ESG action transparency (Hamrouni et al., 2019). The readability and tone of CSR disclosure reports are also important for conveying future CSR disclosure quality and providing the market with valuable information (Du & Yu, 2021). Second, CSR disclosure strengthens stakeholder relationships. For example, robust CSR disclosure policy can be crucial in retaining stakeholder support and protecting shareholder value during financial uncertainty, such as that caused by the COVID-19 pandemic (Gao et al., 2016; Lu et al., 2024). In addition, disclosure of corporate social responsibility affects investor trust. In the absence of guaranteed transparency, firms are often more motivated to engage in CSR disclosure as a means of enhancing their ethical image and societal legitimacy (Stuart et al., 2021).

However, corporate social responsibility disclosure (CSR/D) can also have drawbacks. Sopian et al. (2018) found that corporate social responsibility disclosure does not affect firm value. Mandatory CSR/D can negatively impact profitability and shareholder value (T. Lu et al., 2021). Additionally, CSR/D may harm operational and market performance, though it does not affect financial performance (Buallay et al., 2020). The relationship between share price and CSR disclosure deteriorated sharply when companies moved from voluntary to mandatory reporting (Mittelbach-Hörmanseder et al., 2021). Impression management perceptions suggest that CSR disclosure can be biased, primarily aimed at enhancing corporate image (Cho et al., 2015). Michelon et al. (2016) argue that

managers may use impression management to manipulate public opinion by exaggerating CSRD performance to improve its credibility. Based on the study of Cho et al. (2015), if CSRD is primarily motivated by opportunism, then increased disclosure might not correlate with, or could even negatively impact, the accuracy of analyst forecasts. In China, since the China Securities Regulatory Commission (CSRC) mandated public disclosure of social responsibility information in 2008, firms in polluting industries often report lower capital expenditures and market values, with unsatisfactory financial performance. This trend may reflect the increased spending these firms have had to allocate to corporate social responsibility disclosure, such as environmental protection, in response to public and investor expectations. This additional expenditure can negatively affect the firms financial health, subsequently impacting its capital expenditure and market value (Jensen, 1986; Myers, 1984).

Furthermore, in the real economy, information does not flow freely among investors and firms (Bakke & Whited, 2010). Implementing a monitoring system has become crucial to address potential issues like greenwashing in CSR disclosure activities and enhance the transparency, accuracy, and credibility of CSR disclosures. Financial analysts play a crucial role by generating and communicating firm-specific information through their access to timely data, private knowledge, and analytical skills. As a result, they are seen as helping to reduce information asymmetry between corporate insiders (management) and outsiders (investors) (Frankel & Li, 2004). Financial analysts serve as intermediaries in capital markets, bridging significant gaps in expertise between corporations and investors. Previous literature highlights that financial analysts are crucial for ensuring effective capital allocation, enhancing market liquidity, and building investor trust through their valuation and monitoring activities (Beyer et al., 2010).

Corporate social responsibility disclosure provides financial analysts with valuable non-financial information, which enhances their information environment. As a result, financial analysts are likely to recommend stocks from companies with high CSR performance (Wan-Hussin et al., 2021). However, analysts often face career conflicts as they must balance the demands of managers, fund managers, and peers. Their role as expert critics depends mainly on management approval, but they are occasionally compelled to challenge management decisions. Financial analysts manage role conflicts by maintaining a clear separation between their roles and carefully preparing to meet the expectations of their various audiences. They rely on both fund managers (recipients of their advice) and managers (those being reviewed) to uphold their position as expert critics (Graaf, 2018). This raises a critical question: can financial analyst forecasts maintain objectivity and impartiality while using social responsibility information and effectively perform their role as monitors? In fact, since the implementation of China CSR disclosure laws in 2008, stock prices have become less indicative of actual company value, while the information gap between investors and managers has widened significantly. This issue is particularly pronounced among firms mandated to provide CSR data rather than those voluntarily disclosing such information (Guo et al., 2022).

1.2 Problem Statement

In the actual investment process, corporate investment decision-makers often deviate from optimal choices due to various influences, leading to inefficient capital allocation, either through excessive spending on low-yield projects or overly cautious investment strategies that miss growth opportunities. Inefficient investment decisions deplete resources, erode shareholder value, and may trigger financial instability, including sharp declines in stock prices (Habib & Hasan, 2017). As firms navigate complex investment environments,

corporate transparency and governance mechanisms play a critical role in enhancing investment efficiency. Corporate social responsibility disclosure has gained increasing attention as a tool to improve investment efficiency. However, since 2008, China has implemented mandatory corporate social responsibility disclosure, requiring listed firms to disclose standardized CSR information. The implementation of mandatory CSR disclosure policies was aimed at increasing corporate transparency and enhancing investor confidence (Jiang et al., 2022; Kühn et al., 2014). However, many firms comply with the disclosure requirements only at a superficial level, leading to boilerplate disclosures that lack substantive information (Chen & Zeng, 2014). Furthermore, firms may adjust their reporting practices to meet regulatory requirements, but over time, they may revert to superficial compliance if CSR disclosure is perceived merely as a legal obligation rather than an integral governance practice. While CSR disclosure is intended to improve market transparency, not all disclosures provide equal informational value (Hess, 2019). Some firms engage in low-quality CSR disclosure practices, where information is vague, repetitive, or lacks material depth, reducing its decision usefulness (Zhou 2022). The effectiveness of CSR disclosure in enhancing investment efficiency is therefore contingent upon the credibility and transparency of the disclosed information (Martínez-Ferrero et al., 2021).

Existing studies on corporate social responsibility disclosure have primarily focused on either mandatory CSR disclosure or CSR disclosure and CSR disclosure quality as separate dimensions. However, these studies fail to provide a comprehensive and systematic understanding of how different forms of CSR disclosure influence investment efficiency over time. Specifically, mandatory CSR disclosure is mainly policy-driven and short-term, Lee (2020) finds a positive relationship between mandatory CSR disclosure and improved corporate investment efficiency by analyzing data from emerging Asian markets. In contrast,

Liu and Tian (2021) use a quasi-natural experiment to assess how mandatory CSR disclosure regulations enhance investment efficiency, particularly in addressing issues related to over-investment, comparing firms with and without such requirements in China.

In contrast, CSR disclosure and CSR disclosure quality reflect firms' long-term commitment to transparency and sustainable practices, which may have lasting implications for investment efficiency beyond the initial policy enforcement period. For example, Zhong and Gao (2017) found that social responsibility disclosure improves corporate investment efficiency using a sample of Chinese-listed companies from 2010 to 2013. Huang et al. (2023) demonstrated that CSR disclosure can enhance investment efficiency by reducing information asymmetry and agency costs, based on a sample of Chinese listed firms from 2010 to 2019. Higher CSR performance helps prevent underinvestment and overinvestment, significantly boosting investment efficiency (Cook et al., 2019). Guo et al. (2024) considered that the quality of CSR can mitigate the inefficient investment of firms. Furthermore, in addition to the positive impacts of CSR on investment efficiency, some literature highlights a differential effect. For instance, Firmansyah and Triastie (2020) found that CSR disclosure did not affect investment efficiency in a sample of 43 industrial companies listed on the Indonesian Stock Exchange between 2014 and 2017. A study across selected Brazil, Russia, India, China, and South Africa (BRICS) countries shows that CSR disclosure can increase communication costs, which may decrease corporate investment efficiency (Gupta & Das, 2024). Firms with high levels of CSR participation may be prone to overinvestment (Lin et al., 2021). Additionally, CSR disclosure can reduce the influence of family ownership on investment efficiency (Erawati et al., 2021).

Furthermore, the underlying transmission mechanisms through which CSR disclosure affects investment efficiency remain underexplored. Financial analysts play a

critical part in corporate governance by serving as external monitors. Their monitoring responsibilities include overseeing surplus management (Paiva et al., 2019), non-generally accepted accounting principles reporting (Christensen et al., 2021), environmental and social transparency, investment efficiency (Zadeh et al., 2021), accounting decisions (Ayres et al., 2019), and the green transformation of the manufacturing industry (Leng & Hu, 2024). In addition, financial analysts serve as information intermediaries between firms and investors, providing reports that combine on-site inspections with expert knowledge. Hou et al. (2020) demonstrate that financial analyst forecasts significantly influence stock returns through their intermediary role. However, whether financial analyst forecasts mediate the relationship between CSR disclosure and investment efficiency, and whether this mediation effect differs among mandatory CSR disclosure, CSR disclosure, and CSR disclosure quality, remains an open question. To address this research gap, this study investigates the mediating role of financial analyst forecasts in the relationship between CSR disclosure and investment efficiency, thereby providing a more nuanced and mechanism-driven analysis of how CSR disclosure influences corporate investment behavior.

1.3 General Research Objective

The general objective of this research is to investigate whether financial analyst forecasts mediate the relationship between social responsibility disclosure and investment efficiency from the perspective of the short-term and long-term effects of the implementation of compulsory policies. The study focuses on Chinese-listed companies.

1.3.1 Specific Objectives

- i. To examine the mediating effect of financial analyst forecasts on the relationship between mandatory corporate social responsibility disclosure and investment efficiency.

- ii. To investigate the mediating role of financial analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency.
- iii. To determine the mediating effect of financial analyst forecasts on the relationship between corporate social responsibility disclosure quality and investment efficiency.

1.4 Research Questions

The research objectives serve as the foundation for the research question. The research questions of the study are:

- i. Does mandatory corporate social responsibility disclosure affect investment efficiency through financial analyst forecasts?
- ii. Does corporate social responsibility disclosure affect investment efficiency through financial analyst forecasts?
- iii. Does corporate social responsibility disclosure quality affect investment efficiency through financial analyst forecasts?

1.5 Significance of the Study

The importance of this study can be justified by three key aspects. First, this research addresses a critical gap in understanding the transmission mechanisms through which corporate social responsibility disclosure influences investment efficiency. Second, it advances theoretical perspectives by integrating financial analyst forecasts as information intermediaries on the relationship between CSR disclosure and investment efficiency.

Finally, the study provides practical and policy-relevant insights for firms, investors, and regulators regarding the long-term effectiveness of mandatory CSR disclosure policies.

Existing research on CSR disclosure has primarily focused on its impact on investment efficiency but has not systematically examined the distinct dimensions of CSR disclosure, including mandatory CSR disclosure (MCSR), CSR disclosure (CSR), and CSR disclosure quality (CSRQ), or how these factors influence investment efficiency through financial analyst forecasts. While mandatory CSR disclosure is policy-driven and focuses on short-term compliance, CSR disclosure and CSR disclosure quality reflect a firm long-term commitment to transparency and corporate sustainability (Avotra et al., 2021; Caputo et al., 2021). Prior research has demonstrated mixed findings regarding the direct effects of CSR disclosure on investment efficiency. Some studies indicate that CSR enhances investment efficiency by reducing information asymmetry and aligning firms' long-term strategies with stakeholder expectations (Huang et al., 2023; Zamir et al., 2022). Others suggest that excessive CSR engagement may lead to overinvestment, particularly when firms prioritize social responsibility at the expense of financial performance (Lin et al., 2021). However, the role of financial analyst forecasts as mediators in this relationship remains underexplored.

This study contributes to theoretical development by integrating financial analysts as key intermediaries within the relationship between corporate social responsibility disclosure and investment efficiency. Financial analyst forecasts play a crucial role as external monitors and information intermediaries in capital markets, influencing corporate investment decisions by interpreting CSR disclosure (Tsang et al., 2024). By investigating whether financial analyst forecasts mediate the effects of different forms of CSR disclosure on investment efficiency, this study extends the application of information asymmetry theory,

signaling theory, stakeholder theory, and reputation theory to explain how CSR disclosures influence financial decision-making (Gao et al., 2023; Kouaib & Amara, 2022). The research also evaluates whether mandatory CSR disclosure policies remain effective over time or whether firms revert to symbolic compliance, limiting the long-term benefits of CSR disclosure.

From a practical and policy perspective, this study offers insights for corporate executives, investors, and policymakers regarding the long-term economic impact of CSR disclosure. The findings can help regulatory bodies assess whether mandatory CSR disclosure requirements need further refinement to ensure meaningful transparency rather than reporting driven solely by compliance. Investors and analysts can also use the insights from this study to better assess firms' long-term sustainability and investment potential.

By systematically analyzing the mediating role of financial analyst forecasts on the relationship between different forms of CSR disclosure and investment efficiency, this research contributes to both academic literature and practical decision-making. It bridges the gap between regulatory requirements, market transparency, and investment performance, offering a more comprehensive understanding of the economic consequences of CSR disclosure.

1.6 Definition of Terms

Table 1.1: Key Terms

Keyword(s)	Definition
Investment Efficiency	Investment efficiency refers to a firm's ability to allocate financial resources optimally, aiming to maximize returns while minimizing waste and misallocation. It is a key determinant of firm value, economic growth, and financial market stability. Efficient investment ensures that capital is directed toward projects with positive net present value (NPV), whereas inefficient investment results in either overinvestment or underinvestment. This study adopts the approach developed by Richardson (2006), who proposed a micro-level investment model for regression analysis and used the residuals from the model to measure investment inefficiency. Specifically, the absolute value of the residual term is multiplied by -1 to construct a proxy for investment efficiency. A larger value indicates higher investment efficiency.
Financial Analyst Forecast	This study uses financial analyst forecast accuracy as a proxy variable. Financial analyst forecast accuracy refers to the extent to which financial analyst's earnings forecasts align with the actual reported earnings of a company. It is measured as the absolute difference between the forecasted and actual earnings per share (EPS), multiplied by -1 , and then scaled by the stock price at the beginning of the fiscal year. A higher value indicates greater forecast accuracy.
Mandatory Corporate Social Responsibility Disclosure	In December 2008, the Shanghai and Shenzhen Stock Exchanges both issued the "Notice on the Preparation of 2008 Annual Reports for Listed Companies", requiring certain listed companies to include corporate social responsibility reports in their annual report requirements. This study uses an interaction term, $Treat \times Period$, to represent the effect of mandatory social responsibility disclosure. The Period variable is a dummy variable, with a value of 0 for the years before and including the CSR report mandatory disclosure (2006–2007) and 1 for the post-implementation period (2008–2011). The Treat variable is a 0-1 dummy variable, where 1 indicates firms that are required to make mandatory disclosure and 0 otherwise.
Corporate Social Responsibility Disclosure	CSR is a binary variable that captures whether a company discloses corporate social responsibility (CSR) information. It takes the value of 1 if the enterprise provides mandatory social responsibility reporting from 2008 onward and 0 otherwise. Firms that voluntarily disclose social responsibility information are not considered.

Table 1.1 continued

Corporate Social Responsibility Disclosure Quality	CSR reporting quality was evaluated based on data collected from companies' CSR reports, using the Social Responsibility Research Sub-database of the China Stock Market and Accounting Research (CSMAR) database. The guidelines provide an internationally recognized framework for CSR disclosure, which is comprehensive and covers all disclosure aspects such as employees' welfare, environmental protection, workplace safety, supplier protection, shareholder protection, customer protection, creditor protection, and the construction of the CSR system. The 8 aspects of social responsibility in the CSMAR social responsibility research sub-base were selected as the criteria for measuring the quality of CSR information. Each aspect was assigned a value of 1 if disclosed and 0 if not disclosed.
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1.7 Scope of Research

The goal of this study is to examine the mediating role of financial analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency among listed companies in China. Data are collected from the China Stock Market Accounting Research Database during the study period. The focus areas of this research include corporate social responsibility disclosure, financial analyst forecasts of Chinese listed companies, the impact of corporate social responsibility information on investment efficiency, and the mediating role of financial analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency.

1.8 Organization of the Research

This study is structured into five chapters. Chapter 2 reviews relevant literature on corporate social responsibility (CSR) disclosure, financial analyst forecasts, and investment efficiency. Through a comprehensive literature review, this chapter compares and contrasts

the findings of previous studies, and identifies key research gaps and questions that inform the data selection and methodological approach of this study. Chapter 3, which constitutes the core of this research, outlines the research design and methodology employed, including variable definitions, data sources, and empirical models. Chapter 4 presents the empirical findings, detailing the entire analytical process—from data collection and model estimation to robustness checks and validation. This chapter also includes a thorough discussion of the results in relation to the theoretical framework and existing literature. Chapter 5, the concluding chapter, summarizes the main findings of the study, offers theoretical and practical implications, and provides recommendations for future research, emphasizing the significance of the research outcomes.

1.9 Summary

Overall, using a selection of Chinese A-share listed enterprises, this chapter seeks to determine how financial analyst forecasts affect corporate social responsibility disclosure and investment efficiency. It begins by briefly examining the role of financial analyst forecasts in mediating the relationship between social responsibility disclosure and investment efficiency.

Information plays a crucial role in capital markets. The party with more information often has an advantage in the market. In the investment process, enterprises need not only financial information but also non-financial information. As non-financial information, corporate social responsibility disclosure is crucial for developing firms in the capital market. China began implementing mandatory social responsibility disclosure policies in 2008. As of 2022, 1,476 Chinese listed companies are disclosing social responsibility information; however, the extent of this disclosure remains limited. Since the implementation of the mandatory disclosure policy, it has been confirmed that this policy has enhanced corporate

investment efficiency. In the long term, while studies confirm that corporate social responsibility disclosure can improve investment efficiency, none have identified the specific impact pathways through which CSR disclosure enhances investment efficiency. Additionally, although corporate social responsibility disclosure is intended to increase transparency in the capital market, research has shown that the motivations behind corporate financial disclosures may not always be genuine or effective. This raises questions about the actual effectiveness of CSR disclosure policies.

Theoretically, corporate social responsibility (CSR) disclosure may sometimes be used to obscure significant issues, necessitating the role of financial analyst forecasts to address these concerns. Even if investors have access to information from other sources, financial analyst forecasts remain a potentially crucial source of insight (Salzedo et al., 2018).

Analysts' proactive role can enhance the quality of information available to investors, addressing concerns about their rigor and independence. By playing a supervisory role, financial analyst forecasts improve corporate information transparency, which in turn enhances investment efficiency. Financial analyst forecasts serve as a key intermediary in this process.

CHAPTER 2

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

The main content of this section is to introduce relevant theories, research bases, and research hypotheses about corporate social responsibility (CSR) disclosure, analyst forecasts, and investment efficiency. The foundational theories are information asymmetry theory, reputation mechanism theory, signaling theory, and stakeholder theory. This chapter is essential as it provides the conceptual foundation for shaping the research and serves as the basis for analyzing and discussing the research findings in subsequent sections.

2.2 Theoretical Basis

2.2.1 Reputation Mechanism Theory

Reputation is the image and credibility of an organization or individual in society, reflecting the level of trust and respect that others have for it. Reputation is usually based on past behavior and performance and impacts future behavior (Grund, 1996). In today's globalized business climate, a company's reputation has become one of the important components in its long-term success and sustainable competitive advantage. Reputation is not only an intangible asset (Roberts & Dowling, 2002) but also a crucial aspect in determining consumer trust and loyalty to a firm (Grund, 1996; Ilias et al., 2017; Lins et al., 2010; Roberts & Dowling, 2002). Social responsibility disclosure, as a means by which a company communicates its social responsibility practice, directly impacts the company's reputation and the public's perception of it. In this context, financial analyst forecasts play a crucial role in shaping the perception of a company's reputation.

According to reputation theory, companies can build a good reputation through positive corporate social responsibility disclosure. Stakeholders frequently view CSR disclosure as an impression management tool, which has a detrimental impact on business reputation (Miras-Rodríguez et al., 2020). Meanwhile, Jeffrey et al. (2019) point out that a company's socially conscious actions can positively impact a company's reputation. Corporate social responsibility disclosure is one of the most important ways for businesses to convey their social responsibility policies to the outside world. A good reputation may boost the trust and recognition of the firm among investors, affecting their investment decisions (Bottazzi et al., 2016; Dollinger et al., 1997).

Financial analyst forecasts are an important reference point for investors when assessing the future performance and value of a company. For example, Brown and Rozeff (1978) find that financial analyst forecasts are frequently seen as a reliable predictor of a company's future success. When making investment decisions, investors often rely on financial analyst forecasts. Analysts' external scrutiny incentivizes corporations to improve their corporate social responsibility disclosure (Hinze & Sump, 2019). Corporate social responsibility disclosure is valuable and can affect both investor and analyst decisions. The content of CSR disclosure contributes to the accuracy of financial analyst forecasts, and this link becomes more prominent as more substance is provided in CSR reports (Muslu et al., 2019). When financial analyst forecasts are more accurate and their predictions closer to actual performance, investors have greater confidence in both the analysts and the companies they recommend. This confidence translates into recognition of the company's reputation, which in turn enhances the company's standing. On the other hand, highly accurate financial analyst forecasts can improve the market transparency and information efficiency of a

company, increasing investors' knowledge and trust in the company and thus improving its reputation (Zhang et al., 2021).

2.2.2 Stakeholder Theory

The stakeholder theory states that business activities affect the interests of multiple stakeholders, not just shareholders. These stakeholders include, but are not limited to, employees, customers, suppliers, the public, the government, and the environment. According to Freeman (2010), businesses should be responsible for the interests of diverse stakeholders to achieve long-term sustainable development rather than merely focusing on making profits. Meanwhile, according to stakeholder theory, corporations should balance the interests of all parties rather than pursuing one party's goals unilaterally. The enterprise's actions and conduct should meet the interests of all stakeholders to the greatest extent practicable while avoiding severe harm to the interests of any single party. This theory emphasizes that organizations' management and decision-making processes should consider the interests of all parties, not just shareholders (Clarkson, 1995).

Furthermore, stakeholder theory highlights the importance of corporate social responsibility disclosure in business, asserting that corporations should accept responsibility for society and the environment and contribute positively whenever feasible (Freeman, 2010). By doing so, an organization can improve its reputation and competitive edge, gain the confidence and support of its stakeholders, and strengthen its social responsibility. Companies can increase their long-term value by actively engaging in corporate social responsibility activities. For instance, corporate social responsibility disclosure creates long-term benefits (Kramer & Porter, 2006; McWilliams & Siegel, 2001; Nguyen et al., 2020), including reduced environmental impact (Ahmad et al., 2021; Kraus et al., 2020), and improved customer satisfaction (Ali et al., 2020). In the long run, these activities help

organizations gain the trust and support of investors. This confidence and support not only boost an enterprise's share price (Annamalah et al., 2019; Qiu et al., 2020) and market value (H. Lu et al., 2021) but also helps to minimize financing costs (Meng & Yin, 2019) and generate long-term value for shareholders (Schoenmaker & Schramade, 2019).

According to stakeholder theory, corporations are expected to be transparent and communicate efficiently with all stakeholders (Donaldson & Preston, 1995). Financial analyst forecasts play a critical role in this process. By exposing information to the market, including financial reports (Barniv et al., 2005) and sustainability reports (Bernardi & Stark, 2018; Ferrer et al., 2020; Hertl & Maniora, 2024; Pizzi et al., 2024), corporations provide analysts with adequate data and sources of information to help them make accurate projections and evaluations (Wang, 2016).

Financial analysts generally consider a company's social responsibility performance in their projections and judgments (Dhaliwal et al., 2012; Muslu et al., 2019). If a firm excels in corporate social responsibility, such as actively participating in charitable activities and environmental protection, financial analyst forecasts tend to be more accurate and optimistic, reflecting confidence in the company's future success (Dhaliwal et al., 2011). Conversely, analysts may adjust their forecasts if a company has social responsibility issues. When financial analyst forecasts view corporate social responsibility disclosure as an agency cost, they tend to offer bearish recommendations for companies with high CSR scores. However, as the focus on stakeholders increases, analysts' perspectives on corporate social responsibility disclosure shift, leading to tremendous enthusiasm for these organizations. Senior analysts are typically the first to adjust the relationship between corporate social responsibility disclosure ratings and optimism in investment recommendations (Ioannou & Serafeim, 2015).

Financial analysts' estimates and opinions directly impact investors' actions. On the one hand, high forecast quality is associated with increased investment if a business is more prone to under-invest and decreased investment if the firm is more likely to over-invest, suggesting that financial analyst forecast quality enhances firm-level investment efficiency (Chen et al., 2017). On the other hand, investor sentiment reacts more strongly to upgrade announcements than to downgrade ones, indicating that financial analyst forecast reports provide valuable trading signals to uninformed investors (Kim et al., 2019). Consequently, investors tend to view professional financial analyst forecast opinions as one of the most critical sources of information for making investment decisions, which in turn influences stock price volatility and corporate financing costs.

While stakeholder theory provides a useful framework for understanding corporate social responsibility (CSR) disclosure, it has certain limitations in explaining the role of financial analysts as intermediaries on the relationship between CSR disclosure and investment performance. Specifically, it does not sufficiently account for factors such as financial analysts' behavioral biases, information acquisition costs, market uncertainty, and investor demand—all of which can influence the extent to which analysts engage with CSR disclosure and assess their implications for investment efficiency.

2.2.3 Information Asymmetry Theory

One of the key theories in game theory and economics is information asymmetry theory, which examines the issues and consequences arising from unequal access to information among participants in a transaction. Akerlof (1970) uses the example of second-hand cars to illustrate how the seller typically knows more about the quality of the product than the buyer. This disparity in knowledge leads to buyer uncertainty about the product's quality, resulting in a lower market price for high-quality products and allowing

low-quality products to dominate the market. This example laid the groundwork for the subsequent theory of information asymmetry. The mechanism of information asymmetry consists primarily of two components: hidden information and concealed actions. Hidden information refers to a situation where one party possesses knowledge about a product or transaction that the other does not. Concealed action refers to when one party takes covert actions during a transaction, making it impossible for the other party to know the truth. These processes lead to variations in access to and use of information among transaction parties, affecting the market's regular operation.

Information asymmetry directly affects the formation and development of investment efficiency. For example, Grossman and Stiglitz (1980) argue that information asymmetry in the market means that various market participants possess different levels of information. Some participants may have more information, while others may lack critical details. This disparity can lead to market anomalies, volatility, and incomplete reactions, ultimately reducing market efficacy and investment efficiency.

The information transfer from the corporation to its stakeholders is the foundation of the linkage flow, which often involves a conflict of interest when two parties simultaneously do not have access to the same information. This disparity can lead to inefficient investing, as different investors may react based on the varying knowledge and expectations they possess (Marcel et al., 2010). When managers have more information about the firm's value than the rest of the market, the market may penalize the issuance of instruments (such as equity) whose projected payoffs are closely tied to the assessment of that value (Myers & Majluf, 1984). According to Healy and Palepu (2001), information flow cannot be separated from information intermediation.

Financial analysts play a crucial role as information intermediaries in capital markets. Chen et al. (2017) point out high-quality public information enhances analysts' ability to generate distinctive insights. In modern capital markets, analysts who gather information to develop superior earnings estimates may gain a competitive advantage in issuing reliable stock recommendations (Loh & Mian, 2006). Financial analysts' research reports and forecasts may contain non-public insights that are unavailable to investors, influencing investor behavior and affecting the market. For instance, analysts' capital expenditure projections provide essential information to both managers and investors about a company's development potential, which can promote informed investment decisions (Choi et al., 2020).

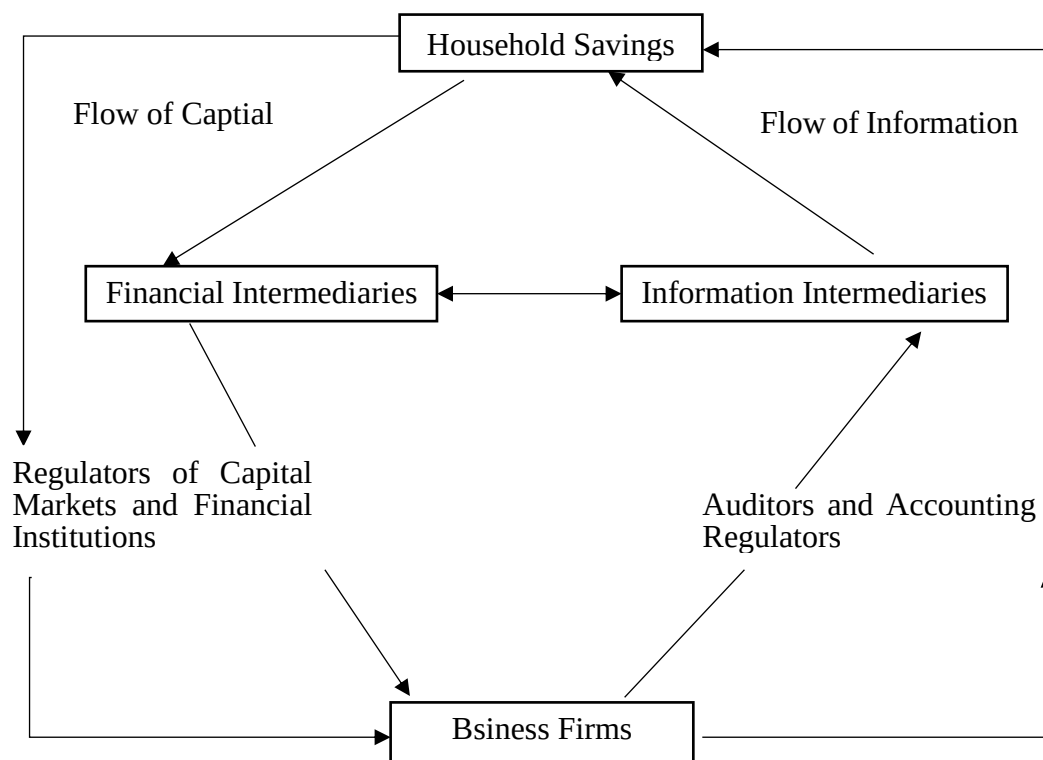


Figure 2.1: Financial and Information Flows in a Capital Market Economy (Healy & Palepu, 2001)

The information asymmetry theory explains the existence of information disparities in the stock market, which complicates the establishment of investment efficiency and market stability. Figure 2.1 illustrates the flow of capital and information within an economic system. Financial analyst forecasts act as information intermediaries, addressing imperfect information by providing investors with estimates and recommendations on future company performance (Belnap, 2023; Drake et al., 2017; Xia et al., 2023). Financial analysts may possess relatively complete knowledge, including information on social responsibility. Muslu et al. (2019) find that firms with high CSR disclosure scores tend to have more accurate estimates, whereas firms with low CSR disclosure scores are no more precise than those that do not disclose CSR reports. The accuracy and reliability of financial analyst forecasts significantly influence the development of investment efficiency. However, the information asymmetry argument often overlooks the speed and breadth of information transmission.

2.2.4 Signaling Theory

Signaling theory was first introduced with a hypothetical example to explain how signals affect choices in the job market. Employers cannot directly observe job seekers' talents during the recruiting process; thus, job seekers can use specific signals to convey information about their potential abilities to employers, thereby increasing their chances of being hired. According to signaling theory, skilled job seekers might choose to transmit visible signals to employers, such as strong academic credentials or professional certifications. These signals do not directly represent skill but can indirectly communicate information about prospective abilities, thereby enhancing the likelihood of being employed (Spence, 1973).

In the stock market, corporate social responsibility disclosure may be a signal conveying information about a company's social responsibility performance (Cho et al., 2013). The aspects covered in CSR disclosure are not consistently defined across various studies. For example, one study defines corporate social responsibility disclosure as encompassing environmental, social, and governance factors (Arouri et al., 2019). Zhang (2024) argues that the evaluation criteria for corporate social responsibility disclosure include shareholders, creditors, workers, consumers, suppliers, government, society, and environmental preservation. Investors may view this information as reflecting the company's principles and business philosophy, which can influence their expectations and assessments of its future success.

Corporate social responsibility disclosure serves as a signal in the capital market, and investors must evaluate the credibility and accuracy of these disclosures when they are received. Previous studies on the influence of corporate social responsibility disclosure on investment offer two contrasting viewpoints. One perspective holds that corporate social responsibility disclosure is transparent and reliable, with some research suggesting that such disclosures improve investment efficiency (Cook et al., 2019; Lin et al., 2021). The other viewpoint argues that corporate social responsibility disclosure may increase a company's commercial risks, such as reputational harm from environmental lawsuits or negative public opinion (Barnett, 2007). Corporate social responsibility programs might also conflict with shareholders' interests, leading to investor skepticism regarding corporate management decisions (Beltratti & Stulz, 2012). Consequently, investors may be skeptical about the accuracy or reliability of this information and may either disregard it or scrutinize it more closely.

Financial analysts play a vital role in the stock market by providing investors with projections and assessments of a company's future performance through extensive corporate research and analysis (Gu et al., 2019; Hollie et al., 2017). Meanwhile, an increasing number of investors recognize that a company's social responsibility performance is not only a moral requirement but also has a significant impact on the company's long-term viability and profitability (ElAlfy et al., 2020; Fontaine, 2013; Hou, 2019).

Examining this topic makes it challenging for a single theory to fully explain the relationship between factors. Employing multiple theories can help analyze the problem from different perspectives, leading to a more comprehensive understanding.

2.3 Chinese Institutional Background

With the acceleration of globalization, corporate social responsibility disclosure has become a key indicator of corporate transparency and accountability worldwide (Kaymak & Bektas, 2017; Nair et al., 2019). The Global Reporting Initiative (GRI) and the International Integrated Reporting Committee (IIRC) have developed frameworks to guide firms in disclosing their social responsibility reports to a variety of stakeholders. The GRI is one of the most well-known guidelines for sustainability reporting. The Global Sustainability Standards Board enhances GRI Standards by requiring enterprises to publicly report their business actions and demonstrate their potential to advance sustainable development (Bosetti, 2022). Since its reform and opening up in 1978, China's economy has expanded rapidly to become the second-largest in the world. However, this growth has come at a significant environmental and social cost, including issues such as widespread pollution, resource depletion, and increasing concerns about corporate responsibility (Geng & Doberstein, 2008). As a result, corporate social responsibility disclosure has become an important means for companies to demonstrate their responsibility and enhance corporate reputation.

The Chinese government attaches great importance to corporate social responsibility disclosure. According to the study by Wang (2020), China corporate social responsibility disclosure has gone through four stages:

2.3.1 Starting Stage (2001-2004)

At this stage, Chinese policies and regulations on social responsibility were relatively scattered, mainly reflected in some basic corporate laws and regulations, and the requirements for social responsibility were not clear. During this period, the concept of corporate social responsibility in China was just beginning, and society awareness and requirements for it were not high. CSR disclosure largely followed a voluntary approach, lacking standardized policy guidance or enforceable regulatory mechanisms. A series of high-profile incidents—including coal mine disasters, the Sanlu milk powder scandal, and the moldy mooncake case—exposed serious deficiencies in corporate accountability and heightened public concern over the state of CSR among Chinese enterprises. These events underscored the inadequacy of the existing CSR system and highlighted the urgent need for stronger regulatory oversight and clearer disclosure requirements.

2.3.2 Hovering Stage (2005-2007)

In 2006, China issued the "Corporate Social Responsibility Guidelines", marking the beginning of a rapid development stage for China's policies and regulations on corporate social responsibility disclosure. During this stage, the Chinese government gradually introduced a series of policies and guidelines to encourage and guide companies in disclosing social responsibility information. At this point, only a handful of companies, such as Haier and Midea, paid attention to corporate social responsibility. While these companies created wealth and pursued profit maximization, they also assumed social responsibilities to

employees, consumers, communities, and the environment (*Hong, 2018*). During this period, the level of social responsibility fulfillment by Chinese enterprises was not high, and the level of awareness was far lower than that of developed western countries (*Yang, 2005*). CSR disclosure during this period was largely voluntary, fragmented, and characterized by low quality and limited standardization (*Li, 2004*).

2.3.3 Spurring Stage (2008-2012)

As society attaches greater importance to corporate social responsibility disclosure, the Chinese government began to issue guiding documents and policy recommendations to promote greater transparency in CSR practices. In 2008, the China Securities Regulatory Commission issued the "Guidelines on Social Responsibility of Listed Companies." This was a milestone event in developing social responsibility information disclosure in China. Our country has officially entered an era of combining mandatory disclosure and voluntary disclosure of corporate social responsibility information. At this stage, the number of corporate social responsibility reports published in our country has increased rapidly, and considerable progress has been made in both theory and practice. At this stage, many businesses release corporate social responsibility reports; however, they are often vague and complicated. Some companies overemphasize important areas directly relevant to their company while ignoring other corporate social responsibility disclosure issues. For instance, China Southern Power Grid's 2008 report overemphasized the southern snow calamity and neglected other corporate social responsibility disclosure areas. Thus, Chinese enterprises lack a basic understanding of corporate social responsibility disclosure drafting rules (*Noronha et al., 2013*).

2.3.4 Improving Stage (2013-now)

Since 2013, China's policies and regulations on social responsibility information disclosure have become increasingly comprehensive and institutionalized. The government has not only increased the requirements for corporate social responsibility disclosure but also promoted the establishment of relevant standards and evaluation systems to improve the quality and effectiveness of information disclosure. At this stage, policies and regulations are more detailed and specific, covering a wider range of enterprises and industries, and the standards and requirements for information disclosure are more stringent.

2.4 Investment Efficiency

Investment, as a resource allocation mechanism, aims to maximize a firm's market value by selecting suitable projects. According to neoclassical theory, market transactions in a perfect market are frictionless. In such an environment, as long as capital gains exceed capital expenses, the investment is considered profitable and enhances the enterprise's worth (Modigliani & Miller, 1958). Markowitz (1952) proposed that portfolio selection should incorporate not only the optimization of expected returns but also the risk associated with the portfolio.

Investment efficiency is a critical factor in business success, impacting the efficient allocation of resources (Hovakimian, 2011), risk management (Al - Hadi et al., 2017), and innovation capacity (Rehman et al., 2024). Enterprises must continuously evaluate and optimize their investment decision-making processes to ensure long-term success and sustainability. However, in actual capital markets, no market is perfectly frictionless. For example, high transaction costs can reduce investment returns, and disparities in information among market participants can lead to inefficient resource allocation. Investors with superior

information might exploit their advantage, while those with less information may withdraw from the market, thereby diminishing overall market efficiency.

The efficiency of business investment can be assessed in various ways. Fazzari et al. (1988) explore the relationship between corporate investment and cash flow, introducing the investment-cash flow model. This financial theoretical model analyzes business investment behavior, particularly when financing constraints are considered. The model posits that a firm's investment decisions are influenced not only by the potential returns of a project but also by the firm's internal cash flows. This theoretical framework contrasts with traditional neoclassical investment theory, which asserts that a firm's investment decisions are based solely on the investment opportunity itself, irrespective of the financing method. The investment cash flow model was primarily developed to address a real-world phenomenon: firms facing financing constraints often rely on internally generated cash flows for investments. This reliance means that even when profitable investment opportunities are available, firms may be unable to pursue them if they cannot secure the necessary funds through internal cash flows or external financing. The model thus underscores the influence of financing constraints on firms' investment behavior, particularly for smaller and growing firms with limited access to external capital markets.

In empirical research, the investment cash flow sensitivity model is typically validated by examining the relationship between a firm's investment expenditures and cash flows. A positive correlation between investment expenditures and cash flows, particularly in firms perceived to face significant financing constraints, supports the investment cash flow model. This correlation implies that an increase (or decrease) in cash flow directly leads to a corresponding increase (or decrease) in investment spending, highlighting the critical role of internal financing.

While the investment cash flow model offers valuable insights into how financing constraints affect firms' investment behavior, it also has limitations. The model is based on the correlation between cash flow and investment, but this relationship does not necessarily imply causality. Other factors, such as an increase in market demand, may boost cash flow and simultaneously drive firms to increase their investment. Consequently, interpreting the correlation between cash flow and investment as a sign of inefficient investment due to financing constraints may not always be accurate.

Based on the investment cash flow model, Vogt (1994) introduced the cash flow-investment opportunity interaction model, which analyzes firms' investment behavior by incorporating financing constraints and investment opportunities. The core idea of this model is that a company's investment decisions are influenced not only by its internal cash flows but also by external investment opportunities. The model examines how the interaction between internal cash flows (financial capacity) and external investment opportunities (market prospects) impacts the firm's level of investment. If the coefficient of the interaction between cash flow and investment opportunities is significantly positive, it indicates that increased sensitivity is likely due to financing constraints. In this case, the firm's inefficient investment behavior would typically manifest as underinvestment. Conversely, if the coefficient is significantly negative, it suggests that the increased sensitivity might be attributable to agency problems, which could lead to overinvestment.

Compared to the investment cash flow sensitivity model, the cash flow investment opportunity interaction model has the advantage of distinguishing between different types of inefficient investment, whether it is underinvestment or overinvestment. However, it does not measure the degree of investment inefficiency.

Richardson (2006) modified previous approaches to measuring investment efficiency by categorizing investment into maintenance and new investment, with new investment further divided into prospective and abnormal investment. By comparing actual and expected investments, this method assesses whether an enterprise is over-investing or under-investing. If the actual investment exceeds the expected investment, it may indicate over-investment. Conversely, if the actual investment falls short of the expected investment, it may suggest under-investment.

However, this model is not without limitations. The predicted investment amounts provided by the model's regression are not necessarily the ideal levels of investment. Despite this, the model helps assess the extent of investment efficiency across a broad range of applications (Khurana et al., 2018; Liu et al., 2022; Zhou & Zhao, 2022). For this study, this model was selected to measure investment efficiency due to its comprehensive applicability.

2.4.1 Factors Affecting Investment Efficiency

Investment efficiency refers to the extent to which a firm effectively allocates its financial resources to maximize value creation while minimizing inefficiencies such as overinvestment or underinvestment. Various firm-specific, governance-related, macroeconomic, and market-related factors influence investment efficiency.

2.4.1.1 Firm Characteristics and Financial Constraints

Firm-specific attributes, such as size, financial leverage, asset growth, and free cash flow, play a crucial role in determining investment efficiency. Firm size impacts investment behavior, with larger firms often exhibiting overinvestment tendencies due to easier access to external financing, while smaller firms are more likely to underinvest due to financing constraints (Zhang & Yin, 2018). Chi and Choi (2017) also observe that firm size impacts investment efficiency, with large enterprises often prone to overinvestment and small

enterprises to underinvestment. Financial leverage influences firms' ability to optimize capital allocation. Guo et al. (2021) found an inverted U-shaped relationship between financial leverage and investment efficiency, where debt financing enhances efficiency in high-growth firms but leads to excessive risk-taking in low-growth firms. Uncertainty in cash flow also affects firms' investment strategies. Companies with high cash flow volatility tend to adopt a conservative approach, limiting research and development (R&D) investments, while firms with stable cash flow are more likely to invest aggressively in innovation (Ma et al., 2024). Additionally, financing liabilities can have mixed effects—while they mitigate underinvestment, they often lead to overinvestment due to excessive borrowing (Stanton, 1998; Wang et al., 2022). Asset growth is another crucial factor influencing investment efficiency. Firms with rapid asset expansion may experience capital misallocation, leading to inefficiencies in investment decisions. High asset growth can be associated with overinvestment when firms aggressively expand without sufficient internal governance controls (Farooq et al., 2015). Conversely, firms with low or negative asset growth may underinvest due to limited access to financing or reluctance to take on new projects (Whittred & Chan, 1992). Thus, while asset growth signals firm expansion, it also requires careful financial planning and governance mechanisms to avoid inefficient capital allocation. The effect of asset growth on investment efficiency is often contingent on firm-level governance quality, industry conditions, and macroeconomic factors.

2.4.1.2 Corporate Governance

The effectiveness of corporate governance mechanisms significantly impacts investment efficiency. Board independence, board size, and audit committee oversight enhance transparency, reducing agency costs and improving capital allocation (Garad et al., 2021; Ghafran & O'Sullivan, 2013; Upadhyay & Sriram, 2011). Ownership concentration

also plays a crucial role in shaping investment decisions. Highly concentrated ownership, particularly in firms dominated by controlling shareholders, may lead to more effective monitoring, thereby reducing agency problems and enhancing investment efficiency (Zeckhauser & Pound, 1990). However, in cases where controlling shareholders prioritize private benefits over minority shareholders' interests, ownership concentration can lead to inefficient capital allocation and overinvestment in non-value-maximizing projects (Dharwadkar et al., 2000; Young et al., 2008). CEO duality, where the CEO also serves as the chair of the board, may weaken internal control mechanisms and exacerbate agency problems. This governance structure has been associated with inefficient capital allocation, particularly in diversified firms where capital may be disproportionately allocated to low-growth segments due to inadequate checks on managerial discretion (Aktas et al., 2019).

Additionally, corporate reputation and corporate social responsibility performance influence investment efficiency (Cook et al., 2019; Erawati et al., 2021; Fasaee et al., 2018). A positive corporate image can enhance investment efficiency by boosting investor and stakeholder confidence, attracting more capital, and reducing financing costs. Implementing various methods and disclosures to meet corporate social responsibility objectives helps minimize information asymmetry, which in turn improves investment efficiency. Benlemlih and Bitar (2018) use a sample of 21,030 US enterprises from 1998 to 2012 to show that high levels of CSR disclosure reduce unproductive expenditures. However, Firmansyah and Triastie (2020) demonstrate that CSR disclosure has no significant effect on investment efficiency based on panel data from Indonesian listed companies from 2014 to 2017.

2.4.1.3 Macroeconomic and Market Conditions

Investment efficiency is also shaped by macroeconomic factors. Macroeconomic variables such as monetary policy (Han & Zhang, 2016) and interest rate levels (Odhiambo,

2003) significantly impact investment efficiency. These factors influence the cost of funding and available investment options, thereby affecting investment decisions and overall efficiency. However, they can also lead to overinvestment and a decline in the efficiency of resource allocation, particularly among firms that face weaker market constraints and less stringent financing conditions. In addition, Laksmana and Yang (2015) found that market competition encourages managers to take risks. Competitive pressures not only affect a firm's profit potential and risk level but also determine the investment required to maintain a competitive advantage. Financing constraints further limit firms' ability to access external finance, thereby affecting their capability to seize external investment opportunities.

2.5 Corporate Social Responsibility Disclosure

2.5.1 Corporate Social Responsibility Concepts

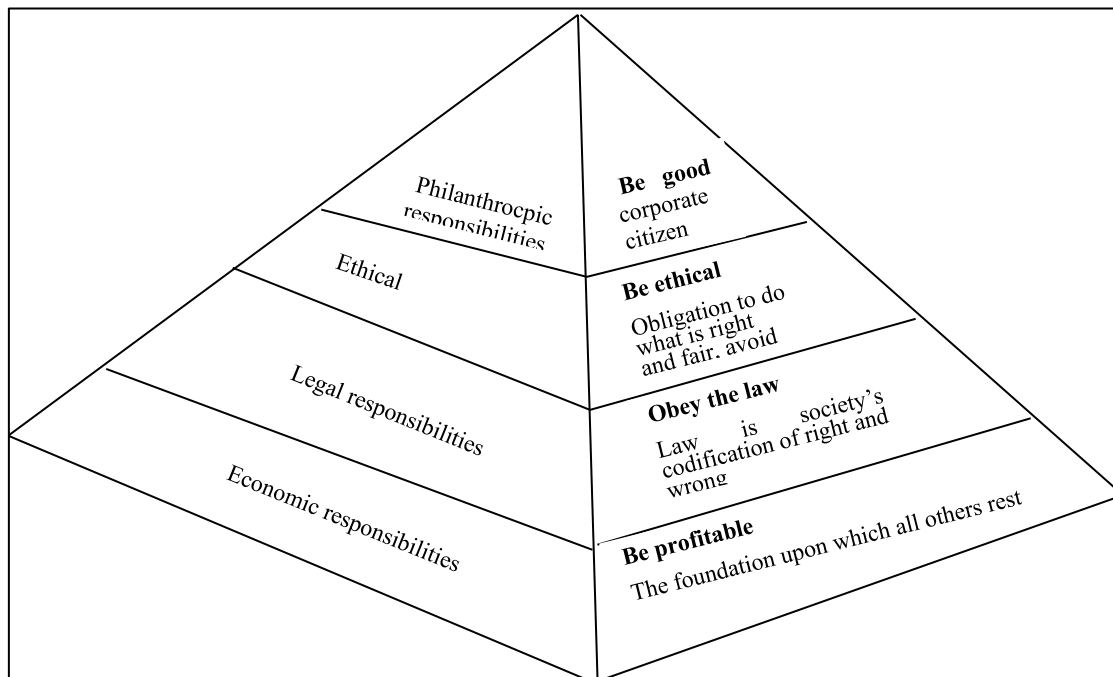


Figure 2.2: CSR Pyramid (Carroll, 1991)

Figure 2.2 shows the pyramid model of corporate social responsibility (CSR), emphasizing the responsibilities of companies at different levels. According to (Carroll,

1991), CSR involves not only the pursuit of social objectives and initiatives, but also the integration of ethical considerations into all aspects of corporate decision-making, practices, and procedures.

The concept of corporate social responsibility (CSR) was first introduced by Sheldon (1924), who proposed that a company's services to society have an ethical dimension, enhance community well-being, and should align with the diverse needs of consumers. Over the past 100 years, the development of CSR has refined and expanded its boundaries. According to Sheldon's framework, modern CSR emphasizes that enterprises should not solely pursue profit maximization, but also be accountable for their social and environmental impacts. Profit is not the sole objective of enterprise development. Beyond achieving financial success, companies are expected to uphold the legitimate rights and interests of shareholders and employees. Additionally, they should proactively address responsibilities such as reducing environmental pollution, employing unemployed individuals, and contributing to community infrastructure development.

CSR gained international prominence in the late 20th century, largely due to the global focus on sustainable development and the ongoing trend of globalization. The United Nations Development Program (UNDP) highlighted CSR as a framework for United Nations private sector collaboration to achieve its goals, significantly enhancing the concept's international recognition. The term "corporate social responsibility" encompasses a company's responsibilities to its stakeholders (Smith, 2007). Visser (2006) reexamines Carroll (1991) pyramid theory by applying it to developing countries. In this context, the emphasis shifts, with economic responsibilities being prioritized, charitable efforts, and legal and ethical responsibilities (see Figure 2.3 below).

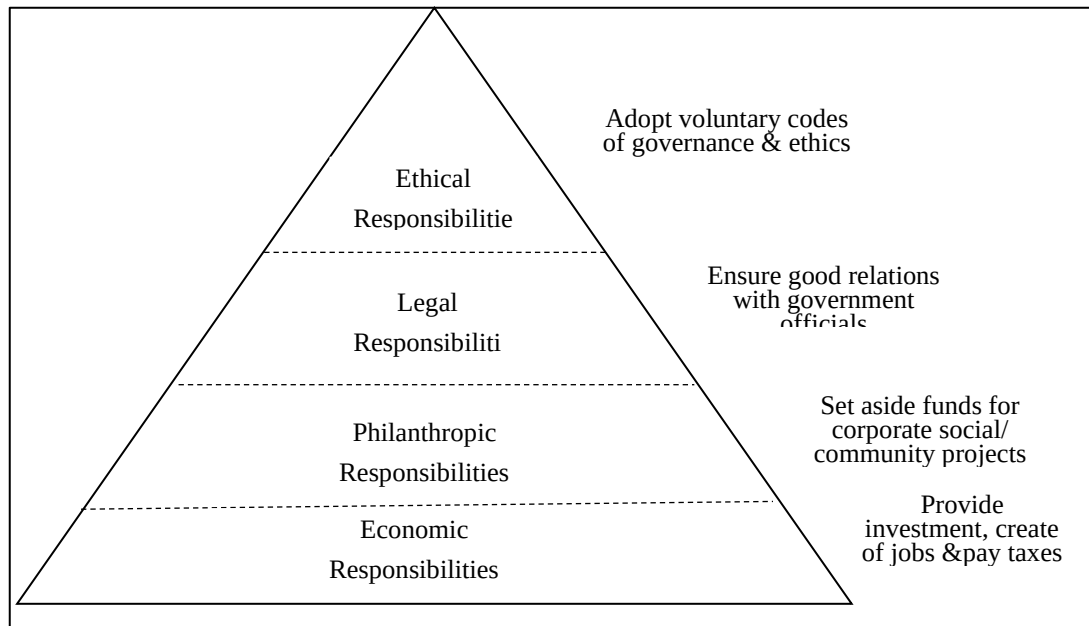


Figure 2.3: CSR Pyramid in Developing Countries (Visser, 2006)

At a conceptual level, CSR has always been inherent in business practices, encompassing social, environmental, and economic implications, stakeholder concerns (such as those of the government, customers, and owners), and adherence to regulations. These practices have evolved over time through established patterns. However, the operational landscape has shifted significantly due to globalization. New stakeholders and diverse national legislations are altering expectations and redefining how businesses balance social, environmental, and economic impacts in their decision-making. Consequently, in this evolving context, CSR management tools, in addition to traditional practices, are necessary for developing and implementing an effective business strategy (Dahlsrud, 2008).

The study of corporate social responsibility (CSR) is an essential component of business ethics research. Current CSR theories posit that corporations depend on society for their continued existence and growth. Companies that treat the public fairly are more likely to receive favorable societal perceptions (Pedersen, 2010). Carroll (2015) integrates various aspects of CSR, including stakeholder engagement and stewardship, business ethics,

corporate citizenship, corporate sustainability, and shared value creation, under the overarching concept of social responsibility.

The measurement of Corporate Social Responsibility (CSR) in China varies significantly across different studies, reflecting the lack of a unified framework. Several approaches have been developed, each emphasizing different dimensions and methodologies.

For instance, Liao et al. (2024) constructed a CSR disclosure index using the social responsibility rating system provided by Hexun.com. Their framework evaluates CSR based on seven key aspects—shareholder, employee, supplier, customer, consumer, environmental, and social responsibilities—further divided into 13 secondary and 38 tertiary indicators. A notable feature of their approach is the categorization of CSR into internal (e.g., shareholder, employee, supplier, customer, and consumer responsibilities) and external (environmental and social responsibilities) dimensions. This classification is useful for distinguishing between firm-centric and society-centric CSR activities. However, the reliance on disclosure-based scoring (assigning 1 for disclosed items and 0 otherwise) may introduce bias, as companies might engage in symbolic disclosure without substantive CSR commitment. Rauf et al. (2020) employed CSR reports from the CSMAR database and evaluated CSR across ten performance areas, including shareholder protection, employee protection, creditor protection, and defect management. Their methodology uses a binary scoring system (0 for no information and 1 for qualitative disclosure), with the aggregated score reflecting CSR quality. While this approach offers a standardized way to assess CSR, it may oversimplify CSR efforts by not capturing the depth, quality, or effectiveness of CSR initiatives beyond mere disclosure. Yeh et al. (2011) took a different approach by using content analysis to construct CSR measurement in four steps. This qualitative method

enables a more nuanced examination of CSR disclosures but may suffer from subjectivity and inconsistencies in coding, thereby affecting reliability and replicability.

Overall, while these studies contribute to CSR measurement in China, they have limitations. The reliance on disclosure-based scoring systems may not fully capture actual CSR practices, as companies could engage in greenwashing or selective reporting. Moreover, variations in the number and definition of CSR dimensions across studies indicate the absence of a consensus framework. Future research should explore more comprehensive and multidimensional CSR assessment methods, potentially integrating textual analysis, machine learning, or stakeholder perspectives to enhance measurement accuracy.

2.5.2 Corporate Social Responsibility Disclosure

Corporate Social Responsibility (CSR) disclosure refers to the voluntary or mandatory dissemination of non-financial information regarding a firm's social, environmental, and ethical practices (Dhaliwal et al., 2011). Furthermore, CSR disclosure is one of the ways a company communicates with its stakeholders. To build a positive corporate reputation, a corporation employs CSR disclosure as part of the dialogue to explain to its stakeholders the ethics of its business operations. Previous literature points out that CSR plays an important role in increasing firm value (Colleoni, 2013; Orbaningsih et al., 2017).

Corporate Social Responsibility (CSR) disclosure has been examined through multiple theoretical lenses that explain firms' motivations and the expected market outcomes. According to information asymmetry theory, CSR disclosure reduces information asymmetry between corporate insiders and external investors, thereby improving investment decisions and capital allocation (Arab et al., 2020). By providing transparent information about corporate activities, firms mitigate agency conflicts and lower the cost of capital

(Cuadrado-Ballesteros et al., 2016). Building on this perspective, signaling theory suggests that firms with superior CSR performance use disclosure as a signal to differentiate themselves from competitors and attract investors (Su et al., 2016). High-quality CSR disclosures serve as credible signals that a company is committed to sustainability and ethical business practices (Zerbini, 2017). Extending this argument, stakeholder theory suggests companies disclose CSR information to build and maintain strong relationships with key stakeholders, including investors, employees, customers, and regulators (Cordeiro & Tewari, 2015). High levels of CSR disclosure can improve corporate legitimacy and long-term financial stability by aligning corporate activities with stakeholder expectations (Dumay et al., 2015). Closely related to stakeholder engagement, reputation theory highlights that firms strategically engage in CSR disclosure to enhance their corporate reputation, leading to higher investor confidence and improved financial performance (Ajayi & Mmutle, 2021). A strong reputation derived from CSR transparency can reduce firm-specific risk and increase firm value over time (Baraibar-Diez & Sotorrío, 2018).

However, the extent to which CSR disclosure achieves these benefits depends on whether it is mandated by regulations or voluntarily undertaken by firms. Mandatory CSR disclosure is imposed by regulatory authorities, ensuring standardized reporting across firms and reducing managerial discretion in reporting non-financial information (Wang et al., 2018). In contrast, voluntary disclosure allows firms to strategically decide what CSR information to disclose, often influenced by reputational incentives or market-driven pressures (Nikolaeva & Bicho, 2011). While both mandatory and voluntary CSR disclosures contribute to corporate transparency, their effectiveness depends on the quality of the disclosed information. Low-quality disclosures, whether mandatory or voluntary, may lead to incomplete, misleading, or superficial CSR reporting, reducing the usefulness of CSR

information in financial decision-making (Jeriji & Louhichi, 2021). Therefore, analyzing CSR disclosure quality provides a more nuanced perspective on how firms genuinely integrate CSR into their business strategies rather than merely fulfilling reporting requirements.

2.5.3 CSR Disclosure and Economic Consequences

Some prior studies suggest that corporate social responsibility disclosure weakens the value of enterprises. Jadiyappa et al. (2021) used a sample of 6,281 listed businesses in India from 2011 to 2017 to confirm that CSR disclosure is associated with a decline in corporate value. Similarly, Sharma and Aggarwal (2022) used a sample of Indian-listed companies from 2015 to 2019 to confirm that the mandatory disclosure of CSR-related expenditures negatively affects corporate profitability. These findings highlight the potential cost burdens and performance trade-offs associated with enforced CSR disclosure policies, particularly when such requirements are perceived by firms as compliance-driven rather than strategically aligned.

Despite some concerns regarding its potential drawbacks, mandatory corporate social responsibility (CSR) disclosure has also been shown to yield several positive outcomes. For instance, firms subject to mandatory CSR disclosure exhibit higher earnings response coefficients and lower post-earnings announcement price drift, indicating that CSR reporting provides investors with incremental information useful for assessing future risks and firm performance (Wang et al., 2021). Using a sample of Chinese listed companies from 2003 to 2012, Wang et al. (2018) conducted quasi-natural experiments to demonstrate that mandatory social responsibility disclosure policies can reduce information asymmetry and improve the quality of financial reports. Fonseka and Richardson (2023) also performed quasi-natural experiments with a sample of Chinese-listed businesses from 2006 to 2016,

finding that mandatory social responsibility disclosure regulations can enhance the likelihood of dividend payments. Moreover, corporate social responsibility disclosure is strongly related to increased company profits and the growth of the company's reputation (Park, 2019). Additionally, it is seen as a commitment by the company to respond responsibly (Cook et al., 2019).

In addition to the influence of social responsibility disclosure policies and strategies, the quality of social responsibility disclosure affects investment decisions. Higher-quality CSR disclosure is more likely to attract efficient investments (Anwar & Malik, 2020). Kouaib and Amara (2022) confirmed that firms with higher-quality CSR disclosures tend to exhibit greater investment efficiency compared to those with lower-quality disclosures, using a panel data sample of Saudi-listed companies from 2018 to 2021. The quality of corporate social responsibility disclosure positively impacts investment by increasing transparency. This effect is observed not only in short-term capital inflows but also in the long-term market performance and investment returns of enterprises (Hoti & Krasniqi, 2022).

2.6 Financial Analyst Forecasts

By integrating non-financial and financial data to create profit projections, financial analysts utilize sophisticated financial statements (Schipper, 1991). Financial analyst forecasts are common in financial, economic, and market research. Previous studies have explored the role of analysts, highlighting their importance as information providers in capital markets. Financial analyst forecasts play a crucial role in addressing information scarcity (Charitou et al., 2019). They are responsible for gathering, analyzing, and producing information for the investing community. This information is collected from various sources, including financial documents, news, and earnings calls. A core component of their function is rigorous analytical evaluation, which involves assessing a company's strategic direction,

accounting policies, historical financial performance, and anticipated future earnings growth. Based on this analysis, financial analysts recommend whether to buy or sell a stock. Financial analysts' findings are communicated to clients, investors, corporate management, and other market participants through both official and informal channels (Baldwin & Rice, 1997). The quality of financial analyst forecasts should be supported by robust information. The ability to gather and interpret information is a crucial skill that many analysts and other information agents strive to develop. Therefore, the ability to collect, interpret, and synthesize complex data is a fundamental skill that distinguishes effective analysts from their peers and underscores their value as market information agents.

The content of financial analyst forecasts is interpreted differently across various literature. For instance, financial analyst forecast dispersion is considered one of the key indicators for assessing the uncertainty of a company's future performance (Givoly & Lakonishok, 1984). Accuracy is one of the most significant factors in financial analyst forecast performance. Prior studies suggest that more accurate analysts have a greater capacity to influence prices (Gu & Wu, 2003). Considering the more subjective judgment and calculation involved in financial analyst forecasts divergence, there may be significant variations and uncertainties that affect the reliability of research results. Therefore, accuracy is a key concern in the study of financial analyst forecasts. Five analyst characteristics that influence the accuracy of forecast include the size of the brokerage house, the number of firms followed, the number of industries covered, company-specific experience, and general experience (Barron et al., 1998; Clement, 1999). In capital markets, financial analyst forecasts accuracy is often used to assess corporate risk and information transparency. Historically, forecasting accuracy has varied among analysts.

The accuracy of financial analyst forecasts is influenced by both internal and external factors. From an internal point of view, Rennie et al. (2021) highlight the value of financial analyst expertise in improving forecast accuracy. Beyond technical expertise, factors such as cognitive biases, information processing capabilities, and psychological stress have also been found to affect forecast accuracy (Guedj & Bouchaud, 2005; Kott & Perconti, 2018; Paulus et al., 2024). The literature suggests that cognitive biases and stress harm financial analyst forecast accuracy.

In terms of external factors, from a macro perspective, financial analyst forecasts become more challenging due to market uncertainty and volatility (Amiram et al., 2018). Share prices are more affected by numerous unforeseen events that are difficult to predict, particularly in highly volatile markets, which increases the likelihood of financial analyst forecast errors. Additionally, the unpredictability of macroeconomic conditions, laws, and regulations makes it harder for financial analysts to make accurate forecasts (Sharma et al., 2024). The transparency and credibility of both financial and non-financial reporting directly affect analysts' ability to access and interpret relevant data. When CSR disclosures are comprehensive and authentic, they serve as valuable informational input, enabling analysts to form more accurate assessments and reduce forecast errors. As such, CSR disclosure quality is an important external determinant of forecast accuracy in increasingly complex market environments.

In addition to macro factors, corporate governance can also influence financial analyst forecasts. For example, Byard et al. (2006) find that the accuracy of financial analyst forecasts increases as board independence rises and decreases as the size of the board increases. The size of the board of directors impacts the efficiency and credibility of the

company monitoring mechanism, which, in turn, affects the reliability of managers' performance forecasts. Smaller boards have advantages such as easier coordination, faster decision-making, and a reduced likelihood of free-riding (Badru et al., 2017). Karamanou and Vafeas (2005), analyzing 1,621 earnings forecasts issued by 275 Fortune 500 companies in the United States in 1995, found that companies with large boards of directors tend to issue overly optimistic forecasts, which may lead to inaccuracies. A study by Bédard et al. (2008) on Canadian Initial Public Offerings (IPO) found no link between the number of members on the board of directors and the accuracy of the firm earnings forecasts. Similarly, research by Nurwati et al. (2010) on the Malaysian IPO market reached a similar conclusion, indicating that the size of the board of directors does not significantly impact the reliability of earnings forecasts. These mixed findings suggest that while board characteristics can affect the informational environment in which analysts operate, their impact on forecast accuracy may vary depending on institutional context, market structure, and firm-specific governance practices.

Additionally, the accuracy of financial analyst forecasts tends to decline when the Chief Executive Officer (CEO) simultaneously serves as Chairman of the Board, a governance structure commonly referred to as CEO duality. During initial public offerings (IPOs), such dual roles have been shown to weaken corporate monitoring mechanisms, reduce organizational credibility, and lead to less reliable outcome forecasts. Yang and Kao (2007) find that managerial duality negatively affects the quality of financial analyst forecasts, arguing that executives holding both positions are more likely to exhibit over-optimism, thereby increasing forecast error. Conversely, Dey et al. (2011) suggest that separating the roles of CEO and board chair enhances the firm's governance environment and improves the credibility of financial disclosures and forecasts. However, contrasting

evidence is presented by Xing et al. (2019), who report that certain aspects of forecast quality—including frequency, timeliness, and accuracy—may improve in firms where top executives hold multiple senior positions, implying a context-dependent relationship between governance structure and forecast performance. Ownership structure also plays a critical role in shaping forecast accuracy. Bouteska (2018) finds that in firms characterized by concentrated ownership, whether held by management or other external parties, financial analyst forecasts tend to be more accurate, even though such firms often exhibit wider bid-ask spreads. When corporate managers hold a significant ownership stake, forecasts of future earnings tend to be closer to actual outcomes, likely due to enhanced alignment of interests and more reliable information disclosure.

It is worth noting that financial analysts may not immediately revise their forecasts in response to new information due to the presence of cognitive biases and herd behavior, both of which can compromise forecast accuracy (Guedj & Bouchaud, 2005). Moreover, under conditions of heightened environmental uncertainty—particularly when investor demand for information is high—financial analyst forecasts may become more timely, yet not necessarily more accurate (Amiram et al., 2018). This distinction underscores the fact that the speed of information assimilation does not always translate into forecast reliability, especially when analysts are influenced by behavioral tendencies rather than objective analysis.

2.7 Corporate Social Responsibility Disclosure and Investment Efficiency

Investors also consider social responsibility when making investment decisions. Previous literature includes studies that analyze the relationship between social responsibility disclosure and investment efficiency, focusing on mandatory social

responsibility disclosure policies, corporate social responsibility disclosure, and the quality of social responsibility disclosures.

As shown in Table 2.1, various studies using quasi-natural experiments have confirmed that mandatory corporate social responsibility disclosure impacts corporate investment efficiency. Marshall et al. (2022) conducted a quasi-natural experiment with 23,694 observations from 4,168 enterprises in Mumbai from 2012 to 2017, finding that firms adhering to mandatory CSR disclosure attract more investment from foreign organizations. Liu and Tian (2021) used data from Shanghai and Shenzhen A-share non-financial enterprises from 2004 to 2013 to demonstrate that inefficient investment decreases once mandatory CSR disclosure requirements are implemented, particularly over-investment. This indicates that the impact of compulsory corporate social responsibility disclosure on business investment is consistent across firms that disclose social responsibility compared to those that do not.

In addition to examining the impact of mandatory corporate social responsibility disclosure on investment efficiency, previous studies also investigate the long-term effects of mandated disclosure. According to the study of Zhong and Gao (2017), their analysis of China's listed firms from 2010 to 2013 demonstrated that social responsibility disclosure enhances information transparency, reduces information asymmetry, and improves corporate investment efficiency. Similarly, Huang et al. (2023), using data from Chinese listed companies between 2010 and 2019, found that mandatory social responsibility disclosure is more effective than voluntary disclosure in increasing corporate investment efficiency by lowering information asymmetry and agency costs.

Furthermore, corporate social responsibility disclosure quality also affects investment efficiency. Safi et al. (2023) discovered that corporate social responsibility disclosure quality is a key determinant influencing the investment efficiency of corporations by analyzing data from Chinese financial service institutions from 2010 to 2019. Similarly, Ho et al. (2022) found a link between superior performance in corporate social responsibility disclosure and increased investment efficiency after analyzing data from China's listed companies from 2009 to 2015. (Guo et al., 2024) argued that the quality of CSR disclosure can reduce inefficient investment using data from listed companies in China from 2009 to 2021.

Table 2.1: Relevant Literature on CSR Disclosure and Investment Efficiency

Research focus	Independent variable	Research method	Sample	Source
Mandatory CSR disclosure, monitoring and investment efficiency: Evidence from China	If corporate social responsibility disclosure is mandatory, assign a value of 1; otherwise, assign a value of 0	● Difference-in-difference Method ● Parallel Trend Test ● Placebo Test ● PSM-DID Method	Data of listed companies in China, 2007-2010	Liu and Tian (2021)
Does family control explain how corporate social responsibility affects investment efficiency?	Assign a score of 100 if the corporation has a policy related to the item and zero otherwise.	● Feasible Generalized Least Squares Regression	190 listed non-finance companies in Pakistan over the period of 2007–2017	Shahza d et al. (2018)

Table 2.1 continued

Corporate Social Responsibility and Investment Efficiency	The CSR score, which reflects social responsibility, is determined using the entire range of scores from environmental, social, and governance dimensions for each firm.	● Ordinary Least Squares Regression Analysis ● Robustness analysis ● Propensity Score Matching Test	More than 3000 US individual firms between 1998 and 2012	
The nature of corporate social responsibility disclosure and investment efficiency: Evidence from China	If a corporation releases a CSR report in period t-1, it equals 1; otherwise, assign a value of 0.	● Ordinary Least Squares Regression Analysis ● Robustness Check ● Two-step Least Square Method (2SLS) ● Propensity Score Matching Test	All Chinese A-share companies listed throughout the years 2010 to 2019	Huang et al. (2023)
Investment Inefficiency and Corporate Social Responsibility	Select the relevant indicators and aggregate them into a weighted score using the specified system of weights.	● Ordinary Least Squares Regression Analysis	European listed companies for the period between 2009 to 2016.	Engida et al. (2022)
Corporate Social Responsibility Disclosure Quality and Firms' investment Efficiency: Evidence from Chinese Listed Companies	Scoring of CSR disclosure content of sample companies categorized in the CSMAR database.	● Ordinary Least Squares Regression Analysis ● Heterogeneity Analysis	A-share listed Chinese firms from 2009 to 2021	Guo et al. (2024)

2.8 Corporate Social Responsibility Disclosure and Financial Analyst Forecasts

Corporate social responsibility disclosure enhances the information environment available to financial analysts for making predictions. During periods of heightened economic policy uncertainty, significant market volatility, and information opacity, the accuracy of financial analyst forecasts tends to deteriorate (Chahine et al., 2021). The CSR disclosure policy was initially implemented with a certain degree of uncertainty. First of all, the disclosure format of independent reports was not standardized. Thus, the independent reports issued by listed companies were in very different formats (Wang & Lu, 2012). Secondly, in terms of content, listed companies are more inclined to disclose information that is favorable to them, and information that may affect the image of the company exists in the form of non-disclosure or under-disclosure (Zhang, 2010). In addition, in terms of the implementation process, while previous literature confirms that the Chinese mandatory corporate social responsibility disclosure system in 2009 placed more emphasis on specific guidelines and regulations than the original voluntary-oriented system, leading to a significant increase in the level and quality of the disclosure content (Biddle et al., 2009; He et al., 2012). There is a decoupling from policy to implementation (Graafland & Smid, 2019). When there is a conflict of interest between the enterprise and the stakeholders, the social responsibility decoupling behavior is an intentional, strategic decision, and the enterprise takes the initiative to adopt symbolic behavior, selective disclosure, and other means to protect its interests and maintain a good relationship with the stakeholders.

Financial analyst forecasts rely on both financial and non-financial reports. In countries and firms with lower information transparency, independent CSR reports can complement financial disclosure and reduce financial analyst forecast errors (Dhaliwal et al., 2012). CSR disclosure encompasses four main components: financial transparency,

corporate governance, stakeholder risk management, and soundness of investment decisions. Strong performance in these areas can collectively reduce biases in earnings forecast errors. This effect is largely attributed to the overall higher quality of corporate social responsibility disclosure (Becchetti et al., 2012).

Financial analysts surplus forecasts are primarily based on financial information provided by the company. Due to managers' tendency to conceal unfavorable news for self-interest, financial analysts often seek additional information through various channels, such as field research and private communication with executives (Tan & Cui, 2015; Yang et al., 2019). A social responsibility report, which includes details about a company's customer relations, production and sales costs, financing, debt, and debt disputes, serves as a crucial supplement to financial information. This non-financial information can significantly aid financial analysts in evaluating future surpluses and making more accurate forecasts (Dhaliwal et al., 2012). However, corporate social responsibility disclosure is assessed based on various criteria, and financial analysts, like individual investors, often struggle to react to all available information in a timely and accurate manner. As a result, they may choose to overlook corporate social responsibility disclosure when faced with significant discrepancies in social responsibility ratings provided by different rating agencies (Hirshleifer et al., 2009).

2.9 Financial Analyst Forecasts and Investment Efficiency

It has been widely discussed how financial analyst forecasts impact capital markets. Recent literature indicates that financial analyst forecasts influence firms' cash flows, tax planning, accounting decisions, and stock market performance (Ayers et al., 2018; Ayres et al., 2019; Chen et al., 2018). The dynamic nature of financial markets has led investors to increasingly recognize the value of incorporating financial analyst forecasts into their investment strategies (Brauer & Wiersema, 2018).

Financial analyst forecasts accuracy has significant effects on investment efficiency. Financial analyst forecasts act as intermediaries, aiding in transmitting, interpreting, and transforming information between investors and the market (Kelly & Ljungqvist, 2012). They extract valuable insights from company financial statements, industry dynamics, market trends, and macroeconomic factors, presenting this information to investors and decision-makers in a comprehensible format. This process reduces information asymmetry and somewhat enhances transparency (Amiram et al., 2016). Also, financial analyst forecast accuracy can help reduce market volatility (Beaver et al., 2020; Mattei & Platikanova, 2017). When financial analysts provide accurate forecasts, the market's reaction to significant company events or earnings announcements tends to be more stable, as the information is often anticipated and absorbed by the market in advance. This reduces the likelihood of market overreactions to unexpected news or data fluctuations, thereby contributing to a more stable and transparent investment environment.

Simultaneously, financial analyst forecasts act as market monitors (Zadeh et al., 2021). They engage directly with corporate management, participating in earnings calls and other public forums to question and discuss strategic decisions and judgments. Through their evaluation of corporate governance structures, policies, and practices, financial analyst forecasts contribute to promoting better governance practices (Chen et al., 2015).

2.10 Literature Gap

Corporate social responsibility (CSR) disclosure plays an increasingly vital role in the modern business environment. As public awareness and stakeholder expectations regarding corporate conduct continue to rise, companies are shifting their focus from purely pursuing economic profit to emphasizing CSR performance and disclosure transparency.

A growing body of literature has confirmed that CSR disclosure exerts a significant influence on investment efficiency. Several studies employing quasi-natural experimental designs have provided empirical evidence on the causal effects of mandatory CSR disclosure policies in improving investment efficiency (Liu & Tian, 2021; Zhong & Xu, 2015). Beyond policy-based analyses, a substantial number of studies suggest that CSR disclosure has a positive effect on investment efficiency, although they adopt varied measurement approaches. For instance, some researchers use dummy variables to indicate whether a firm discloses CSR information and find that such disclosure is associated with enhanced investment efficiency (Benlemlih & Bitar, 2018; Zhong & Gao, 2017). Others assess CSR disclosure from the perspective of disclosure quality, recognizing that the depth, consistency, and credibility of disclosed information are critical determinants of its effectiveness.

In studies focusing on U.S. and European listed firms, CSR scores are commonly used as proxies to evaluate the relationship between CSR disclosure and investment efficiency. For example, Huang et al. (2023) utilize corporate social responsibility disclosure choices as a measure of social responsibility. Within the Chinese context, prior research has investigated both the short-term and long-term effects of mandatory CSR disclosure on investment behavior. While most findings indicate a positive relationship, some studies also highlight potential negative consequences, suggesting that CSR disclosure may, under certain conditions, undermine firm efficiency due to overinvestment, managerial distraction, or symbolic compliance (Bhandari & Javakhadze, 2017).

Overall, existing research mainly focuses on the effects of corporate social responsibility (CSR) disclosure on investment efficiency. Most studies examine this relationship from an internal organizational perspective, emphasizing corporate governance, firm characteristics, or managerial behavior. For example, Lin et al. (2021) find that

corporate strategy moderates the relationship between corporate social responsibility disclosure and investment efficiency.

In contrast, limited attention has been given to the role of capital market participants, especially financial analysts, who serve as important information intermediaries between firms and investors. Existing literature on the connection between CSR disclosure and financial analyst forecasts suggests that firms with stronger CSR performance tend to experience less stakeholder conflict, which helps reduce information asymmetry and improve forecast accuracy (Al - Hadi et al., 2019). Empirical findings also show that higher CSR performance is associated with more accurate and reliable analyst forecasts (Muslu et al., 2019; Shan et al., 2023). This implies that CSR disclosure may contribute to improving investment efficiency by enhancing the quality of financial analyst forecasts.

Similarly, several studies have explored the relationship between financial analyst forecasts and investment efficiency. The accuracy of analyst forecasts improves the overall information environment and strengthens external oversight, thereby enhancing corporate investment efficiency (Chen et al., 2017). Accurate forecasts by financial analysts also help reduce ineffective investment (Zadeh et al., 2021). Yeganeh et al. (2017) found that financial analyst forecasts accuracy significantly improves investment efficiency and curbs overinvestment, based on a sample of firms listed on the Tehran Stock Exchange from 2009 to 2013.

Although many studies have examined the relationships between corporate social responsibility (CSR) disclosure and investment efficiency, as well as the influence of financial analyst forecasts, there remains a clear lack of comprehensive research that integrates all three dimensions. This study seeks to address this gap by investigating the

impact of CSR disclosure on financial analyst forecasts, with a focus on both the short-term and long-term effects of mandatory CSR disclosure policies. It further explores how changes in analyst forecast quality serve as an indirect channel through which CSR disclosure affects investment efficiency. This integrated approach provides new insights into the role of CSR disclosure in shaping corporate financial decisions and influencing market outcomes. By addressing this research gap, the study contributes to a deeper understanding of the multiple functions of CSR disclosure and offers a more evidence-based foundation for firms and policymakers aiming to strengthen corporate governance and improve market efficiency.

2.11 Hypothesis Development

2.11.1 The Mediating Role of Financial Analyst Forecasts on the Relationship between MCSR Disclosure and Investment Efficiency

Investment efficiency is essential for corporate value creation, as it ensures that firms allocate financial resources optimally to generate sustainable growth (Hu et al., 2019). However, according to information asymmetry theory, managers may struggle to effectively communicate the quality of existing assets and investment prospects due to adverse selection caused by information asymmetry. This issue can increase the likelihood that attractive investment opportunities may not secure sufficient capital, resulting in underinvestment. This occurs because managers may be forced to forgo investments with a positive net present value (NPV) due to funding constraints (Myers & Majluf, 1984). Signaling theory suggests that firms use disclosure as a mechanism to convey their quality to external investors, particularly in markets with high levels of information asymmetry (Cui et al., 2018). CSR disclosure, when mandated by regulation, functions as a credible and standardized signal of a firm's commitment to ethical governance, sustainability, and corporate accountability (Mazzotta et al., 2020). Unlike voluntary CSR reporting, which may suffer from self-

selection bias or greenwashing, mandatory CSR disclosure ensures consistency and comparability across firms, thereby increasing the credibility of information available to investors and analysts (Fan et al., 2023; Wang et al., 2021). Stakeholder theory emphasizes that firms must balance the interests of multiple stakeholders, including investors, employees, regulators, and the broader society (Freeman, 1984). In this context, the implementation of mandatory CSR disclosure is intended to enhance corporate transparency and reduce information asymmetry, thereby improving market efficiency (Kühn et al., 2014). By requiring companies to disclose their social responsibility activities and performance, these policies enable the market to gain a more comprehensive understanding of the company. In the short term, the impact of mandatory disclosure is significant, as companies must adhere to stricter disclosure standards, ensuring the completeness and accuracy of information and thereby providing analysts with a richer source of information.

A large body of empirical evidence suggests an influential relationship between mandatory CSR disclosure, investment efficiency, and financial analyst forecasts. On the one hand, empirical evidence suggests that mandatory corporate social responsibility disclosure leads to improved investment efficiency and financial analyst forecasts. For example, Liu and Tian (2021) found that firms subject to mandatory CSR disclosure experience lower capital constraints, better market valuations, and enhanced investment efficiency. Similarly, Chen and Zeng (2022) demonstrated that high-quality non-financial disclosure reduces capital misallocation, ensuring that firms allocate resources more efficiently. The improved quality of mandated CSR disclosure effectively boosts the firm's investment efficiency and innovation potential, resulting in better total factor productivity (Ban & Zhu, 2023). Shi et al. (2023) found that mandatory CSR disclosure significantly improves the information environment for financial analyst forecasts using a quasi-natural

experiment. On the other hand, financial analyst forecasts can also affect investment efficiency. Chen et al. (2017) found financial analyst forecasts quality improves investment efficiency at the company level. Greater environmental and social transparency optimizes the information environment for financial analyst forecasts and enhances their information intermediation and monitoring capabilities, thereby increasing the efficiency of firms' investment (Zadeh et al., 2021).

Financial analyst forecasts serve as crucial information intermediaries in the capital markets, providing forecasts and recommendations based on their analysis of company disclosures. Evidence indicates that their earnings forecasts are often more accurate than those generated by time-series models, partly because financial analysts can promptly incorporate firm-specific and economic news into their forecasts (Brown et al., 1987). High-quality information and accurate market analysis are crucial for enhancing a company's investment efficiency (Richardson, 2006). In the short term, mandatory CSR disclosure provides analysts with high-quality forecasts and reports, which can help corporate management identify effective investment opportunities and avoid issues such as overinvestment or underinvestment. By serving as intermediaries, financial analyst forecasts facilitate the use of CSR information to not only enhance corporate transparency but also improve investment efficiency through more precise market analysis. Based on this analysis, the study proposes the following hypothesis:

H1: There is a positive relationship between mandatory social responsibility disclosure and investment efficiency mediated by financial analyst forecasts.

2.11.2 The Mediating Role of Financial Analyst Forecasts on the Relationship between CSR Disclosure and Investment Efficiency

Reputation theory posits that a firm's long-term reputation is built through consistent, transparent, and responsible business practices. According to Eberl and Schwaiger (2005), reputation is more about a company's personality than its communicated image. It develops over time and is the consequence of interactions and relationships between the company and its stakeholders. In other words, it is based on the perception of the company by stakeholders who have had direct and satisfactory interactions with it. Corporate reputation is a stable, issue-specific portrayal of a company's past actions and future prospects when compared to certain standards (Walker, 2010). Similar to this, Kotha et al. (2001) view a positive company reputation as an investment that lowers transaction costs and boosts revenues by lowering the uncertainty surrounding buyer-supplier exchanges. Reputable businesses may also quickly draw in funding and strategic partners, as well as easily enter new markets.

In this context, corporate social responsibility disclosure (CSR D) plays a critical role in shaping and enhancing corporate reputation, influencing investor trust, stakeholder relations, and financial performance. For example, CSR disclosure can positively impact stakeholders' perceptions and maximize a company's reputation for profit (Unerman, 2008). Maden et al. (2012) emphasize the impact of stakeholders' perceptions of an organization's social responsibility on its reputation. This includes the extent to which CSR D programs and outcomes align with stakeholders' social and environmental values. CSR D has become a key driver of the company's reputation. Additionally, corporate social responsibility disclosure is very important for corporate reputation, and companies should attach importance to corporate social responsibility activities (Jeffrey et al., 2019). CSR D helps organizations build and enhance their reputation among various stakeholders, including employees (internal customers), customers (external customers), suppliers, competitors, bankers, and

investors (Branco & Rodrigues, 2006). Previous literature supports the idea that reputation is developed gradually based on an individual's or organization's behavior and performance over time (Grund, 1996). Reputable companies are more likely to attract long-term investors as they are perceived to have significant long-term growth potential and stability (Pang et al., 2022). If investors believe a company's reputation reflects its performance, this perception predominantly influences their investment decisions (Kromidha & Li, 2019). CSR disclosure and effective corporate governance draw in financial analysts and enhance their capacity to predict profits (Cormier & Magnan, 2014).

CSR disclosure could also provide positive signals to market participants and increase business reputation, develop stronger mutual trust between managers and other stakeholders within the organization, and stabilize contractual ties in the long term (Cheng et al., 2014). Enhanced information communication fosters better mutual trust between internal managers and stakeholders, leading to more stable and enduring contractual relationships (Cheng et al., 2014). Corporate social responsibility disclosure has become an integral part of corporate operations. Companies that engage in CSR disclosure are less likely to manipulate earnings through discretionary accruals and real earnings adjustments compared to those that do not disclose CSR activities. This suggests that companies engaging in CSR are providing transparent and reliable information to investors, reflecting their commitment to ethical and responsible decision-making (Fieseler, 2011). Good corporate governance is founded on integrity and transparency, which in turn enhances investor trust in the enterprise (Alnaser et al., 2014). Institutional and long-term investors often favor companies with strong corporate governance structures due to their greater sustainability and stability over time.

As information intermediaries in the capital market, financial analysts leverage their expertise and advantages in information collection and processing to assess and evaluate publicly disclosed financial and non-financial information of listed companies. Through their research, they project the future development prospects of enterprises, forecast their accounting earnings, and provide market participants with insights that reflect the intrinsic value of the companies. Additional disclosures reduce the cost of information gathering and processing for financial analyst forecasts by broadening the sources of available information (Lang & Lundholm, 1996). Accurate and positive financial analyst forecasts can enhance investor confidence in a business. High ratings and favorable forecasts from financial analysts can attract more investors, particularly institutional and long-term investors, who prioritize in-depth fundamental analysis and the long-term value of companies.

Empirical studies provide substantial evidence on the relationship between corporate social responsibility disclosure, financial analyst forecasts, and investment efficiency. Prior research indicates that CSR disclosure enhances investment efficiency by reducing information asymmetry and mitigating agency costs. For instance, a study examining Chinese-listed firms from 2010 to 2019 found that CSR disclosure positively impacts investment efficiency, particularly by alleviating underinvestment issues (Safi et al., 2023). This suggests that firms engaging in CSR disclosure are more likely to allocate resources efficiently, avoiding both excessive and insufficient investments. Financial analyst forecasts play a crucial role in this dynamic by evaluating and interpreting CSR disclosures, which subsequently influence investor perceptions and decision-making. Research has demonstrated that financial analyst attention to CSR activities contributes to improved investment efficiency, as their assessments help reduce information asymmetry between firms and investors (Li et al., 2023). In particular, firms with CSR disclosures tend to receive

more accurate and frequent coverage from financial analysts, further enhancing transparency and reducing capital misallocation. Moreover, studies have shown that CSR disclosure improves the accuracy of financial analyst forecasts, which in turn bolsters investor confidence and attracts more investment (Cormier & Magnan, 2014; Ni et al., 2023). Higher forecast accuracy leads to better alignment between firm fundamentals and investment decisions, thereby contributing to overall investment efficiency (Goodman et al., 2014). This underscores the mediating role of financial analyst forecasts in the relationship between CSR disclosure and investment efficiency, reinforcing the argument that CSR disclosure indirectly enhances investment outcomes by improving the information environment through financial analysts' activities. Based on the above analysis, hypothesis 2 is proposed.

H2: There is a positive relationship between corporate social responsibility and investment efficiency mediated by financial analyst forecasts.

2.11.3 The Mediating Role of Financial Analyst Forecast on the Relationship between CSR Disclosure Quality and Investment Efficiency

Previous studies have used various theoretical approaches to explain the potential impacts of corporate social responsibility disclosure (Rezaee, 2016). These theories collectively illustrate how CSR disclosure serves as a critical mechanism for reducing uncertainty, strengthening corporate-stakeholder relationships, and improving capital allocation decisions. Reputation theory states that a company's market reputation is the result of accumulation over time and depends on the transparency and consistency of its behavior. High-quality CSR disclosure helps to enhance the credibility of a company so that it is perceived by investors and financial analysts as a more robust and lower-risk market player. Companies that maintain high-quality CSR disclosure over a long period are more likely to gain the trust of the market and reduce investors' concerns about the company's moral hazard.

Stakeholder theory emphasizes that firms should establish long-term and stable relationships with their stakeholders (e.g., investors, suppliers, regulators, the public, etc.) to enhance sustainability (Donaldson & Preston, 1995; Freeman, 2010). High-quality CSR disclosure makes institutional investors more willing to allocate long-term capital, as they believe that companies have stable governance mechanisms and a sense of social responsibility. The information asymmetry theory states that corporate management usually has more information than outside investors, and this information imbalance affects the efficiency of the market in allocating resources (Byun et al., 2011). When investors are unable to judge the true financial position of a company, management may invest funds in inefficient or ineffective projects due to information asymmetry. Signaling theory suggests that firms can increase their capital market value by signaling to the market and reducing investor uncertainty (Reuer et al., 2012; Yoon & Starks, 1995). Stable CSR disclosure signals to the market that corporate governance is sound and enables investors to have clearer expectations for the future development of the enterprise. Financial analyst forecasts rely on publicly disclosed information from companies when making earnings forecasts, and high-quality CSR information reduces forecast uncertainty and improves investor market confidence.

Scholars found the goal of corporations completely releasing social responsibility information is to protect investors' interests, improve information flow between firms and society, minimize information asymmetry, and boost corporate transparency (Reverte, 2009). Investors may thoroughly and effectively evaluate the business and risk elements of listed companies and make the best decisions when social responsibility information is disclosed. In this situation, capital markets' efficacy and transparency can be improved. The market would show that a listed company was legitimate under the law, honest, reliable, and conscientious in its business dealings if it honestly disclosed its social responsibility

information to the public. Incorporating social responsibility into business operations, management, strategy, and decision-making can assist the company generate non-financial benefits. A mutually beneficial practice that upholds long-term business interests and satisfies societal development criteria is corporate social responsibility. From this view, high-quality corporate social responsibility disclosure quality contributes significantly to a firm's long-term value by enhancing transparency, strengthening investor trust, and fostering sustainable business practices. Firms that consistently provide high-quality CSR information demonstrate a commitment to ethical governance, environmental responsibility, and social impact, which reduces information asymmetry and mitigates agency problems (Wang et al., 2024). Empirical research suggests that CSR disclosure quality is positively associated with long-term firm performance, as it attracts institutional investors, lowers capital costs, and enhances financial stability (Branco & Rodrigues, 2006; Pang et al., 2022). Furthermore, firms with superior CSR disclosure quality develop strong reputational capital, which helps them navigate regulatory pressures, maintain stakeholder confidence, and achieve sustained competitive advantages (Chen et al., 2018). Therefore, CSR disclosure quality serves as a critical determinant of corporate long-term value, reinforcing financial resilience and ensuring sustainable growth in an evolving global market.

Previous studies confirm that CSR disclosure quality significantly impacts corporate investment efficiency (Anwar & Malik, 2020; Benlemlih & Bitar, 2018). High-quality CSR disclosure enhances a company's reputation and increases trust in the capital market, thereby reducing financing costs, optimizing capital allocation, and improving investment efficiency (Bhandari & Javakhadze, 2017; Ruonan & Hong, 2019). Additionally, high-quality CSR disclosure can enhance a company's innovation capabilities and management practices, thereby promoting long-term sustainable development (Cook et al., 2019). Excellent CSR

disclosure performance enhances operational efficiency and profitability (Waddock & Graves, 1997). However, for the average investor, corporate social performance is often uncertain and obscure, and financial analysts can serve as a conduit of information that connects corporate social performance and company stock returns (Luo et al., 2015). Financial analyst forecasts play a monitoring role in capital markets. This monitoring effect is more pronounced when financial analysts' earnings projections are precise and exhibit less variability, a phenomenon known as the "monitoring agent role" of financial analysts. By interacting directly with management during the research process and creating earnings forecasts (e.g., through communications with managers and company visits), financial analysts can directly monitor firms and influence decision-making (Chen et al., 2015). External monitoring by financial analysts incentivizes companies to enhance their CSR engagement (Hinze & Sump, 2019). CSR-related information is expected to be a valuable input for capital market participants in their analysis and valuation processes (Dhaliwal et al., 2012). Also, some empirical evidence suggests that the CSR disclosure quality affects financial analyst forecasts. Compared to corporations that do not disclose CSR reports, CSR disclosure with high disclosure ratings is linked to more accurate forecasts, whereas those with poor scores are not linked to accurate analyst forecasts (Muslu et al., 2019).

Positive evaluations of CSR disclosure quality by financial analyst forecasts can boost investor confidence in a company, thereby enhancing its market value and financing capabilities. Additionally, financial analysts' research reports and ratings significantly impact external corporate governance. Financial analysts often consider a company's CSR disclosure performance when assigning ratings and publishing research reports. High-quality CSR disclosure not only enhances a company's rating but also attracts more institutional investors. These investors focus not only on the financial performance of enterprises but also

on their social responsibility performance. Based on the above analysis, the following hypothesis is proposed:

H3: There is a positive relationship between corporate social responsibility quality and corporate investment efficiency mediated by analyst forecasts.

2.12 Theoretical Framework

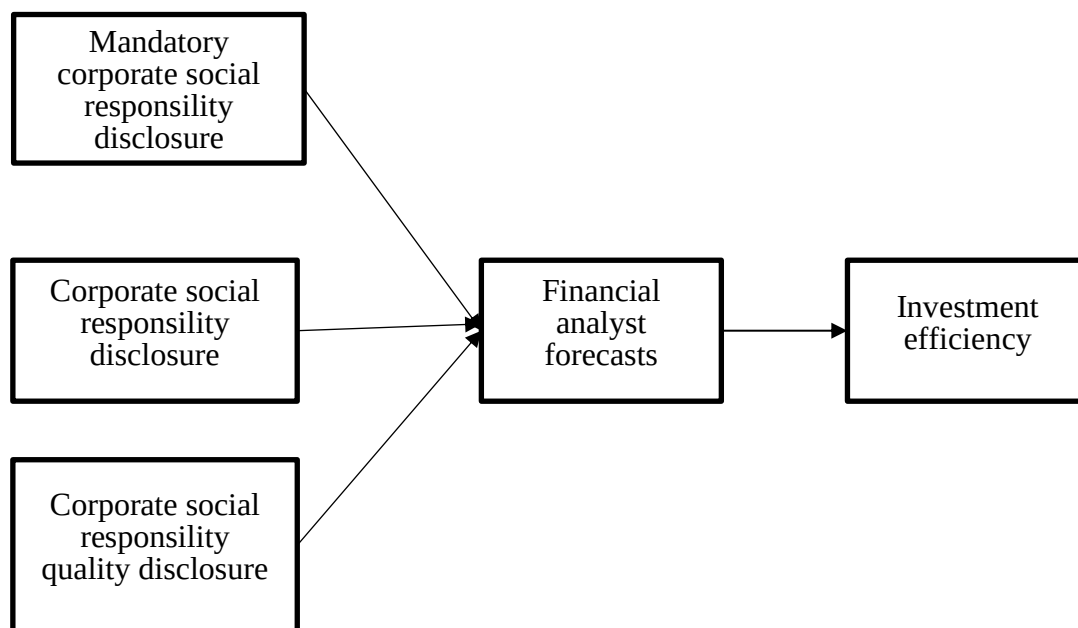


Figure 2.4: Theoretical Framework of the Study

Figure 2.4 illustrates that investment efficiency is the dependent variable of this study, while corporate social responsibility disclosure is the independent variable, and financial analyst forecasts are the mediating variable. It is anticipated that both CSR disclosure and financial analyst forecasts significantly influence investment efficiency.

The conceptual framework was developed based on theoretical foundations and empirical evidence related to corporate social responsibility disclosure and investment efficiency. It explains the relationship between mandatory CSR disclosure, CSR disclosure, and CSR disclosure quality in influencing investment efficiency through financial analyst forecasts. The framework considers mandatory CSR disclosure as a policy-driven factor, ensuring firms comply with disclosure requirements, while CSR disclosure and CSR disclosure quality represent long-term corporate transparency practices beyond regulatory mandates. Financial analyst forecasts serve as a key mediating variable, interpreting and transmitting CSR disclosure to the market. Investment efficiency, positioned as the dependent variable, reflects how well firms allocate resources in response to the quality and extent of their CSR disclosure. The directional arrows in the framework illustrate the indirect effect of CSR disclosure on investment efficiency via financial analysts assessments, emphasizing the importance of information intermediaries in capital markets.

Mandatory corporate social responsibility disclosure serves as a regulatory tool to reduce information asymmetry in capital markets. Information asymmetry theory suggests that managers often hold more information than external investors, leading to inefficient capital allocation (Myers & Majluf, 1984). Mandatory CSR disclosure ensures firms provide standardized non-financial information, giving financial analysts and investors better insights into corporate sustainability and ethical practices. This improves market transparency, strengthens financial analyst forecasts, and enhances investor trust. According to signaling theory, firms that disclose CSR activities send positive signals to the market, increasing investment efficiency (Moratis, 2018).

Beyond regulatory enforcement, stakeholder theory emphasizes that firms committed to CSR disclosure build stable relationships with investors, regulators, and the

public (Morsing & Schultz, 2006). Long-term CSR disclosure signals strong governance and social responsibility, attracting institutional investors and lowering capital costs. Similarly, reputation theory suggests that high-quality CSR disclosure enhances corporate credibility, leading to better market perceptions and increased investment efficiency (Abernathy et al., 2017). Firms maintaining transparent CSR disclosure build stronger reputations, making it easier to access capital and improve investment outcomes.

Financial analyst forecasts act as intermediaries, processing CSR disclosure to mitigate information asymmetry. High-quality CSR disclosure allows financial analysts to produce more accurate earnings forecasts, reducing speculation and improving investor decision-making. This aligns with signaling theory, as firms with transparent CSR disclosure practices differentiate themselves from less transparent competitors. Strong financial analyst forecasts help firms secure external financing, optimize capital allocation, and enhance investment efficiency.

This study integrates information asymmetry theory, reputation theory, signaling theory, and stakeholder theory to examine how different CSR disclosure mechanisms, including mandatory disclosure driven by policy, as well as CSR disclosure and its quality as reflections of long-term commitment, influence investment efficiency through analyst forecasts. The research emphasizes the significance of transparency and corporate accountability in enhancing capital market efficiency.

2.13 Summary

The literature review covers existing and empirical studies on the mediating role of financial analyst forecasts in the relationship between corporate social responsibility (CSR) disclosure and investment efficiency. This study contributes to this body of knowledge by

incorporating multiple theoretical perspectives, including signaling theory, reputation theory, stakeholder theory, and information asymmetry theory, to explain how financial analysts facilitate the transmission of CSR information to improve investment efficiency. Prior research has indicated that CSR disclosure enhances transparency, reduces information asymmetry, and strengthens corporate reputation, ultimately affecting firms' investment behaviors.

Moreover, financial analyst forecasts serve as essential intermediaries in the capital market, interpreting CSR disclosure to provide investors with more accurate and comprehensive forecasts. These forecasts help mitigate capital misallocation, reduce financing constraints, and improve firms' investment efficiency. While previous studies have examined the direct impact of CSR disclosure on firms investment, fewer have focused on the role of analysts in this process. This study bridges this gap by investigating how financial analysts process CSR disclosure information to influence investment decisions, thus offering new insights into the long-term implications of CSR disclosure on market efficiency.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The chapter outlines the research methodology, which includes the research design, estimation models, measures of dependent and independent variables, samples, and data sources. The goal of this chapter is to investigate the mediating role of financial analyst forecasts between corporate social responsibility disclosure and investment efficiency in the context of mandatory disclosure of the short- and long-term effects of social responsibility.

3.2 Research Approach

The chapter uses a quantitative method to test the hypotheses. Based on previous studies, the quantitative analysis is divided into two parts: one part is used to test the short-term effects of mandatory social responsibility disclosure, while the other is used to test the long-term effects.

3.3 Sample and Data Source

This study investigates the influence of financial analyst forecasts on corporate social responsibility (CSR) disclosure and corporate investment efficiency by using a sample of Chinese firms listed in the Shanghai and Shenzhen A-share markets from 2006 to 2022. Given that China implemented its mandatory CSR disclosure policy in December 2008, the year 2008 is adopted as the baseline year for evaluation. To assess the short-term effects of the policy, a sub-sample consisting of 5,537 firm-year observations from 2006 to 2011 is constructed. Firms from the years 2006 to 2007 serve as the control group (non-CSR disclosure firms), while those from 2008 to 2011 constitute the treatment group (firms

subject to mandatory CSR reporting). The difference in differences method is employed to estimate the policy's causal impact. Given that mandatory CSR disclosure has been in effect for over fourteen years, this study also aims to explore its long-term implications for the investment efficiency of publicly listed firms. Accordingly, a panel data set covering A-share listed firms from 2008 to 2022 is used to capture extended effects.

There are two main reasons for selecting this sample. First, data on listed firms are more readily available and reliable compared to non-listed firms, as relevant information can be obtained from annual reports, corporate websites, and third-party financial databases, which facilitates empirical testing. Second, the 2006 to 2022 time frame allows for a comprehensive examination of changes in both the capital market and CSR disclosure practices in China. The year 2006 represents a critical point at which CSR awareness and reporting began to gain traction, while the inclusion of data up to 2022 ensures that the analysis reflects the most recent developments and policy effects. Examines the influence of financial analyst forecasts on corporate social responsibility disclosure and corporate investment efficiency using Chinese companies with A-share listings in Shanghai and Shenzhen from 2006 to 2022.

Following the collection of relevant data, the screening principles for the preliminary data are as follows:

- i. Excluding all financial firms from the sample due to the significant differences in the structure of the statements between the financial and non-financial sectors;

- ii. Disregarding any enterprises with financial issues, including ST and *ST, because the peculiar financial conditions and activities of these organizations cannot guarantee the reliability and comparability of accounting information;
- iii. Eliminating listed companies with incomplete data;
- iv. Removing companies with voluntary disclosure from the sample.

After the above process, a total of 25,552 samples are obtained, which are divided into two sub-samples according to the research needs: the first is the difference-in-differences (DID) model sub-sample to study the short-term impact of mandatory corporate social responsibility disclosure policy, specifically including a total of 5,442 samples from 2006-2011, of which 1,156 are from the treatment group (mandatory CSR reporting firms), and 4,286 are from the control group (non-CSR disclosure firms); the second is the two-fixed-effects model sub-sample to study the long-term impact of the policy. It includes 24,235 samples from 2008-2022, with 4,707 mandatory corporate social responsibility disclosure samples and 19,528 non-disclosure samples. The list of voluntary corporate social responsibility disclosure is found through a search on the manually structured Juchao Information Website. The financial and corporate governance data are drawn from the China Stock Market & Accounting Research Database (CSMAR), whereas EXCEL and STATA17 software are used for all data processing and statistical analysis in this paper. Additionally, all continuous variables are trimmed at the 1% level to minimize the effect of anomalies.

3.4 Definition and Measurement of Variables

The variables involved in this study include dependent variables, independent variables, mediator variables, control variables, and propensity score matching (PSM) matched variables. Table 3.1 provides a summary of all variables.

3.4.1 Dependent Variable

The dependent variable in the research is investment efficiency (Inv). The Richardson model measures the efficiency of firm investment in terms of actual investment compared to expected investment, and the results are robust (Richardson, 2006). The model is frequently utilized in the research of investment efficiency in the A-share market (Li & Wang, 2010; Lv & Xiong, 2022; Zhang et al., 2022). In particular, since the original calculation of corporate investment efficiency responds to inefficient investment, it is multiplied by -1 in Equation 3.1 to measure investment efficiency. The larger the residuals, the higher the firm's investment efficiency.

$$\begin{aligned} Inv_{i,t} = & \alpha_0 + \alpha_1 Cash_{i,t-1} + \alpha_2 Growth_{i,t-1} + \alpha_3 Age_{i,t-1} \\ & + \alpha_4 Size_{i,t-1} + \alpha_5 Return_{i,t-1} + \alpha_6 Inv_{i,t-1} \\ & + \alpha_7 Lev_{i,t-1} + Industry + Year + \varepsilon_{i,t} \end{aligned} \quad \text{Equation 3.1}$$

In this model, the new investment $Inv_{i,t}$ is calculated by the formula:

$$\begin{aligned} Inv_{i,t} = & CAPEX_{i,t} + Aquisiton_{i,t} + RD_{i,t} - salePPE_{i,t} \\ & - InvestMaintain_{i,t} \end{aligned} \quad \text{Equation 3.2}$$

$CAPEX_{i,t}$ is capital expenditures, which are divided into two accounts: "cash paid for the construction of fixed assets, intangible assets, and other long-term assets" and "net cash paid for the acquisition of subsidiaries and other business units." $Aquisiton_{i,t}$ represents merger and acquisition expenses, while $RD_{i,t}$ represents research and development expenses. $salePPE_{i,t}$ is the account for "net cash recovered from the disposal of fixed assets, intangible assets, and other long-term assets" plus the account "net cash paid

for the disposal of subsidiaries and other business units." $InvestMaintain_{i,t}$ indicates replacement investment, which comprises the accounts for "depreciation of fixed assets, depletion of oil and gas assets, and depreciation of productive biological assets". $A_{i,t-1}$ is the total assets at the beginning of the period.

In the model, " $Growth_{i,t-1}$ " represents the revenue growth rate from the prior period, which is used to show the firm investment potential. The prior period's cash assets are represented by $Cash_{i,t-1}$. $Age_{i,t-1}$ represents the firm's age during the previous time frame. $Size_{i,t-1}$ represents the size of the assets in the prior period, which is equal to the logarithm of the sum of the prior period's assets plus one. It also represents the prior period's stock return. It also represents the prior period's stock return. $Lev_{i,t-1}$ represents the firm's leverage; $Inv_{i,t-1}$ represents the fresh investment made in the preceding period; Industry and Year are dummy variables that represent the relevant industry and year. This model is subjected to OLS regression, and the residuals computed from the regression outcomes are utilized to assess investment efficiency.

3.4.2 Mediating Variables

Prior research finds that financial analyst earnings forecast is a reaction to management earnings forecasts (Baginski & Hassell, 1990; Waymire, 1986). As a mediator variable, This research focuses on financial analyst forecast accuracy in our study. According to Wang et al. (2015), the study uses the opposite of financial analyst forecasts error to measure financial analyst forecasts.

$$AnalystF_{i,t} = - \frac{|\text{Mean}(FEPS_{i,t}) - MEPS_{i,t}|}{Price} \quad \text{Equation 3.3}$$

In this context, AnalystF_{it} stands for financial analyst forecast accuracy, which calculates the absolute difference between financial analyst forecasted Earnings Per Share (EPS) and the actual EPS. EPS represents earnings per share. $\text{Mean}(\text{FEPS}_{it})$ denotes financial analyst forecasted average earnings per share, MEPS_{it} represents the actual earnings per share of the target company, and Price denotes the stock price at the end of the period. Equation 3.3 divides financial forecast accuracy by the stock price, which standardizes financial analyst forecast accuracy so that it is independent of the firm size and stock price. Financial analyst forecasts accuracy is measured by multiplying the absolute difference between forecast EPS and actual EPS by -1, multiplied by the stock price at the beginning of the fiscal year, with larger values of this indicator indicating more accurate analyst forecasts.

3.4.3 Independent Variables

The first independent variable is mandatory corporate social responsibility disclosure, which represents the policy effect and is measured by the $\text{Treat} \times \text{Period}$ interaction term. The policy dummy variable Treat and the time Period dummy variable post for the required disclosure of corporate social responsibility are established in accordance with the model design requirements. Specifically, the policy dummy variable measures whether a listed company is subject to a mandatory disclosure policy and takes the value of 1 for a listed company under a mandatory corporate social responsibility disclosure policy as of December 31, 2008, or 0 otherwise. The time Period dummy variable is used to differentiate between the periods before and after the corporation is affected by the policy. Since the policy's actual impact occurs in the year 2008, the period 2008-2011 is designated as the policy's "after" period and is assigned the value 1, while the period 2006-2007 is designated as the policy's "before" period and is assigned the value 0.

Consistent with Zhang and Yang (2021), the CSR disclosure variable is defined as a binary indicator that equals 1 if the firm is subject to mandatory CSR disclosure requirements, and 0 otherwise. Since voluntary disclosure of CSR differs from mandatory disclosure in terms of motivation, voluntary disclosure CSR samples are not considered in this study.

In addition, CSRDQ represents the quality of CSR disclosure. To better measure the relationship between post-mandatory disclosure policy CSR and investment efficiency, this study uses the CSR quality of a mandatory disclosure sample. Stakeholder theory posits that a business's interactions with its stakeholders define its corporate social responsibility and that an enterprise has fulfilled its social obligations when it addresses and meets the demands and expectations of its stakeholders (Clarkson, 1995). Therefore, this research obtains data on the quality of CSR disclosure from CSMAR based on previous literature (Rauf et al., 2020; Yuan et al., 2022). China Stock Market & Accounting Research Database (CSMAR) documents corporate social responsibility activities. The CSMAR guidelines for evaluating CSR disclosure cover a wide range of sub-areas. These dimensions include all disclosure aspects such as employees' welfare, environmental protection, workplace safety, supplier protection, shareholder protection, customer protection, creditor protection, and the construction of the CSR system. Items with useful information received a score of 1, and items without useful information received a score of 0. A higher value of this indicator indicates that the company has better corporate social responsibility quality.

3.4.4 Control Variables

Based on the prior study (Ezzi et al., 2023; Rauf et al., 2020; Saedi & Dastgir, 2017; Shagerdi et al., 2020; Zhang, 2023), the research selects financial factors that affect the investment efficiency of enterprises. These factors include firm size (Size), debt level (Lev),

asset growth rate (AssetGrowth), free cash flow (Cashflow), age of listed companies (ListAge), board size (Board), whether the chairman and general manager are the same person (Dual), and the proportion of shares held by the largest shareholder (Top1).

Size is the natural logarithm of year-end total assets. Different-sized businesses have varied motivations to influence corporate social responsibility disclosure (Udayasankar, 2008). Corporate social responsibility disclosure is substantially influenced by the size of the organization (Waluyo, 2017). The size of a firm affects its investment efficiency, with small firms often facing underinvestment, while large firms may tend to overinvest (Chi & Choi, 2017).

Lev, calculated as total liabilities at year-end divided by total assets at year-end, is an important indicator of a company's level of financial leverage and represents its ability to service debt. Irregularities in a company's investment plan may arise due to variations in the asset-liability ratio (Gong et al., 2023; Ling & Wu, 2022).

The ratio of net cash flow to total assets at the beginning of the period is an important financial metric that measures the efficiency and ability of an enterprise to generate cash over time by comparing its net cash flow (i.e., the difference between cash inflows and outflows from operating, investing, and financing activities) to its total assets at the beginning of the period. This ratio reflects the enterprise's ability to generate cash from its existing assets and is crucial in assessing liquidity, efficiency of capital utilization, and long-term financial health (Chen et al., 2016; Gugler et al., 2004; Wei & Zhang, 2008).

Asset growth rate reflects the increase in the size of a firm's assets over time, with investment being one of the main drivers of this growth. Additionally, the asset growth rate

can be seen as an indicator for assessing the efficiency of an enterprise's investments and the quality of its decisions (Cooper & Maio, 2019; Junaidi et al., 2019; Rauf et al., 2020).

Board size is measured as the natural logarithm of the number of members on the board of directors, which has significant implications for corporate governance and decision-making (Nor et al., 2017). Board diversity allows members to provide a broader perspective and more in-depth analysis when reviewing investment projects, thereby enhancing the quality and efficiency of investment decisions (Mirza et al., 2020; Sun & Zhang, 2021; Ullah et al., 2020).

ListAge is calculated as the current year minus the year of listing plus the natural logarithm of 1, which is often used to measure the maturity and market experience of a public company. Investors and analysts may consider the age at IPO as a factor in assessing the value and risk of a company. Companies that have been on the market for a long time may be viewed as more conservative investment choices due to their stability and predictability (Lundvall & Battese, 2000; Thaker & Mohamad, 2019).

Dual refers to the situation where the chairman (Chairman) and the chief executive officer (CEO) of a company are held by the same person. On the one hand, combining these roles can enhance the company's ability to seize market opportunities and make investment decisions quickly, potentially improving investment efficiency. On the other hand, it helps ensure that investment decisions align with the company's long-term development goals, thereby enhancing long-term returns on investment (Anton & Lin, 2020; Meng & Byun, 2020). However, excessive centralization of power may lead to insufficient oversight of management by the board of directors, weakening checks and balances on investment

decisions and increasing the risk of overinvestment or inefficient investment (Wei & Li, 2020).

The proportion of shares held by the largest shareholder is the ratio of shares held by the shareholder with the largest number of shares among all the shareholders of the company to the total shares of the company. This indicator is important for studying corporate governance, decision-making mechanisms, risk appetite, and other aspects. A higher proportion of shares held by the largest shareholder usually implies stronger control and higher equity concentration, which may lead to more effective supervision and management but may also increase the risk of infringing on the interests of minority shareholders (Wan et al., 2015). Additionally, the percentage of ownership of the largest shareholder affects the firm's decision-making process, risk-taking behavior, and foreign investment strategy (Chen et al., 2013; Jiang et al., 2018).

3.4.5 Matching Variables

When using the propensity score matching (PSM) method, selecting the matching variables is a critical step that directly affects the quality of the match and the final causal inference. Matching variables are those that may affect both mandatory corporate social responsibility disclosure and investment efficiency. By controlling for these variables, PSM reduces bias due to confounding factors and ensures the accuracy of the treatment effect estimates. According to Shan et al. (2023), this study estimates propensity scores using a probit model with firm size (Size), return on assets (Assetreturn), asset-liability ratio (Lev), industry (Industry), and age of firm listing (ListAge) as matching variables.

Size is the natural logarithm of year-end total assets. Different-sized businesses have varied motivations to influence social responsibility disclosure (Udayasankar, 2008).

Corporate social responsibility disclosure is substantially influenced by the size of the organization (Waluyo, 2017). The size of a firm impacts its investment efficiency, with small firms often facing underinvestment, while large firms may tend to overinvest (Chi & Choi, 2017).

AssetReturn refers to non-recurring gains divided by total assets at year-end. A higher return on assets typically reflects a well-structured governance system and effective management efficiency within the enterprise. It also indicates that the enterprise can effectively oversee and manage its investment projects, ensuring optimal utilization of resources (Bzeouich et al., 2019).

Lev, calculated as total liabilities at year-end divided by total assets at year-end, is an important indicator of a company's level of financial leverage and represents its ability to service debt. Irregularities in a company's investment plan may arise due to variations in the asset-liability ratio (Gong et al., 2023; Ling & Wu, 2022).

ListAage is calculated as the current year minus the year of listing plus the natural logarithm of 1, which is often used to measure the maturity and market experience of a public company. Investors and analysts may consider the age at IPO as a factor in assessing the value and risk of a company. Companies that have been on the market for a long time may be viewed as more conservative investment choices due to their stability and predictability (Lundvall & Battese, 2000; Thaker & Mohamad, 2019).

Table 3.1: Variable Table

Variable types	Variable symbol	Name	Measurement	Sources
Dependent variable	Inv	Investment Efficiency	The residuals calculated by the Richardson model are multiplied by -1.	Richardson (2006)
Independent variable	Treat	Policy Dummy Variable	The dummy variable for mandatory CSR report disclosure is set to 1 for enterprises required to disclose CSR reports and 0 for those not subject to mandatory disclosure.	Wang et al. (2018)
	Period	Year Dummy Variable	The dummy variable is set to 0 for the years before and including the CSR report mandatory disclosure period (2006–2007) and 1 for the years following the disclosure requirement (2008–2011).	Wang et al. (2018)
	MCSR	Treat*Period	Policy effect	Wang et al. (2018)
	CSR	Corporate Social Responsibility Disclosure	The dummy variable equals 1 if firms mandatorily disclosed social responsibility reports during the sample observation period and 0 otherwise.	Zhong and Gao (2017)
	CSRQ	Quality of Social Responsibility Disclosure	The 8 aspects of social responsibility in the CSMAR social responsibility research sub-base were selected as the basic criteria for measuring the quality of CSR information. Each aspect was assigned a value of 1 if disclosed and 0 if not disclosed.	Yuan et al. (2022)

Table 3.1 continued

Mediating variable	AnalystF	Financial analyst forecast	Financial analyst forecast is represented by analyst forecast errors, which measure the exact difference between the average EPS forecast and the actual EPS, scaled by the stock price at the beginning of the fiscal year. The result multiplied by -1 indicates the prediction accuracy. A larger score indicates a higher rate of accurate analyst forecasts and a lower rate of error.	Clement (1999), Hutton et al. (2012)
Match variable	Size	The scale of the asset	Natural logarithm of total assets at the end of the year.	Shan et al. (2023), Yan et al. (2022)
	AssetReturn	Return on assets	Non-recurring gains are divided by total assets at year-end.	Shan et al. (2023), Yan et al. (2022)
	LEV	Asset-liability ratio	Total liabilities at year-end divided by total assets at year-end.	Shan et al. (2023), Yan et al. (2022)
	ListAge	Number of years listed	Current year minus listed year plus the natural logarithm of 1.	Shan et al. (2023)
	Industry	Industry Classification	The 2012 industry classification was issued by the China Securities Regulatory Commission.	Shan et al. (2023)
Control variable	Size	The scale of the asset	Natural logarithm of total assets at the end of the year.	Cao et al. (2020), Zhang et al. (2016)
	Lev	Asset liability ratio	Total liabilities at year-end divided by total assets at year-end.	Benlemlih and Bitar (2018), Lara et al. (2016), (Chang et al., 2020)

Table 3.1 continued

	Cashflow	CashFlowStatus	Net cash flows from operating activities / total assets at the beginning of the period.	Chen et al. (2011)
	AssetGrowth	Asset growth rate	Total assets for the current year / Total assets for the previous year -1.	Bzeouich et al. (2019)
	Board	Board size	Natural logarithm of the number of board members.	Majeed et al. (2018)
	Dual	Whether the two posts are merged or not	The chairman of the board and the general manager are the same person; otherwise, 0.	Anton and Lin (2020)
	ListAge	Number of years listed	Current year minus listed year plus the natural logarithm of 1.	Shan et al. (2023), Chen et al. (2017), Chen et al. (2011)
	Top1	Largest holder rate	Number of shares held by the largest shareholder/total number of shares.	Chang et al. (2020)

3.5 Estimate Model

Mediation effects refer to the process by which one variable indirectly affects the dependent variable through another mediating variable. Mediation effect analysis is designed to reveal how the independent variable affects the dependent variable and help understand the processes underlying the relationship. The examination of mediation effects is a statistical technique used to investigate the transmission mechanism of the relationship between variables. Based on a restatement of the guidelines of Judd and Kenny (1981) and

Baron and Kenny (1986) for assessing mediation, the mediating impact is divided into four steps.

$$Y = \beta_{01} + \beta_{02}X + \omega_1 \quad \text{Equation 3.4}$$

$$Me = \beta_{011} + \beta_{012}X + \omega_2 \quad \text{Equation 3.5}$$

$$Y = \beta_{021} + \beta_{022}X + \beta_{023}Me + \omega_3 \quad \text{Equation 3.6}$$

The first phase investigates the relationship between the variables X and Y by evaluating and testing the coefficients β_{02} in the regression Equation 3.4. The objective of this stage is to verify whether the total effect of the independent variable X on the dependent variable Y is significant; the regression results should indicate significance. The second part of the analysis involves examining the relationship between the explanatory variable X and the prospective mediating variable M. This is achieved by evaluating the coefficient β_{012} , which illustrates the impact of X on M. The regression results in this stage should also be significant. Subsequently, the third step aims to establish the correlation between the variables M and Y while accounting for the independent variable X. This is done by evaluating the coefficients β_{023} in the regression Equation 3.6. The results should demonstrate a significant relationship between M and Y. The final step is to evaluate and test the coefficients of the paths β_{022} to determine whether the data support the establishment of the mediation hypothesis. If all the coefficients are significant and the coefficient β_{022} is smaller than β_{02} , it indicates that the mediating effect partially explains the effect of the independent variable on the dependent variable. This represents a partial mediation effect.

The coefficients of the indirect effects ($\beta_{012} * \beta_{023}$) should be non-zero when mediating effects are present (MacKinnon et al., 1995). However, this estimate of the indirect effect is susceptible to estimation error. Baron and Kenny (1986) suggest that the large sample test proposed by Sobel can be used to derive the standard error of the estimate of the indirect effect. However, the Sobel test relies on the assumption of a normal distribution for the sampling distribution of the indirect effects. In practical applications, this assumption often fails, especially when the sample size is small or the mediating effect is weak. Although the Sobel test is widely used, there are concerns about its validity in such situations.

In addition, in the classic Baron and Kenny four-step method, causal inference is used to confirm the presence of a mediating effect. However, MacKinnon et al. (2004) note that even if the individual paths in the model are not significant, a mediating effect may still be present, particularly in complex models. They recommend using nonparametric tests, such as the bootstrap method, for more accurate estimation of mediating effects. According to the research by Preacher and Hayes (2008), a mediating effect can exist even if the total effect is not significant. The bootstrap method is favored for its accuracy in evaluating mediating effects. This method assesses the indirect effect of X on Y through the mediating variable M by calculating the product of the point estimates β_{012} and β_{023} .

According to the study by Shrout and Bolger (2002), the bootstrap method involves performing repeated sampling from the data, calculating the indirect effect in each sample, and then estimating the confidence interval for the indirect effect based on these repeated samples. If the confidence interval does not include zero, it indicates the presence of a mediating effect. The bootstrap percentile approach is used to accurately estimate these confidence intervals. In many cases, this method's confidence interval excludes zero, which supports the existence of a mediating effect, even if the overall effect of X on Y may not be

significantly different from zero. The efficacy of the testing strategy is enhanced by the precision of the mediation model.

3.5.1 Model for the Mediating Role of Financial Analyst Forecasts on the Relationship between MCSR Disclosure and Investment Efficiency

Mandatory corporate social responsibility disclosure in China was implemented in 2008, and previous studies have explored its impact on investment efficiency (Liu & Tian, 2021; Zhong & Xu, 2015). Financial analysts, as information intermediaries, influence investor decisions through their predictions and recommendations. This part of the study examines the short-term role of financial analyst forecasts in mediating the relationship between mandatory CSR disclosure and investment efficiency. To investigate the mediating effect of financial analyst forecasts (as outlined in H1) between mandatory CSR disclosure and investment efficiency, this study employs panel data and follows the four-step methodology established by Baron and Kenny (1986) and (Bolger et al., 1998). Panel data analysis offers notable advantages by accounting for individual heterogeneity and time effects. This approach enhances the accuracy and efficiency of estimations by integrating observations from multiple individuals across different periods.

Additionally, panel data mitigates multicollinearity issues and provides more reliable causal inferences, which are crucial for thorough policy evaluation and comparison. This methodology is especially well-suited for investigating firm behavior and the impact of policies. The four-step model is presented in Equations 3.7, 3.8, and 3.9.

$$\begin{aligned}
 Inv_{i,t} = & \beta_{10} + \beta_{11}Treat * Period_{i,t} + \beta_{12}Control_{i,t} \\
 & + \mu_i + \lambda_t + \varepsilon_{i,t}
 \end{aligned}
 \tag{Equation 3.7}$$

$$AnalystF_{i,t} = \beta_{20} + \beta_{21}Treat * Period_{i,t} + \beta_{22}Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad \text{Equation 3.8}$$

$$Inv_{i,t} = \beta_{30} + \beta_{31}Treat * Period + \beta_{32}AnalystF_{i,t} + \beta_{33}Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad \text{Equation 3.9}$$

Investment efficiency ($Inv_{i,t}$) is measured as the absolute value of residuals. $Treat*Period$ represents mandatory corporate social responsibility disclosure. Firm size (Size), Firm financial leverage ratio (LEV), asset growth rate (AssetGrowth), corporate cash flow (Cashflow), age of listed companies (ListAge), board size (Board), whether the chairman and chief executive officer are the same person (Dual), and the shareholding ratio of the largest shareholder (TOP1) are all control variables used for firm characteristics. Financial analyst forecast accuracy ($AnalystF_{i,t}$) is included to measure analyst forecasts. To address the effect of unmeasurable omitted variables, the study employs a two-way fixed effects panel regression model, where μ_i represents individual firm-fixed effects and λ_t represents year-fixed effects.

The examination of mediating effects encompasses various essential stages, as demonstrated in Models 3.7-3.9. Equation 3.7 examines the comprehensive impact of mandatory corporate social responsibility disclosure on investment efficiency, with the coefficient β_{11} serving as a defining characteristic of this effect. Additionally, coefficient β_{21} in Equation 3.8 characterizes the influence of mandatory corporate social responsibility disclosure on financial analyst forecasts. Equation 3.9 uses financial analyst forecasts as a mediating variable to account for the direct impact of mandatory corporate social responsibility disclosure on investment efficiency. The indirect influence of mandatory

corporate social responsibility disclosure on investment efficiency is revealed by β_{32} , which takes financial analyst forecasts mediating path.

Given that Equation 3.7 in mediated effects examines the impact of mandatory social responsibility disclosure policies on investment efficiency, this study constructs a difference-in-differences (DID) model to assess the causal impact of a given policy or intervention. The DID model removes the interference of time and individual fixed effects on the estimation results by comparing the differences between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) before and after the treatment. Treat is a dummy variable that assigns a value of 1 if the firm implemented the mandatory corporate social responsibility disclosure policy in 2008 (the treatment group), and takes the value of 0 otherwise (the control group). Period denotes the time of implementation of the policy, assigning a value of 1 for 2008 and later since the mandatory corporate social responsibility disclosure policy was implemented in 2008, and takes the value of 0 for the period before 2008. Treat*Period is an interaction term that indicates the implementation of the mandatory corporate social responsibility disclosure. To avoid the problems of covariance and multicollinearity, this study does not include two separate dummy variables for Treat and Period, as the model already incorporates individual firm-fixed effects and year-fixed effects.

Equation 3.7 is the DID model. The assessment of the policy effects of mandatory CSR disclosure on investment efficiency begins with the implementation of the following research design procedure:

- i. Benchmark regression in the DID Model: This stage is crucial in the study of the DID model. The regression of the DID model yields the core explanatory variable coefficients (interaction terms). The sign, size, and significance of

these coefficients are used to assess the impact of the studied policy on the explanatory variables, which in turn evaluates the policy implementation effects on the subject population. By contrasting the size and significance of the coefficients of the main explanatory variables in various contexts, This study selects control variables, firm and year fixed effects for the regression to determine the most suitable DID model for empirical research. In this study, the interaction between the independent variable (Treat*Period) and the dependent variable (investment efficiency) was examined in two scenarios: one without firm and year fixed effects and the other with them.

- ii. The parallel trend test is the most important step in constructing the DID model and is a prerequisite for its implementation. It is one of the core assumptions of the difference-in-differences (DID) method, which is used to test whether the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) have similar development trends before the policy or intervention occurs. Before the DID model can be used for empirical analysis, the parallel trend test must be carried out. If the variables pass the parallel trend test, the DID model can be initially constructed for empirical analysis. If not, the model cannot proceed. After successfully passing the parallel trend test, the DID model requires further baseline regression analysis, the placebo test, and the robustness test. Completing this process ensures that the "policy effect" of the DID model is more accurate and realistic. Therefore, mastering the practical methods of parallel trend testing is essential for using the DID model.

- iii. In the DID model, the placebo test is employed to rule out the impact of non-policy elements on the study findings. This is done to prevent changes in the research respondents' perceptions due to the impending policy implementation, which could lead to a "policy effect" fallacy. The most common placebo test is the individual test, which involves plotting kernel density. Generally, the more points that are clustered close to zero on the horizontal axis, the more trustworthy the "policy effect" of the DID model is.
- iv. In addition, following Ghimire et al. (2024), PSM-DID experiments are conducted to address potential "selection bias" due to the initial differences between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms). Given the possibility of non-random selection of mandatory social responsibility disclosure samples, the propensity score matching (PSM) method is used in the forthcoming study to establish a match between the required disclosure group and the non-disclosure group.

Lastly, regarding the mediating effect, Shrout and Bolger (2002) suggest that the bootstrap approach can be utilized to assess the mediating effect in the study. This study examines the indirect effect of a mandatory corporate social responsibility disclosure policy on investment efficiency, as mediated through financial analyst forecasts. The bootstrap test result with a confidence interval omitting zero indicates that the mediation effect is significant. By employing the bootstrap methodology to evaluate and examine both direct and indirect effects, the issue of asymmetrical distributions of mediator and outcome variables is resolved, thereby enhancing the precision of the mediation analysis. The study

performed a bootstrap test to evaluate the robustness of the mediating effect (Biesanz et al., 2010).

3.5.2 Model for the Mediating Role of Financial Analyst Forecast on the Relationship between CSR Disclosure and Investment Efficiency

The present study investigated the effects of mandatory corporate social responsibility disclosure policy on investment efficiency during the current implementation period by employing the difference-in-differences (DID) model. Additionally, the study examined the mediating role of financial analyst forecasts in the relationship between mandatory corporate social responsibility disclosure and investment efficiency.

However, since the mandatory corporate social responsibility disclosure policy was implemented in 2008 and has been in effect for 14 years, this study aims to explore its long-term effects on the investment efficiency of listed companies. To achieve this, the research is developed in both quantitative and qualitative dimensions. On the one hand, the study investigates the mediating effect of financial analyst forecasts on the relationship between CSR disclosure and investment efficiency over the long term, comparing firms with mandatory CSR disclosure to those without (as mentioned in hypothesis 2). On the other hand, the study examines the mediating role of financial analyst forecasts on the relationship between CSR quality and investment efficiency, focusing on the long-term effects of the policy (as mentioned in hypothesis 3).

This section aims to examine the potential mediating effect of corporate social responsibility disclosure and investment efficiency on the long-term policy effect of mandatory corporate social responsibility disclosure, as hypothesized in hypothesis 2. To achieve this, a specific model specification is employed, following the four-step method outlined by (Baron & Kenny, 1986).

$$Inv_{i,t} = \gamma_0 + \gamma_1 CSR_{i,t-m} + \gamma_2 Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad \text{Equation 3.10}$$

$$AnalystF_{i,t} = \gamma_3 + \gamma_4 CSR_{i,t} + \gamma_5 Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad \text{Equation 3.11}$$

$$Inv_{i,t} = \gamma_6 + \gamma_7 CSR_{i,t} + \gamma_8 AnalystF_{i,t} + \gamma_9 Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad \text{Equation 3.12}$$

$CSR_{i,t}$ is a dummy variable indicating corporate social responsibility disclosure, equal to 1 if a listed firm subject to the mandatory disclosure policy discloses social responsibility reports during the sample observation period, and 0 otherwise. $AnalystF_{i,t}$ is measured based on the accuracy of financial analyst forecasts. Inv represents the investment efficiency.

The examination of mediating effects involves several essential stages, as illustrated in Models 3.10–3.12. Equation 3.10 evaluates the overall impact of corporate social responsibility disclosure on investment efficiency, with coefficient γ_0 representing this effect. Equation 3.11 assesses the influence of corporate social responsibility disclosure on financial analyst forecasts, characterized by coefficient γ_4 . Equation 3.12 uses financial analyst forecasts as a mediating variable to examine the direct effect of CSR disclosure on investment efficiency. The indirect effect of corporate social responsibility disclosure on investment efficiency through financial analyst forecasts is captured by $\gamma_4 * \gamma_8$.

Shrout and Bolger (2002) suggested that the bootstrap approach can be used to assess the mediating effect in the study. The impact of corporate social responsibility disclosure on investment efficiency, as predicted by analysts, is the indirect effect examined in this study.

The bootstrap test results, with confidence intervals excluding zero, indicate that the mediation effect is significant. By employing the bootstrap methodology to evaluate both direct and indirect effects, the issue of asymmetrical distributions of mediator and outcome variables is addressed, thereby enhancing the precision of the mediation analysis.

3.5.3 Model for the Mediating Role of Financial Analyst Forecasts on the Relationship between CSR Disclosure Quality and Investment Efficiency

This section aims to examine the potential mediating effect of corporate social responsibility disclosure quality and investment efficiency on the long-term policy effect of mandatory disclosure, as hypothesized in hypothesis 3. To achieve this, a specific model specification is employed, following the four-step method outlined by (Baron & Kenny, 1986).

$$Inv_{i,t} = \rho_0 + \rho_1 CSR DQ_{i,t} + \rho_2 Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad \text{Equation 3.13}$$

$$\begin{aligned} AnalystF_{i,t} = \rho_3 + \rho_4 CSR DQ_{i,t} + \rho_5 Control_{i,t} \\ + \mu_i + \lambda_t + \varepsilon_{i,t} \end{aligned} \quad \text{Equation 3.14}$$

$$\begin{aligned} Inv_{i,t} = \rho_6 + \rho_7 CSR DQ_{i,t} + \beta_8 AnalystF_{i,t} + \rho_9 Control_{i,t} \\ + \mu_i + \lambda_t + \varepsilon_{i,t} \end{aligned} \quad \text{Equation 3.15}$$

$CSR DQ_{i,t}$ is the scorer of the company's participation in social responsibility activities. The China Stock Market & Accounting Research Database (CSMAR) documents corporate social responsibility activities. The CSMAR guidelines for evaluating CSR disclosure cover a wide range of sub-areas. These dimensions include all disclosure aspects such as employees' welfare, environmental protection, workplace safety, supplier protection,

shareholder protection, customer protection, creditor protection, and the construction of the CSR system. Items with useful information received a score of 1, and items without useful information received a score of 0. $Analyst_{i,t}$ is measured in terms of financial analyst forecast accuracy. $Inv_{i,t}$ represents the investment efficiency.

The examination of mediating effects encompasses various essential stages, as demonstrated in Models 3.13-3.15. Equation 3.13 assesses the comprehensive impact of corporate social responsibility disclosure quality on investment efficiency, with the coefficient ρ_1 defining this effect. Additionally, coefficient ρ_4 in Equation 3.14 characterizes the influence of corporate social responsibility disclosure quality on financial analyst forecasts. Equation 3.15 uses financial analyst forecasts as a mediating variable to account for the direct impact of corporate social responsibility disclosure quality on investment efficiency. The indirect influence of corporate social responsibility disclosure quality on investment efficiency through financial analyst forecasts is revealed by $\rho_4 * \rho_8$.

Shrout and Bolger (2002) suggested that the bootstrap approach can be utilized to assess the mediating effect in this study. This study investigates how the quality of corporate social responsibility disclosure indirectly affects investment efficiency through financial analyst forecasts. The bootstrap test results, with a confidence interval excluding zero, indicate that the mediation effect is significant. By employing the bootstrap method to evaluate both direct and indirect effects, issues related to asymmetrical distributions of mediator and outcome variables are addressed, thereby enhancing the precision of the mediation analysis.

3.6 Endogeneity Test

According to Wen and Sun (2023), there may be "selection bias" due to slight differences in the initial conditions between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms), considering the potential for non-random selection of corporate social responsibility disclosure samples. To address this issue, the forthcoming study employs the propensity score matching (PSM) method to match firms required to disclose corporate social responsibility reports with those not required to do so. The specific steps are as follows:

- i. Following the extant body of literature, this research identifies five matching variables that are common attributes of businesses: enterprise size, asset-liability ratio, return on assets, industry affiliation, and listing age.
- ii. The study employs the logit model to compute estimated propensity scores for both the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms). A propensity score is calculated for each firm based on the matching factors.
- iii. The next step is to apply propensity score matching, which pairs each treatment group company with a control group company. The nearest neighbor matching approach is used during this process, utilizing a caliper range of 1 to 4 with replacement. The caliper is configured with a propensity score of 0.5 times the standard error. The logit model is defined as follows based on the previously mentioned matching variables.

$$\begin{aligned}
\text{Logit}(\text{CSR}) = & \rho_0 + \rho_1 \text{Size}_{i,t} + \rho_2 \text{AssetReturn}_{i,t} \\
& + \rho_3 \text{Lev}_{i,t} + \rho_4 \text{ListAge}_{i,t} + \rho_5 \text{Industry}_i \\
& + \omega_{i,t}
\end{aligned}
\tag{Equation 3.16}$$

Last, this study examines the mediating role of analyst forecasts in the long-term impact of corporate social responsibility disclosure on investment efficiency, using sample data that has been subjected to propensity score matching.

3.7 Robustness Test

According to Kong et al. (2020), if the above results are significant, this study adopts the ordinary least squares (OLS) method with clustered robust standard errors for robustness testing. Ordinary least squares is a basic method widely used in regression analysis, which relies on variance assumptions such as homogeneity and independence of error terms, which are suitable for unbiased estimation of linear relationships between variables. Adding industry and year control variables to the OLS model can more accurately capture the relationship between the main research variables and reduce the impact of confounding factors on the estimation results. This approach not only enhances the external validity and robustness of the research results, but also improves the applicability of the research results in different contexts.

3.8 Chapter Summary

This chapter describes the research methodology adopted in this study, including the research design, sample selection, and data collection methods. It explains the rationale for adopting a positivist paradigm that systematically examines the relationship between corporate social responsibility (CSR) disclosure, financial analyst forecasts, and investment efficiency by testing the hypotheses in the model. The chapter also details the

operationalization of the variables by defining the independent variables, including mandatory CSR disclosure, CSR disclosure, and CSR disclosure quality, as well as the dependent variable, investment efficiency, and the mediating variable, financial analyst forecasts. In addition, it describes the methodology used, including the difference-in-differences (DID) model, which assesses the short-term effects of mandatory CSR disclosure, and the fixed-effects model, which assesses the long-term effects of CSR disclosure and quality. The data for this study were obtained from the China Stock Market Accounting Research (CSMAR) database. In addition, this chapter discusses endogeneity and robustness to ensure the robustness of the empirical results. This chapter also describes the empirical testing of the theoretical model introduced in Chapter 2, which sets the stage for the data analysis and conclusions discussed in Chapter 4.

CHAPTER 4

FINDINGS AND DISCUSSION

4.1 Overview

The goal of this section is to investigate the role of financial analyst forecasts as a mediating factor on the relationship between corporate social responsibility disclosure and investment efficiency. This study analyzes mandatory CSR disclosure from the perspective of its implementation and explores its long-term effects. Specifically, the study examines the relationship among the three factors: CSR disclosure, CSR disclosure quality, and investment efficiency in the context of long-term effects.

This study includes two subsamples. Given that China implemented the mandatory CSR disclosure in December 2008, 2008 is used as the baseline year for evaluating the regulation effects. To investigate the short-term effects, a sub-sample covering 5,537 observations from 2006 to 2011 is utilized, with 2006-2007 serving as the control group and 2008-2011 as the experimental group, using a difference-in-differences (DID) model. For assessing the long-term effects, the study employs a subsample of 24,235 observations spanning from 2008 to 2022, comprising 4,707 observations for mandatory disclosure and 19,528 for non-disclosure.

To evaluate the impact of mandatory corporate social responsibility disclosure on investment efficiency, specifically whether mandatory corporate social responsibility disclosure enhances or diminishes investment efficiency compared to the pre-disclosure period, this study employs the difference-in-differences (DID) method. The DID method is effective for observing the exogenous effects of policies or significant events. To ensure the robustness of the assessment results, the study also conducts a parallel trend test, placebo

test, and PSM-DID test. Additionally, the mediating role of financial analyst forecasts between mandatory CSR disclosure and investment efficiency is analyzed using a mediating effect model and the bootstrap method.

Since the mandatory disclosure of social responsibility has been in effect since 2008, lasting 14 years, this study aims to deeply investigate its long-term effects on the investment efficiency of listed companies. To achieve this, the study first selects panel data from A-share listed companies in Shanghai and Shenzhen for the period 2008-2022. This data is compared with that from companies not subject to CSR disclosure to explore the long-term impact of mandatory corporate social responsibility disclosure, with a focus on the mediating role of financial analyst forecasts between CSR disclosure and investment efficiency. Additionally, the study examines how the quality of corporate social responsibility disclosure affects investment efficiency by analyzing the mediating role of analyst forecasts in the long-term effects of mandatory corporate social responsibility disclosure using a mediating effects model. If mediating effects are identified in these analyses, the study applies propensity score matching (PSM) to assess endogeneity and perform robustness tests on alternative models.

The structure is organized as follows: Section 4.1 provides a general introduction to the research framework and outlines the structure of the chapter. Section 4.2 explores the mediating effect of financial analyst forecasts on the relationship between mandatory CSR disclosure and investment efficiency. It includes descriptive statistics, mean difference tests, correlation analysis, a total effect test, parallel trend test, placebo test, and the application of propensity score matching combined with difference-in-differences (PSM-DID). This is followed by regression analysis and the bootstrap method to assess the robustness and significance of the mediating effect. Section 4.3 shifts focus to CSR disclosure quality,

examining how it affects investment efficiency through the channel of financial analyst forecasts. This part includes mediation regressions, and bootstrap analysis, and addresses potential endogeneity and robustness issues to ensure the credibility of the empirical findings. Section 4.4 investigates the mediating effect of financial analyst forecasts on the relationship between CSR disclosure quality and investment efficiency. Regression and bootstrap techniques are employed to test the mediation pathway. Section 4.5 offers a discussion of the findings, synthesizing the results from the previous sections to draw meaningful conclusions and implications from the study. Finally, section 4.6 concludes the chapter, summarizing the key results and setting the stage for subsequent analysis.

4.2 The Mediating Effect of Financial Analyst Forecasts on the Relationship between MCSR Disclosure and Investment Efficiency

This section explores the mediating effect of financial analyst forecasts on the relationship between mandatory CSR disclosure and investment efficiency. The research involves 5,442 samples of Chinese A-share listed companies in Shanghai and Shenzhen from 2006 to 2011, utilizing data from the China Stock Market Research Database. The study uses mandatory corporate social responsibility disclosure issued by the SSE and SZSE at the end of 2008 as the cut-off point, defining the mandatory corporate social responsibility disclosure period as 2008-2011 and the pre-policy period as 2006-2007. This is denoted by the time dummy variable Period (T. Lu et al., 2021). The second step of the study involves splitting the sample into the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms). It also establishes the mandatory corporate social responsibility disclosure dummy variable Treat, which takes a value of 1 for companies subject to the mandatory corporate social responsibility disclosure during the mandatory corporate social responsibility disclosure period and 0 otherwise. Statistical analyses conducted in this

section include descriptive analysis, correlation analysis, parallel trends, PSM-DID, placebo test, mediation effects regression, and bootstrap test.

4.2.1 Descriptive Statistics

Investment efficiency is measured using the absolute value of the residuals from the Richardson model. The dependent variable is the mandatory corporate social responsibility disclosure, represented by the interaction term post and treat in the difference-in-differences (DID) model. The mediating variable is financial analyst forecast accuracy, used as a proxy for financial analyst forecasts. Control variables include Size, Lev, AssetGrowth, Cashflow, ListAge, Board, Dual, TOP1.

Table 4.1: Descriptive Statistics for Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Inv	5442	-.087	.097	-.917	0
Treat*Period	5442	.211	.408	0	1
AnalystF	5442	-.029	.046	-.433	0
period	5442	.758	.428	0	1
Treat	5442	.212	.409	0	1
Size	5442	21.974	1.173	19.317	25.782
Lev	5442	.498	.185	.027	.879
AssetGrowth	5442	.207	.333	-.373	3.484
Cashflow	5442	.055	.081	-.223	.283
ListAge	5442	2.192	.52	0	2.996
Board	5442	2.212	.201	1.609	2.708
Dual	5442	.14	.347	0	1
TOP1	5442	37.388	15.145	8.915	75.843

Table 4.1 summarizes the descriptive statistics for all variables from 2006 to 2011. The average investment efficiency of the enterprises is -0.087, with a range from -0.917 to 0. The

results show that inefficient investment is common among the sample firms. By contrasting the minimum and mean values, in addition to the range and standard deviation, one can further demonstrate the considerable variability in firms' investment efficiency. Chen et al. (2022) found that Chinese companies suffer from inefficient investment.

The mean value of Treat*period is 21.1%, indicating that 21.1% of the firms in the sample are affected by mandatory corporate social responsibility disclosure. The mean value for Treat is 21.2%, which shows that 21.2% of the observed units are in the treatment group, while the remaining 79.8% are in the control group with no intervention. This statistical result is consistent with (Wang et al., 2018). The Period mean value is 75.8%, meaning that approximately 75.8% of all observations are conducted after the intervention or treatment, so post-intervention observations account for 75.8% of the total.

The mean financial analyst forecasts is -0.029, indicating a low overall accuracy in financial analyst forecasts, which could be attributed to the high level of uncertainty in the stock market (Kwon, 2002). Furthermore, the range of values from -0.433 to 0 reveals substantial variability, suggesting considerable differences in financial analyst forecast accuracy. Similar differences between the mean values have been reported in previous literature (Lin et al., 2022).

The mean firm size is 21.974, with a standard deviation of 1.173, indicating moderate variability among firms in the sample. The values range from 19.317 to 25.782, suggesting that the dataset primarily comprises medium-to-large firms. Firm size plays a crucial role in investment efficiency, as larger firms generally benefit from greater access to capital, more robust governance frameworks, and a wider range of investment opportunities (Beck & Demirguc-Kunt, 2006). The relatively high mean value suggests that the firms in this sample are well-established and hold a substantial position in the market.

The average assets-to-debt ratio is 0.498, indicating that, on average, half of the assets of the analyzed organizations are funded by debt. The range of values, from 0.027 to 0.879, shows significant variation in financial leverage among the entities in the sample. These variations may be attributed to the distinct characteristics of different industries or the divergent financial strategies adopted by various organizations (Appiah et al., 2020).

The average asset growth rate is 0.207, with a minimum of -0.373 and a maximum of 3.484. This illustrates that, on average, company assets generally exhibit a positive growth trend within the specified sample or time frame. The range of asset growth rates, from -0.373 to 3.484, indicates significant variability in asset growth among different entities or periods. These discrepancies could be attributed to business strategies and capital structure (Selling & Stickney, 1989; Voulgaris et al., 2002).

The mean value of cash flow is 0.055, indicating that the company can generate a certain amount of funds in its daily operations. The minimum value of cash flow is -0.223, and the maximum value is 0.283, showing the diversity of the company in its management. McGuire et al. (1988) found that companies with stronger cash flow may be more capable of carrying out CSR disclosure.

The average age of listed companies is 2.192 years, indicating that the time since the listing of enterprises during the sample observation period is relatively short. The minimum value is 0, indicating that some companies may have just been listed or have not been listed for an entire year during the observation period. The maximum value is 2.996, close to 3 years, indicating that the longest-lasting time during the sample observation period is 3 years. The length of a firm's listing period may affect its performance in terms of social responsibility. Companies that have been listed for a longer time usually experience more

market supervision and social pressure, which may prompt them to fulfill their social responsibilities more actively (Cormier & Magnan, 1999).

The natural logarithmic mean of the number of boards of directors is 2.219, with a range from a minimum of 1.609 to a maximum of 2.708. This variability in the number of boards of directors among the studied entities indicates differences in board structures across companies or industries. Board size promotes corporate social responsibility disclosure (Alabdullah et al., 2019).

The average value indicating whether the chairman of the board and the managing director are the same person is 0.14, with a minimum of 0 and a maximum of 1. This shows that, in most cases, the chairman and managing director are not the same individual. This implies a higher degree of separation between the roles, with the chairman overseeing the board and the managing director or CEO managing the firm's day-to-day operations. The data reflects the diverse corporate governance structures across companies. According to Alabdullah et al. (2019), the dual role of the CEO is not conducive to the implementation of corporate social responsibility disclosure. Some organizations may choose to separate these positions to enhance transparency and minimize conflicts of interest, while others may consolidate the roles for strategic or cultural reasons.

The mean proportion of shares held by the largest shareholder is 37.88%. This finding suggests that the largest shareholder may exercise substantial control and significant influence over business decisions in several corporations. The range of shareholdings, from 8.915% to 75.843%, indicates considerable variability in shareholding structures among companies. While some companies have dispersed shareholdings, others exhibit a high concentration of shares controlled by the primary stakeholder. Cao et al. (2019) confirmed

that the higher the shareholding ratio of corporate shareholders, the worse the quality of corporate social responsibility disclosure.

4.2.2 Test for Differences in the Means of the Variables

In addition to the basic descriptive statistical analysis of the variables, this study also tested the differences in means of the explanatory, mediating, and control variables between the two sample groups: those with and without mandatory corporate social responsibility disclosure. Table 4.2 presents the results of the t-test for the variable means.

Table 4.2: Tests for Differences in the Means of the Variables

Variable	No disclosure group		Mandatory disclosure group		Mean-diff	t
	obs(0)	mean(0)	obs(1)	mean(1)		
Inv	4286	-0.089	1156	-0.082	-0.007**	-2.138
AnalystF	4286	-0.028	1156	-0.032	0.005***	3.238
Size	4286	21.722	1156	22.909	-1.187***	-33.521
Lev	4286	0.493	1156	0.518	-0.025***	-4.114
AssetGrowth	4286	0.204	1156	0.218	-0.014	-1.264
Cashflow	4286	0.054	1156	0.060	-0.007**	-2.534
ListAge	4286	2.160	1156	2.310	-0.150***	-8.779
Board	4286	2.199	1156	2.261	-0.062***	-9.360
Dual	4286	0.145	1156	0.119	0.026**	2.242
TOP1	4286	36.868	1156	39.314	-2.446***	-4.883

Note: The variable "Inv" represents the firm investment efficiency, calculated as the residuals of inefficient investment using Richardson model multiplied by -1. Larger values of "Inv" indicate higher investment efficiency. "AnalystF" is the mediating variable representing financial analyst forecasts, where larger values denote higher accuracy. "Treat*period" represents mandatory social responsibility disclosure. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. Statistical significance is indicated by * for the 10% level, ** for the 5% level, and *** for the 1% level.

The mean investment efficiency for enterprises in the no social responsibility disclosure group is -0.089, whereas for enterprises in the mandatory disclosure of CSR group, it is -0.082. This difference is statistically significant at the 5% significance level, indicating that investment efficiency is significantly higher for enterprises with mandatory social responsibility disclosure. This suggests that mandatory corporate social responsibility disclosure positively influences investment efficiency.

The mean value of financial analyst forecasts in the no-disclosure group is -0.028, while in the mandatory disclosure group, it is -0.032. This difference is statistically significant at the 1% level, indicating that prediction errors are higher in the mandatory disclosure group. This suggests that analysts face greater uncertainty or challenges when interpreting corporate information under mandatory disclosure conditions.

The mean value of enterprise size in the no social responsibility disclosure group is 21.722, while in the mandatory disclosure of CSR group, it is 22.909. This difference is statistically significant at the 1% level, indicating that enterprises with mandatory CSR disclosure are significantly larger than those without disclosure. This suggests that larger enterprises are more capable of or inclined to comply with mandatory social responsibility disclosure requirements.

The mean value of asset appreciation in the no social responsibility disclosure group was 0.204, while in the mandatory CSR disclosure group, it was 0.218. This indicates that firms with mandatory CSR disclosure experience higher asset appreciation than non-disclosing firms. This suggests that enterprises with mandatory CSR disclosure may perform better in terms of asset utilization and appreciation.

The mean cash flow for the no social responsibility disclosure group is 0.054, while for the mandatory CSR disclosure group, it is 0.060. This difference is statistically significant at the 5% level, indicating that enterprises with mandatory CSR disclosure have a significantly higher mean cash flow than those without disclosure. This suggests that firms with mandatory social responsibility reporting perform better in cash flow management.

The mean age of listed companies in the no social responsibility disclosure group is 2.160, whereas in the mandatory CSR disclosure group, it is 2.310. This difference is statistically significant at the 1% level, indicating that companies with mandatory CSR disclosure are significantly older than those without disclosure. This suggests that companies with a longer history are more likely to engage in corporate social responsibility disclosure.

The mean board size of listed companies in the no social responsibility disclosure group is 2.199, while in the mandatory CSR disclosure group, it is 2.261. This difference is statistically significant at the 1% level, indicating that companies with mandatory CSR disclosure have significantly larger boards compared to those without disclosure. This suggests a significant association between larger board size and corporate social responsibility disclosure.

The mean value of the dual role of chairman and CEO in the no corporate social responsibility disclosure group is 0.145, while in the mandatory CSR disclosure group, it is 0.119. This difference is statistically significant at the 1% level, indicating that the practice of having the chairman and CEO as the same person is significantly less common in companies with mandatory CSR disclosure compared to those without. This suggests that companies where the chairman and CEO are separate individuals are more likely to engage in social responsibility disclosure.

The mean proportion of shares held by the largest shareholder in the no corporate social responsibility disclosure group is 36.868, while in the mandatory CSR disclosure group, it is 39.314. This difference is statistically significant at the 1% level, indicating that companies with mandatory CSR disclosure have a significantly higher proportion of shares held by their largest shareholder compared to those without disclosure. This suggests that companies with a higher concentration of ownership by the largest shareholder are more likely to engage in corporate social responsibility disclosure.

4.2.3 Correlation Analysis

Pearson's correlation coefficient is commonly used to measure the strength and direction of the linear relationship between two continuous variables. The coefficient ranges from -1 to +1, where +1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation, and 0 indicates no correlation.

Table 4.3 illustrates the relationship between investment efficiency and various variables. Pearson's correlation coefficient indicates that the effect of mandatory corporate social responsibility disclosure is associated with investment efficiency, with a significance level of 0.1. This suggests that mandatory corporate social responsibility disclosure may help reduce inefficient investment by corporations. Additionally, the Pearson correlation coefficient highlights the role of mediating factors, such as financial analyst forecasts, in relation to investment efficiency. Financial analyst forecasts and investment efficiency are negatively correlated, but this correlation is not statistically significant, suggesting that variations in financial analyst forecasts are not significantly related to variations in investment efficiency. However, financial analyst forecasts are negatively correlated with mandatory social responsibility disclosure, with a significance level of 0.01. This indicates

that the level of financial analyst forecasts is significantly associated with the implementation of mandatory corporate social responsibility disclosure.

Several firm-level characteristics, including firm size, gearing ratio, asset growth rate, board size, the shareholding ratio of the largest shareholder, cash flow, and the proportion of intangible assets, are found to be negatively associated with investment efficiency. According to Pearson's results, investment efficiency is positively correlated with having the same individual serve as duality. Similarly, there is a positive relationship between the age of firm listing and investment efficiency. However, neither of these correlations is statistically significant.

Table 4.3: Correlation Analysis for Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
Inv	1										
Treat*Period	0.029**	1									
AnalystF	-0.0210	-0.043***	1								
Size	-0.089***	0.419***	-0.090***	1							
Lev	-0.025*	0.056***	-0.202***	0.418***	1						
AssetGrowth	-0.289***	0.0170	0.132***	0.196***	0.118***	1					
Cashflow	-0.051***	0.036***	0.176***	-0.0200	-0.210***	-0.086***	1				
ListAge	0.00700	0.124***	-0.0180	0.237***	0.216***	-0.047***	-0.032**	1			
Board	-0.041***	0.127***	0.00100	0.271***	0.108***	0.0180	0.082***	-0.0130	1		
Dual	0.027*	-0.033**	0.00500	-0.129***	-0.103***	0.0130	-0.028**	-0.123***	-0.103***	1	
TOP1	-0.095***	0.068***	0.030**	0.268***	0.054***	0.075***	0.046***	-0.063***	0.0120	-0.086***	1

Note: Table 4.3 presents the results of Pearson's correlation coefficients for all variables in this study. The variable "Inv" represents the firm investment efficiency, calculated as the residuals of inefficient investment using Richardson model multiplied by -1. Larger values of "Inv" indicate higher investment efficiency. "AnalystF" is the mediating variable representing analyst forecast accuracy, where larger values denote higher accuracy. "Treat*period" represents mandatory social responsibility disclosure. The "-" and "+" signs indicate negative and positive correlations, respectively, between the variables. The numbers 1-11 in the first row represent corporate investment efficiency (Inv), mandatory corporate social responsibility disclosure (Treat*Period), analyst Forecasts (AnalystF), company size (Size), asset-liability ratio (LEV), asset growth rate (AssetGrowth), cash flows (Cashflow), age of listed companies (ListAge), board size (Board), dual role (Dual), and shareholding ratio of the largest shareholder (TOP1), respectively.

4.2.4 Total Effect Test

Table 4.4: The Regression Results of MCSR Disclosure on Investment Efficiency

Variable	Inv	Inv
Treat*Period	0.014*** (4.22)	0.012* (1.82)
Size	-0.003** (-2.11)	-0.043*** (-4.60)
Lev	0.009 (1.16)	-0.005 (-0.23)
AssetGrowth	-0.084*** (-21.55)	-0.060*** (-6.46)
Cashflow	-0.083*** (-5.23)	-0.017 (-0.78)
ListAge	-0.003 (-1.00)	-0.024 (-1.55)
Board	-0.013** (-2.03)	-0.018 (-0.99)
Dual	0.005 (1.31)	0.003 (0.55)
TOP1	-0.000*** (-4.72)	-0.001 (-0.97)
_cons	0.044 (1.51)	0.975*** (4.82)
N	5442	5442
firm	no	yes
year	no	yes
r ²	0.099	0.427

Note: Table 4.4 presents the regression results of the impact of mandatory social responsibility disclosure on corporate investment efficiency. Investment efficiency, the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. The independent variable "Treat*Period" represents mandatory corporate social responsibility disclosure. Standard errors are robust and clustered at the firm level. Size represents firm

size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. Statistical significance is indicated by * for the 10% level, ** for the 5% level, and *** for the 1% level.

To investigate the mediating role of financial analyst forecasts between mandatory corporate social responsibility disclosure and investment efficiency, the first step is to perform a regression analysis of the total effect of mandatory CSR disclosure on investment efficiency. According to Liu and Tian (2021), this total effects regression is conducted using the difference-in-differences method. To ensure the robustness of the results, this study also employs parallel trend tests, placebo tests, and PSM-DID tests.

Table 4.4 presents the regression results of the impact of mandatory social responsibility disclosure on corporate investment efficiency, including both firm and year-fixed effects. The regression follows the model specified in Equation 3.4. The coefficients of Treat*Period in the first and second columns are significantly positively correlated at the 1% and 10% levels, respectively, with and without firm and year-fixed effects. This indicates that mandatory corporate social responsibility disclosure significantly improves investment efficiency. Specifically, a one-point increase in Treat*Period corresponds to an increase in investment efficiency of 0.014 and 0.012 points, with and without firm and year-fixed effects, respectively. Economically, a one standard deviation increase in Treat*Period (0.408) results in a rise in investment efficiency by 0.005712 (0.014×0.408) and 0.004896 (0.012×0.408), respectively. Overall, these results suggest that the estimated effect of mandatory CSR disclosure is not only statistically significant but also has a meaningful economic impact on investment efficiency. This finding supports previous literature (Liu & Tian, 2021; Zhong & Gao, 2017). Mandatory CSR disclosure increases firm transparency (Kühn et al., 2014), which in turn boosts investor confidence and encourages long-term investments.

Additionally, it enhances the firm reputation and brand image (Ahamed & Tripathi, 2023). Consumers and the public are generally more inclined to support companies that prioritize social responsibility (Aparna & Amilan, 2022).

Regarding the control variables, the coefficients for Size and AssetGrowth are significantly negatively correlated with firm and year-fixed effects at the 1% level. This indicates that investment efficiency tends to decrease as firms increase in size and asset growth, which aligns with findings from previous studies (Amanda & Saputro, 2023; You, 1995). In contrast, the other control variables—Lev, Cashflow, ListAge, Board, Dual, and TOP1—do not show a significant impact on firm investment efficiency when firm and year fixed effects are included in this study.

4.2.5 Parallel Trend Test

The difference-in-differences (DID) model assumes that the trends in the experimental and control groups are parallel before mandatory corporate social responsibility disclosure and that there is no significant difference between these groups before mandatory corporate social responsibility disclosure implementation. The parallel trend test is a crucial prerequisite for validating the double difference model. This test ensures that there are no significant differences between the experimental and control groups before mandatory corporate social responsibility disclosure is implemented. The control group comprises firms not subject to the intervention or mandatory corporate social responsibility disclosure, whereas the treatment group consists of firms that received the intervention or were directly affected by the policy change mandatory corporate social responsibility disclosure. If this condition is met, the results from the double difference model are considered accurate and reliable. Essentially, the parallel trend test evaluates whether mandatory corporate social responsibility disclosure implementation genuinely

alters the trend for the experimental group compared to the control group. According to Zhang et al. (2021), the analysis involves cross-multiplying the firm dummy variables for the experimental and control groups with the time dummy variables. This process is followed by selecting the periods before and after mandatory corporate social responsibility disclosure implementation as the base periods to avoid multicollinearity between the variables. If the difference between the experimental and control groups before the mandatory social responsibility disclosure is not statistically significant, it indicates that the parallel trend hypothesis is valid. This implies that the conditions required for the double difference model to be valid are met.

Table 4.5: Parallel Trend Test for MCSRD and Investment Efficiency

Variable	Inv
pre_2	0.013 (0.36)
pre_1	0.014 (0.69)
current	0.010 (1.19)
las_1	0.018** (2.22)
las_2	0.012 (1.46)
las_3	0.008 (0.93)
Size	-0.042*** (-4.54)
Lev	-0.006 (-0.24)
AssetGrowth	-0.060***

Table 4.5 continued

	(-6.45)
Cashflow	-0.017
	(-0.79)
ListAge	-0.025
	(-1.58)
Board	-0.019
	(-1.00)
Dual	0.004
	(0.57)
TOP1	-0.001
	(-0.95)
_cons	0.974***
	(4.77)
<i>N</i>	5442
firm	yes
year	yes
<i>r</i> ²	0.427

Note: Table 4.5 presents the results of the dynamic effect regression on the impact of mandatory disclosure of social responsibility on corporate investment efficiency. Investment efficiency, the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. Pre_* reflects the coefficients of the cross-product items in each period before mandatory corporate social responsibility disclosure was implemented. Las_* reflects the coefficients of the interaction terms in each period after mandatory corporate social responsibility disclosure is implemented. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. Standard errors are robust and clustered at the firm level. Significance levels are indicated by * for 10%, ** for 5%, and *** for 1%.

The regression results in Table 4.4 demonstrate that mandatory corporate social responsibility disclosure regulations lead to increased investment efficiency. For the empirical analysis using the difference-in-differences (DID) model, it is essential to satisfy

the parallel trend assumption. This assumption requires that the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) exhibit similar trends before the implementation of the mandatory corporate social responsibility disclosure. To test this assumption, the year 2008 is used as the base period. Six pseudo-variables are created: `pre_2`, `pre_1`, `current`, `las_1`, `las_2`, and `las_3`. In this context, "current" refers to the year 2008 when mandatory corporate social responsibility disclosure was introduced, "pre" denotes the years preceding its implementation, and "post" signifies the years following its enactment. According to the results in Table 4.5, the coefficients of `Pre_` and `current` are not statistically significant before 2008. This lack of significance indicates that there was no substantial difference between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) before mandatory corporate social responsibility disclosure implementation, thus supporting the parallel trends assumption.

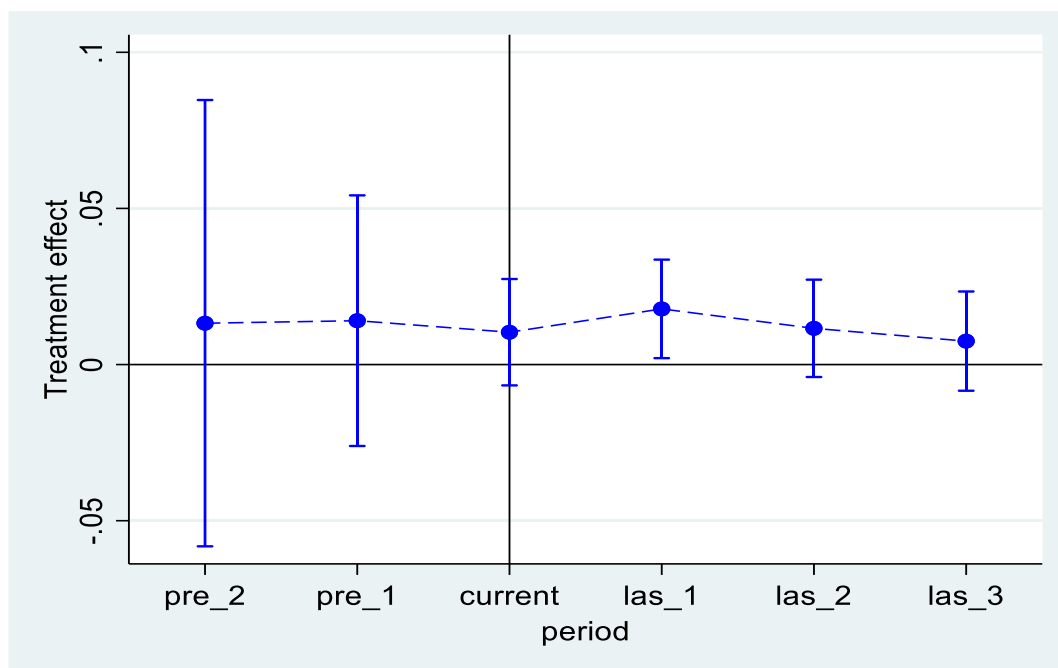


Figure 4.1: Parallel Trend Test Chart

Figure 4.1 illustrates the parallel trend test for mandatory disclosure of social responsibility, using 2008 as the base period. In the plot, the current represents the year 2008, when the mandatory corporate social responsibility disclosure was implemented, while pre_2 and pre_1 correspond to the years 2006 and 2007, respectively, representing the period before the mandatory corporate social responsibility disclosure implementation. The variables las_1, las_2, and las_3 represent the years 2009, 2010, and 2011, indicating the period after mandatory corporate social responsibility disclosure implementation. The plot shows that before the mandatory corporate social responsibility disclosure implementation, all estimated coefficients were not statistically significant, and the regression coefficients were close to zero. This indicates that there were no significant differences between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) before mandatory corporate social responsibility disclosure. The lack of significant differences confirms that the parallel trends assumption is satisfied, demonstrating that the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) are comparable. However, as time progresses into the post-mandatory period, particularly from 2010 onwards, the effect appears to weaken gradually.

4.2.6 Placebo Test

To ensure that the adoption of the 2008 reform was not influenced by other factors, this study employs a placebo test, following the practice of assigning a hypothetical implementation time for mandatory corporate social responsibility disclosure. In the placebo test, an experimental group is randomly assigned through self-sampling, with the randomization process repeated 1,000 times. The results of the placebo test are illustrated in the figure below.

Figure 4.2 illustrates the density distribution and corresponding p-value distribution of the difference-in-differences (DID) estimator. The horizontal axis shows the values of the DID estimators, the left vertical axis indicates the p-values and the right vertical axis represents the kernel density of the estimators. Blue points represent the p-values for each estimator, while the red curve depicts the kernel density distribution of the DID estimators. The figure reveals that DID estimates are primarily concentrated around 0, with fewer extreme values on either side. The larger p-values associated with estimates close to 0 suggest lower statistical significance in this range, indicating that the results are not significantly affected by temporal changes. This further supports the robustness of the regression results, confirming that mandatory social responsibility disclosure has a significant impact on investment efficiency.

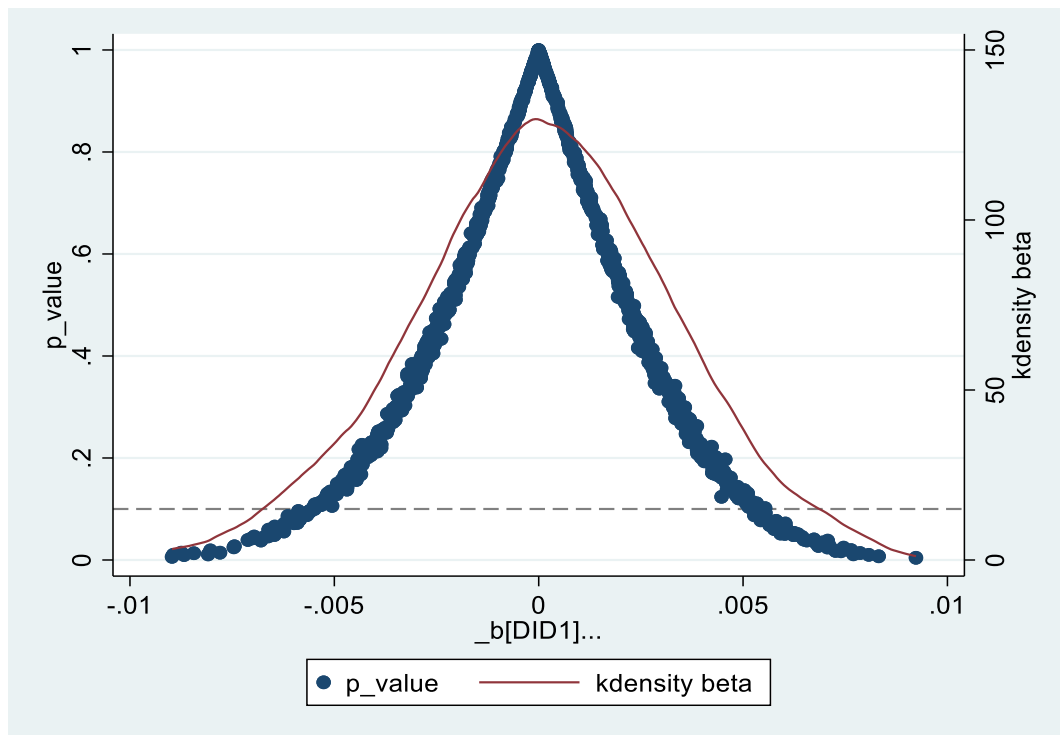


Figure 4.2: Placebo Test for MSCRD and Investment Efficiency

4.2.7 PSM-DID

According to Cheng et al. (2013), the propensity score matching approach was applied to align the mandatory and non-mandatory corporate social responsibility disclosure groups to address sample selection bias in the study. This approach was based on previous research to account for potential biases. Given the possibility that additional prevalent attributes of the selected companies might influence the research findings, a probability model was developed to approximate these attributes. Following Shan et al. (2023), company size, return on assets, gearing, industry classification, and age were used as matching variables. The 1:4 nearest neighbor matching method was employed.

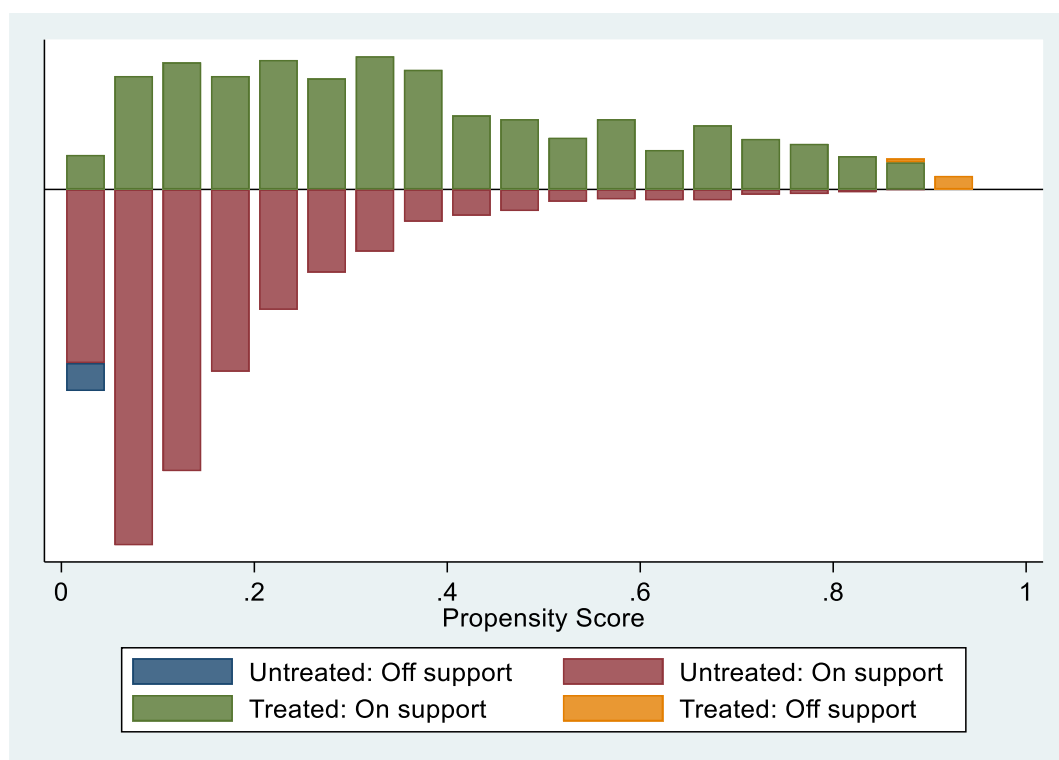


Figure 4.3: The Common Range of Values for Propensity Score Matching

Given that the control group was larger than the experimental group, the k-nearest neighbor matching method ($k=4$) was employed for propensity score matching. This method

integrates logit model parameter estimation with kernel matching using a wide bandwidth of 0.05. The data were scored on propensity, and variables that could be accurately observed were matched within a range of values common to all samples. Figure 4.3 illustrates the common range of values for propensity score matching. The majority of observations of the propensity scores for firms with mandatory social responsibility disclosure and those without fall within this common range. A total of 5344 samples (1142 in the treatment group and 4202 in the control group) are within the common support domain, while only 98 samples (14 in the treatment group and 84 in the control group) fall outside this domain. This evidence suggests that the sample loss rate is 1.8%, indicating that the experimental group can find individuals with similar propensity scores through matching.

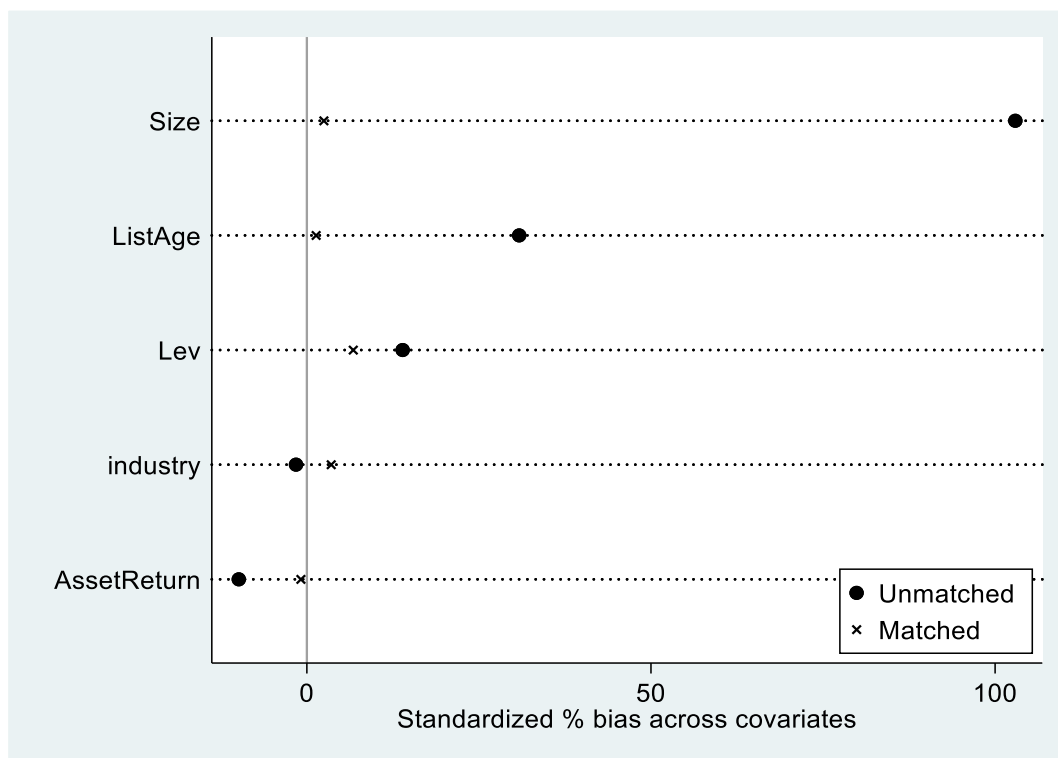


Figure 4.4: Standardized Deviation for Each Variable

Furthermore, Figure 4.4 illustrates the standardized differences (Standardized Bias) for each variable before and after matching, which measures the improvement in the balance

of variables between the samples. Solid black dots indicate standardized differences before matching, while black crosses represent standardized differences after matching. Most variables showed a significant reduction in standardized differences post-matching, demonstrating that the matching process effectively improved the balance between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms). Notably, the Size and ListAge variables exhibited a large difference before matching and a significant reduction after matching. Additionally, the AssetReturn variable showed almost no difference after matching, achieving a good balance.

Table 4.6: PSM Balance Test Results

Variable	Matched	Treated	Control	%bias	bias	t	p> t	V(C)
Size	U	22.909	21.722	102.9		33.52	0.000	1.65*
	M	22.874	22.846	2.5	97.6	0.56	0.579	1.12*
Lev	U	.51833	0.49309	13.9		4.11	0.000	0.86*
	M	.51878	0.50657	6.7	51.6	1.62	0.106	0.89*
AssetReturn	U	.00619	.00783	-9.9		-2.75	0.006	0.54*
	M	.00624	.00639	-0.9	91.1	-0.25	0.803	1.02
industry	U	4.6548	4.706	-1.6		-0.47	0.638	0.93
	M	4.6804	4.5657	3.5	-124.2	0.88	0.377	1.13*
ListAge	U	2.3099	2.1598	30.9		8.78	0.000	0.64*
	M	2.3125	2.3059	1.3	95.7	0.35	0.726	0.88*

Note: Size represents the firm size, Lev denotes leverage, AssetReturn refers to non-recurring gains divided by total assets at year-end, and ListAge refers to the number of years since the firm's listing. * represents the 10% significance level, ** represents the 5% significance level, and *** represents the 1% significance level.

Table 4.6 presents the means, standardized deviations (% bias), and significance test results for the five variables in the experimental and control groups before and after matching. Before matching (U), the standardized deviations for Size, Lev, AssetReturn, industry, and ListAge are large, indicating significant differences between the treatment group (mandatory

CSR reporting firms) and the control group (non-CSR disclosure firms) on these variables. Notably, Size (102.9) and ListAge (30.9) have the largest deviations. After matching (M), the standardized deviations for these variables are significantly reduced. For instance, the deviation for Size is reduced to 2.5, and for ListAge, it is reduced to 1.3, demonstrating that the matching process significantly improved the balance of the sample. Most variables show a reduction in bias of more than 90% after matching, and the significance tests (p-values) indicate that the differences after matching are no longer significant. This suggests that the differences between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) on these variables have been effectively controlled. According to Rosenbaum and Rubin (1983), the standard deviation of the propensity score match should not exceed 20% in absolute value. This standard confirms that the data in this study is ideally matched using PSM-DID.

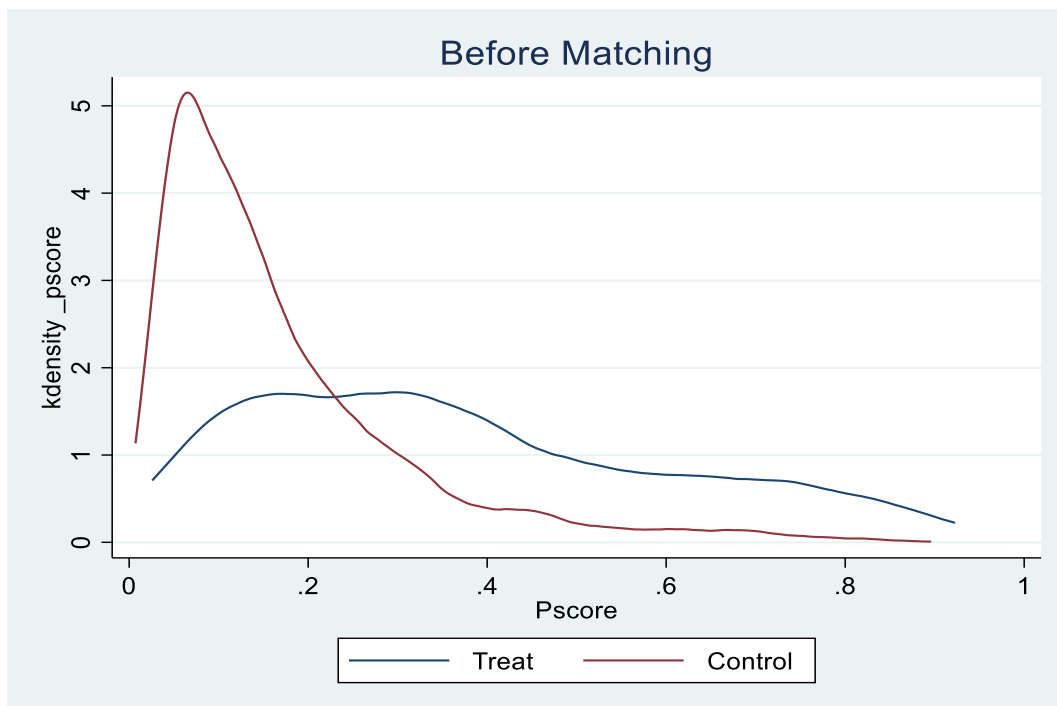


Figure 4.5: Kernel Density Plot before Matching

Figure 4.5 displays the kernel density estimation of the distribution of propensity scores for the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) groups before matching. The blue curve represents the treatment group, while the red curve represents the control group. The figure shows that the distribution of propensity scores for the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) is significantly different. The treatment group's distribution is more gradual, with a peak of around 0.2, whereas the control group's distribution is more concentrated, peaking at around 0. This indicates a substantial difference in propensity scores between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) before matching. Therefore, matching is necessary to address this imbalance and enable more reliable causal inferences.

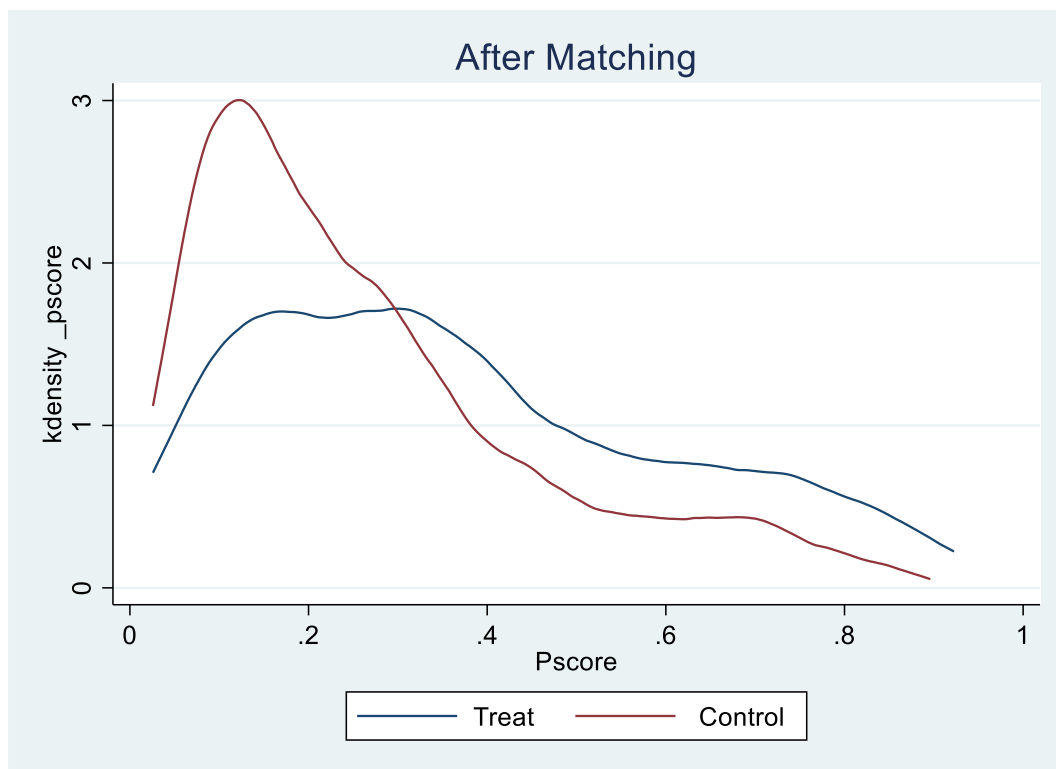


Figure 4.6: Kernel Density Plot after Matching

Figure 4.6 shows the kernel density estimation of the distribution of propensity scores for the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) after matching. The blue curve represents the treatment group, while the red curve represents the control group. Compared to before matching, the propensity score distributions of the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) are much closer after matching. The distribution curves for both groups nearly overlap, particularly in the range between 0.2 and 0.6. This indicates that matching has significantly reduced the difference in propensity scores between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms), greatly improving the balance of the samples. The more similar distribution of propensity scores between the two groups provides a more reliable basis for subsequent causal inference.

The regression results using the matched samples are displayed in Table 4.7. The first column presents the regression results after excluding missing values, while the second column shows results based on the common support region. Both findings indicate that mandatory corporate social responsibility disclosure has a significant positive impact on investment efficiency.

Table 4.7: PSM-DID Regression Results

Variable	Inv	Inv
Treat*period	0.017*** (4.31)	0.015* (1.65)
Size	-0.008*** (-3.82)	-0.045*** (-3.28)
Lev	0.028** (2.48)	-0.021 (-0.54)
AssetGrowth	-0.084***	-0.067***

Table 4.7 continued

	(-16.28)	(-4.92)
Cashflow	-0.106***	0.008
	(-4.74)	(0.26)
ListAge	0.002	-0.005
	(0.47)	(-0.18)
Board	-0.009	-0.020
	(-1.05)	(-0.62)
Dual	0.006	-0.005
	(1.06)	(-0.52)
TOP1	-0.000***	0.000
	(-2.98)	(0.25)
_cons	0.114***	0.979***
	(2.81)	(3.20)
N	3050	3050
firm	no	yes
year	no	yes
r ²	0.109	0.511

Note: Table 4.7 demonstrates the PSM-DID regression results for the effect of mandatory corporate social responsibility disclosure on investment efficiency. Investment efficiency, the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. The variable Treat*period represents mandatory corporate social responsibility disclosure. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. Standard errors are robust and clustered at the firm level. The significance levels are denoted as * for 10%, ** for 5%, and *** for 1%.

Despite the advantages of the DID method in addressing self-selection sample bias, sample selection bias remains a concern in the experimental and control groups due to differing initial conditions. For instance, the requirement for firms to disclose corporate social responsibility is not random but is related to the firm's development. This leads to heterogeneity between the experimental and control groups. To mitigate sample selection

bias and heterogeneity, following Zhong and Gao (2017), this study employs propensity score patching (PSM) to address bias caused by confounding factors. Thus, the combination of PSM and DID effectively evaluates the causality of the impact of mandatory corporate social responsibility disclosure on investment efficiency.

Taking investment efficiency as the dependent variable and mandatory corporate social responsibility disclosure (Treat*period) as the independent variable, the impact of mandatory corporate social responsibility disclosure implementation on investment efficiency can be directly reflected in the DID regression results. To test the robustness of the model, Table 4.7 presents two specifications: column 1 does not include firm and year fixed effects, while column 2 includes firm and year fixed effects. The results show that although the estimated coefficient of Treatperiod varies in value, it remains positive. This indicates that mandatory corporate social responsibility disclosure significantly improves investment efficiency even after controlling for firm and year fixed effects. Regardless of whether the fixed effects are included, the coefficient of Treat*Period remains positive. The significant impact of mandatory corporate social responsibility disclosure can be attributed to several factors. First, governments play a crucial role in promoting CSR disclosure. They encourage and enforce corporate social responsibility through guidance, demonstration projects, and public disclosure of relevant information (Wirba, 2024). Second, enterprises have their own development needs. By disclosing social responsibility efforts, companies can enhance their image and build trust and cooperation with stakeholders, such as investors, consumers, and employees (Taghian et al., 2015). Additionally, effective CSR disclosure management improves the sustainable development capabilities of enterprises, reduces risks, and enhances competitiveness (Hadj, 2020).

4.2.8 Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between MCSR Disclosure and Investment Efficiency

Hypothesis 1 proposes that financial analyst forecasts mediate the relationship between mandatory corporate social responsibility disclosure and investment efficiency. To test hypothesis 1, this study performs a double fixed effects mediation analysis using panel data from a subsample of 5,442 observations spanning from 2006 to 2011. First, the total effect of mandatory social responsibility disclosure on investment efficiency is examined, as detailed in part 4.24, utilizing the difference-in-differences method to assess implications. The robustness of these results indicates that mandatory corporate social responsibility disclosure significantly enhances investment efficiency. To further explore how mandatory corporate social responsibility affects investment efficiency through financial analyst forecasts, mediation effect regressions are conducted following the four-step mediation effect method outlined by Baron and Kenny (1986).

Table 4.8 displays the regression results for hypothesis 1, which examines the mediating role of financial analyst forecasts on the relationship between mandatory corporate social responsibility disclosure and investment efficiency. Baron and Kenny's (1986) four-step method is used to elucidate the mediation effect. The first step involves estimating and analyzing the overall impact of mandatory corporate social responsibility disclosure on investment efficiency. This analysis is supported by the parallel trend test, PSM-DID test, and placebo test discussed earlier. The regression results for this overall effect are shown in the first column of Table 4.8. The coefficient of $Treat*Period$ in the first column indicates a strong positive association at the 10% significance level, suggesting that mandatory corporate social responsibility disclosure enhances investment efficiency. These findings align with previous research (Liu & Tian, 2021).

Table 4.8: Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between MCSRD and Investment Efficiency

Variable	Inv	AnanalystF	Inv
Treat*Period	0.012* (1.82)	0.002 (0.61)	0.012* (1.83)
AnalystF			-0.025 (-0.66)
Size	-0.043*** (-4.60)	-0.006* (-1.93)	-0.043*** (-4.61)
Lev	-0.005 (-0.23)	-0.057*** (-5.62)	-0.007 (-0.29)
AssetGrowth	-0.060*** (-6.46)	0.020*** (8.42)	-0.059*** (-6.35)
Cashflow	-0.017 (-0.78)	0.060*** (5.17)	-0.015 (-0.71)
ListAge	-0.024 (-1.55)	0.023*** (3.19)	-0.023 (-1.51)
Board	-0.018 (-0.99)	0.009 (1.26)	-0.018 (-0.98)
Dual	0.003 (0.55)	-0.001 (-0.32)	0.003 (0.55)
TOP1	-0.001 (-0.97)	0.000** (2.49)	-0.001 (-0.96)
_cons	0.975*** (4.82)	0.035 (0.56)	0.976*** (4.82)
N	5442	5442	5442
firm	yes	yes	yes
year	yes	yes	yes
r ²	0.427	0.523	0.427

Note: Table 4.8 provides the regression results assessing the mediating role of financial analyst forecasts between mandatory corporate social responsibility disclosure and investment efficiency. In this analysis, Investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. AnalystF is the mediating variable, representing financial analyst forecasts, where a higher value indicates greater accuracy. Treat*Period is the independent variable and represents mandatory CSR disclosure. Standard

errors are robust and clustered at the firm level. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. The significance levels are indicated as follows: * denotes the 10% significance level, ** denotes the 5% significance level, and *** denotes the 1% significance level.

This study subsequently develops and estimates two models (Model 3.7 and Model 3.9) to examine the potential mediating role of financial analyst forecasts on the relationship between mandatory corporate social responsibility disclosure and investment efficiency. The potential mediating variables include financial analyst forecast accuracy. According to the findings in Table 4.8, the coefficient on Treat*Period in the four-step test, as shown in the second column, is not statistically significant. This indicates that mandatory corporate social responsibility disclosure does not have a significant impact on financial analyst forecast accuracy. From the perspective of information asymmetry theory (Akerlof, 1970), this result suggests that, at the outset of mandatory corporate social responsibility disclosure implementation, there may be considerable flexibility and subjective judgment, leading to inconsistencies and uncertainty in the information provided, which can hinder analysts' ability to make accurate forecasts (Hallberg, 2015). The lack of standardized enforcement and assurance mechanisms limits the effectiveness of these disclosures in reducing information asymmetry, making it difficult for financial analysts to generate precise forecasts. Despite many Chinese corporations issuing reports, the quality and reliability of the information remain challenging to verify due to the lack of external guarantees for corporate social responsibility disclosures (Noronha et al., 2013).

Subsequent examination in column (3) of Table 4.7 evaluates the influence of mandatory corporate social responsibility disclosure on investment efficiency while accounting for the accuracy of financial analyst forecasts. The regression results in the third

column show that the direct effect of mandatory corporate social responsibility disclosure (Treat*Period) on inefficient investment (Inv) remains significant (coefficient of -0.012, $p < 0.1$). However, the mediating variable of financial analyst forecasts (AnalystF) is not significant (coefficient of -0.025, $p > 0.1$) regarding inefficient investment. This finding aligns with signaling theory (Spence, 1978). However, when CSR disclosure is mandated, firms may not have sufficient incentives to ensure high-quality reporting, weakening the reliability of disclosed information as a market signal. Moreover, reputation theory suggests that firms with strong reputational incentives are more likely to engage in high-quality CSR disclosure (Fombrun & Shanley, 1990). The lack of significance in financial analyst forecasts as a mediating variable indicates that, in the short term, mandatory corporate social responsibility disclosure does not sufficiently enhance firm reputation to influence investment efficiency through financial analyst forecasts. This result indicates that while mandatory corporate social responsibility disclosure has a significant direct effect on investment efficiency, financial analyst forecasts do not play a significant mediating role in this process. Therefore, hypothesis 1 is rejected.

For the control variables, the coefficient of Size is negative and significant in all three models, indicating that larger firm size is associated with more inefficient investment (Inv). Stein (2003) found information asymmetry and agency problems increase as the size of the company increases, which in turn affects investment efficiency. This effect is particularly evident in columns (1) and (3), where the coefficient is -0.043 with a significance level of 1%. In column (2), Size has a smaller effect on financial analyst forecast accuracy (AnalystF), with a coefficient of -0.006 and a significance level of 10%. Ying and Zhang (2014) found that the larger the company, the lower the financial analyst forecast accuracy.

The asset-liability ratio (Lev) has no significant effect on investment efficiency (Inv) in columns (1) and (3), with coefficients of -0.005 and -0.007, respectively, and insignificant t-values. However, Lev has a significant negative effect on financial analyst forecasts (AnalystF) in column (2), with a coefficient of -0.057 and a significance level of 1%. This suggests that a higher gearing ratio is associated with less analyst accuracy. Companies with higher debt-to-asset ratios are generally exposed to greater financial risk and uncertainty. This may increase the degree of information asymmetry, making it more challenging for analysts to predict the future performance of these companies, thereby reducing the accuracy of financial analyst forecasts (Bowen et al., 2008).

Cashflow has no significant effect on investment efficiency (Inv) in columns (1) and (3), with coefficients of -0.017 and -0.015, respectively. However, Cashflow has a significant positive effect on financial analyst forecasts (AnalystF) in column (2), with a coefficient of 0.060 and a significance level of 1%. This indicates that higher cash flow is associated with less accurate financial analyst forecasts. Jensen (1986) argued that a large amount of free cash flow may cause management to make inefficient investments or other actions that complicate the company's financial situation, making it more difficult for financial analysts to predict.

Listed age (ListAge) has no significant effect on investment efficiency (Inv) in columns (1) and (3), with coefficients of -0.024 and -0.023, respectively. However, ListAge has a significant positive effect on financial analyst forecasts (AnalystF) in column (2), with a coefficient of 0.023 and a significance level of 1%. This indicates that a longer listing period is associated with more accurate financial analyst forecasts. Bhushan (1989) found that as the company ages and its business becomes more complex, the accuracy of financial analyst forecasts may be negatively affected.

The largest shareholder ownership (TOP1) has no significant effect on investment efficiency (Inv) in columns (1) and (3), with a coefficient of 0.001. However, TOP1 has a significant negative effect on financial analyst forecasts (AnalystF), with a coefficient of -0.000 and a significance level of 5%. This suggests that a higher percentage of ownership by the largest shareholder is associated with more accurate financial analyst forecasts. Board size (Board) and two positions in one post (Dua) have no significant effect on either investment efficiency (Inv) or financial analyst forecasts (AnalystF) in all three models.

4.2.9 Bootstrap Results for the Mediating Effect of Financial Analyst Forecast on the Relationship between MCSR Disclosure and Investment Efficiency

Subsequently, this study employs the bootstrap approach with a 95% confidence interval and randomly sampled 5000 times to investigate the potential mediating role of financial analyst forecasts between investment efficiency and mandated corporate social responsibility disclosure (Yuan & Cao, 2022).

Table 4.9 shows that the confidence intervals for the indirect effects of mandatory corporate social responsibility disclosure on investment efficiency through financial analyst forecasts include 0, whereas the confidence intervals for the direct effects do not. The findings indicate that there is no statistically significant mediating effect of financial analyst forecasts on the relationship between mandatory corporate social responsibility disclosure and investment efficiency. Financial analyst forecasts fail to serve as a link between mandatory corporate social responsibility disclosure and investment efficiency. This result rejects hypothesis 1.

Table 4.9: Bootstrap Results for the Mediating Role of Financial Analyst Forecasts on the Relationship between MCSRD and Investment Efficiency

Path	Type	Coefficient	Std.err.	z	p> z	BC 95% CI	
Treat*Period- AnalystF-Inv	indirect	.0002698	.0001264	2.13	0.033	.000022	.0005177
Treat*period - Inv	direct	.0142592	.0019464	7.33	0.000	.0104444	.0180741

Note: In this analysis, investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. AnalystF is the mediating variable, representing analyst forecast, where a higher value indicates greater accuracy. Treat*Period is the independent variable and represents mandatory CSR disclosure.

Overall, the findings of this research suggest that financial analyst forecasts do not mediate the relationship between mandatory corporate social responsibility disclosure and investment efficiency; thus, hypothesis 1 is not supported. To enhance the accuracy of evaluating the mediating role of financial analyst forecasts in the context of mandatory corporate social responsibility, future research might consider focusing on the long-term impacts of mandatory corporate social responsibility disclosure. Financial analyst forecasts may not have fully adjusted their forecasting models to incorporate new information immediately following mandatory corporate social responsibility disclosure implementation, and both markets and companies may still be adapting to these changes. Over time, the quality and accuracy of financial analyst forecasts may improve, as may market participants' use of the disclosed information.

4.3 The Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure and Investment Efficiency

Mandatory corporate social responsibility disclosure, which was implemented in 2008, has been in effect for 14 years. To study its long-term effects on the investment

efficiency of listed companies, this study uses a panel data model of A-share listed companies in Shanghai and Shenzhen from 2008 to 2022. The analysis compares companies that disclose CSR reports with those that do not, aiming to investigate the long-term effects of mandatory corporate social responsibility disclosure and the mediating role of financial analyst forecasts between CSR disclosure and investment efficiency. Descriptive Statistics

Table 4.10 demonstrates the descriptive statistics for the sample of long-term effects of mandatory corporate social responsibility disclosure.

Table 4.10: Full and PSM Sample Descriptive Statistics

Variable	Full sample					PSM sample				
	Obs	Mean	Std.	Min	Max	Obs	Mean	Std.	Min	Max
Inv	24235	-.074	.097	-1.447	0	11865	-.075	.105	-1.447	0
AnalystF	24235	-.043	.064	-.433	0	11865	-.042	.063	-.433	0
CSR	24235	.194	.396	0	1	11865	.354	.478	0	1
CSRQ	4707	6.419	1.272	0	8	4201	6.38	1.298	0	8
Size	24235	22.38	1.289	19.317	26.452	11865	22.966	1.203	19.63	26.452
Lev	24235	.441	.199	.027	.908	11865	.475	.195	.032	.908
AssetGrowth	24235	.174	.345	-.383	5.116	11865	.181	.357	-.383	5.116
Cashflow	24235	.051	.07	-.222	.283	11865	.054	.07	-.222	.283
ListAge	24235	2.24	.647	0	3.401	11865	2.449	.587	1.099	3.401
Board	24235	2.139	.2	1.609	2.708	11865	2.168	.204	1.609	2.708
Dual	24235	.256	.437	0	1	11865	.211	.408	0	1
TOP1	24235	34.656	14.947	8.02	75.843	11865	36.168	15.594	8.02	75.843

Note: In this analysis, investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency; a larger value signifies higher investment efficiency. AnalystF is the mediating variable, representing analyst forecast accuracy, where a higher value indicates greater accuracy. CSR refers to corporate social responsibility disclosure choice. CSRQ represents the quality of CSR disclosure. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration.

The full sample consists of 24,235 observations with an average investment efficiency value of -0.074, a standard deviation of 0.097, a minimum value of -1.447, and a maximum value of 0. This indicates that most firms exhibit low levels of investment efficiency, although a few firms display high levels of investing behavior. In contrast, the PSM sample comprises 11,865 observations, with a mean investment value of 0.075, a standard deviation of 0.105, a minimum value of 0, and a maximum value of 1.447. This suggests that the distribution of investment efficiency values in the matched sample is similar to that of the full sample.

The full sample consists of 24,235 observations with a mean financial analyst forecasts value of -0.043, a standard deviation of 0.064, a minimum value of -0.433, and a maximum value of 0. This suggests that most firms are not negatively evaluated by financial analyst forecasts. The PSM sample comprises 11,865 observations with a mean analyst forecast value of -0.042, a standard deviation of 0.063, a minimum value of -0.433, and a maximum value of 0. This indicates that the matching process does not alter the distributional characteristics of financial analyst forecasts.

In the full sample of 24,235 observations, the mean value of CSR disclosure is 0.194, with a standard deviation of 0.396 and a range from 0 to 1. This suggests that most firms do not engage in CSR disclosure, with only a few doing so. In the PSM sample, which consists of 11,865 observations, the mean value of CSR disclosure is 0.354, with a standard deviation of 0.478 and a range from 0 to 1. This indicates a higher percentage of CSR disclosure in the matched sample.

Among the 4,707 observations in the full sample, the mean value of CSR quality is 6.419, with a standard deviation of 1.272, ranging from 0 to 8. This indicates that the quality of mandatory CSR disclosure is generally high across most firms, though there is some variation. In the PSM sample of 4,201 observations, the mean value of CSR quality is 6.38, with a standard deviation of 1.298 and a range from 0 to 8. This suggests that the distribution of CSR quality in the matched sample is similar to that of the full sample.

In the full sample of 24,235 observations, the mean firm size is 22.38, with a standard deviation of 1.289, ranging from 19.317 to 26.452. This indicates that most firms are large and concentrated. In the PSM sample of 11,865 observations, the mean firm size is 22.966, with a standard deviation of 1.203, ranging from 19.63 to 26.452. This suggests that the matched sample includes slightly larger firms on average and is also concentrated in larger firms.

In the full sample of 24,235 observations, the mean gearing ratio is 0.441, with a standard deviation of 0.199, a minimum value of 0.027, and a maximum value of 0.908. This shows variability in the level of indebtedness among firms. In the PSM sample of 11,865 observations, the mean gearing ratio is 0.475, with a standard deviation of 0.195, a minimum value of 0.032, and a maximum value of 0.908. This indicates that the level of liabilities in the matched sample is similar to that in the full sample.

In the full sample of 24,235 observations, the mean asset growth rate is 0.174, with a standard deviation of 0.345, a minimum value of -0.383, and a maximum value of 5.116. This indicates that most firms have a low asset growth rate, though some exhibit very high growth rates. In the PSM sample of 11,865 observations, the mean asset growth rate is 0.181, with a standard deviation of 0.357, a minimum value of -0.383, and a maximum value of

5.116. This suggests that the matched sample closely mirrors the full sample concerning asset growth rate.

In the full sample of 24,235 observations, the mean value of cash flow is 0.051, with a standard deviation of 0.070, a minimum value of -0.222, and a maximum value of 0.283. This indicates that most firms experience fluctuations within a narrow range of cash flow. In the PSM sample of 11,865 observations, the mean cash flow is 0.054, with a standard deviation of 0.070, a minimum value of -0.222, and a maximum value of 0.283. This suggests that the distribution of the cash flow variable in the matched sample is nearly identical to that in the full sample.

In the full sample of 24,235 observations, the mean listing age is 2.24 years, with a standard deviation of 0.647, a minimum of 0, and a maximum of 3.401. This indicates that most companies have a relatively short listing history. In the PSM sample of 11,865 observations, the mean listing age is 2.449 years, with a standard deviation of 0.587, a minimum of 1.099, and a maximum of 3.401. This suggests that the listing age of companies in the matched sample is more concentrated and generally longer.

In the full sample of 24,235 observations, the mean value of board characteristics is 2.139, with a standard deviation of 0.2, a minimum of 1.609, and a maximum of 2.708. This indicates that the board structure of most companies is relatively consistent. In the PSM sample of 11,865 observations, the mean value of board characteristics is 2.168, with a standard deviation of 0.204, a minimum of 1.609, and a maximum of 2.708. This suggests that the distribution of board characteristics in the matched sample is similar to that in the full sample.

In the full sample of 24,235 observations, the mean value for holding both the chairman and general manager positions is 0.256, with a standard deviation of 0.437, a minimum of 0, and a maximum of 1. This indicates that most firms do not combine these two positions. In the PSM sample of 11,865 observations, the mean value for holding both positions is 0.211, with a standard deviation of 0.408, a minimum of 0, and a maximum of 1. This suggests that the distribution in the matched sample is similar to that in the full sample.

In the full sample of 24,235 observations, the mean value for the shareholding percentage of the largest shareholder is 34.656%, with a standard deviation of 14.947%, a minimum of 8.02%, and a maximum of 75.843%. This indicates significant variability in the shareholding percentage of the largest shareholder. In the PSM sample of 11,865 observations, the mean percentage of maximum shareholder ownership is 36.168%, with a standard deviation of 15.594%, a minimum of 8.02%, and a maximum of 75.843%. This suggests that the shareholding percentage of the largest shareholder in the matched sample is similar to that in the full sample.

In the full sample of 24,235 observations, the return on assets has a mean of 0.006, a standard deviation of 0.016, a minimum value of -0.609, and a maximum value of 0.324. This indicates that most firms exhibit a low and concentrated return on assets. In the PSM sample of 11,865 observations, the mean return on assets is 0.006, with a standard deviation of 0.015, a minimum of -0.201, and a maximum of 0.324. This suggests that the distribution of return on assets in the matched sample closely resembles that of the full sample.

4.3.1 Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure and Investment Efficiency

This section aims to examine the potential mediating effect of corporate social responsibility disclosure on the long-term impact of mandatory corporate social

responsibility disclosure, as hypothesized in H2. The regression results are presented in Table 4.11.

Table 4.11: Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSRD and Investment Efficiency

Variable	Inv	Inv	AnalystF	AnalystF	Inv	Inv
CSRD	0.006*** (3.54)	0.012*** (3.52)	0.017*** (14.94)	0.006*** (2.92)	0.004** (2.55)	0.012*** (3.40)
AnalystF					0.096*** (10.29)	0.070*** (5.88)
Size	0.003*** (5.50)	-0.012*** (-4.97)	-0.004*** (-10.05)	-0.002 (-1.54)	0.004*** (6.16)	-0.012*** (-4.91)
Lev	-0.007* (-1.95)	-0.005 (-0.63)	-0.056*** (-24.15)	-0.101*** (-16.73)	-0.001 (-0.35)	0.002 (0.23)
AssetGrowth	-0.120*** (-72.78)	-0.107*** (-19.06)	0.043*** (38.21)	0.039*** (20.09)	-0.124*** (-73.28)	-0.109*** (-18.89)
Cashflow	-0.066*** (-7.97)	-0.026** (-2.43)	0.122*** (21.29)	0.108*** (14.34)	-0.078*** (-9.31)	-0.033*** (-3.09)
ListAge	-0.008*** (-8.16)	-0.012*** (-2.95)	0.006*** (9.18)	0.010*** (3.84)	-0.009*** (-8.77)	-0.012*** (-3.12)
Board	-0.016*** (-5.57)	0.001 (0.14)	0.015*** (7.23)	0.006 (1.35)	-0.018*** (-6.05)	0.000 (0.07)
Dual	0.004*** (2.82)	-0.001 (-0.49)	-0.002** (-2.29)	-0.000 (-0.01)	0.004*** (2.97)	-0.001 (-0.49)
TOP1	-0.000*** (-6.74)	-0.001*** (-3.58)	0.000*** (13.83)	0.001*** (6.87)	-0.000*** (-7.64)	-0.001*** (-3.84)
_cons	-0.061*** (-4.67)	0.264*** (4.77)	0.001 (0.10)	-0.017 (-0.54)	-0.061*** (-4.69)	0.266*** (4.80)
N	24235	24235	24235	24235	24235	24235
firm	no	yes	no	yes	no	yes
year	no	yes	no	yes	no	yes
r ²	0.184	0.396	0.122	0.401	0.188	0.398

Note: Table 4.11 presents the regression results analyzing the mediating effect of financial analyst forecasts between corporate social responsibility disclosure and investment efficiency. In this table, investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. AnalystF serves as the mediating variable, reflecting financial analyst forecasts, higher values represent greater accuracy. CSRD is the independent variable representing corporate social responsibility disclosure choice. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. Standard errors are robust and clustered at the firm level. Significance levels are denoted as follows: $p < 0.10$ (10% significance level), $*p < 0.05$ (5% significance level), and $**p < 0.01$ (1% significance level).

The relationship between corporate social responsibility disclosure (CSRD) and investment efficiency is mediated by financial analyst forecasts accuracy, as illustrated in Table 4.11. The impact of corporate social responsibility disclosure on investment efficiency is evident in the first and second columns, where the coefficient of corporate social responsibility disclosure (CSRD) is positive and statistically significant at the 1% level, even after controlling for firm and year-fixed effects. This finding aligns with stakeholder theory, which posits that firms engaging in CSR disclosure foster stronger relationships with key stakeholders, including investors, thereby improving access to capital and investment efficiency (Omran & Ramdhony, 2015). This finding is also consistent with previous research (Erawati et al., 2021; Huang et al., 2023; Liu & Tian, 2021). Compared to firms that do not disclose CSR information, those that do publicly disclose such information can build trust with investors, consumers, and other stakeholders, thereby enhancing their reputation (Hansen et al., 2011; Kumari et al., 2021; Swaen & Chumpitaz, 2008). Reputation theory further supports this argument, suggesting that firms with a strong reputation derived from CSR disclosure are perceived as more reliable and financially stable, reducing investors' risk perceptions and fostering higher investment efficiency (Othman et al., 2011). This increased trust and improved reputation can reduce information asymmetry and

alleviate investor concerns, leading to greater investment and enhanced capital market efficiency.

Columns (3) and (4) examine the potential association between CSR disclosure and financial analyst forecasts. The results indicate a weak positive correlation, with significance at less than 1%, between corporate social responsibility disclosure and financial analyst forecasts accuracy, consistent with existing literature (Cormier & Magnan, 2014; Cui et al., 2018). From the perspective of information asymmetry theory (Akerlof, 1970), CSR disclosure helps bridge the gap between corporate insiders and external investors by providing more transparent and standardized non-financial information. This improved information environment enables financial analysts to make more accurate forecasts, thereby mitigating investment distortions caused by uncertainty and asymmetric information. For financial analyst forecasts to serve as a mediator, both the impact of CSR disclosure on the outcome variable and on the mediating variable must be statistically significant. Given the selection for corporate social responsibility disclosure, it is anticipated that financial analyst forecasts have a significant impact on investment efficiency. This aligns with previous research (Zadeh et al., 2021), which verifies the mediating role of financial analyst forecasts accuracy on the relationship between corporate social responsibility disclosure and investment efficiency.

Columns 5 and 6 of Table 4.11 present the regression results for the mediating effect of financial analyst forecasts on the relationship between corporate social responsibility disclosure (CSR D) and investment efficiency. In column 5, both CSR D (coefficient = 0.004, $t = 2.55$) and AnalystF (coefficient = 0.096, $t = 10.29$) are positively and significantly associated with investment efficiency, indicating a partial mediation effect. In column 6, after controlling for AnalystF, the coefficient of CSR D (0.012, $t = 3.40$) remains significant,

while AnalystF also maintains a strong positive effect (coefficient = 0.070, $t = 5.88$). Based on the classical three-step approach proposed by Baron and Kenny (1986), these results confirm the existence of a significant mediating effect of financial analyst forecasts. The results of this study support hypothesis 2.

4.3.2 Bootstrap Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure and Investment Efficiency

In addition, the study employs the bootstrap approach to investigate the potential mediating role of financial analyst forecasts between corporate social responsibility disclosure and investment efficiency. To conduct this analysis, the study generates 5,000 bootstrap samples from the original dataset with replacement.

Table 4.12 shows that the confidence intervals for both the indirect effect and the direct effect include 0, indicating that financial analyst forecasts do play a mediating role between corporate social responsibility disclosure and investment efficiency. The findings suggest that there is a significant mediating effect of financial analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency. Corporate social responsibility disclosure indirectly impacts investment efficiency by influencing financial analyst forecasts. This substantial mediating effect supports hypothesis 2.

Table 4.12: Bootstrap Results for the Mediating Effect of Financial Analysts Forecasts on the Relationship between CSRD and Investment Efficiency

Path	Type	coefficient	Std.err.	z	p> z	BC 95% CI	
CSRD-AnalystF-Inv	indirect	.0015308	.0002759	5.55	0.000	.00099	.0020716
CSRD-Inv	direct	-.0104757	.0017458	6.00	0.000	.007054	.0138974

Note: Table 4.12 presents the bootstrap results analyzing the mediating effect of financial analyst forecasts between social responsibility disclosure and investment efficiency. In this table, investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency; a larger absolute value of these residuals indicates higher investment efficiency. AnalystF serves as the mediating variable, reflecting analyst forecast accuracy; higher values represent greater accuracy. CSRD is the independent variable representing social responsibility disclosure choice.

4.3.3 Endogeneity Test

4.3.3.1 Propensity Score Matching

According to the relevant literature by Shan et al. (2023), firm size (Size), age of listing (ListAge), industry (Industry), asset growth rate (Assetgrowth), and asset debt ratio (Lev) are initially selected as covariates in the propensity score matching (PSM) model to minimize differences in characteristics and address the sample matching issue. A logit model is then used to estimate the propensity score, which represents the conditional probability of accepting corporate social responsibility disclosure to mitigate the self-selection problem. Subsequently, the K-nearest neighbor matching method is applied in PSM. Following Abadie and Imbens (2006), a 1:4 matching ratio is used, meaning each treatment group sample is matched with four control group samples to enhance comparability and reduce variance between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms). After completing the sample matching, this study conducted several steps to verify its validity. First, this research performed a common trend test to ensure that the treatment and control groups exhibited similar trends before matching. This involved comparing the trends of both groups before and following the matching process. Next, this study conducted a balance test to assess whether significant differences in key covariates between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) persisted after matching. This step was essential

to confirm that the matching process had effectively eliminated systematic differences in key characteristics between the two samples.

Table 4.13: The Common Range of Values for Propensity Score Matching

Method	Treatment	Support		
	Assignment	Off support	On support	Total
Neighbor	Untreated	124	19404	19528
	Treated	4	4703	4707

Given that the control group was larger than the experimental group, this study employed the k-nearest neighbor matching method with k=4 during propensity score matching. This approach combines Logit model parameter estimation with kernel matching, using a wide bandwidth of 0.05 to generate propensity scores for the data. Variables that could be accurately observed were matched within a common range of values applicable to all samples. Table 4.13 illustrates that the majority of propensity scores for firms with mandatory social responsibility disclosure and those without fall within this common range. Specifically, 24,107 samples (4,703 in the treatment group and 19,404 in the control group) are within the common support domain, while only 128 samples (4 in the treatment group and 124 in the control group) fall outside this domain. This indicates a sample loss rate of 0.5% and suggests that the experimental group can find comparable individuals with similar propensity scores through matching.

Table 4.14 presents the means, standardized differences (% bias), and significance test results for each variable before and after matching, assessing the improvement in sample balance. Before matching (U), the standardized differences for variables such as Size, Lev, AssetReturn, Industry, and ListAge were notably large. For instance, the standardized difference for Size was 126.8%, and for ListAge, it was 64.5%. After matching (M), these

differences were significantly reduced, with Size decreasing to 0.9% and ListAge to -13.2%, indicating a substantial improvement in sample balance. Post-matching t-tests reveal that the differences in Size, Lev, AssetReturn, and Industry are no longer significant (all p-values greater than 0.05). Although the standardized difference for ListAge remains significant after matching, it was considerably reduced, demonstrating that the matching process effectively minimized systematic differences between the treatment and control groups and enhanced sample comparability.

Table 4.14: Balance Test Results

Variable	Matched	Treated	Control	%bias	bias	t	p> t	V(C)
Size	U	23.646	22.074	126.8		85.72	0.000	1.77*
	M	22.644	23.632	0.9	99.3	0.40	0.689	1.02
Lev	U	.50824	.42488	43.5		26.17	0.000	0.85*
	M	.50848	.51626	-4.1	90.7	-1.92	0.055	0.78*
AssetReturn	U	.00586	.00665	-5.1		-2.96	0.003	0.70*
	M	.00587	.00559	1.8	64.9	0.90	0.366	0.83*
Industry	U	4.8995	4.6267	8.3		5.17	0.000	1.10*
	M	4.9016	4.9581	-1.7	79.3	-0.83	0.408	1.07*
ListAge	U	2.5442	2.1663	64.5		36.98	0.000	0.60*
	M	2.5439	2.6216	-13.2	79.4	-6.87	0.000	0.75*

Note: Size represents the firm size, Lev denotes leverage, AssetReturn refers to non-recurring gains divided by total assets at year-end, and ListAge refers to the number of years since the firm's listing. * represents the 10% significance level, ** represents the 5% significance level, and *** represents the 1% significance level.

Figure 4.7 displays kernel density estimates of the propensity score (Pscore) distributions for the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) before matching. The blue curve represents the treatment group, while the red curve denotes the Control group. The figure illustrates that the distribution of propensity scores for the treatment group is flatter and covers a wider range of scores,

whereas the propensity scores for the control group are highly concentrated near 0 and decrease rapidly as the score increases. This significant disparity in the propensity score distributions between the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) highlights the need for a matching method to enhance sample comparability and balance the differences in propensity scores between the two groups.

Figure 4.8 shows the kernel density estimates of the propensity score (Pscore) distributions for the treated (Treat) and control (Control) groups after matching. The blue curve represents the treatment group, and the red curve represents the Control group. Compared to the pre-matching period, the distributions of propensity scores for the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms) are much more similar, particularly in the range between 0.2 and 0.6, where the distribution curves of the two groups nearly overlap. This close alignment indicates that the matching process has significantly reduced the difference in propensity scores between the two groups, thereby enhancing sample balance and providing a more reliable foundation for subsequent causal inference.

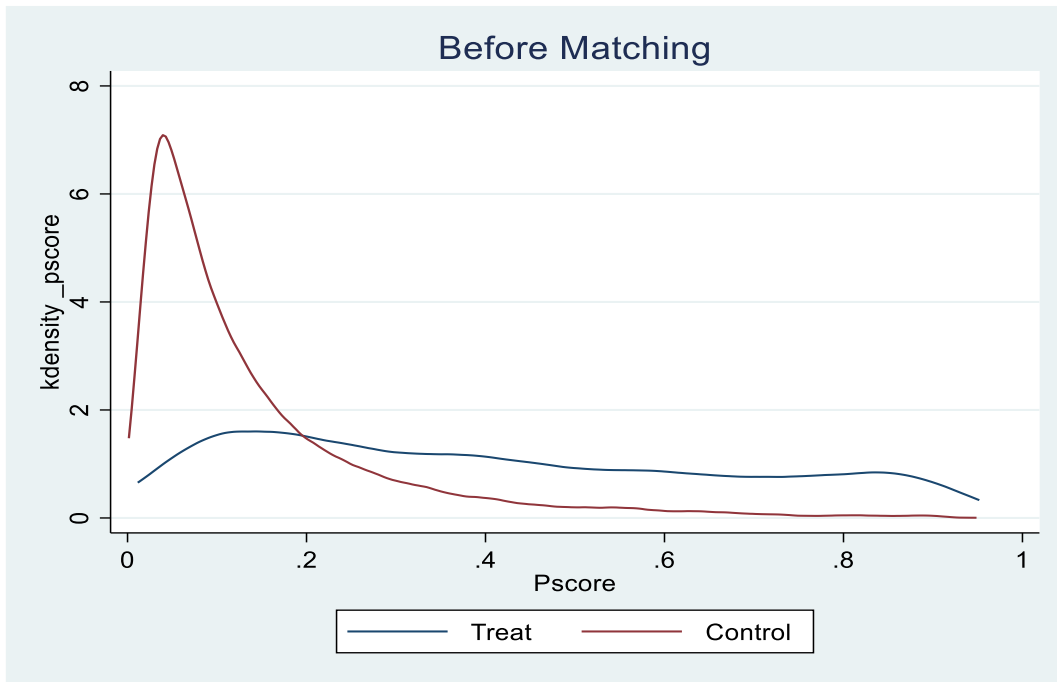


Figure 4.7: Density Distribution before Matching

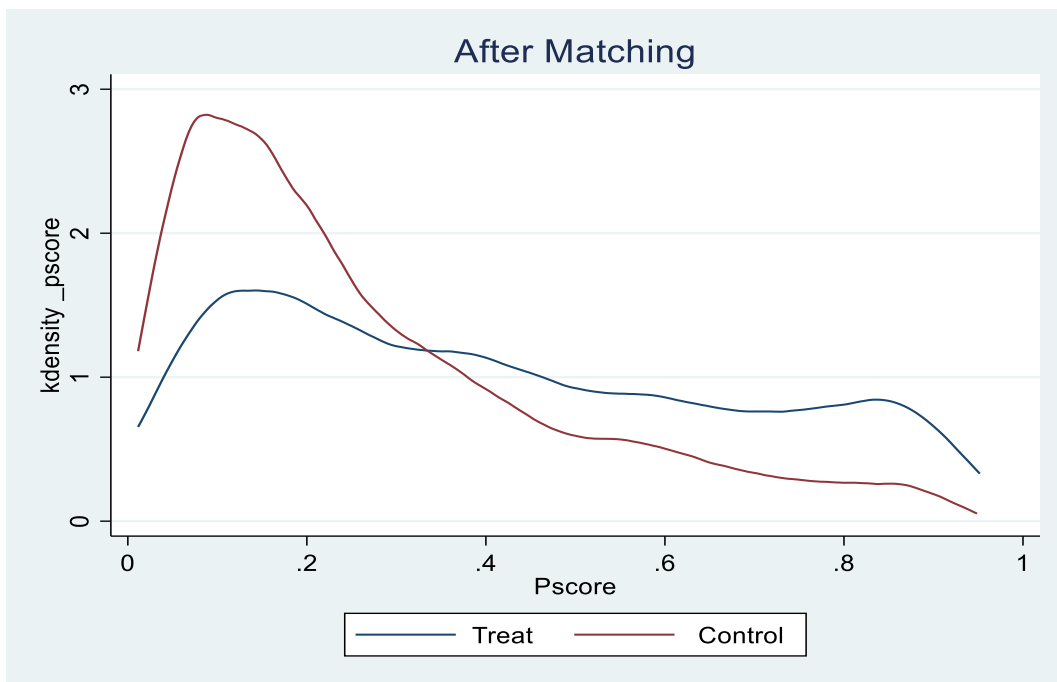


Figure 4.8: Density Distribution after Matching

4.3.3.2 Regression Results of PSM Sample of the Mediating Effect of Financial Analyst Forecasts on the relationship between CSRD and Investment Efficiency

Table 4.15: Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSRD and Investment Efficiency in the PSM Sample

Variable	Inv	Inv	AnalystF	AnalystF	Inv	Inv
CSRD	0.006*** (3.47)	0.013*** (2.96)	0.016*** (13.37)	0.005* (1.79)	0.005*** (2.76)	0.013*** (2.88)
AnalystF					0.081*** (5.72)	0.067*** (3.55)
Size	0.002** (2.10)	-0.012*** (-2.90)	-0.003*** (-5.24)	-0.000 (-0.13)	0.002** (2.38)	-0.012*** (-2.90)
Lev	-0.005 (-0.89)	-0.024* (-1.67)	-0.055*** (-16.18)	-0.097*** (-10.20)	-0.000 (-0.04)	-0.017 (-1.20)
AssetGrowth	-0.137*** (-57.35)	-0.127*** (-15.49)	0.036*** (23.61)	0.033*** (12.64)	-0.140*** (-57.34)	-0.130*** (-15.31)
Cashflow	-0.099*** (-7.89)	-0.027 (-1.55)	0.118*** (14.52)	0.094*** (8.11)	-0.109*** (-8.59)	-0.033* (-1.89)
ListAge	-0.007*** (-4.43)	-0.017** (-2.45)	0.005*** (4.52)	0.018*** (3.72)	-0.007*** (-4.67)	-0.019*** (-2.62)
Board	-0.025*** (-5.68)	0.011 (1.10)	0.010*** (3.54)	0.015** (2.30)	-0.025*** (-5.87)	0.010 (1.01)
Dual	0.002 (0.97)	-0.001 (-0.26)	-0.001 (-0.56)	-0.001 (-0.20)	0.002 (1.00)	-0.001 (-0.25)
TOP1	-0.000*** (-6.28)	-0.001*** (-2.64)	0.000*** (8.77)	0.000*** (3.52)	-0.000*** (-6.73)	-0.001*** (-2.76)
_cons	-0.005 (-0.26)	0.266*** (2.91)	-0.009 (-0.73)	-0.092* (-1.81)	-0.004 (-0.22)	0.272*** (2.98)
N	11865	11865	11865	11865	11865	11865
firm	no	yes	no	yes	no	yes
year	no	yes	no	yes	no	yes
r ²	0.224	0.484	0.116	0.473	0.226	0.485

Note: Table 4.15 provides the regression results for the mediating effect of financial analyst forecasts between corporate social responsibility disclosure and investment efficiency. In the regression model, Investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. The mediating variable, AnalystF, measures financial analyst forecast accuracy, where a higher value corresponds to higher forecast accuracy. The independent variable, CSRD, represents the choice of corporate social responsibility disclosure. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. The results, presented with robust standard errors clustered at the firm level, are significant at various levels: * denotes a 10% significance level, ** indicates a 5% significance level, and *** signifies a 1% significance level.

To address sample selection bias in this study, the propensity score matching (PSM) approach, as recommended by Lu et al. (2022), was utilized to align the mandatory and non-mandatory disclosure groups. To account for additional attributes that might influence the results, a probability model was developed based on key company characteristics. Variables such as company size, return on assets, leverage, industry classification, and listing age were selected as matching variables, following Shan et al. (2023). A Logit regression model was employed to calculate propensity scores for each sample. Subsequently, samples in the control group with propensity scores closest to those in the experimental group were selected and matched using a 1:4 ratio, allowing for a more precise comparison. After matching, no significant differences were observed between the experimental and control groups in terms of covariate means at the 1% significance level, thereby supporting the robustness of the model estimation.

The results of the balance tests, as shown in Table 4.14, illustrate the effectiveness of the propensity score matching process. Before matching, there were significant differences between the means of the treatment group (mandatory CSR reporting firms) and the control group (non-CSR disclosure firms). However, these differences were eliminated

after matching, as evidenced by Table 4.14. The matching process led to a substantial reduction in the deviations of control variables, with standardized deviations for all variables falling below 10% in absolute value. According to Rosenbaum and Rubin (1983), the standard deviation of the propensity score should not exceed 20% in absolute value, and the results in Table 4.14 confirm that this threshold was met, further validating the adequacy of the matching procedure.

The regression results in Table 4.15 provide empirical evidence on the mediating role of analyst forecasts in the relationship between corporate social responsibility (CSR) disclosure and investment efficiency (Inv) within the propensity score matching (PSM) sample. The six models incorporate different specifications, including firm and year fixed effects, to enhance the robustness of the findings. Columns (1) and (2) estimate the total impact of CSR disclosure on investment efficiency (Inv). The results show that CSR disclosure has a significant positive effect on investment efficiency, with coefficients of 0.006 ($p < 0.01$) and 0.013 ($p < 0.01$) in models without and with firm fixed effects, respectively. These findings align with signaling theory, which suggests that CSR disclosure signals a firm's commitment to ethical business practices, reducing investor uncertainty and fostering trust (Zhang et al., 2021). The positive association is also consistent with information asymmetry theory, which argues that improved transparency through CSR disclosure helps reduce adverse selection and agency conflicts, leading to more efficient capital allocation (Healy & Palepu, 2001). Columns (3) and (4) explore the effect of CSR disclosure on financial analyst forecast (AnalystF). The coefficients for CSR are 0.016 ($p < 0.01$) and 0.005 ($p < 0.1$), indicating that CSR disclosure positively influences analyst forecasts, though the effect diminishes when controlling for firm-level fixed effects. This suggests that analysts play a crucial role in processing CSR-related information to enhance

forecast precision. Columns (5) and (6) introduce financial analyst forecasts as a mediating variable between CSR and investment efficiency. Financial analyst forecasts have a significantly positive impact on investment efficiency, with coefficients of 0.081 ($p < 0.01$) and 0.067 ($p < 0.01$), respectively. These findings align with reputation theory, which posits that firms engaging in CSR disclosure build a stronger reputation, thereby enhancing investor confidence and reducing capital constraints (Fombrun & Shanley, 1990). This supports and verifies H2, aligning with findings from (Liu & Tian, 2021) and indicating that social responsibility disclosure enhances information transparency and investment efficiency.

4.3.3.3 Bootstrap Results of PSM Sample of the Mediating Effect of Financial Analyst Forecasts on the relationship between CSR disclosure and Investment Efficiency

Table 4.16: Bootstrap Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSRD and Investment Efficiency in the PSM Sample

Path	Type	coefficient	Std.err.	z	p> z	BC 95% CI	
CSRD-AnalystF-INV	indirect	.0015308	.0001329	11.52	0.000	.0012704	.0017912
CSRD-INV	direct	.0104757	.0019703	5.32	0.000	.006614	.0143374

Note: Table 4.16 presents the bootstrap results analyzing the mediating effect of financial analyst forecasts between corporate social responsibility disclosure and investment efficiency. In this table, Investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency; a larger absolute value of these residuals indicates higher investment efficiency. AnalystF serves as the mediating variable, reflecting financial analyst forecast, higher values represent greater accuracy. CSRD is the independent variable representing social responsibility disclosure choice.

This study employs the bootstrap methodology with 5,000 replicated samples to explore the mediating role of financial analyst forecasts accuracy on the relationship between corporate social responsibility disclosure (CSRD) and investment efficiency (Inv). As shown

in Table 4.16, the indirect effect of corporate social responsibility disclosure (CSR) on investment efficiency (Inv) through financial analyst forecasts (AnalystF) is 0.0015308, with a standard error of 0.0001329, a z-value of 11.52, and a p-value of 0.000, indicating a highly statistically significant indirect effect. The bootstrap 95% confidence interval for this effect is (0.0012704, 0.0017912), which does not include zero, further validating the significance of the indirect effect. These results suggest that CSR disclosure indirectly reduces inefficient investments by improving financial analyst forecast accuracy.

In addition, the study reveals a direct effect of corporate social responsibility disclosure (CSR) on investment efficiency (INV) with a coefficient of 0.0104757, a standard error of 0.0019703, a z-value of 5.32, and a p-value of 0.000, indicating that this direct effect is highly statistically significant. The bootstrap 95% confidence interval for this effect is (0.006614, 0.0143374), which does not include zero, further confirming the significance of the direct effect. The results indicate that CSR disclosure improves investment efficiency through the mediating role of financial analyst forecasts (AnalystF), thereby supporting hypothesis 2.

4.3.4 Robustness Test

To confirm the validity of the results from the basic regression analyzing the mediating role of financial analyst forecasts between CSR disclosure and investment efficiency (as mentioned in hypothesis 2), following (Kong et al., 2020), this study employs the ordinary least squares (OLS) method with cluster robust standard errors for robustness testing. OLS is chosen for the following reasons. First, industries in which firms operate have different characteristics, operating environments, and regulatory requirements, which can significantly affect corporate social responsibility performance and investment decisions. By controlling for industry effects, the study can eliminate systematic biases caused by

heterogeneity across industries, thus ensuring the generalizability and accuracy of the results. Second, variations in the economic environment, policy changes, and market conditions over time can also significantly impact CSR disclosure and investment efficiency. Controlling for vintage effects effectively eliminates exogenous fluctuations due to time factors and ensures more robust estimates of the relationship between CSR disclosure and investment efficiency. Additionally, ordinary least squares (OLS) is a fundamental method widely used in regression analysis, relying on assumptions such as homoskedasticity and independence of the error term, which makes it suitable for unbiased estimation of linear relationships between variables. By including control variables for industry and year in the OLS model, the relationship between the main research variables can be captured more accurately, and the influence of confounding factors on the estimation results can be reduced. This approach not only enhances the external validity and robustness of the research findings but also improves their applicability across different contexts. Therefore, OLS is used to conduct robustness tests for hypothesis 2.

$$Inv_{i,t} = \alpha_{011} + \alpha_{012}CSR_{i,t} + \alpha_{013}Control_{i,t} + \lambda_t + \delta_j + \mu_{i,t} \quad \text{Equation 4.1}$$

$$AnalystF_{i,t} = \alpha_{022} + \alpha_{023}CSR_{i,t} + \alpha_{024}Control_{i,t} + \lambda_t + \delta_j + \mu_{i,t} \quad \text{Equation 4.2}$$

$$Inv_{i,t} = \alpha_{033} + \alpha_{034}CSR_{i,t} + \alpha_{035}AnalystF_{i,t} + \alpha_{036}Control_{i,t} + \lambda_t + \delta_j + \mu_{i,t} \quad \text{Equation 4.3}$$

Where i denotes the firm and t denotes time. $Inv_{i,t}$ is the investment efficiency of the i firm at the t time point, Investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure

that higher values indicate greater efficiency. The independent variable for CSR disclosure choice, CSR_D, is a dummy variable equal to 1 if firm *i* is mandated to publish an independent CSR report and 0 otherwise. Analyst_{F_{i,t}} represents financial analyst forecasts accuracy of *i* firm at *t* time point. The larger the value, the less accurate financial analyst forecasts is. To account for unobservable heterogeneity across industries and over time, the models include industry fixed effects (δ_j) and year fixed effects (λ_t). In estimating Equation 4.1, This research focuses on the coefficient on CSR_D, α_{012} , which is expected to be significantly positive if firms make CSR disclosure and positively affect investment efficiency. In estimating Equation 4.2, focus on the coefficient of CSR disclosure α_{023} , which is expected to be significantly positive if firms have CSR disclosure and positively affect financial analyst forecasts. In estimating Equation 4.3, focusing on the coefficients α_{034} and α_{035} of CSR disclosure (CSR_D) and financial analyst forecasts (Analyst_F), when the expected partial mediation effect is present, the value of the mediator variable Analyst_F coefficient α_{035} is significantly positively correlated when controlling for the independent variable CSR disclosure (CSR_D), this makes the coefficient α_{034} of CSR disclosure (CSR_D) should be smaller than α_{012} .

4.3.4.1 Regression Results of the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure and Investment Efficiency

Following Kong et al. (2020), this study employs the ordinary least squares (OLS) method with cluster robust standard errors for robustness testing. The specific regression results are in Table 4.17. As shown in Table 4.17, the influence of corporate social responsibility disclosure on investment efficiency is significant at the 1% level in column (1), indicating that CSR disclosure has a substantial positive impact on investment efficiency. Specifically, firms that disclose CSR information demonstrate higher investment efficiency compared to firms that do not disclose CSR, suggesting that CSR disclosure improves

investment efficiency. This finding aligns with previous research (Benlemlih & Bitar, 2018; Zhong & Gao, 2017).

Table 4.17: OLS Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSRD and Investment Efficiency

Variable	Inv	AnanalystF	Inv
CSRD	0.012*** (5.69)	0.015*** (11.23)	0.010*** (4.98)
AnalystF			0.104*** (10.41)
Size	0.001 (0.86)	-0.003*** (-3.81)	0.001 (1.15)
Lev	-0.010** (-2.06)	-0.064*** (-15.86)	-0.004 (-0.72)
AssetGrowth	-0.119*** (-20.50)	0.039*** (21.28)	-0.123*** (-20.61)
Cashflow	-0.032*** (-3.21)	0.123*** (17.96)	-0.045*** (-4.49)
ListAge	-0.008*** (-5.34)	0.004*** (4.96)	-0.008*** (-5.70)
Board	0.000 (0.09)	0.011*** (3.97)	-0.001 (-0.21)
Dual	0.001 (0.75)	-0.001 (-0.95)	0.001 (0.84)
TOP1	-0.000** (-2.10)	0.000*** (9.17)	-0.000*** (-2.75)
_cons	-0.075*** (-3.93)	-0.040*** (-2.92)	-0.071*** (-3.72)
N	24235	24235	24235
Industry	yes	yes	yes
year	yes	yes	yes
r ²	0.217	0.163	0.222

Note: Table 4.17 presents the regression results examining the mediating effect of financial analyst forecasts between corporate social responsibility disclosure and investment efficiency. The dependent variable, investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. The mediating variable, AnalystF, represents financial analyst forecast, where a higher value denotes higher accuracy in forecasts. The independent variable, CSR, denotes disclosure of corporate social responsibility. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. Standard errors are robust and clustered at the firm level. Significance levels are denoted as follows: * indicates the 10% significance level, ** indicates the 5% significance level, and *** indicates the 1% significance level.

According to signaling theory, disclosing CSR information signals a firm's commitment to long-term sustainable development, which enhances its credibility and transparency. This, in turn, attracts support from quality investors and stakeholders (Conte et al., 2023). For the control variables, Leverage (Lev), Asset Growth (AssetGrowth), Cash Flow (Cashflow), Listing Age (ListAge), and Largest Shareholder Ownership (TOP1) significantly impact investment efficiency. This is consistent with Ling and Wu (2022) who found the increase in asset-liability ratio reduces investment efficiency. Cooper and Maio (2019) showed an increase in asset growth leads to a fall in stock prices. Richardson (2006) argued companies with excess cash flow are more likely to invest inefficiently. Chen et al. (2011) reported the longer a company has been listed, the more likely it is to be in the mature or declining stage of its business life cycle, which means less investment activity, so the coefficient of the variable is negative, according to Chen et al. (2017), equity concentration reduces investment efficiency. Notably, Asset Growth and Cash Flow have the most pronounced positive effects on investment efficiency, indicating that firms experiencing rapid growth and possessing ample cash flow are more prone to inefficient investment behavior. Conversely, variables such as whether the chairman and CEO are the same person (Dual) do not significantly affect investment efficiency.

The positive impact of corporate social responsibility disclosure on financial analyst forecasts, as shown in column (2), is significant at the 1% level, indicating that CSR disclosure significantly improves financial analyst forecast accuracy. By fulfilling their social responsibilities, companies often enhance their information disclosure and transparency. This improvement allows financial analysts to access clearer and more comprehensive information about the company's operating conditions and financial performance, thereby increasing financial analyst forecasts and reducing errors. Information asymmetry theory supports the notion that reducing gaps in information availability leads to more precise market predictions, as analysts rely on disclosed CSR information to assess firms' risk profiles and future cash flows (Verrecchia, 2001). This is in line with previous literature (Dhaliwal et al., 2012). Regarding control variables, firm size (Size) and leverage (Lev) have a significant negative effect on financial analyst forecasts, suggesting that larger and highly leveraged firms tend to perform poorly in terms of financial analyst forecast accuracy. This is consistent with previous literature (Bhandari et al., 2018; Leung & Srinidhi, 2006). Conversely, firms with high Asset Growth, substantial Cash Flow, longer listing duration (ListAge), board size (Board), and high shareholder concentration (TOP1) exhibit a significant positive effect on financial analyst forecast accuracy (AnalystF). This implies that fast-growing firms, those with high cash flow, longer market presence, particular board characteristics, and high shareholding concentration, perform well in terms of financial analyst forecast accuracy. According to Wen (2019), asset growth contains information about future market returns, which suggests that asset growth has a significant impact on financial analyst forecast accuracy. Financial analyst forecasts that include cash flow forecasts are more accurate than those that do not (Call et al., 2009). Parkash et al. (1995) found that equity concentration positively correlates with financial analyst forecast accuracy.

Additionally, whether the chairman and CEO are the same person (Dual) does not significantly affect financial analyst forecast accuracy, suggesting that this governance structure characteristic does not play a significant role in analyst forecasting accuracy within this model. These results highlight the complex interplay between firm characteristics and governance structures in influencing analyst forecast accuracy.

Although the coefficient on the effect of CSR disclosure (CSR_D) on investment efficiency (Inv) in column (3) is attenuated after controlling for financial analyst forecasts (AnalystF), it remains significant at the 1% level. This suggests that financial analyst forecasts (AnalystF) play a partial mediating role between CSR disclosure and investment efficiency (Inv). In other words, CSR disclosure indirectly influences investment efficiency (Inv) by affecting financial analyst forecasts (AnalystF). This finding aligns with previous research by (Chen et al., 2011; Dhaliwal et al., 2012). CSR disclosure can reduce information asymmetry by enhancing corporate transparency and improving the quality of disclosure, which in turn boosts the accuracy of financial analyst forecasts. Financial analyst forecasts can make better investment decisions based on more accurate information, thereby partly explaining the indirect effect of CSR disclosure (CSR) on corporate investment efficiency (Inv). Reputation theory (Fombrun & Shanley, 1990) suggests that companies with strong CSR disclosure engagement build trust and credibility in the market, which further strengthens the reliability of their disclosures (Othman et al., 2011). This improved corporate reputation mitigates information asymmetry and reduces uncertainty, thereby facilitating more accurate and reliable forecasts by financial analysts. Stakeholder theory (Freeman, 1984) supports the argument that firms proactively engaging with stakeholders through transparent CSR disclosure fosters better relationships with investors and analysts, leading to improved information interpretation and market efficiency (Awa et al., 2024). For the

control variables, AssetGrowth, Cashflow, ListingAge, and Shareholding of the Largest Shareholder (TOP1) have a significant positive effect on inefficient investment (Inv). This is consistent with previous literature (Chen et al., 2017; Cooper & Maio, 2019; Ling & Wu, 2022; Richardson, 2006). This indicates that fast-growing firms, firms with abundant cash flow, firms with longer listing durations, and firms with high equity concentration are more likely to engage in inefficient investments. In contrast, firm size (Size), leverage (Lev), board characteristics (Board), and whether the chairman and CEO are the same person (Dual) do not significantly impact inefficient investment. These results suggest that certain firm characteristics and governance structures can partly explain firms' inefficient investment behavior, while others do not play a major role. This finding is consistent with the basic regression results, thus supporting hypothesis 2.

4.3.4.2 Bootstrap Results of the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSRD and Investment Efficiency

In addition, Table 4.18 presents the results of 5,000 bootstrap samplings. The coefficient for the indirect effect of CSR disclosure on investment efficiency through financial analyst forecasts (AnalystF) is 0.0015308, with a standard error of 0.0001439, a z-value of 10.64, and a p-value of 0.000. This indicates that the indirect effect is highly statistically significant. The bootstrap 95% confidence interval for this effect is (0.0012488, 0.0018128), which excludes zero, confirming the robustness of the indirect effect. Furthermore, the coefficient for the direct effect of CSR disclosure on investment efficiency is 0.0104757, with a standard error of 0.001615, a z-value of -6.49, and a p-value of 0.000. The Bootstrap 95% confidence interval for the direct effect is (0.0073104, 0.013641), which also excludes zero, further confirming the significance of the direct effect.

Taken together, corporate social responsibility disclosure (CSR) improves investment efficiency both indirectly and directly. Specifically, CSR indirectly enhances investment efficiency by reducing financial analyst forecast accuracy (AnalystF). Both effects are significant at the 1% level. The robustness of these findings is further supported by the fact that none of the 95% confidence intervals from the bootstrap sampling (5,000 times) contain zero. This suggests that CSR disclosure has a significant and multifaceted positive effect on enhancing investment efficiency. This result supports hypothesis 2.

Table 4.18: Bootstrap Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR and Investment Efficiency

Path	Type	coefficient	Std.err.	z	p> z	BC 95% CI	
CSR- AnalystF- INV	indirect	.0015308	.0001439	10.64	0.000	.0012488	.0018128
CSR-INV	direct	.0104757	.001615	6.49	0.000	.0073104	.013641

Note: Table 4.18 presents the bootstrap results analyzing the mediating effect of financial analyst forecasts between corporate social responsibility disclosure and investment efficiency. In this table, Investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency; a larger absolute value of these residuals indicates higher investment efficiency. AnalystF serves as the mediating variable, reflecting financial analyst forecasts; higher values represent greater accuracy. CSR is the independent variable representing corporate social responsibility disclosure choice.

4.4 The Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure Quality and Investment Efficiency

In this section, this study examines the mediating effect of financial analyst forecasts on the relationship between CSR disclosure quality and investment efficiency. The following subsection presents the regression results, providing empirical evidence on whether financial analyst forecasts significantly mediate this relationship.

To test hypothesis 3, regression analysis was conducted using models 3.13–3.15. Table 4.19 details the mediating effect of financial analyst forecasts on the relationship between the quality of mandatory social responsibility disclosure and investment efficiency.

4.4.1 Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure Quality and Investment Efficiency

Table 4.19: Regression Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSRDQ and Investment Efficiency

Variable	Inv	Inv	AnalystF	AnalaystF	Inv	Inv
CSRDQ	0.002** (1.99)	-0.001 (-0.64)	-0.000 (-0.54)	0.000 (0.05)	0.002** (2.03)	-0.001 (-0.64)
AnalystF					0.140*** (4.71)	0.112*** (3.29)
Size	0.002* (1.76)	-0.011** (-2.16)	-0.001* (-1.90)	-0.007*** (-2.79)	0.002* (1.90)	-0.010** (-2.01)
Lev	0.003 (0.36)	-0.022 (-1.12)	-0.042*** (-11.16)	-0.032*** (-3.54)	0.009 (1.12)	-0.018 (-0.93)
AssetGrowth	-0.110*** (-22.49)	-0.109*** (-7.07)	0.028*** (11.82)	0.027*** (7.87)	-0.114*** (-23.01)	-0.112*** (-7.08)
Cashflow	-0.098*** (-5.36)	-0.033 (-1.47)	0.090*** (10.08)	0.104*** (8.33)	-0.110*** (-6.00)	-0.044** (-1.98)
ListAge	0.002 (0.71)	-0.026** (-2.48)	0.002* (1.73)	0.009 (1.59)	0.001 (0.59)	-0.027*** (-2.59)
Board	-0.017*** (-3.01)	0.025* (1.91)	0.001 (0.33)	0.019*** (2.95)	-0.017*** (-3.04)	0.023* (1.75)
Dual	0.004 (1.05)	0.001 (0.18)	-0.002 (-1.00)	-0.004 (-1.26)	0.004 (1.12)	0.001 (0.26)
TOP1	-0.000** (-1.98)	-0.001** (-2.38)	0.000* (1.83)	-0.000 (-0.97)	-0.000** (-2.11)	-0.001** (-2.34)
_cons	-0.063** (-2.58)	0.257** (2.14)	-0.007 (-0.56)	0.072 (1.28)	-0.062** (-2.54)	0.249** (2.07)

Table 4.19 continued

<i>N</i>	4707	4707	4707	4707	4707	4707
firm	no	yes	no	yes	no	yes
year	no	yes	no	yes	no	yes
<i>r</i> ²	0.108	0.397	0.098	0.398	0.113	0.399

Note: Table 4.19 provides the results of the regression of financial analyst forecasts on the mediating effect between corporate social responsibility disclosure quality and investment efficiency. Investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency. AnalystF is the mediating variable, representing financial analyst forecasts, where a higher value indicates greater accuracy. CSRDQ is the independent variable that represents the quality of corporate social responsibility disclosure. Size represents firm size, Lev denotes leverage, AssetGrowth captures asset growth, and Cashflow measures operating cash flow. ListAge refers to the number of years since the firm's listing, Board indicates board size, Dual represents CEO duality, and TOP1 denotes ownership concentration. Standard errors are robust and clustered at the firm level. * represents the 10% significance level, ** represents the 5% significance level, and *** represents the 1% significance level.

Column (1) illustrates the overall impact of corporate social responsibility disclosure quality on investment efficiency. The coefficient on Inv is negative and significant at less than the 1% level after accounting for various control variables. This suggests that high-quality social responsibility disclosure is linked to improved corporate investment efficiency. This result aligns with signaling theory, which suggests that firms with high-quality CSR disclosure send positive signals to investors and stakeholders, reducing information asymmetry and enhancing investment decisions (Hamrouni et al., 2022). Additionally, stakeholder theory supports this finding, as improved CSR discourse transparency strengthens relationships with key stakeholders, leading to better resource allocation and reduced inefficient investments (Benlemlih & Bitar, 2018). This finding is consistent with previous research (Cook et al., 2019; Samet & Jarbouï, 2017). However, when firm and year-fixed effects are included, the impact of CSR quality on firm investment efficiency becomes

statistically insignificant. This indicates that firm-specific and temporal factors might diminish the effect of CSR quality on investment efficiency.

Columns (3) and (4) explore whether the quality of social responsibility disclosure affects financial analyst forecasts. The results show that social responsibility disclosure quality does not significantly influence financial analyst forecasts, with a coefficient of 0.0000, irrespective of whether firm and year-fixed effects are controlled. Several factors may explain this finding. First, the current system for CSR disclosure in China remains imperfect. The absence of effective auditing and supervision mechanisms leads to skepticism about the value and reliability of CSR disclosure. Despite increasing attention to non-financial disclosures by companies, CSR disclosure in China is often characterized by inconsistency, lack of clarity, and irregularity. This variability in the quality of CSR disclosure makes it challenging for analysts and users to form a coherent and reliable assessment of the disclosed information. Although more enterprises are beginning to emphasize non-financial information disclosure, CSR disclosure in China remains problematic, characterized by inconsistency, confusion, and irregularity. This situation makes it challenging for users to obtain a coherent and reliable view of CSR reports. In practice, social responsibility ratings provided by third-party agencies are intended to guide investor decision-making and are widely utilized by researchers. However, the phenomenon of a single company receiving markedly different ratings from various agencies has raised concerns. This discrepancy forces users of CSR disclosure ratings to critically reassess the accuracy of these measures and their overall impact on the market (Dai et al., 2021). Second, Christensen et al. (2022) argue that a lack of consensus on the interpretation of disclosures can exacerbate information asymmetry and deepen differences of opinion among information users. Chatterji et al. (2016) find that, despite efforts by leading social

responsibility disclosure rating agencies to cover similar subjects (e.g., environmental and social performance), the absence of harmonized disclosure norms and rating standards leads to significant differences in the ratings assigned to the same company. This variation underscores the need for users of CSR disclosure ratings to approach these assessments with caution.

The regression results in columns (5) and (6) of Table 4.19 present evidence of the mediating effect of financial analyst forecasts on the relationship between CSR disclosure quality (CSR DQ) and investment efficiency (Inv). In column (5), CSR DQ is positively associated with investment efficiency at the 5% significance level (coefficient = 0.002, $t = 2.03$), and financial analyst forecasts (AnalystF) are also significantly positively associated with investment efficiency at the 1% level (coefficient = 0.140, $t = 4.71$). However, in column (6), when controlling for both CSR DQ and AnalystF simultaneously, the coefficient on CSR DQ becomes statistically insignificant (coefficient = -0.001, $t = -0.64$), while AnalystF remains significant (coefficient = 0.112, $t = 3.29$). Based on the classical three-step approach (Baron & Kenny, 1986), the mediation effect is not supported, as the relationship between CSR disclosure quality (CSR DQ) and financial analyst forecasts (AnalystF) is not statistically significant. The results of this study rejected hypothesis 3.

4.4.2 Bootstrap Results for the Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure Quality and Investment Efficiency

This study uses the bootstrap method to sample 5,000 times. Table 4.20 shows the estimated results of the indirect and direct effects of corporate social responsibility disclosure quality (CSR DQ) on investment efficiency (Inv) through mediating variable financial analyst forecasts (AnalystF). The P value in the first row is 0.806, showing that the indirect effect is not significant. The bootstrap 95% confidence interval for this effect is (-

0.001499, 0.0001166), which includes zero, confirming the absence of indirect effects. The p-value in the second row is not significant, showing that the direct effect is not significant, which is consistent with the results in the four-step approach. The bootstrap 95% confidence interval for the direct effect is (-0.0006441, 0.0039497), which also includes zero, further confirming the absence of direct effects. This result confirms that both the direct and indirect effects of corporate social responsibility quality on investment efficiency are not significant, and hypothesis 3 is rejected.

Table 4.20: Bootstrap Results for the Mediating Effect of Financial Analysts Forecasts on the Relationship between CSR Disclosure Quality and Investment Efficiency

Path	Type	Coefficient	Std.err.	z	p> z	BC 95% CI	
CSR-DQ- AnalystF-Inv	indirect	-.0000167	.0000068	-0.25	0.806	-.0001499	.0001166
CSR-DQ-Inv	direct	.0016528	.0011719	1.41	0.158	-.0006441	.0039497

Note: Table 4.20 presents the bootstrap results analyzing the mediating effect of financial analyst forecasts between corporate social responsibility disclosure quality and investment efficiency. In this table, investment efficiency (Inv), the dependent variable, is measured using the residuals calculated by the Richardson model, which are multiplied by -1 to ensure that higher values indicate greater efficiency; a larger absolute value of these residuals indicates higher investment efficiency. AnalystF serves as the mediating variable, reflecting analyst forecast accuracy; higher values represent greater accuracy. CSR-DQ is the independent variable representing corporate social responsibility disclosure quality.

4.5 Discussion

This section discusses in detail the results of the data analysis in the previous chapter in light of the hypothesized research objectives of this study and compares the results of this study with previous studies to see if they are consistent with the literature in the field. If some of the results are not consistent with previous studies, this study provides possible explanations and arguments for the results not being done the way they should be based on

the grounded theory and context. This study has three research objectives which are based on the research questions derived from the existing theoretical literature.

4.5.1 The Mediating Effect of Financial Analyst Forecasts on the Relationship between MCSR Disclosure and Investment Efficiency

RO1: To examine the mediating effect of financial analyst forecasts on the relationship between mandatory corporate social responsibility disclosure and investment efficiency.

The primary research objective of this study is to examine the mediating role of financial analyst forecasts on the relationship between mandatory CSR disclosure and investment efficiency. The distinction between this study and prior studies is the mediating role of financial analyst forecasts. Previous studies have directly linked mandatory CSR disclosure to investment efficiency without explicitly considering the role of financial analyst forecasts in this relationship. The inclusion of financial analyst forecasts as a mediating mechanism provides a new avenue of explanation.

Hypothesis 1 was developed to investigate the mediating effect of financial analyst forecasts on the relationship between mandatory corporate social responsibility disclosure and investment efficiency. The details of this hypothesis are as follows: the direct relationship between mandatory CSR disclosure and financial analyst forecasts, the direct relationship between mandatory CSR disclosure and investment efficiency, and the direct relationship between financial analyst forecasts and investment efficiency. The direct relationship between mandatory CSR disclosure and financial analyst forecasts was hypothesized to be positive, as increased transparency is expected to improve the financial analyst information environment and forecast accuracy. Similarly, the direct relationship between financial analyst forecasts and investment efficiency was also hypothesized to be

positive, as analyst accurate forecasts could enhance firms' capital allocation efficiency. The direct relationship between mandatory CSR disclosure and investment efficiency was hypothesized to be positive. The findings of the study suggested that not all the direct relationships that were hypothesized are proven in this study.

The results indicated a direct, positive, and significant relationship between mandatory corporate social responsibility disclosure and investment efficiency, aligning with stakeholder theory and information asymmetry theory, which suggest that greater transparency fosters better resource allocation (Francis et al., 2009; Omran & Ramdhony, 2015). However, contrary to signaling theory, which posits that CSR disclosure provides valuable signals for market participants, the study found no significant indirect effect through financial analyst forecasts. Findings of the direct relationship between mandatory corporate social responsibility disclosure and investment efficiency are consistent with prior studies (Liu & Tian, 2021; Makosa et al., 2020), supporting the view that regulatory-driven CSR disclosure mitigates agency conflicts and enhances decision-making efficiency. However, the absence of a mediating effect contradicts previous assumptions that financial analyst forecasts play a crucial role in processing CSR information.

A potential explanation lies in mandatory corporate social responsibility disclosure uncertainty, particularly in the early stages of mandatory corporate social responsibility disclosure implementation, which may have limited financial analysts' ability to incorporate CSR data effectively (Ruan et al., 2020). Additionally, external factors such as market sentiment, investor behavior, and corporate governance structures could exert a stronger influence on investment efficiency than financial analyst forecasts alone (Huang et al., 2016). These findings suggest that while mandatory corporate social responsibility disclosure

enhances investment efficiency, its transmission mechanism remains complex, warranting further investigation into alternative mediators beyond financial analysts.

4.5.2 The Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure and Investment Efficiency

RQ: To investigate the mediating role of financial analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency.

The main contribution of the present study is to examine the mediating role of financial analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency. Previous studies have primarily focused on the direct effects of CSR disclosure on investment efficiency, yet the indirect mechanisms through which CSR influences corporate decision-making remain underexplored. This study extends the literature by introducing financial analyst forecasts as a key intermediary in this relationship. Traditionally, CSR disclosure has been regarded as a transparency-enhancing mechanism that reduces information asymmetry in the capital market. However, this study takes a step further and investigates whether financial analyst forecasts act as a channel through which CSR disclosure impacts investment efficiency. Specifically, the study examines whether CSR disclosure enhances financial analyst forecast accuracy, thereby providing investors with more reliable financial insights, which in turn improve investment efficiency.

The present study has formulated hypothesis 2 to examine the mediating role of financial analyst forecasts on the relationship between corporate social responsibility (CSR) disclosure and investment efficiency. The purpose of this hypothesis is to determine whether CSR disclosure enhances financial analyst forecasts, which in turn influences corporate investment efficiency. The details of this mediating relationship are as follows: the

investigation of the direct effect of CSR disclosure on financial analyst forecasts, the direct effect of CSR disclosure on investment efficiency, and the direct effect of financial analyst forecasts on investment efficiency. Additionally, the study examines the indirect pathway through which CSR disclosure affects investment efficiency via financial analyst forecasts. Similar to prior research on information intermediaries, it was hypothesized that the direct relationship between CSR disclosure and financial analyst forecasts would be positive, as increased transparency is expected to enhance financial analysts' ability to provide accurate market assessments. Furthermore, the direct relationship between financial analyst forecasts and investment efficiency was also expected to be positive, as more precise and credible forecasts reduce information asymmetry and improve resource allocation. However, the direct relationship between CSR disclosure and investment efficiency was hypothesized to be dependent on the mediating role of financial analysts, meaning that without effective interpretation and dissemination of CSR information, the direct impact might be limited. The results indicated that while CSR disclosure had a significant impact on financial analyst forecasts, the full mediating effect on investment efficiency was only partially supported, suggesting that additional mechanisms may also influence the relationship.

The findings of the study revealed that there was a direct, positive, and significant relationship between corporate social responsibility (CSR) disclosure and financial analyst forecasts. The strength of this direct effect suggests that firms with CSR disclosure receive greater financial analyst attention and more accurate earnings forecasts, supporting the assumption of this study. This finding aligns with signaling theory, which posits that CSR disclosure serves as a positive signal to the market, attracting analysts and improving information processing (Du & Yu, 2021; Hinze & Sump, 2019). Additionally, it is consistent with information asymmetry theory, as increased CSR transparency reduces uncertainty,

enabling analysts to make more precise evaluations of firm performance (Hamrouni et al., 2022). Furthermore, the study found a significant positive relationship between financial analyst forecasts and investment efficiency. This indicates that financial analyst forecasts help improve capital allocation by reducing investment inefficiencies, such as overinvestment and underinvestment. The results support prior literature suggesting that analysts act as critical information intermediaries, refining corporate disclosures into valuable insights for investors and corporate decision-makers (Chen et al., 2017).

Consistent with hypothesis 2, the mediation analysis confirmed that financial analyst forecasts significantly mediate the relationship between CSR disclosure and investment efficiency. This finding highlights the role of financial analyst forecasts in transmitting CSR-related information to market participants, ultimately improving investment decisions. It suggests that while CSR disclosure alone enhances transparency, its ability to improve investment efficiency is primarily realized through the interpretation and dissemination of this information by analysts. These results are in line with previous studies emphasizing the indirect pathways through which CSR disclosure influences financial outcomes, reinforcing the importance of financial analysts in ensuring that CSR information translates into more efficient corporate investments (Dhaliwal et al., 2012; Hinze & Sump, 2019).

4.5.3 The Mediating Effect of Financial Analyst Forecasts on the Relationship between CSR Disclosure Quality and Investment Efficiency

RQ3: To determine the mediating effect of financial analyst forecasts on the relationship between corporate social responsibility disclosure quality and investment efficiency.

The present study formulated hypothesis 3 to examine whether financial analyst forecasts mediate the relationship between corporate social responsibility (CSR) disclosure

quality and investment efficiency. This hypothesis aimed to determine whether higher-quality CSR disclosure enhances investment efficiency through analysts' ability to interpret and disseminate information. Unlike prior studies that primarily focused on the existence of CSR disclosure, this study goes a step further by considering the quality of disclosed information and its potential financial implications. The details of this mediating relationship are as follows: the direct effect of CSR disclosure quality on financial analyst forecasts, the direct effect of CSR disclosure quality on investment efficiency, and the direct effect of financial analyst forecasts on investment efficiency. Additionally, this study examined the indirect path through which CSR disclosure quality may improve investment efficiency via financial analysts.

It was hypothesized that the direct relationship between CSR disclosure quality and financial analyst forecasts would be positive, as higher-quality disclosures provide financial analysts with more comprehensive and credible information, improving forecast accuracy. Similarly, the direct relationship between financial analyst forecasts and investment efficiency was expected to be positive, as financial analysts' evaluations influence capital allocation decisions. However, the direct relationship between CSR disclosure quality and investment efficiency was expected to depend on the mediating effect of financial analyst forecasts, suggesting that without proper interpretation and dissemination of CSR information, its direct impact on investment efficiency may be limited.

The results indicated a significant positive relationship between corporate social responsibility disclosure quality (CSR-DQ) and investment efficiency, aligning with stakeholder theory, which suggests that high-quality CSR disclosures enhance corporate reputation and stakeholder confidence (Hetze, 2016; Usman, 2020). However, the expected mediating role of financial analyst forecasts was not significant, contradicting signaling

theory, which posits that better disclosures improve analyst assessments. One possible explanation is the lack of harmonized tools and standards for measuring CSR disclosure quality, making it difficult for financial analysts to assess its true impact (Tschopp & Nastanski, 2014). Additionally, reliance on corporate self-reporting may limit the credibility of disclosed CSR information, reducing its influence on financial analyst forecasts (Reimsbach & Hahn, 2015). Financial analyst forecasts also incorporate multiple factors beyond CSR disclosure in their evaluations, further weakening the mediating effect. These findings suggest that while CSR disclosure quality improves investment efficiency, its ability to do so via financial analyst forecasts remains uncertain. This highlights the need for alternative mechanisms, such as stronger regulatory enforcement or increased investor engagement, to ensure that CSR disclosure quality is effectively integrated into financial decision-making.

4.6 Chapter Summary

This chapter reports the results of the empirical analysis, focusing on the short-term and long-term effects of mandatory social responsibility disclosure, which has been in place for 14 years. The analysis is divided into two main parts. The first part evaluates the short-term effects, specifically examining the role of financial analyst forecasts on mediating the relationship between mandatory social responsibility disclosure and investment efficiency. Empirical tests for this part include descriptive statistical analysis, t-tests for group means, correlation analysis, difference-in-differences (DID), parallel trend tests, propensity score matching with DID (PSM-DID), placebo tests, and bootstrap methods. The second part assesses the long-term effects of mandatory social responsibility disclosure. It investigates the mediating role of financial analyst forecasts between CSR disclosure and investment

efficiency, employing full sample and PSM sample descriptive statistics, as well as bootstrap mediation effect tests.

The research models are categorized into three groups. The first group assesses the effects of mandatory corporate social responsibility disclosure, using a combination of the difference-in-differences (DID) model and a four-step mediation effects model. The total effect of mandatory social responsibility disclosure policies on firms' investment efficiency is significant and is supported by various robustness tests, including parallel trend tests, PSM-DID regressions, and placebo tests. However, the initial models in the four-step mediation effects regression did not demonstrate that financial analyst forecasts mediate the relationship between mandatory social responsibility disclosure and investment efficiency, leading to the rejection of hypothesis 1.

The second and third sets of models examine the transmission mechanism of CSR disclosure on investment efficiency, focusing on the long-term effects of mandatory social responsibility disclosure. The second set of models employs the four-step mediation effects method, propensity score matching (PSM), and the bootstrap method to evaluate the mediating role of financial analyst forecasts between CSR and investment efficiency over the long term. This analysis reveals a positive relationship between corporate social responsibility disclosure and investment efficiency mediated by financial analyst forecasts, thus supporting hypothesis 2.

The third set of models applies the four-step mediation effects method and the Bootstrap method to evaluate the mediating role of financial analyst forecasts between CSR disclosure quality and investment efficiency in the long-term effects of mandatory social responsibility disclosure. This analysis indicates that financial analyst forecasts do not

mediate the relationship between CSR disclosure quality and investment efficiency, leading to the rejection of hypothesis 3.

In addition, the values of the estimated coefficients for the control variables in the mediated effects models across each group were held constant in the full model. These coefficients maintained the same sign, similar order of magnitude, and level of significance across all models. A summary of these results is provided in Table 4.21.

Table 4.21: Summary of Empirical Results

Hypothesis	Result
H1: There is a positive relationship between mandatory corporate social responsibility disclosure and investment efficiency, mediated by financial analyst forecasts.	Rejected
H2: There is a positive relationship between corporate social responsibility disclosure and investment efficiency, mediated by financial analyst forecasts.	Supported
H3: There is a positive relationship between corporate social responsibility disclosure quality and investment efficiency, mediated by financial analyst forecasts.	Rejected

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study aims to examine the mediating role of financial analyst forecasts on the relationship between corporate social responsibility disclosure and investment efficiency. It involves investigating both the short-term and long-term consequences of mandatory corporate social responsibility disclosure.

This chapter is organized into several sections. The initial part provides a comprehensive overview of the entire study, followed by an explanation of the study's significance, detailing its importance to both the theoretical framework and the capital market. It then addresses the limitations of the investigation and offers key recommendations for future research. The chapter is divided into the following sections: 5.1 Introduction, 5.2 Findings, 5.3 Research Limitations, 5.4 Research Contributions, and 5.5 Recommendations.

5.2 Study Findings

This study aims to examine both the immediate and long-term mediating effects of financial analyst forecasts on the relationship between mandatory social responsibility disclosure policies and investment efficiency. The study uses a sample of Chinese A-share listed companies from Shanghai and Shenzhen covering the period from 2006 to 2022. Based on previous research, several control variables are included in the estimation model to ensure its accuracy. These control variables include firm size, gearing ratio, asset growth rate, shareholding ratio of the largest shareholder, and the duality of positions (i.e., whether the chairman and CEO are the same person). Additionally, this study addresses the lack of

exploration into the transmission mechanisms through which mandatory social responsibility disclosure affects investment efficiency.

In analyzing the impact of mandatory social responsibility disclosure during the initial implementation period, this study finds that financial analyst forecasts do not significantly mediate the relationship between mandatory social responsibility disclosure and investment efficiency. Although mandatory social responsibility disclosure increased the amount of publicly available information on social responsibility, this information did not immediately improve the accuracy of financial analyst forecasts or enhance investment efficiency through better forecast accuracy in the short term. This result may reflect a learning and adjustment process that market participants, particularly financial analysts, need to undergo to adapt to new policies and effectively utilize the additional information.

In exploring the long-term impact of mandatory social responsibility disclosure, this study reveals a significant finding: firms that have consistently implemented social responsibility disclosure over time enable financial analysts to predict their future performance more accurately compared to firms that do not disclose corporate social responsibility information. This improvement in financial analyst forecast accuracy subsequently enhances investment efficiency. This result suggests that after the initial adaptation period, market participants, particularly analysts, are better able to utilize the social responsibility information provided by firms to assess their long-term value and risk more effectively. This finding underscores the importance of mandatory corporate social responsibility disclosure in improving market informational efficiency and highlights financial analyst forecasts play as both interpreters and transmitters of information.

Similar to the effect of disclosure optionality, this study also finds that corporate social responsibility disclosure quality does not significantly impact the accuracy of financial

analyst forecasts even many years after mandatory corporate social responsibility disclosure implementation. This lack of effect means that financial analyst forecasts do not mediate the relationship between corporate social responsibility disclosure quality and investment efficiency. This suggests that this information may not be fully utilized in the financial analyst forecasts process or may not be perceived as having a critical impact. This may be related to the lack of harmonized disclosure standards for CSR disclosure.

5.3 Research Contributions

This study applies reputation theory, signaling theory, stakeholder theory, and information asymmetry theory to examine the relationship between social responsibility disclosure and investment efficiency, particularly through the mediating role of financial analyst forecasts. Each theory provides a distinct perspective on how CSR disclosure influences corporate transparency, investor perceptions, and financial decision-making. Reputation theory explains how high-quality CSR disclosure enhances corporate credibility, influencing investment efficiency by attracting long-term investors. Signaling theory supports the idea that firms use CSR disclosure to convey positive information about their financial stability and governance, which financial analysts incorporate into their forecasts. Stakeholder theory highlights that CSR disclosure strengthens relationships with key stakeholders, ultimately improving investment efficiency. Information asymmetry theory justifies the role of financial analyst forecasts as intermediaries who process CSR information, reducing uncertainty and improving investment decisions. Practically, the findings have implications for investors, analysts, and companies, offering insights into how mandatory social responsibility disclosure affects investment efficiency and the role of financial analyst forecasts in this process.

5.3.1 Theoretical Contributions

The findings of this study provide important implications for theory, policy, and corporate practice by deepening the understanding of the relationship between corporate social responsibility (CSR) disclosure and investment efficiency. This study integrates signaling theory, reputation theory, stakeholder theory, and information asymmetry theory to examine the different effects of mandatory CSR disclosure (MCSR), CSR disclosure (CSR), and CSR disclosure quality (CSRQ) on investment efficiency. The results provide a theoretical basis for the different roles of these disclosure types in influencing investment decisions, indicating that CSR disclosure plays a more important role in improving investment efficiency, while mandatory disclosure does not produce the same effect. In addition, this study introduces financial analyst forecasts as a key mediating variable, providing a refined perspective on how information mediators facilitate the transmission of CSR disclosure into investment decisions.

From a theoretical perspective, this study contributes to the literature by proposing a new mediating mechanism within the conceptual framework, showing that financial analysts significantly moderate the relationship between CSR disclosure and investment efficiency. The empirical findings confirm that CSR disclosure can improve corporate transparency, reduce information asymmetry, and enhance corporate reputation, thereby improving the accuracy of financial analysts' forecasts and leading to better investment efficiency. However, the study also found that financial analyst forecasts do not mediate the impact of mandatory CSR disclosure or CSR disclosure quality, suggesting that regulatory-driven CSR reporting may be viewed as compliance-oriented rather than value-enhancing. Based on this, the research model of this study establishes three new relationships: (1) the impact of corporate social responsibility disclosure on investment efficiency through financial analyst

forecasts; (2) the lack of mediation in the relationship between mandatory CSR disclosure and investment efficiency; and (3) the mediating effect of financial analysts between CSR disclosure quality and investment efficiency is not significant. These findings advance the literature by highlighting the differentiated role of CSR disclosure and its impact on corporate financial outcomes through market mediation.

5.3.2 Practical Contributions

This study provides empirical evidence on both the short- and long-term effects of mandatory social responsibility disclosure, assisting policymakers in evaluating the effectiveness of current regulations and identifying areas for improvement. Based on the study's findings, policymakers can develop more detailed and specific disclosure guidelines to encourage firms to provide higher-quality and more relevant social responsibility information, thereby enhancing the long-term impact of the policy.

For firms, corporate management can learn from the study about the potential impact of corporate social responsibility disclosure on enhancing investment efficiency. This understanding can prompt them to pay more attention to and invest resources in improving the quality and transparency of their social responsibility disclosures. For investors, the study's findings highlight the importance of high-quality social responsibility disclosure, which can enhance their ability to evaluate companies and make more informed investment decisions.

For financial analysts, examining the impact of mandatory social responsibility disclosure can provide a deeper understanding of how to incorporate corporate social responsibility performance into financial analysis and forecasts. This is particularly valuable when assessing a company's long-term value and sustainability. By integrating these insights,

analysts can offer investors more comprehensive and nuanced guidance, aiding them in making more informed investment decisions.

5.4 Research Limitations

This study was designed and conducted with great care to enhance its ability to achieve its objectives. However, like most studies, it has limitations. Firstly, the sample includes only companies that either implement mandatory corporate social responsibility disclosure or do not disclose social responsibility at all. Companies that voluntarily disclose social responsibility were not considered in this study. While the focus on mandatory disclosure is significant, voluntary social responsibility disclosure is also crucial for investigating its impact on analysts' forecasts and investment efficiency. This study primarily emphasizes firms with mandatory social responsibility disclosure.

Additionally, in evaluating the influence of mandatory corporate social responsibility disclosure on financial analyst forecasts, relying exclusively on forecast accuracy as a measure of financial analyst forecast variables, while significant, may fail to capture other relevant dimensions. For example, optimism bias in forecasts can significantly affect investor sentiment and market reactions, factors that are not adequately addressed in the current research framework. Therefore, a limitation of this study is that it does not explore these additional dimensions of analysts' forecasting behavior, which could be equally important for understanding the market impact of disclosure policies.

5.5 Recommendations

This study aims to investigate the correlation between mandatory corporate social responsibility disclosure, financial analyst forecasts, and investment efficiency. Specifically, it explores the relationships across various time frames (short-term versus long-term) and

dimensions (disclosure choice versus quality). The scope of this investigation was confined to these aspects. However, future research could expand on these findings by exploring additional variables and dimensions. The limitations identified in this study provide valuable insights for further research. Based on these findings, recommendations have been formulated to guide future studies.

To enhance the generalizability and depth of the findings, future research should extend the study to different countries and regions. This approach would account for variations in legal, cultural, and market environments that affect social responsibility disclosure and its impact on financial analyst forecast accuracy. Such an extension would provide a more comprehensive understanding of the global effects of social responsibility disclosure policies and how financial analysts' behavior might change under varying market conditions.

To better understand the analyst forecasting problem, examining the dimensional characteristics of forecasts can provide more comprehensive insights. For example, assessing forecast optimism bias can reveal the degree of optimism or pessimism in forecasts by comparing systematic deviations between analyst forecasts and actual values. This approach explores psychological and market factors influencing forecast bias, such as overconfidence, herding effects, or the impact of management-guided forecasts.

There are several areas for future research. First, in terms of content, future studies could focus on specific firms or events as case studies to examine how financial analysts respond to corporate social responsibility disclosure and how these responses affect financial analyst forecasts and market reactions. By collecting and analyzing publicly available information, news reports, and analyst reports, this approach would allow for a detailed exploration of case-specific contexts, processes, and dynamics. Such qualitative insights can

provide richer, more detailed information than traditional quantitative methods, helping to reveal potential causal and influencing mechanisms.

Second, from the perspective of developing harmonized assessment standards, there is a need to establish and promote globally consistent CSR disclosure assessment criteria. These standards should be flexible enough to accommodate the diverse needs of different enterprises and industries while encompassing various aspects of performance, including environmental protection, social responsibility, and governance structures. The assessment criteria should encourage transparency and completeness in disclosure. Regulators should implement stricter disclosure requirements to ensure enterprises provide full and truthful reports on their CSR disclosure. Enterprises, in turn, should offer detailed quantitative and qualitative data that reflect all aspects of their performance and the challenges they encounter.

Third, from the standpoint of strengthening third-party auditing and validation, enterprises should engage independent third-party auditors to conduct thorough reviews of their CSR disclosure. This practice ensures the authenticity and accuracy of the reported data, enhancing information transparency and building greater trust among stakeholders in the assessment results.

Finally, enhancing public participation and monitoring of CSR disclosure behaviors is crucial. Increased public and media scrutiny can lead to more substantive and effective CSR disclosure actions. Public oversight not only boosts transparency but also motivates enterprises to continually improve their CSR disclosure, thereby achieving greater social and economic benefits. Therefore, actively encouraging and guiding public and media involvement is a key measure to ensure that enterprises genuinely fulfill their social responsibility.

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