



R&D Investment, Internal Audit Quality and Enterprise Performance

Jing Wang^a, Chunhui You^{*}

School of Economics and Management, Jiaying University, Meizhou, China

^aEmail: 1707729145@qq.com

^{*}Email: 411108790@qq.com

Abstract. In order to make full use of big data technology and realize digital transformation, China's publishing enterprises have increased their R&D investment. Taking Chinese A-share listed companies in the publishing industry as the target, an OLS regression model is used to empirically examine the impact of R&D investment and internal audit quality on enterprise performance. It is found that R&D investment of listed companies in the publishing industry is significantly negatively correlated with enterprise performance in the current period and the following two periods, and the low intensity of R&D investment is an important reason for the failure of R&D investment to bring about performance improvement; the quality of internal auditing is not only significantly positively correlated with enterprise performance but also has the role of positively moderating the relationship between R&D investment and enterprise performance; in the process of marketization reform, the quality of internal audits of listed companies in the publishing industry has been continuously improved, which has contributed to the improvement of corporate performance. Listed companies in the publishing industry should, on the one hand, increase the intensity of R&D investment, strengthen the construction of software and hardware facilities, and improve the data processing capability; on the other hand, they should improve the internal audit and give full play to the value-added function of internal audit.

Keywords: R&D investment, internal audit quality, enterprise performance, publishing industry

1 Introduction

Since its birth, the publishing industry has undertaken the mission of recording and preserving human data and information, and is the core category of cultural industry. The sustained and healthy development of the publishing industry is an important support and guarantee to meet the people's cultural needs and enhance the national cultural soft power. Big data can efficiently collect, capture, analyze, mine and utilize digital resources and act on the publishing industry through technology-driven, product-driven, business-driven and industry-driven (Pan and Ma, 2023)^[12], which helps to improve the publishing industry's ability of data analysis, publishing innovation,

© The Author(s) 2025

G. M. Lee et al. (eds.), *Proceedings of the 2025 4th International Conference on Bigdata Blockchain and Economy Management (ICBBEM 2025)*, Advances in Intelligent Systems Research 195,

https://doi.org/10.2991/978-94-6463-742-7_34

business value-added and industrial upgrading, and is an important opportunity for the publishing industry to achieve synergistic high-quality development of social and economic benefits.

In order to make full use of big data technology and realize digital transformation, China's publishing enterprises have increased their R&D investment. According to CSMAR database, listed companies in publishing industry invested a total of 5.882 billion yuan in R&D during the 13th Five-Year Plan period, which is 5.43 times more than the R&D investment in the 12th Five-Year Plan period. Not only the total amount has increased, but also the number and average value of R&D investment have shown an increasing trend. The study of the current situation and effectiveness of R&D investment in the publishing industry not only helps to promote the high-quality development of publishing enterprises, but also helps to meet the spiritual and cultural needs of the public.

As far as the existing literature is concerned, the findings on the relationship between R&D investment and firm performance are not unanimous. R&D investment has been regarded as an important component of economic growth (Brown et al., 2009)^[3], which on the one hand helps to build brand strength and gain market share, and on the other hand improves the utilization rate of factors of production, which in turn enhances firms' economic performance (Alam et al., 2020, Xiao et al., 2024)^{[1][22]}. However, some scholars hold a different view, arguing that R&D investment requires the use of corporate resources, which not only leads to a decline in current profits, but also does not lead to an improvement in corporate performance when the intensity of investment is below the first threshold (Vithessonthi & Racela, 2016; Dai et al., 2013)^{[18][5]}.

Existing literature has explored the relationship between R&D investment and enterprise performance based on theoretical research perspectives, but no consistent conclusion has been formed, and the existing literature fails to consider the impact of internal audit, a corporate governance mechanism, on the relationship between the two. Internal auditing can help reduce the risk of R&D investment, improve the efficiency of capital utilization, and accelerate the transformation of R&D results, but this has not been studied in the existing literature. Taking listed companies in the publishing industry as the research object, this paper investigates the impact of R&D investment and internal audit quality on corporate performance and its deep-rooted reasons, which not only can make up for the shortcomings of the existing research, but also helps to improve the effect of R&D investment in publishing enterprises. This study aims to answer three research questions (RQs) in the Chinese context. RQ1: Does R&D investment in listed companies in the publishing industry lead to improved firm performance? What are the reasons for it? RQ2: What is the relationship between internal audit quality and firm performance of listed companies in the publishing industry? RQ3: What is the moderating effect of internal audit quality on the relationship between R&D investment and firm performance?

The remainder of the paper is organized as follows: Section 2 is the literature review and research hypotheses, Section 3 is the research design and sample selection, Section 4 is the analysis of the empirical results, and Section 5 is the conclusions and implication.

2 Literature Review and Research Hypotheses

2.1 R&D Investment and Enterprise Performance

There is a large amount of literature on the relationship between R&D investment and enterprise performance, but its findings are still controversial and include three main categories: (1) R&D investment promotes enterprise performance. Resource base theory suggests that heterogeneous resources and capabilities are the source of sustained competitiveness for firms, and that firms can explore these heterogeneous resources and capabilities through R&D activities in order to form competitive advantages. Chen et al. (2013) found that R&D investment leads to an increase in firm profitability and stock price growth^[4], and Dai et al. (2021) and Xiao et al. (2024) concluded that R&D investment has a positive effect on firm performance, but with a certain lag^{[6][22]}. (2) R&D investment reduces enterprise performance. R & D investment needs to take up enterprise resources. In the case of a certain amount of resources, the long return period of R & D investment will inevitably lead to a decline in current profits. In addition, R & D investment also has stage characteristics, which must exceed a certain threshold in order to bring significant innovation benefits to the enterprise. Dai et al. (2013) and Tian et al. (2019) found that the R&D investment intensity of most firms in China is still below the first threshold and fails to improve firm performance^{[5][17]}; Vithessonthi & Racela (2016) also found that R&D investment is negatively related to operating performance^[18]. (3) R&D investment is not related to firm performance. R&D is a high-risk activity, and there is no significant effect between R&D investment and firm performance for firms in emerging industries and start-ups. Li (2014) found no significant correlation between the intensity of R&D investment and firm performance in strategic emerging industries^[9], and Sridhar et al. (2014) found that R&D investment did not lead to an increase in firm sales^[15]. Due to the high threshold for the establishment of publishing enterprises, it is difficult for capital from outside the industry to enter, resulting in limited financing for the industry. During the 13th Five-Year Plan period, the ratio of borrowing to total assets of listed companies in the publishing industry is only 1/5 of the average value of all listed companies in A-share, and the intensity of R&D investment is only 1/3 of the average value. When the intensity of R&D investment of the enterprise is too low, it will be easier for other publishing enterprises to follow up the investment in R&D, which will lead to the decline or even disappearance of monopoly profit of the original enterprise and the decline of enterprise performance. Therefore, hypothesis 1 is proposed.

Hypothesis 1: R&D investment in listed companies in the publishing industry is negatively related to enterprise performance while other conditions remain constant.

2.2 Internal Audit Quality and Enterprise Performance

The existence of the principal-agent relationship is the direct reason for the emergence of internal auditing (Xia et al., 2016)^[21], which improves corporate governance and realizes value-added functions by exerting its consulting and confirmation services. Specifically, the ways in which it plays a role mainly include: (1) internal audit

can improve the quality of internal information, improve the efficiency of the internal contract, and reduce the agency cost; (2) internal audit helps to correct the financial reporting bias, improve the quality of corporate decision-making and the efficiency and effectiveness of operation and management; and (3) internal audit can reduce the cost of financing of corporate equity and debt. Based on this, the China Securities Regulatory Commission (CSRC) and the Shenzhen Stock Exchange (SZSE) have put forward requirements for listed companies to set up internal audit organizations and improve their internal audit systems. Xie and Tao (2015) found that the quality of internal audit is crucial to the fulfillment of the role of internal audit, and the greater the independence of internal audit, the greater the objectivity of its findings and the more it contributes to the improvement of corporate performance^[23]. Alyaarubi et al. (2021) and Sun and Yin (2024) argued that the higher the quality of internal auditing, the stronger the effectiveness of internal control^{[2][16]}. Liu (2019) found that the improvement of internal audit quality can reduce the reverse effect of mergers and acquisitions on firm performance^[11]. The development trend of market-oriented operation and industrialization of China's publishing industry has been formed, mergers and acquisitions are increasing day by day, and competition among enterprises has intensified. Changes in the external environment have forced publishing enterprises to pay more attention to improving internal corporate governance, playing the function of internal audit to reduce corporate costs and risks, and improving corporate performance. Therefore, hypothesis 2 is proposed.

Hypothesis 2: Internal audit quality of listed companies in the publishing industry is positively related to enterprise performance while other conditions remain constant.

2.3 The Moderating Effect of Internal Audit Quality on the Relationship between R&D Investment and Enterprise Performance

Internal audit is the re-supervision of internal control, and good internal audit quality can accurately transmit operational information to investors, which is conducive to smooth financing and increased R&D investment. Wang and Yu (2016) found that perfect internal control can alleviate the inhibiting effect of financing constraints on R&D investment^[19]. Before the start of R&D, internal audit can review the demonstration of R&D projects to prevent the lack of innovation and waste of resources caused by the lack of demonstration or insufficient demonstration; during the R&D process, internal audit can effectively supervise the R&D activities and improve the efficiency of the use of R&D funds; after the completion of the R&D, internal audit can promote the rational use of R&D results and evaluate their effectiveness. Li et al. (2019) found that internal control plays a crucial role in resource allocation for technological innovation^[10]; Wang et al. (2015) and Shi et al. (2016) both found that a high level of internal control reduces the operational risk of R&D projects and improves the transformation and market recognition of R&D results^{[20][14]}. From the above analysis, it can be seen that the quality of internal audit has a positive impact on R&D investment both before, during, and after R&D investment, bringing about an increase in firm performance, so hypothesis 3 is proposed.

Hypothesis 3: Internal audit quality can positively moderate the impact of R&D investment on enterprise performance of listed companies in the publishing industry when other conditions are constant.

3 Research Design and Sample Selection

3.1 Sample Selection and Data Sources

This paper takes the data of China's A-share listed companies in the publishing industry from 2008 to 2023 as the initial research sample, and carries out the following processing: (1) eliminating the samples with missing data; (2) eliminating the samples with the gearing ratio greater than 1; (3) eliminating the samples of ST, *ST, and PT, and finally obtaining 181 valid samples. Data related to R&D investment, financial status and performance of enterprises are sourced from CSMAR database. Data related to the quality of internal auditing are sourced from Juchao Information Network, the official websites of listed companies, and manually organized based on the company's articles of association, the audit committee's working rules (regulations), the implementation measures of internal auditing, and the annual report of the audit committee of the board of directors on the performance of its duties.

3.2 Variable Definition

The explained variable of this paper is enterprise performance, measured by return on total assets (ROA). The explanatory variable is R&D investment (RDI), measured as the ratio of R&D investment to total assets. The moderating variable is internal audit quality (IAQ), and drawing on Prawitt et al. (2009) and Xie and Tao (2015), this paper measures internal audit quality in terms of four characteristics: the status of internal auditing, the scope of internal auditing responsibilities, the number of audit committees, and the number of annual audit committee meetings^{[13][23]}. Each characteristic factor is dichotomized by the median, assigning a value of 1 if it is above the median and 0 otherwise, and then summed to obtain values ranging from 0 to 4 for a comprehensive measure of internal audit quality. Based on the research results of Yang et al. (2021), Li and Zheng (2024), this paper uses firm size (Size, the natural logarithm of total assets at the end of the period), firm age (Age, the number of years of continuous operation of the firm since its incorporation), firm capital structure (Lev, the end-of-period gearing ratio), and firm growth capacity (Grow, the growth rate of firm revenue) as control variables^{[24][8]}. Since enterprise performance and enterprise R&D investment decisions are also affected by the point in time, this paper also controls annual dummy variables.

3.3 Construction of the Model

In order to test the impact of R&D investment on firm performance, this paper empirically analyzes the firm performance in the current period of R&D investment, 1 pe-

riod after the investment, and 2 periods after the investment and constructs the regression analysis model (1):

$$ROA_t = \alpha_0 + \alpha_1 RDI_t + \alpha_2 Size_t + \alpha_3 Age_t + \alpha_4 Lev_t + \alpha_5 Grow_t + \alpha_6 \Sigma Year + \varepsilon \quad (1)$$

where α_1 is the effect of R&D investment on firm performance, which is expected to be significantly negative; Year is a yearly dummy variable; α_0 is a constant term and ε is the residual.

To test the effect of internal audit quality on firm performance, regression analysis model (2) was constructed:

$$ROA_t = \beta_0 + \beta_1 IAQ_t + \beta_2 Size_t + \beta_3 Age_t + \beta_4 Lev_t + \beta_5 Grow_t + \beta_6 \Sigma Year + \varepsilon \quad (2)$$

Where β_1 is the effect of internal audit quality on firm performance, which is expected to be significantly positive.

To test the moderating effect of internal audit quality on the relationship between R&D investment and firm performance, regression analysis model (3) was constructed:

$$ROA_t = \delta_0 + \delta_1 RDI_t + \delta_2 IAQ_t + \delta_3 RDI_t \times IAQ_t + \delta_4 Size_t + \delta_5 Age_t + \delta_6 Lev_t + \delta_7 Grow_t + \delta_8 \Sigma Year + \varepsilon \quad (3)$$

where δ_3 is the moderating effect of internal audit quality, which is expected to be significantly positive.

4 Empirical Results and Analysis

4.1 Descriptive Statistics and Correlation Analysis

Table 1 shows the descriptive statistics of the main variables of the sample enterprises. The minimum value of enterprise performance (ROA) is -0.58, the maximum value is 0.15, the standard deviation is 0.1, and the median is 0.06, which indicates that there is a large difference in performance among the sample enterprises, and some of them have serious losses. In addition, while most firms are still profitable, the profitability is not very satisfactory, which is consistent with the findings of Gao et al. (2019) that the total national book sales are at low growth and at a lower rate than the growth rate of disposable income per capita^[7]. The minimum value of R&D investment (RDI) is 0, the maximum value is 0.08, the mean value is 0.01, and the median value is 0, indicating that most of the sample enterprises do not invest in R&D and the overall intensity of R&D investment is low. The minimum value of internal audit quality (IAQ) is 1, the maximum value is 4, and the mean value is 2.21, indicating that the sample enterprises have relatively large differences in internal audit quality.

Table 1. Results of descriptive statistics.

| variable | N | mean | standard deviation | minimum | maximum | median |
|----------|-----|-------|--------------------|---------|---------|--------|
| ROA | 181 | 0.040 | 0.100 | -0.580 | 0.150 | 0.060 |
| RDI | 181 | 0.010 | 0.010 | 0 | 0.080 | 0 |
| IAQ | 181 | 2.210 | 0.980 | 1 | 4 | 2 |
| Size | 181 | 22.45 | 0.980 | 19.890 | 23.970 | 22.450 |
| Age | 181 | 18.23 | 6.770 | 4 | 33 | 18 |
| Lev | 181 | 0.340 | 0.150 | 0.070 | 0.930 | 0.340 |
| Grow | 181 | 0.060 | 0.210 | -0.390 | 1.540 | 0.050 |

Table 2 shows the statistical results of Pearson correlation coefficients between variables. Among the main variables, the correlation coefficient between R&D investment (RDI) and corporate performance (ROA) is -0.326, which is significant at the 1% level, and initially proves that R&D investment of listed companies in the publishing industry is negatively related to corporate performance. This may be due to the fact that companies include R&D investment in current expenses and it takes time for R&D investment to bring profit growth. The correlation coefficient between internal audit quality (IAQ) and ROA is 0.176 which is significant at 5% level. Meanwhile, taking the median IAQ as the criterion for dichotomizing its value, the mean value of ROA for the high-scoring sample group is 0.062, while the mean value of ROA for the low-scoring sample group is only 0.025, and the above results preliminarily indicate that internal audit quality is positively correlated with corporate performance. The absolute values of the correlation coefficients between the explanatory variables and the control variables do not exceed 0.3, while the values of the variance inflation factors for all the variables are less than 1.25, indicating that there is no serious problem of covariance between the variables.

Table 2. Statistical results of correlation coefficients.

| variable | ROA | RDI | IAQ | Size | Age | LEV | Grow |
|----------|-----------|-----------|----------|--------|----------|-------|------|
| ROA | 1 | | | | | | |
| RDI | -0.326*** | 1 | | | | | |
| IAQ | 0.176** | -0.007 | 1 | | | | |
| Size | 0.194** | -0.262*** | 0.283*** | 1 | | | |
| Age | -0.188** | 0.149 | -0.122 | 0.113 | 1 | | |
| Lev | -0.197** | -0.085 | 0.176* | 0.041 | -0.008 | 1 | |
| Grow | 0.118 | 0.063 | 0.123 | -0.065 | -0.212** | 0.108 | 1 |

Note: ***, **, and * indicate two-tailed tests significant at the 1%, 5%, and 10% levels, respectively.

4.2 Regression Analysis

Table 3 shows the regression results of R&D investment, internal audit quality and the cross-multiplier of the two with firm performance. In Model 1, the correlation coefficients between R&D investment (RDI) and corporate performance (ROA) in the input period, the first period after input, and the second period after input are -1.987, -1.656,

and -1.703, respectively, and their corresponding T-values are -3.39, -2.20, and -1.83, respectively. The correlation coefficients are all significant at least at the 10% level, indicating that R&D investment of listed companies in the publishing industry suppresses the firm performance in the period of investment and does not improve the firm performance in the subsequent 2 periods, and hypothesis 1 is verified. There is a threshold effect of R&D investment, only exceeding the first threshold, R&D investment can bring significant improvement of enterprise performance. Combined with the fact that the R&D investment intensity of listed companies in the publishing industry is too low, the above regression results indicate that the low intensity of R&D investment is the reason why R&D investment fails to improve enterprise performance. In Model 2, the correlation coefficient between internal audit quality (IAQ) and corporate performance is 0.017, significant at the 5% level, indicating that the higher the internal audit quality, the more significant the improvement of corporate performance, and Hypothesis 2 is verified. The correlation coefficient between the cross-multiplier term ($RDI \cdot IAQ$) and firm performance in the first column of Model 3 is 2.412, which is significant at the 1% level. In the case that R&D investment is significantly negatively correlated with firm performance, the cross-multiplier term is significantly positively correlated with firm performance, indicating that although R&D investment can inhibit firm performance, the improvement of internal audit quality can reduce the negative impact of R&D investment, i.e., R&D investment has a positive moderating effect on firm performance. To further validate the moderating effect of internal audit quality, this paper groups the IAQ by the median of internal audit quality, i.e., assigning a value of 1 to the IAQ of the high-achieving group and a value of 0 to the IAQ of the low-achieving group, and then re-run the regression. The regression results are shown in the second column in Model 3. The cross-multiplier term ($RDI \cdot IAQ$) is still significantly and positively related to firm performance at the 1% level, indicating that internal audit quality has the effect of weakening the negative impact of R&D investment and Hypothesis 3 is tested.

As for the control variables, the correlation coefficient between enterprise size and enterprise performance is positive and significant in Model 1 and Model 2, indicating that enterprise size can bring about an improvement in enterprise performance to a certain extent. This may be due to the fact that, in general, the larger the size of a publishing enterprise, the more obvious its head effect. The age of the enterprise is significantly negatively correlated with enterprise performance, indicating that in the long-term process of overall transformation and upgrading of the publishing industry, the original business model and experience of the enterprise instead restricts the improvement of enterprise performance. Capital structure is negatively correlated with enterprise performance, indicating that publishing enterprises fail to effectively utilize the leverage of liabilities. Although growth capacity is positively correlated with corporate performance, it is not significant, which is basically consistent with the fact that since the reform of the cultural system, China's publishing enterprises tend to focus on quantitative expansion but neglect qualitative improvement.

Table 3. Regression results.

| variable | Model 1 | | | Model 2 | Model 3 | |
|---------------------|----------------------|---------------------|---------------------|----------------------|----------------------|---------------------|
| | ROA_0 (1) | ROA_1 (2) | ROA_2 (3) | ROA (4) | ROA(a) (5) | ROA(b) (6) |
| RDI | -1.987*** (-3.39) | -1.656** (-2.20) | -1.703* (-1.83) | | -2.181* (-1.75) | -2.673* (-1.80) |
| IAQ | | | | 0.017** (2.09) | 0.026*** (3.11) | 0.050*** (2.97) |
| RDI*IAQ | | | | | 2.412*** (3.20) | 3.864*** (2.32) |
| Size | 0.015 (1.54) | 0.023* (1.85) | 0.043*** (2.68) | 0.020** (2.21) | 0.002 (0.32) | 0.001 (0.21) |
| Age | -0.002* (-1.68) | -0.004** (-2.01) | -0.004* (-1.71) | -0.002*** (-2.68) | -0.001 (-1.28) | -0.002 (-1.65) |
| Lev | -0.152** (-2.29) | -0.145 (-1.49) | -0.218* (-1.94) | -0.171* (-1.96) | -0.224*** (-2.64) | -0.187** (-2.30) |
| Grow | 0.047 (1.11) | 0.022 (0.40) | 0.035 (0.55) | 0.029 (0.57) | 0.040 (0.83) | 0.048 (0.97) |
| Constant | -0.307 (-1.48) | -0.413 (-1.58) | -0.728** (-2.19) | -0.394* (-1.84) | -0.009 (-0.06) | -0.044 (-0.32) |
| YEAR | YES | YES | YES | YES | YES | YES |
| N | 181 | 159 | 139 | 181 | 181 | 181 |
| Adj. R ² | 0.178 | 0.102 | 0.160 | 0.238 | 0.256 | 0.241 |
| F-value | 2.53*** | 1.67* | 2.10** | 1.89** | 3.18*** | 3.00*** |

Note: T-values in parentheses, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

4.3 Further Discussion and Analysis

Since the cultural system reform in 2003, China has been promoting the market-oriented reform of the publishing industry in an orderly manner. In 2014, the General Office of the State Council issued a document entitled “Provisions on the Conversion of Operational Cultural Institutions into Enterprises in the Reform of the Cultural System”, which requires sound corporate governance structure along with policy support. In 2018, the General Office of the State Council once again issued a document supporting the conversion of operational cultural institutions, adding measures for corporate shareholding reform on the basis of the original policy, and requiring the establishment of a modern enterprise system and the improvement of the corporate governance structure. In order to test the impact of market-oriented reform on corporate governance in the publishing industry, this paper divides the sample into two time points by 2014 and 2018 and conducts regression again, and the regression results are shown in Table 4.

Table 4. Regression results for sub-samples.

| variable | Model 3 | | |
|----------------------|------------------|-----------------------|----------------------|
| | Year≤2014 (1) | 2014<Year≤2018 (2) | Year>2018 (3) |
| RDI | 2.089 (1.42) | -3.037*** (-3.03) | -3.291*** (-5.06) |
| IAQ | 0.019 (0.62) | 0.031* (2.10) | 0.044*** (3.77) |
| RDI*IAQ | 4.260 (0.94) | 2.568* (2.00) | 3.939** (2.13) |
| Controls | YES | YES | YES |
| N | 24 | 56 | 101 |
| Adj. R ² | 0.585 | 0.247 | 0.652 |
| Mean value of IAQ | 1.917 | 2.268 | 2.317 |

Note: T-values in parentheses, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

The correlation coefficient between the cross-multiplier term (RDI*IAQ) and firm performance in Column 1 of Table 4 is positive but insignificant; the correlation coefficient between the cross-multiplier term and firm performance in Column 2 is 2.568, which is significant and positive at the 10% level; and the correlation coefficient between the cross-multiplier term and firm performance in Column 3 is 3.939, which is significant and positive at the 5% level. It can be found that the correlation coefficient of the cross-multiplier term is from insignificant to significant, from significant at 10% level to significant at 5% level, and the correlation coefficient is increased from 2.568 to 3.939, which indicates that the improvement of the quality of internal auditing promotes the enhancement of the performance of enterprises with the continuous advancement of the market-oriented reforms, and that it plays an increasingly important role.

4.4 Robustness Tests

To make the conclusions more robust, this paper also performs the following tests:(1) Change the measure of firm performance. ROA is replaced by return on equity (ROE) and re-run the regression. The results show that ROE is significant at the 5%, 10%, and 5% levels with R&D investment, internal audit quality, and cross-multiplier terms, respectively, and the sign of the correlation coefficients remains unchanged. (2) Change the measurement methods of R&D investment and internal audit quality. Replace RDI with R&D personnel ratio (number of R&D personnel/total number of personnel in the enterprise) and IAQ with internal control audit opinion given by accounting firms (standard unqualified opinion is assigned a value of 1, otherwise it is assigned a value of 0), and re-test them. The regression results show that ROA is significant with R&D investment, internal audit quality and cross-multiplier terms at least at the 5% level while the sign of the correlation coefficients remains unchanged. The robustness test results further support the conclusions of this paper.

5 Conclusions and Implication

5.1 Conclusions

This paper takes listed companies in the publishing industry as the research object to empirically examine the relationship between R&D investment, internal audit quality and corporate performance, as well as the moderating role of internal audit quality. It is found that: (1) the overall intensity of R&D investment of listed companies in the publishing industry is low, which leads to its failure to bring about the improvement of corporate performance, and the R&D investment in lag 1 and lag 2 is still negatively correlated with the corporate performance; (2) the improvement of internal audit quality can promote the improvement of corporate performance; (3) internal audit quality plays a positive moderating role in the relationship between R&D investment and firm performance, and it can weaken the negative impact of R&D investment on firm performance; (4) in the process of market-oriented reform, internal audit quality of listed companies in the publishing industry has been continuously improved, which has contributed to the improvement of firm performance.

5.2 Implication

Based on the above research conclusions, combined with the current development situation of China's publishing industry, this paper puts forward the following implications: (1) Further increase the strength of R&D investment. The small amount of R&D investment and the low proportion of R&D personnel are the important reasons for the delayed transformation of the benefits of R&D investment in China's publishing industry. Promoting the integration of publishing and emerging technologies such as big data is a breakthrough in the transformation and upgrading of the publishing industry. Publishing enterprises should increase R&D investment in an orderly manner according to their financial situation, and strengthen the construction of software and hardware facilities in a demand-oriented manner. By improving data processing capabilities and cooperating with large Internet companies and data companies, they should actively carry out technological innovation and content innovation, and gradually realize the role change from knowledge producers and book publishers to data and information service providers. (2) Improve internal auditing and give full play to the value-added function of internal auditing. Internal audit is one of the four cornerstones of corporate governance. Publishing enterprises should improve the quality of internal audit by safeguarding the independence of internal audit, improving the professional competence of internal auditors, increasing the investment in internal audit personnel and funding, improving the quality control system of internal audit, and enhancing the implementation of internal audit.

5.3 Theoretical Contributions

The theoretical contributions of this paper is mainly reflected in the following aspects: (1) This paper is the first research on the quality and benefits of R&D investment in

publishing enterprises, and finds that R&D investment negatively affects enterprise performance in the current period and the following 2 periods, and the low intensity of R&D investment is the reason why R&D investment fails to bring positive lag effect, which makes up for the lack of empirical evidence of the benefits of R&D investment in current publishing enterprises; (2) Comprehensively measuring internal audit quality and empirically analyzing the changes of internal audit quality in Chinese publishing enterprises during the process of market-oriented reform and its moderating effect on the relationship between R&D investment and enterprise performance, which enriches the related research on the relationship between R&D investment and enterprise performance.

5.4 Limitations and Future Research

This study examines the relationship between R&D investment, internal audit quality and firm performance and the moderating role of internal audit quality. There are still limitations in the following two aspects: first, there are big differences between listed and non-listed publishing companies in terms of scale and resources, and this study only takes listed companies as samples and does not consider and compare the performance of R&D investment in non-listed companies; second, this study only investigates the unidirectional impact of R&D investment and internal audit quality on corporate performance, and does not explore their bidirectional interaction. In view of the above limitations, the future can be carried out in the following aspects. First, to study the performance of R&D investment of non-listed publishing enterprises and compare it with listed publishing enterprises, and analyze the differences and reasons; second, to explore the two-way interactive relationship between R&D investment, internal audit quality and enterprise performance, and to study the interaction and the influence mechanism.

Reference

1. Alam, A., Uddin, M., Yazdifar, H., Shafique, S., Lartey, T. (2020). R&D investment, firm performance and moderating role of system and safeguard: Evidence from emerging markets. *Journal of Business Research*, 106: 94-105. <https://doi.org/10.1016/j.jbusres.2019.09.018>.
2. Alyaarubi, H. J., Alkindi, D. S., Ahmed, E. R. (2021). Internal auditing quality and earnings management: Evidence from Sultanate of Oman. *Journal of Governance and Integrity*, 4(2): 115-124. <https://doi.org/10.15282/jgi.4.2.2021.6054>.
3. Brown, J. R., Fazzari, S. M., Petersen, B. C. (2009). Financing innovation and growth: Cash flow, external equity, and the 1990s R&D boom. *The Journal of Finance*, 64(1): 151-185. <https://doi.org/10.1111/j.1540-6261.2008.01431.x>.
4. Chen, S. S., Chen, Y. S., Liang, W. L., Wang, Y. (2013). R&D spillover effects and firm performance following R&D increases. *Journal of Financial and Quantitative Analysis*, 48(5): 1607-1634. <https://doi.org/10.1017/S0022109013000574>.
5. Dai, X. Y., Cheng, L. W. (2013). Threshold effects of R&D intensity on firm performance. *Studies in Science of Science*, 11:1708-1716. <https://doi.org/10.16192/j.cnki.1003-2053.2013.11.015>.

6. Dai, Z. M., Gu, L. Y., Zhu, Z. J. (2021). Research on the impact of R&D investment on firm performance: Based on threshold regression of firm financialization level. *Journal of Industrial Engineering and Engineering Management*, 2: 36-43.
<https://doi.org/10.13587/j.cnki.jieem.2021.02.004>.
7. Gao, H. T., Wang, G. Y., Wang, Y. Q. (2019). The main contradictions of China's press and publication industry in the new era and its countermeasures. *China Publishing Journal*, 17:24-29. <https://doi.org/CNKI:SUN:ZGCB.0.2019-17-010>.
8. Li, M., Zheng, Z, G. (2024). Shareholder voting rights delegation in control rights transfer scenarios and corporate performance. *Management World*, 40(10):189-208.
<https://doi.org/10.19744/j.cnki.11-1235/f.2024.0113>.
9. Li, Q. (2014). A study of development intensity and firm performance of strategic emerging industries firms. *Communication of Finance and Accounting*, 4:22-24.
<https://doi.org/10.16144/j.cnki.issn1002-8072.2014.12.010>.
10. Li, W., Han, Y., He, J. (2019). How does the heterogeneity of internal control weakness affect R&D investment?. *Emerging Markets Finance and Trade*, 55(15): 3591-3614.
<https://doi.org/10.1080/1540496X.2019.1620729>.
11. Liu, L. L. (2019). Internal audit quality, affiliated mergers and acquisitions, and corporate performance. *Communication of Finance and Accounting*, 21:40-43.
<https://doi.org/10.16144/j.cnki.issn1002-8072.2019.21.009>.
12. Pan, W. N., Ma, J. (2023). The influence mechanism, role path and driving effect of big data in the high-quality development of publishing industry. *Publishing Research*, 09:22-31.
<https://doi.org/10.19393/j.cnki.cn11-1537/g2.2023.09.008>.
13. Prawitt, D. F., Smith, J. L., Wood, D. A. (2009). Internal audit quality and earnings management. *The accounting review*, 84(4): 1255-1280.
<https://doi.org/10.2308/accr.2009.84.4.1255>.
14. Shi, X., Wu, H. T. (2016). Internal control, R&D intensity and managerial myopia: Empirical evidence from China's listed corporations. *Journal of Nanjing Audit University*, 5:19-29. <https://doi.org/CNKI:SUN:NJSJ.0.2016-05-003>.
15. Sridhar, S., Narayanan, S., Srinivasan, R. (2014). Dynamic relationships among R&D, advertising, inventory and firm performance. *Journal of the Academy of Marketing Science*, 42: 277-290. <https://doi.org/10.1007/s11747-013-0359-0>.
16. Sun, Q., Yin, M. Q. (2024). Can improving internal control quality reduce the divergence of corporate ESG ratings? *Scientific Decision-Making*, 10:16-34.
<https://doi.org/10.3773/j.issn.1006-4885.2024.10.016>.
17. Tian, Q. Q., Wang, S. R., Wang, H. Y. (2019). Research on the influence of R&D expenditure on enterprise performance under the background of corporate governance. *Journal of Heilongjiang Bayi Agricultural University*, 31(1): 99-104.
<https://doi.org/10.3969/j.issn.1002-2090.2019.01.017>.
18. Vithessonthi, C., Racela, O. C. (2016). Short-and long-run effects of internationalization and R&D intensity on firm performance. *Journal of Multinational Financial Management*, 34: 28-45. <https://doi.org/10.1016/j.mulfin.2015.12.001>.
19. Wang, S. Z., Yu, J. (2016). An empirical analysis of the relationship between internal control, financing constraints and R&D investment. *Statistics and Decision*, 15: 183-186.
<https://doi.org/10.13546/j.cnki.tjyj.2016.15.049>.
20. Wang, Y. C., Lu, D., Gong, Y. F. (2015). Do corporate internal controls improve R&D efficiency? *Securities Market Herald*, 1:39-45.
<https://doi.org/CNKI:SUN:ZQDB.0.2015-01-007>.
21. Xia, H. Y., Li, Y. Z., Zhang, Q. Y., Zhang, D. H. (2016). Internal audit quality, enterprise scale and corporate performance: Empirical study of listed companies based on panel data.

Journal of Central University of Finance & Economics, 6:71-78.

<https://doi.org/CNKI:SUN:ZYCY.0.2016-06-008>.

22. Xiao, J. H., Cao, W. H., Xia, Z. H. (2024). Adaptive change in the digitalization of manufacturing enterprises: A dual-path model of leapfrogging and foundation-strengthening. *China Industrial Economics*, 12:136-154.
<https://doi.org/10.19581/j.cnki.ciejournal.2024.12.008>.
23. Xie, Z. H., Tao, Y. X. (2015). Influence of internal audit quality and its characteristics on external audit fees: A case study of Shenzhen A-share mainboard. *Journal of Southeast University*, 3: 76-84. <https://doi.org/10.13916/j.cnki.issn1671-511x.2015.03.015>.
24. Yang, D. M., Wan, D. X., Guo, J. Y. (2021). R&D investment in corporate science and technology and firm performance. (2021). *Shandong Social Sciences*, 5:129-135.
<https://doi.org/10.14112/j.cnki.37-1053/c.2021.05.019>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

