

Study of the Role of Financialization in the Relationship Between Corporate Social Responsibility and Research and Development Investment

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Abstract: Under the social environment of high-quality development and improvement of corporate innovation performance, the purpose of this study is to explore the internal mechanism of corporate social responsibility's impact on research and development investment, in order to find an effective way to promote research and development investment. Corporate social responsibility can not only significantly increase research and development investment, but also promote financialization, which plays an intermediary role with masking effect in the relationship between corporate social responsibility and research and development investment. Therefore, the government should encourage enterprises to fulfill their social responsibilities, establish a correct concept of responsibility, and play a role in promoting research and development investment. At the same time, it is also necessary to pay attention to the reputation insurance effect formed by corporate social responsibility, strengthen the strict supervision of listed companies' social responsibility, improve the quality of social responsibility information disclosure, and improve the quality of external supervision and internal control. Preventing contribution of corporate social responsibility to research and development investment from being partially offset and overshadowed by financialization.

Keywords: Corporate Social Responsibility; Research and Development; Financialization.

1. Introduction

In the 14th Five-Year Plan, it is pointed out that our innovation capacity does not meet the requirements of high-quality development. We need to unneringly implement the new development concepts of innovation, coordination, green, open and sharing, and persist in the central role of innovation in our country's overall modernization drive. We will strengthen the dominant position of enterprises in innovation and enhance their technological innovation capabilities.

Research and development (R&D) investment is the key path to improve the technological innovation ability of enterprises. On the development process of Chinese research and development investment: From the first year of the 11th Five-Year Plan- 2006, the research and development investment was 300.31 billion yuan, and the research and development investment intensity (the proportion of research and development investment in the Gross Domestic Product) was 1.42%. From the end of the 13th Five-Year Plan- 2020, the research and development investment were 2.439.31 billion yuan, and the research and development investment intensity were 2.40% (Data source: National Bureau of Statistics of China). Although the two indexes have increased by 712% and 71.43% respectively during the 15-year period, there is still a certain gap between the intensity of research and development investment and that of some developed countries, which is 3% to 4% (Data source: Wind database).

In order to smoothly promote the 14th Five-Year Plan and complete the expected annual growth of research and development investment of no less than 7%, it is more necessary to increase research and development investment, and realize the research and development investment to drive scientific and technological innovation, promote the transformation of Chinese made to Chinese created, promote the transformation of Chinese speed to Chinese quality, promote the

transformation of Chinese products to Chinese brands, and try to accelerate the construction of a manufacturing power.

With the development of society, the government has become more and more aware that the fulfillment of corporate social responsibility is of great significance to the long-term healthy development of the national economy and the sustainable development of enterprises. In order to better regulate and improve the market environment and promote enterprises to actively undertake social responsibilities, A-shared listed companies have successively released corporate social responsibility reports since 2006 to disclose the concept of corporate social responsibility and report the results of corporate social responsibility. According to the statistics of corporate social responsibility reports (hereinafter referred to as corporate social responsibility reports) in China stock market & accounting research (SCMAR) database and Wind database, A-share listed companies issued A total of 12,349 corporate social responsibility reports from 2006 to 2022: the number of corporate social responsibility reports showed an increasing trend year by year in these 16 years. Corporate social responsibility behavior is a kind of capital investment activity similar to research and development investment, which can not only bring good social moral capital but also get positive feedback from the capital market. Research and development investment and fulfilling social responsibility are related to the sustainable development of enterprises, which is a long-term activity.

An enterprise is a legal person with profit as its purpose. Its goal has evolved from profit maximization at the beginning to shareholder benefit maximization and enterprise value maximization, and now it advocates stakeholder benefit maximization. The fulfillment of corporate social responsibility focuses on the relationship between micro individual enterprises and relevant stakeholders in the process of their own development and management. Because the development of

enterprises is in the economic ecosystem, is a part of it, if because of their own development and destroy the economic ecosystem, will also suffer. Corporate social responsibility and the sustainable and healthy development of enterprises are an inevitable internal relationship. However, financialization pursues profit maximization of enterprises, which is a short-term behavior implemented by enterprises (especially in the real sector). Financialization makes enterprises reduce their social responsibilities to other stakeholders, which is not conducive to the long-term healthy development of enterprises.

So what does corporate social responsibility do for R&D investment and financialization separately? The role of financialization in the relationship between corporate social responsibility and R&D investment is what this paper needs to study in depth.

2. Theoretical Analysis and Research Hypothesis

2.1. The Relationship between Corporate Social Responsibility and R&D Investment

Shareholders are the most important stakeholders in corporate social responsibility, and the fulfillment of social responsibility can alleviate the agency costs between shareholders and management to a certain extent. Investment in research and development can effectively improve the competitiveness of enterprises and ensure the sustainable and healthy development of enterprises, which is in line with the interests of shareholders. Therefore, management's investment in research and development can also reduce agency problems. Therefore, research and development investment is similar to the fulfillment of social responsibility. To relieve their agency responsibility and alleviate the principal-agent problem, the management usually starts from these two aspects, not only actively fulfill their social responsibility, but also strive to strengthen research and development. In addition, the management of an enterprise with good social responsibility will also fulfill its responsibilities to stakeholders except shareholders by increasing investment in research and development and giving back to the society with new results generated from research and development. Yang (2021) shows that mandatory disclosure of corporate social responsibility can reduce information asymmetry and agency costs, increase investors' trust and help enterprises obtain more external innovation resources, thus significantly and effectively promoting corporate innovation [1]. Zhang, Wu & Hong (2022) show that corporate social responsibility under voluntary disclosure can foster a positive collaborative innovation environment and significantly promote technological innovation [2].

According to the resource-based theory, the resources owned by an enterprise are the key to ensure its long-term development. People are the most critical resources of an enterprise, and the role of research and development and innovation cannot be separated from people. Corporate social responsibility also includes responsibility to employees. When an enterprise performs its social responsibility well, employees will not only feel that the enterprise is responsible for its employees, but also feel proud of its contribution to society. In addition, in the process of fulfilling its social responsibility, the enterprise will also create a positive corporate culture. All these will improve employees' organizational identity, will enhance the sense of organizational identity to give play to the subjective initiative of employees, actively do their own work, improve team

cooperation ability, and contribute to the scientific and technological innovation of enterprises. Bode C, & Singh J. (2018) believe that corporate social responsibility is an important tool for strategic management of human resources, which will enhance the intellectual capital of enterprises, and the intellectual capital provides the intellectual drive for enterprise innovation [3].

According to the stakeholder theory, while pursuing profits, enterprises need to take into account the interests of stakeholders and balance the relationship with them. According to the signal transmission theory, good performance of social responsibility can reduce the information asymmetry, release the signal of harmonious development to stakeholders, help establish a good public image, get the support of stakeholders, and promote innovation of enterprises. Zhang, Shi & Zhou(2020) concluded that social responsibility in Chinese manufacturing enterprises can attract more innovative resources for enterprises through signal transmission effect, which will play a positive role in improving research and development investment[4].

Based on the above analysis, this paper proposes hypothesis 1.

H1: Corporate social responsibility can promote enterprises' research and development investment.

2.2. The Role of Financialization in Corporate Social Responsibility and R&D Investment.

According to the principal-agent theory, the conflict of interests between shareholders and management will lead the management to "seek advantages and avoid disadvantages" and increase financial investment, thus promoting the financialization of enterprises; Secondly, due to the asymmetry of information, stakeholders are unable to effectively supervise the financialization of enterprises. As non-financial information, corporate social responsibility, like financial information, can convey signals of managers' moral integrity to all parties in society and reduce the information asymmetry of enterprises, can increase the information transparency of enterprises and help curb the bad motives of management. Under the signal transmission theory, under the supervision of stakeholders, the management can restrain its own behavior, reduce the irrational pursuit of financial assets, and focus on the development of the enterprise's main business. So a firm with good social responsibility will restrain financialization. Liu, Liu, Yang & Yang (2019) in order to prove whether the fulfillment of corporate social responsibility is to cover up corporate financialization or promote the healthy and long-term development of enterprises, selected the data of A-share listed non-financial companies from 2009 to 2016 and found that: The fulfillment of corporate social responsibility can effectively prevent the financialization behavior of enterprises, and this effect is more obvious in the companies with high corporate social responsibility score, state-owned enterprises and companies that should disclose corporate social responsibility information. Based on the theoretical analysis, the empirical test further found that corporate social responsibility can inhibit the financialization behavior of enterprises through two mechanisms: signaling and financing constraints[5]. Shu & Zou (2022) through their research on Shanghai-Shenzhen A-shared listed enterprises from 2010 to 2020, also confirmed that fulfilling social responsibility can reduce financing constraints, thus reducing the willingness of enterprises to allocate financial assets excessively, and thus achieving the purpose of restraining financialization [6]. Based on the above analysis, this paper

proposes hypothesis 2.

H2: Corporate social responsibility can restrain corporate financialization.

According to the resource-based theory, every resource in an enterprise has alternatives, and the resources for financialization will inevitably crowd out the resources for other aspects, such as research and development. Moreover, many scholars' studies have shown that financialization does not have the function of "reservoir" but will inhibit the research and development investment and innovation output of enterprises. Barane A I, & Hake E R.(2018) believes that driven by speculative motives, enterprises will reduce operation efficiency due to excessive allocation of financial assets, resulting in idling of funds, and will eventually restrain enterprises' innovation input due to the aggravation of liquidity risk[7]. Xie (2018) found that financialization would reduce the intensity of research and development investment and inhibit the innovation of enterprises. When enterprises are faced with financing constraints and high pressure of management performance, this inhibitory effect will be more obvious[8]. Using the data of A-share manufacturing listed companies from 2008 to 2017 as samples, Shu & Yu (2022) found that excessive financialization would have a significant crowding out effect on research and development investment; By grouping the property right nature, adjustment cost and industry characteristics, it is further concluded that the crowding out effect will be more obvious in non-state-owned enterprises, enterprises with low adjustment cost of research and development investment and high-tech industries [9]. Wan, Zha & Rao (2020) made use of the data of China's A-share manufacturing listed companies in the past 11 years and selected feasible generalized least square method to conduct multiple linear regression analysis, and the results were as follows: In the process that financialization inhibits innovation output, research and development investment plays a part of mediating effect, which shows that financialization has a crowding out effect on research and development investment, and the reduction of research and development investment will reduce innovation output. In addition, in non-state-owned enterprises, when there is less equity incentive, more fierce market competition and relatively loose monetary policy, the crowding out effect of financialization on research and development investment will be more significant [10]. By studying the data of A-share listed companies and NEEQ listed companies, Yang & Zhao (2021) found that the financialization behavior of entity enterprises significantly inhibits the innovation of enterprises, while digital financial inclusion can alleviate such inhibition [11]. Hao & Yang (2022) conducted a regression test on the 6-year data of 1097 listed manufacturing companies and concluded that financialization has a significantly negative impact on research and development investment, in which operating profit rate plays a partial intermediary effect. In addition, it analyzes the heterogeneity of financial asset liquidity, property rights of enterprises and financialization degree[12].

Based on the above analysis, this paper proposes hypothesis 3.

H3: Financialization plays a mediating role between corporate social responsibility and research and development investment.

3. Study Design

3.1. Data and Research Samples

Based on China's unique practice environment, this study

intends to use the sample data of China's A-shared listed companies selected during the statistical period to consider the relationship between corporate social responsibility and research and development investment by using regression analysis method and panel data model.

Among them, the corporate social responsibility(CSR) related data comes from the social responsibility score data of Hexun, a third-party rating agency, and the robustness test is conducted using the social responsibility report grade evaluation of Hexun. The research and development investment data were obtained from the wind database, and some missing research and development investment data were manually collected by querying the company's annual report.

In this paper, the A-shared listed companies in Shanghai and Shenzhen from 2012 to 2020 are selected as the initial research samples, and on this basis, the sample data are screened as follows:

(1) Financial enterprises and real estate enterprises are excluded;

(2) ST and ST* companies are excluded;

(3) Excluding companies listed in the B share market or the H share market at the same time, because the listed companies of "A + B" or "A + H" shares face the dual regulatory environment at home and abroad, and the enterprises may have to bear additional social responsibilities or only bear very little social responsibilities due to legal provisions;

(4) Eliminate companies with missing data and outliers.

Finally, a total of 2435 sample companies were obtained, with a total of 15,435 sample observations. To eliminate the effect of extreme outliers, we winsorize all continuous variables at 1% and 99% levels.

3.2. Primary Variable Definition

Explained variable: Rresearch and development investment (rd), measured as the logarithm of a firm's annual research and development investment plus one.

Explanatory variable: Corporate social responsibility (CSR). This paper chooses Hexun's corporate score as the proxy variable to measure corporate social responsibility. In the robustness test, Hexun's Enterprise Rating (CSR D) was used as a substitute for the test.

Mediating variable: corporate financialization (Fin). Since corporate financialization is mainly reflected in the behavior of enterprises allocating more resources to financial assets, this paper draws uses the ratio of current financial assets to the total starting output of enterprises at the end of the year to represent the financialization behavior of enterprises in the operation process based on the account of balance sheet. The financial assets in this paper include: transactional financial assets, derivative financial assets, net loans and advances, net available-for-sale financial assets, net hold-to-maturity investment, and net investment real estate.

Moderating variable: Media attention. For reference to the current common practice, the number of annual media reports of listed companies is added by 1, and then the natural logarithm is taken.

Control variables: In terms of the basic situation of companies, this paper selects two indicators, Size and FirmAge, as control variables. Large companies have deeper resource base, while companies in growth stage have stronger growth and flexibility. At the financial level, the company's research and development activities require large and continuous capital investment, so the company's financial and cash flow situation will affect the resource allocation decision of the company. At the financial

level, we selected ROA, FIXED assets and TobinQ. At the level of corporate governance, a company's management structure and incentive mechanism are also important factors affecting corporate behavior. This paper selects two indicators, Indep and Dual, as control variables to reflect corporate governance information. In addition, this paper also controls the industry effect and the annual effect.

3.3. Model Assumption

First, in order to verify the relationship between corporate social responsibility and research and development investment, regression model (1) is set as follows:

$$R \& D_{i,t} = \alpha_0 + \alpha_1 CSR_{i,t+1} + \alpha_i \sum CONTROL_{i,t} + \delta_{i,t} \quad (1)$$

Where i represents the individual listed company, t represents the year,

$\alpha_i CONTROL_{i,t}$ represents the sum of the product of the control variables and the corresponding regression coefficients. If α_1 is significantly positive, hypothesis 1 "corporate social responsibility will promote investment" can be verified, that is to say, the better corporate social responsibility performance, the more research and development investment.

Secondly, in order to verify hypothesis 2: the role of corporate social responsibility on financialization, model (2) is constructed. If β_1 value is negative and significant, then corporate social responsibility can curb financialization.

$$Fin_{i,t} = \beta_0 + \beta_1 CSR_{i,t+1} + \beta_i \sum CONTROL_{i,t} + \delta_{i,t} \quad (2)$$

Thirdly, to test the mediating role of financialization in the relationship between corporate social responsibility and research and development investment, the paper adopts the stepwise regression method. In order to verify hypothesis 3 that financialization plays an intermediary role in the relationship between corporate social responsibility and research and development investment, model (3) is constructed:

$$R \& D_{i,t} = \mu_0 + \mu_1 CSR_{i,t+1} + \mu_2 Fin_{i,t} + \mu_i \sum CONTROL_{i,t} + \delta_{i,t} \quad (3)$$

Correlation models (2) and (3), if β_1 , μ_2 both are significant, it indicates that the indirect effect is significant, then test the significance of μ_1 ; If μ_1 is not significant, it is completely mediated, if μ_1 is significant, it is partially mediated.

4. Empirical Analysis

4.1. Descriptive Analysis

The purpose and function of descriptive statistics is to sort out, summarize and summarize the data of each variable, so that its overall picture and distribution characteristics can be clearly and clearly displayed.

The descriptive statistics in Table 1 show that the mean value of research and development (rd) is 17.79, the median is 17.872, the standard deviation is 1.572, the minimum value is 12.997, and the maximum value is 21.486, indicating that there are certain differences in the research and development level of various companies. The mean value of corporate social responsibility (CSR) is 22.79, the median is 21.420, the standard deviation is 14.542, the minimum value is -3.700, and the maximum value is 73.410. The data description reflects that corporate social responsibility (CSR) scores of different enterprises are somewhat different and fluctuate greatly. The

mean value of corporate financialization (Fin) is 0.03, the median is 0.006, the minimum value is 0, the maximum is 0.334, and the standard deviation is 0.063, indicating that the degree of corporate financialization fluctuates greatly. The mean net profit margin on total assets (ROA) is 0.04, the median is 0.039, the standard deviation is 0.063, the minimum is -0.225, and the maximum is 0.217. The average value of FirmAge is 2.89, the median is 2.944, the standard deviation is 0.314, the minimum value is 1.946, the maximum value is 3.497, and the dispersion degree is the lowest. The mean value of FIXED assets (FIXED) is 0.22, the median is 0.197, the standard deviation is 0.149, the minimum value is 0.003, and the maximum value is 0.710. The mean value of Dual is 0.27, the median is 0.000, the standard deviation is 0.446, and the minimum and maximum values are 0 and 1 respectively, indicating that the number of dual jobs in the sample is smaller than that of non-dual jobs.

Table 1. Descriptive Statistics

VarName	Obs	Mean	Median	SD	Min	Max
rd	15435	17.79	17.872	1.572	12.997	21.486
CSR	15435	22.79	21.420	14.542	-3.700	73.410
Fin	15435	0.03	0.006	0.062	0.000	0.334
Size	15435	22.25	22.118	1.161	19.879	25.629
ROA	15435	0.04	0.039	0.063	-0.225	0.217
FirmAge	15435	2.89	2.944	0.314	1.946	3.497
FIXED	15435	0.22	0.197	0.149	0.003	0.710
Dual	15435	0.27	0.000	0.446	0.000	1.000
Indep	15435	0.37	0.333	0.053	0.333	0.571
TobinQ	15435	2.00	1.588	1.270	0.852	8.911

4.2. Analysis of the Impact of Corporate Social Responsibility on Research and Development Investment

Table 2. Regression Analysis of Corporate Social Responsibility on Research and Development Investment

Number of obs		15,435				
F(93, 15341)		222.88				
Prob > F		0.0000				
R-squared		0.5665				
Root MSE		1.038				
rd	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
CSR	.0036901	.0008049	4.58	0.000	.0021124	.0052678
Size	.8551714	.0091077	93.90	0.000	.8373191	.8730236
ROA	2.382443	.1797018	13.26	0.000	2.030206	2.734679
FirmAge	-.2873705	.0296829	-9.68	0.000	-.3455524	-.2291886
FIXED	.1689359	.0812274	-2.08	0.038	.0097205	.3281513
Dual	.0699047	.0182732	3.83	0.000	.034087	.1057223
Indep	-.3195405	.1617068	-1.98	0.048	-.6365051	-.002576
TobinQ	.0490511	.0082843	5.92	0.000	.0328129	.0652892
_cons	-1.849489	.2564124	-7.21	0.000	-2.352087	-2.352087

In order to answer research question: Can the fulfillment of corporate social responsibility promote the innovation and research and development investment of enterprises? Hypothesis 1 is adopted: Corporate social responsibility can promote enterprises' research and development investment. Table 4 shows the test results.

Table 2 shows the empirical regression results of corporate social responsibility (CSR) and research and development investment (rd). Where $F=222.88$, the corresponding probability value $=0.000$ is less than 0.05 , indicating that the regression effect is significant. Goodness of fit R -squared= 0.5665 for linear regression. The regression coefficient of corporate social responsibility(CSR) is 0.0036901 ; The corresponding P -value is 0.000 , indicating that the regression coefficient is significant at the 1% confidence level, which confirms that corporate social responsibility(CSR) has a significant positive promoting effect on rd, and affirms that the increase of corporate social responsibility will significantly increase the level of research and development investment. This supports the establishment of null hypothesis 1: the fulfillment of corporate social responsibility will promote research and development investment. This may be because enterprises that attach importance to the fulfillment of corporate social responsibility focus on the long-term healthy development of enterprises, which will inevitably prompt enterprises to innovate and increase research and development investment.

In order to make the conclusion of hypothesis 1 more robust, the robustness test was carried out in this study. Table 3 shows the test results.

Table 3. Robustness Test of Regression Analysis of Corporate Social Responsibility for Research and Development Investment: Replacing CSR

Number of obs		15,435				
F (93, 15341)		222.36				
Prob > F		0.0000				
R-squared		0.5660				
Root MSE		1.0386				
rd	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
CSRD	.0549102	.0195313	2.81	0.005	.0166265	.0931939
Size	.8601076	.0090662	94.87	0.000	.8423367	.8778785
ROA	2.659489	.1606518	16.55	0.000	2.344593	2.974386
FirmAge	-.2871154	.0297168	-9.66	0.000	-.3453638	-.2288669
FIXED	.1570397	.0811218	1.94	0.053	-.0019686	.316048
Dual	.0698329	.0182727	3.82	0.000	.0340163	.1056495
Indep	-.3189604	.1618504	-1.97	0.049	-.6362065	-.0017144
TobinQ	.0484255	.0082833	5.85	0.000	.0321892	.0646617
_cons	-1.996706	.2550888	-7.83	0.000	-2.49671	-1.496702

Table 3 is a robust test of empirical regression for corporate social responsibility (CSR) and research and development investment (rd). In this regression model, CSR is replaced by CSRD. CSRD is the rating level of corporate social responsibility, which is divided into 1-5 levels. The higher the rating, the higher the rating, and the highest level is 5. The test results show that $F=222.36$, the corresponding probability value $=0.000$ is less than 0.05 , indicating that the regression effect is significant. Goodness of fit R -squared= 0.5660 for linear regression. The regression coefficient of CSRD was 0.0549 . The corresponding P -value is 0.000 , indicating that the regression coefficient is significant at 1% confidence level. It is confirmed that the independent variable is replaced, and the test results are still valid, supporting the establishment of original hypothesis 1, that is, fulfilling corporate social responsibility will promote research and development investment.

4.3. Analysis of the Influence of Corporate Social Responsibility on Financialization

In order to answer research question: Can the fulfillment of corporate social responsibility curb financialization? Hypothesis 2 is adopted: Corporate social responsibility can restrain corporate financialization. Table 4 shows the test results.

Table 4 shows the regression analysis results of corporate social responsibility on financialization. Where $F=24.37$, the corresponding probability value $=0.000$ is less than 0.05 , indicating that the regression effect is significant.

Goodness of fit R -squared= 0.1303 for linear regression. The regression coefficient of corporate social responsibility is 0.0001959 ; The corresponding P -value is 0.000 , indicating that the regression coefficient is significant at the confidence level of 1% , which confirms that corporate social responsibility (CSR) has a significant positive promoting effect on financialization (Fin), and affirms that the increase of corporate social responsibility (CSR) will promote the financialization behavior of enterprises. Null hypothesis 2 is rejected: the fulfillment of corporate social responsibility will inhibit financialization. However, the empirical conclusion is consistent with the views of Gu, Guo & Wang (2020) [13], which confirms that fulfilling corporate social responsibility can cover up the financialization behavior of enterprises and promote the financialization of enterprises. This may be because corporate social responsibility, as a kind of non-financial information to communicate with the outside of the enterprise, will be used by corporate managers as a tool to cover up short-sighted behaviors.

Table 4. Regression Analysis of Corporate Social Responsibility on Financialization

Number of obs		15435				
F (90, 12467)		24.37				
Prob > F		0.000				
R-squared		0.1303				
Root MSE		1.0576				
Fin	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
CSR	.0001959	.0000355	5.53	0.000	.0001264	.0002654
Size	-.0011036	.0005014	-2.20	0.028	-.0020864	-.0001208
ROA	-.0061101	.0095813	-0.64	0.524	-.0248906	.0126703
FirmAge	.0109355	.0016165	6.77	0.000	.007767	.0141039
FIXED	-.0789278	.0035247	-22.39	0.000	-.0858365	-.072019
Dual	.0029837	.001155	2.58	0.010	.0007198	.0052476
Indep	.0294191	.0091059	3.23	0.001	.0115704	.0472679
TobinQ	.0015415	.0005363	2.87	0.004	.0004902	.0025928
_cons	.0098828	.0136545	0.72	0.469	-.0168816	.0366473

In order to make the conclusion of hypothesis 2 more robust, the robustness test was carried out in this study. Table 5 shows the test results.

Table 5 shows the robustness test results of corporate social responsibility on financialization regression analysis. In this regression model, CSR is replaced by CSRD. CSRD is the rating level of corporate social responsibility, which is divided into 1-5 levels. The higher the rating, the higher the rating, and the highest level is 5. Where $F=23.85$, the corresponding probability value $=0.000$ is less than 0.05 , indicating that the regression effect is significant. Goodness of fit R -squared= 0.1292 for linear regression. The regression coefficient

of CSRD is 0.0022407; The corresponding P-value is 0.011, indicating that the regression coefficient is significant at the 5% confidence level, which confirms that the test results are still valid after the independent variables are replaced. Null hypothesis 2 is rejected: the fulfillment of corporate social responsibility will inhibit financialization. It shows that the fulfillment of corporate social responsibility will promote financialization.

Table 5. Robustness Test of Regression Analysis of Corporate Social Responsibility on Financialization: Replacing CSR

Number of obs		15435				
F(90, 12467)		23.85				
Prob > F		0.000				
R-squared		0.1292				
Root MSE		.05763				
Fin	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
CSRD	.0022407	.0008818	2.54	0.011	.0005122	.0039692
Size	-.0007846	.0004975	-1.58	0.115	-.0017597	.0001905
ROA	.0101015	.008946	1.13	0.529	-.0074337	.0276367
FirmAge	.0109862	.0016194	6.78	0.000	.007812	.0141605
FIXED	-.0795201	.0035397	22.47	0.000	-.0864583	-.0725818
Dual	.0029635	.0011562	2.56	0.010	.0006971	.0052299
Indep	.0294994	.0091087	3.24	0.001	.0116454	.0473535
TobinQ	.001508	.0005368	2.81	0.005	.0004558	.0025602
_cons	.0022608	.013382	0.17	0.866	-.0239694	.028491

4.4. Regression Test of Mediating Effects

In order to answer research question: What role does financialization play in corporate social responsibility and research and development investment? Hypothesis 3 is adopted: Financialization plays a mediating role between corporate social responsibility and research and development investment. Table 6 shows the test results.

Table 6. A Regression Analysis to Verify the Mediating Effect of Financialization in the Relationship Between Corporate Social Responsibility and Research and Development Investment

Number of obs		15435				
F(90, 12467)		227.28				
Prob > F		0.0000				
R-squared		0.5690				
Root MSE		1.0349				
rd	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
CSR	.0039614	.0008027	4.93	0.000	.002388	.0055348
Fin	-1.385078	.1603055	-8.64	0.000	-1.699296	-1.070861
Size	.8536428	.0091016	93.79	0.000	.8358025	.8714831
ROA	2.37398	.1795448	13.22	0.000	2.022051	2.725909
FirmAge	-.272224	.0294707	-9.24	0.000	-.3299901	-.2144579
FIXED	.0596148	.081116	0.73	0.462	-.0993822	.2186117
Dual	.0740373	.0182633	4.05	0.000	.0382392	.1098355
Indep	-.2787927	.1614449	-1.73	0.084	-.595244	.0376585
TobinQ	.0511862	.0083162	6.15	0.000	.0348854	.067487
_cons	-1.8358	.2569304	-7.15	0.000	-2.339414	-1.332186

Table 6 shows the regression results of the inclusion of

corporate social responsibility (CSR) and corporate financialization (Fin) on research and development investment(rd). The results show that the regression coefficient of CSR is 0.00396, and the regression coefficient is significant at 1% level, indicating that after the variable financialization Fin is added, the positive promoting effect of corporate social responsibility (CSR) on research and development investment(rd) still exists significantly, and the direct effect of this effect is 0.00396. In Table 2, we can see that before the variable Fin is added, the total effect coefficient of CSR on rd is 0.0037, and it is significant at 1% confidence level. In Table 4, the coefficient of CSR on Fin is 0.0002 and significant at 1% confidence level; In Table 6, the coefficient of Fin on rd is -1.385078 and is significant at the 1% confidence level. According to the intermediate effect test procedure, the coefficients of the test variables in Table 2, Table 4 and Table 6 are all significant, and the direction of the coefficient of the total effect (0.0037) is opposite to that of the indirect effect (0.0002*-1.385078). Meanwhile, the coefficient of the total effect (0.0037) is smaller than that of the direct effect (0.00396). This suggests that the positive effect of CSR on rd is masked by Fin. Therefore, financialization(Fin) plays an intermediary role with masking effect in the relationship between corporate social responsibility(CSR) and research and development investment(rd). Null hypothesis 3 is: Financialization plays a mediating role between corporate social responsibility and research and development investment. The empirical results support the validity of hypothesis 3. The effect of corporate social responsibility on research and development investment can be conducted through intermediary variables, such as government subsidies proposed by Zheng, Wang & Li (2021) [14]and financing constraints proposed by Song & Sun (2020)[15] . This paper attempts to test the intermediary effect of financialization variable, and the results confirm that: The hypothesis that financialization has an intermediary effect between corporate social responsibility and financialization. Financialization can play an intermediary role in masking the relationship between the two. The reason may be that when enterprises fulfill their social responsibilities, on the one hand, they will promote research and development, and on the other hand, they will cover up the financialization behavior, and the implementation of financialization will inhibit research and development, so that the promotion effect of corporate social responsibility on research and development will be partially offset by financialization.

In order to make the conclusion of hypothesis 3 more robust, the robustness test was carried out in this study. Table 7 shows the test results.

Table 7 shows the robustness test of the mediating effect after replacing the independent variable corporate social responsibility. In this test, CSR is replaced by CSR. CSR is the rating level of corporate social responsibility, which is divided into 1-5 levels. The higher the rating, the higher the rating, and the highest level is 5. The results show that the regression coefficient of CSR is 0.05796, and the regression coefficient is significant at 1% level, indicating that after the inclusion of variable financialization (Fin), the positive promotion effect of corporate social responsibility(CSR) on research and development investment(rd) still exists significantly, and the direct effect of this effect is 0.05796. In Table 3, we can see that before the variable Fin is added, the total effect coefficient of CSR on rd is 0.05491, which is significant at 1% confidence level. In Table 5, the coefficient of CSR on Fin is 0.00224, which is significant at 5% confidence

level; In Table 7, the coefficient of *Fin* on *rd* is -1.3622 and is significant at the 1% confidence level. According to the intermediate effect test procedure, the coefficients of the test variables in Table 3, Table 5 and Table 7 are all significant, and the direction of the coefficient of the total effect (0.05491) is opposite to that of the indirect effect (0.00224*-1.3622). Meanwhile, the total effect coefficient of 0.05491 is smaller than that of the direct effect of 0.05796. The positive effect of CSRD on *rd* is masked by *Fin*. After replacing the independent variable, the conclusion that financialization (*Fin*) plays a masking mediating role in the relationship between corporate social responsibility (CSRD) and research and development investment (*rd*) remains valid. The empirical results support the validity of hypothesis 3.

Table 7. Robustness Test of Regression Analysis to Validate the Mediating Effects of Financialization in the Relationship Between Corporate Social Responsibility and Research and Development Investment: Replacing CSR

Number of obs		15435				
F(90, 12467)		226.39				
Prob > F		0.0000				
R-squared		0.5685				
Root MSE		1.035				
rd	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
CSRD	.0579625	.0194422	2.98	0.003	.0198535	.0960715
Fin	-1.362219	.1602989	-8.50	0.000	-1.676424	-1.048014
Size	.8590387	.0090544	94.87	0.000	.841291	.8767865
ROA	2.67325	.1606276	16.64	0.000	2.358401	2.988099
FirmAge	-.2721497	.0295088	-9.22	0.000	-.3299904	-.214309
FIXED	.0487159	.0810447	0.60	0.548	-.1101413	.2075732
Dual	.0738699	.0182623	4.04	0.000	.0380735	.1096662
Indep	-.2787758	.1616047	-1.73	0.085	-.5955402	.0379887
TobinQ	.0504797	.0083147	6.07	0.000	.034182	.0667775
_cons	-1.993626	.2554875	-7.80	0.000	-2.494412	-1.49284

5. Conclusion and Recommendations

As can be seen from the above research conclusions, corporate social responsibility can promote research and development investment, but it also provides a "FIG leaf" for the financialization behavior of enterprises, diverting the attention of the public, thus offsetting part of the positive effect of corporate social responsibility on research and development investment. Financialization behavior plays a "masking" role in the relationship between corporate social responsibility and research and development investment. Based on the above conclusions, this paper puts forward the following suggestions:

First, the empirical conclusion of hypothesis 1: corporate social responsibility can positively promote research and development investment. The shareholders and managers of enterprises should establish the concept of corporate social responsibility and correctly grasp the relationship between corporate social responsibility and research and development investment. Change the concept of business development, correct the motivation of fulfilling social responsibility, organically unify the fate of enterprises and social development, and seek a comprehensive and sustainable corporate social responsibility strategy. At the same time, further exert the leverage role of corporate social responsibility on research and development investment, rationally allocate limited resources,

adhere to the principle of two-hand, integrate research and development investment and social responsibility, give play to the synergistic effect of the two, and play the effect of "1 plus 1 is greater than 2" for improving the core competitiveness of enterprises.

Second, the empirical conclusion of hypothesis 2: Fulfilling corporate social responsibility positively affects corporate financialization behavior. It is necessary to strengthen the strict supervision of the social responsibility performance of listed companies, improve the quality of social responsibility information disclosure, improve the quality of internal control, improve the corporate governance structure, and prevent, detect and correct the short-sighted behavior of the management. In addition, we will guide funds to return to their source and allocate more financial resources to key areas and weak links in economic and social development.

Thirdly, the empirical conclusion of hypothesis 3: Financialization can play a mediating role in masking the effect of corporate social responsibility on research and development investment. While enhancing social responsibility, enterprises should pay more attention to the performance of social responsibility, which may protect the short-sighted behavior of the management, and strengthen the supervision of the funds of the entity enterprises. Strengthening the supervision of enterprise capital flow is a direct and effective measure to guide enterprises to moderate financialization. Most enterprises have the pursuit of value maximization, so it is inevitable that they will obtain more returns through the allocation of financial assets with higher returns in the economic boom stage, thus whitewashing the earnings situation. It is the excessive financialisation that regulators should do more to curb.

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