

Research on the Relationship Between R & D Investment and Enterprise Performance

Jie Zhang^(⊠)

School of Marxism, Dalian University, Dalian, Liaoning, China 1044479904@qq.com

Abstract. Based on the panel data of Chinese listed enterprises from 2015 to 2020, using the knowledge of econometrics, starting from the impact of R&D investment on enterprise performance, through empirical analysis, a series of reasonable suggestions to improve enterprise performance are put forward.

Keywords: R & D investment \cdot enterprise performance \cdot ownership concentration \cdot feasibility suggestions

1 Introduction

This paper takes 28 listed companies in China from 2015 to 2020 as a sample, and also analyzes the direct impact of relevant factors on the operating income of listed companies more accurately, and conducts regression analysis of these data. In addition, "R&D investment intensity", "equity concentration", "asset-liability ratio" and "government subsidy" were selected as the explanatory variables of the model. This article is developed in these four aspects, through the data from 2015 to 2020 to observe their impact on enterprise performance, so as to provide some suggestions for the long-term development of China's current enterprises.

2 Research Design

2.1 Sample Selection and Data Sources

This paper selects the data of 8 listed companies with strong development momentum, good development prospects and relatively active industrial activities in the past six years. In order to more accurately understand the impact of various relevant factors on enterprise performance, regression analysis was carried out on factors such as financial subsidies, equity concentration and asset-liability ratio. All of the data covered in this article comes from the Cathay Database. Use eViews7 and Excel to perform statistics and analysis on data (Table 1, 2, 3, 4 and 5).

RD	2015	2016	2017	2018	2019	2020	Unit
TCL	37.66	42.66	47.59	46.78	33.97	44.03	Billion
Baoshan Iron & Steel	34.5	36.62	42.07	70.54	88.64	105.38	Billion
BYD	36.75	45.22	37.39	49.89	56.29	81.74	Billion
CHANGAN	25.63	32.03	26.17	31.85	31.69	44.6	Billion
FOTON	22.38	25.53	8.65	15.17	17.2	26.03	Billion
GREE	26.62	35.16	36.18	69.88	58.91	72.73	Billion
GAC	19.19	23.89	4.96	8.38	10.02	9.76	Billion
Hikvision	17.23	24.33	31.94	44.83	54.84	90.22	Billion
Aisino	3.7	5.46	2.53	6.23	7.92	9.3	Billion
Hengrui Medicine	89.17	11.84	17.59	26.7	38.96	60.18	Billion
Hundsun	8.63	10.51	12.79	14.05	15.6	15.17	Billion
Huayu Automotive	15.4	24.45	42.1	51.33	52.65	55.73	Billion
JIANGXI COPPER	17.14	23.28	1.58	2.07	5.86	6.61	Billion
BOE	33.19	41.39	31.78	50.4	67	76.23	Billion
SAIC	83.71	94.09	130.15	153.85	133.94	13395	Billion
SF Holding	2.55	5.61	6.49	9.84	11.93	17.42	Billion
CHANGHONG	12.71	10.84	11.85	13.27	15.89	24.45	Billion
SUNING.COM	10.01	12.58	12.51	22.62	32.68	37.38	Billion
SINOCHEM	16.4	14.65	18.07	25.82	33.17	37.65	Billion
CSCEC	81.92	105.92	123.85	159.11	218.72	237.21	Billion
CCCC	72.73	79.07	85.87	100.14	125.92	195.69	Billion
SINOPEC	56.26	59.4	64.23	79.56	93.95	128.32	Billion
CNPC	149.33	105.79	110.75	128.26	156.66	157.46	Billion
CRCC	87.59	88.67	103.98	115.72	165.28	209.35	Billion
CREC	102.84	104.19	111.03	134.36	165.11	197.41	Billion
MCC	51.79	60.77	53.36	71.83	99.34	123.27	Billion
ZTE	122.01	127.62	129.62	109.06	125.48	147.97	Billion
UNIS	0.67	17.84	30.3	33.28	39.41	51.77	Billion

Table 2.	ZFBT	[Owner-draw]
----------	------	--------------

ZFBT	2015	2016	2017	2018	2019	2020	Unit
TCL	26.29	28.4	8.4	9.57	1.29	4.92	Billion
Baoshan Iron & Steel	6.68	4.39	2.75	3.14	2.13	1.63	Billion
BYD	7.03	8.44	2.79	2.3	2.26	2.82	Billion
CHANGAN	5.15	9.75	1.04	9.16	0.5	0.78	Billion
FOTON	13.13	10.58	1.13	1	1.1	1.82	Billion
GREE	14.04	10.96	5.11	3.18	3.46	2.87	Billion
GAC	3.96	2.74	2.87	3.18	6.61	1.09	Billion
Hikvision	12.94	15.11	0.47	1.11	0.65	0.99	Billion
Aisino	3.68	2.03	0.5	0.79	0.86	0.25	Billion
Hengrui Medicine	0.28	0.31	0.02	0.004	0.008	0.01	Billion
Hundsun	1.48	1.89	0.08	0.02	0.03	0.02	Billion
HuayuAutomotive	4.24	6.25	2.36	6.58	4.16	0.87	Billion
JIANGXI COPPER	2.13	1.51	0.71	0.43	0.91	0.68	Billion
BOE	10.83	20.86	1.8	1.69	2.08	1.21	Billion
SAIC	36.67	29.44	8.69	11.25	7.67	7.5	Billion
SF Holding	0.03	15.57	1.28	1.48	2.13	2.29	Billion
CHANGHONG	4.47	3.58	0.35	0.49	0.37	0.75	Billion
SUNING.COM	16.65	10.6	4.05	5.06	2.51	4.2	Billion
SINOCHEM	1.65	3.06	0.32	0.84	0.86	0.71	Billion
CSCEC	8.65	12.26	10.4	6.09	12.94	18.58	Billion
CCCC	10.68	12.48	5.4	4.73	3.07	3.43	Billion
SINOPEC	69.45	47.06	13.17	20.7	26.01	23.7	Billion
CNPC	129.56	102.2	36.12	32.18	49.71	41.09	Billion
CRCC	8.09	9.34	10.9	10.97	9.75	10.68	Billion
CREC	13.02	10.42	7.64	5.97	6.74	7.99	Billion
MCC	13.76	13.07	4.39	4.5	5.24	4.75	Billion
ZTE	44.43	43.62	1.31	1.43	1.84	2.38	Billion
UNIS	1.24	2.72	1.29	0.83	1.05	1	Billion

Table 3.	LEV	[Owner-draw]	I
----------	-----	--------------	---

LEV	2015	2016	2017	2018	2019	2020
TCL	0.66	0.69	0.66	0.68	0.61	0.65
Baoshan Iron & Steel	0.49	0.51	0.50	0.44	0.44	0.44
BYD	0.69	0.62	0.66	0.69	0.68	0.68
CHANGAN	0.62	0.59	0.55	0.51	0.55	0.56
FOTON	0.56	0.65	0.69	0.74	0.71	0.71
GREE	0.70	0.70	0.69	0.63	0.60	0.58
GAC	0.41	0.45	0.41	0.41	0.40	0.39
Hikvision	0.36	0.41	0.41	0.40	0.40	0.39
Aisino	0.34	0.38	0.37	0.37	0.38	0.35
Hengrui Medicine	0.10	0.10	0.12	0.11	0.09	0.11
Hundsun	0.36	0.45	0.44	0.45	0.41	0.49
HuayuAutomotive	0.57	0.57	0.60	0.59	0.58	0.61
JIANGXICOPPER	0.47	0.44	0.49	0.49	0.56	0.53
BOE	0.49	0.55	0.59	0.60	0.59	0.59
SAIC	0.59	0.60	0.62	0.64	0.65	0.66
SF Holding	0.20	0.53	0.43	0.48	0.54	0.49
CHANGHONG	0.68	0.67	0.68	0.70	0.71	0.73
SUNING.COM	0.64	0.49	0.47	0.56	0.63	0.62
SINOCHEM	0.66	0.65	0.65	0.64	0.68	0.70
CSCEC	0.78	0.79	0.78	0.77	0.75	0.74
CCCC	0.77	0.77	0.76	0.75	0.74	0.73
SINOPEC	0.46	0.45	0.47	0.46	0.50	0.50
CNPC	0.44	0.43	0.43	0.42	0.47	0.47
CRCC	0.81	0.80	0.78	0.77	0.76	0.75
CREC	0.80	0.80	0.80	0.76	0.76	0.74
MCC	0.79	0.78	0.77	0.77	0.75	0.72
ZTE	0.64	0.71	0.68	0.75	0.73	0.69
UNIS	0.57	0.27	0.32	0.37	0.41	0.42

Table 4. TOP [Owner-draw]

	2015	2016	2017	2010	2010	2020
ТОР	2015	2016	2017	2018	2019	2020
TCL	0.06	0.06	0.08	0.08	0.09	0.08
Baoshan Iron & Steel	0.59	0.52	0.52	0.51	0.51	0.49
BYD	0.24	0.24	0.24	0.24	0.24	0.24
CHANGAN	0.34	0.36	0.36	0.19	0.19	0.19
FOTON	0.14	0.27	0.27	0.27	0.27	0.27
GREE	0.18	0.18	0.18	0.18	0.18	0.19
GAC	0.61	0.61	0.38	0.53	0.53	0.53
Hikvision	0.40	0.40	0.39	0.39	0.39	0.39
Aisino	0.40	0.40	0.40	0.40	0.40	0.40
Hengrui Medicine	0.24	0.24	0.13	0.17	0.20	0.24
Hundsun	0.21	0.21	0.12	0.12	0.6	0.21
Huayu Automotive	0.49	0.58	0.58	0.58	0.58	0.58
JIANGXI COPPER	0.41	0.41	0.41	0.42	0.42	0.44
BOE	0.12	0.12	0.12	0.12	0.12	0.12
SAIC	0.70	0.70	0.71	0.71	0.71	0.71
SF Holding	0.43	0.43	0.59	0.59	0.59	0.59
CHANGHONG	0.23	0.23	0.23	0.23	0.23	0.23
SUNING.COM	0.21	0.21	0.21	0.21	0.21	0.21
SINOCHEM	0.65	0.65	0.65	0.40	0.37	0.37
CSCEC	0.40	0.40	0.40	0.56	0.56	0.56
CCCC	0.64	0.64	0.55	0.51	0.45	0.58
SINOPEC	0.71	0.71	0.71	071	0.71	0.68
CNPC	0.86	0.86	0.83	0.81	0.80	0.80
CRCC	0.56	0.56	0.56	0.51	0.51	0.51
CREC	0.50	0.51	0.49	0.47	0.47	0.47
MCC	0.59	0.59	0.59	0.56	0.55	0.49
ZTE	0.28	0.28	0.28	0.28	0.25	0.22
UNIS	0.13	0.55	0.20	0.28	0.38	0.46

Table 5.BI [Owner-draw]

				-		
BI	2015	2016	2017	2018	2019	2020
TCL	1048.31	1065.46	1117	1134	750.78	768.3
Baoshan Iron & Steel	1638.50	1855.13	2895	3055	2921	3909.07
BYD	800.10	1034.70	1059	1301	1277	1566
CHANGAN	667.72	785.42	800.12	662.98	705.95	1001.88
FOTON	340. 10	465.32	517.1	410.54	469.66	792.08
GREE	999.12	1100.19	1500	2000	2005	2190.11
GAC	294.18	494.18	715.68	723.8	597.04	631.57
Hikvision	252.71	319.24	419.05	498.37	576.58	757.21
Aisino	223.83	256.14	297.54	279.4	339.79	218.13
Hengrui Medicine	93.16	110.94	138.36	174.18	232.89	36249
Hundsun	22.26	21.70	26.66	32.63	38.72	44.71
Huayu Automotive	911.20	1243.10	1405	1572	1440	1336
JIANGXI COPPER	1857.82	2023.08	2051	2153	2404	3186
BOE	486.24	689.10	938	971.09	1161	1356
SAIC	6680.56	7542.30	8706	9022	8433	7421
SF Holding	473	574.83	712.73	909.43	1122	1540
CHANGHONG	648.48	671.75	781.62	833.85	887.93	1187.38
SUNING.COM	1355.48	1485.85	1879	2450	2692	3571.39
SINOCHEM	635.32	530.76	585.71	814.45	1041	1168.21
CSCEC	8805.77	9597.65	10500	12000	14200	20720
CCCC	4044.20	4317.43	4828	4909	5554	6276
SINOPEC	20188.83	19309.11	23600	28900	29600	21100
CNPC	17254.28	16169.03	20200	23700	25200	19300
CRCC	6005.39	6293.27	6810	7301	8305	9103
CREC	6240.31	6432.39	6934	7404	8509	9747
MCC	2173.24	2195.58	2440	2895	3386	4001
ZTE	1001.86	1012.33	1088	855.13	907.37	1015
UNIS	133.50	277.10	390.72	483.38	540.99	768.77

2.2 Selection and Definition of Variables

2.2.1 The Variable Being Explained

The explanatory variable in this article is the performance of the enterprise, and the operating income of the enterprise is the most intuitive table of the performance of the enterprise.

At present, operating income is usually income obtained from engaging in the company's main business or other business. It is divided into the following three types: main business income and other business income. Through the analysis of accounting for operating income, the performance of the enterprise is relatively clarified.

2.2.2 Explanatory Variables

The explanatory variable in this paper is R&D activity investment, which refers to the expenditure of an enterprise in the field of scientific and technological innovation, which is an important relevant indicator to measure the scientific research ability of an enterprise. Through the study of R&D Investment, we can intuitively show the R&D scale of various listed enterprises in China, and more clearly reflect the positive correlation between R&D investment and Enterprise Performance [1].

2.2.3 Control Variables

The control variables that need to be described in this article are defined as the degree of concentration of equity funds of the company, the asset-debt ratio, and government subsidies. Equity concentration refers to the controlling ratio of the largest shareholder, which shows the degree of equity concentration of a company. The asset-liability ratio is the ratio of an enterprise's total liabilities to its total assets, reflecting the comprehensive level of the ability of all assets of Chinese enterprises to actively repay all debts, the comprehensive level of guarantee and use ability, and the comprehensive level of all debts to actively support the use of enterprise funds [2] (Table 6).

2.3 Research Hypotheses

As the most dynamic and influential subject in the market, if enterprises want to maintain their advantages in the complex and diverse international market economic environment, they must improve their core competitiveness, and the most feasible way to improve the competitiveness of enterprises is to improve the independent innovation ability of enterprises, and this independent innovation needs the support of enterprises' research and development investment costs, focusing on the future, and the investment in research

The variable type	Variable symbol	Variable description
The variable being explained	BI	Operating income
Explanatory variables	RD	R&D investment
Control variables	ТОР	Equity concentration (number of holdings of the largest shareholder / total number of shares)
	LEV	Gearing ratio (total liabilities / total assets)
	ZFBZ	Government subsidies

 Table 6. Describes the meaning of variable symbols [Owner-draw]

J. Zhang

and development expenses is closely related to the future survival of the entire enterprise [3]. Based on the above conclusions, this paper puts forward the following hypothesis:

Under the condition that the R&D investment expenses of China's listed enterprises are increasing, the intensity of R&D investment has a significant positive correlation with the operating income of enterprises [4].

2.4 Model Building

Estimation model : BI = C + RD + TOP + LEV + ZFBZLet $Y = BI \times 1 = RD \times 2 = TOP \times 3 = LEV \times 4 = ZFBZ$ $Y = c + c1 \times 1 + c2 \times 2 + c3 \times 3 + c4 \times 4$

where c is the constant term and c1, c2, c3, and c 4 are the parameters to be estimated.

If the coefficient of the variable RD is significantly greater than 0, it indicates that the increase of R&D investment intensity of enterprises is conducive to improving performance. If the coefficient of RD is significantly less than 0, it indicates that the increase in R&D investment intensity of enterprises is not conducive to improving enterprise performance. If the coefficient of RD is not significant, it means that the improvement of R&D and technology investment of enterprises has little effect on the performance of enterprise operation and management [5].

3 Second, Empirical Analysis

3.1 Descriptive Statistical Analysis

3.1.1 The Variable Being Explained

Through the analysis of the statistical results of Table 7, the maximum value of 28 listed enterprises from 2015 to 2020 was 29600 and the minimum value was 21.70, which showed that China's listed enterprises developed well, their operating income maintained a trend of continuous growth, and their performance increased year by year.

	variable	Number of samples	average value	standard deviation	minimum	maximum
The variable being explained	BI	168	4048.52	51.32	21.70	29600
	RD	168	58.58	6522.52	0.67	237.21
Explanatory variables	ТОР	168	40.35	19.91	6.26	86.01
Control	LEV	168	0.57	0.16	0.09	0.81
variables	ZFBZ	168	8.92	16.08	0.01	129.56

 Table 7. Descriptive statistical analysis of variables [Owner-draw]

3.1.2 Explanatory Variables

Through the analysis of the statistical results in Table 7, the average value of these 28 listed companies from 2015 to 2020 is 58.58, which is not very significant compared with the maximum value of 237.21, which indicates that the R&D investment intensity of listed companies in China has changed greatly in the past six years. The maximum value of R&D investment growth is 237.21 and the minimum value is 0.67, which shows that the R&D investment intensity of Chinese enterprises is growing rapidly.

3.1.3 Control Variables

Through the analysis of the statistical results in Table 7, the minimum value of equity concentration is 6.26 and the maximum value is 86.01, the gap is large, and the average value is 40.35, which is also less than the maximum value, which indicates that the equity concentration of enterprises in China has increased. The minimum value of the asset-liability ratio is 0.09, the maximum value is 0.81, the difference is not significant, the average value of 0.57 is not significant compared to the maximum value of 0.81, which also shows that the change in the asset-liability ratio of China's listed enterprises in the past six years is not obvious, the percentage of total liabilities to the total net asset value of the enterprise is not large, and the effectiveness and protection level of funds for debt are relatively high. The minimum value of government subsidies is 0.01 and the maximum value is 129.56, the difference between the two is significant, and the average value of 8.92 is far lower than the maximum value of 129.56, which shows that the subsidy expenditure of the Chinese government to enterprises is increasing year by year.

3.2 Correlation Analysis

In order to accurately determine the correlation between the five related variables of enterprise operating income, R&D investment, effective concentrated use of equity, asset-debt ratio and government subsidy, and further determine whether the interpretive and control variables selected in this paper are reasonable, a simple correlation coefficient is used for analysis, and the results are shown in Table 8.

It can be seen from Table 8 that the correlation coefficient between the respective variables is significantly lower than 1%, and the R&D innovation investment intensity

	Y	X1	X2	X3	X4
Y	1	0.563454	0.549025	-0.005365	0.527154
X1	0.56345	1	0.407096	0.401667	0.354567
X2	0.549025	0.407096	1	0.043190	0.420650
X3	-0.005365	0.401667	0.043190	1	0.002018
X4	0.527154	0.354567	0.420650	0.002018	1

 Table 8. Simple correlation coefficient matrix analysis results [Owner-draw]

of enterprises and the operating income of enterprises show a positive correlation, and it is significant at the level of 1%, indicating that the intensity of investment in the process of carrying out R&D activities of enterprises increases, which will help promote the improvement of the overall operating income of enterprises [6]. The intensity of R&D investment, the degree of equity concentration, and government subsidies are all positively correlated with the company's operating income, indicating that these independent variables are closely related to the company's operating income, indicating that the selection of the control variables in this paper is reasonable.

3.3 Multicollinearity Analysis

The characteristic of applying regression models is that they require that there is no multicollinearity between the individual regressors of the regression model [7]. In order to avoid multiple variables having the same tendency to change, which brings a series of problems to the model estimation, this paper takes relevant measures to test the problem of "whether there is multicollinearity of each variable in the sample" before starting to apply multiple linear regression. This article uses the VIF test, the results are seen in Table 9.

From the data in Table 9, it is clear that the variance inflation factor VIF values are all at a low level, less than 3, and it can be considered that there is no collinearity problem between X1, X2, X3, and X4.

3.4 Regression Analysis

Statistical Inference Test:

Firstly, the goodness-of-fit test of the model is carried out, and the estimated multiple linear regression model is: $Yi = c + C1X1i + C2X2i + C3X3i + \beta + C4X4i + ei$; It is determined by the R2 R2. From the result of the regression result R2 and the square of R- shows that 0 < R2 = 0.551927 < 1, indicating that the model is feasible and well fitted. Secondly, the significance test of the model is carried out, and the hypothesis is proposed: H0:C1 = C2 = C3 = β = Ck = 0 that is, the linear relationship of the model does not hold; The alternative hypothesis is: H1: C1, C2, C3, β , Ck is not all zero; The calculated F statistic follows the F distribution with (4,136) degrees of freedom. Selected at a significance level of 5%, according to the F distribution table, the critical value of 5 .65 < F α (k, n - k - 1) < 5 .66, and the calculated F = 7 .08325 > 5 .66, rejects the null hypothesis H0 at the significance level of 5%, that is, the linear relationship of the model is significance test of the explanatory variables is carried out, and the null hypothesis H0: Ci = 0 is designed. Alternative hypothesis: Ci \neq 0; The absolute value of the T value

 Table 9.
 VIF analysis results [Owner-draw]

Y		X1	X2	X3	X4
VIF value	-	1 .044	2.462	2. 193	1.208

Coefficient	Std. Error	t-Statistic	Prob.	
47.40814	9.423459	5.030864	0.0000	
8901.548	2040.608	4.362204	0.0000	
-6824.510	2405.476	-2.837072	0.0052	
134.2844	27.29865	4.919085	0.0000	
358.2757	1482.709	0.241636	0.8094	
Effects Specification				
Period fixed (dummy variables)				
0.551927	Mean dependent var		4048.521	
0.526404 S	.D. dependent var		6522.521	
4488.690 A	kaike info criterion		19.71419	
3.18E + 09 S	chwarz criterion		19.90014	
-1645.992	Hannan-Quinn criter.		19.78966	
21.62456	Durbin-Watson stat		0.648181	
0.000000				
	Coefficient 47.40814 8901.548 -6824.510 134.2844 358.2757 ables) 0.551927 0.526404 S 4488.690 A 3.18E + 09 S -1645.992 21.62456 0.000000	Coefficient Std. Error 47.40814 9.423459 8901.548 2040.608 -6824.510 2405.476 134.2844 27.29865 358.2757 1482.709 ables) 0.551927 Mean depender 0.526404 S .D. dependent v 4488.690 A kaike info criter 3.18E + 09 S chwarz criterior -1645.992 Hannan-Quinn 21.62456 Durbin-Watson	CoefficientStd. Errort-Statistic 47.40814 9.423459 5.030864 8901.548 2040.608 4.362204 -6824.510 2405.476 -2.837072 134.2844 27.29865 4.919085 358.2757 1482.709 0.241636 ooo	

Table 10. Multiple regression analysis results [Owner]	r-draw]
--	---------

Dependent Variable: Y Method: Panel Least Squares Date: 05/06/21 Time: 02:37 Sample: 2015 2020 Periods included: 6 Cross-sections included: 28 Total panel (balanced) observations: 168

is calculated > 2, indicating that at a significance level of 5%, the original hypothesis H0 is rejected, that is, Ci is significantly not 0, that is, the influence of the variable Xi on the explanatory variable is significant. Through the test, it shows that the model has a good fit, "R&D investment", "equity concentration" and "government subsidy" have a significant impact on enterprise performance, and "asset-liability ratio" has no obvious impact on enterprise performance [8] (Table 10).

4 Conclusions and Recommendations

For improving the operating income of enterprises and increasing the performance of enterprises, suggestions with practical value are put forward: (1) Vigorously strengthen the company's R&D investment investment, increase the proportion of R&D expenditure investment in the company's operating income, and increase the intensity of the company's R&D activities and expense investment. Comprehensively broaden new fields, develop new investment points, improve enterprises' independent innovation capabilities, enhance their core competitiveness, and maintain their dominant position in the complex market environment [9]. (2) Reduce the decentralization of enterprise equity,

396 J. Zhang

appropriately enhance the concentration of shareholding of the largest shareholders, so as to ensure that the interests of the majority shareholders and the company are consistent, stimulate the enthusiasm of the major shareholders, promote the management to better operate the company, and at the same time strengthen the incentive and supervision of the management personnel, which has a positive impact on the performance of the enterprise[10]. (3) It is necessary to strictly control the asset-liability ratio of companies and enterprises, increase funds from the equity owner part, reduce funds from the debt part, reduce the degree of financial risk, and reduce financing costs. While controlling the asset-liability ratio of enterprises, it is also necessary to consider the cash flow of enterprises, and must not affect the effectiveness of the use of enterprises' cash. (4) The government should also increase subsidies to enterprises, especially for their R&D activities. Not only in terms of funds, but also in terms of systems. For example, reducing the tax rate of enterprises in developing new fields and formulating relevant support policies.

References

- TANG Hua, WANG Longmei, CHENG Huiling. Internal Control Effectiveness, R&D Expenditure and Enterprise Innovation Performance—Based on the Empirical Data of High-tech Enterprises[J].Friends of Accounting,2021(08): 136-141.
- 2. GUO Qianwen, XU Huanzhang, WANG Yi.R&D investment, equity structure and enterprise performance[J].Finance and Accounting Bulletin,2020(12):50–57.
- 3. Wang Xiaowei. Research on the impact of R&D investment in China's new energy automobile industry on enterprise performance[D].Shanxi University of Finance and Economics, 2018.
- 4. Wang Yiying. Research on the correlation between R&D investment and enterprise performance of high-tech enterprises[D].Liaoning University,2018.
- Wang Liqiao, Tan Yunqing.Financial subsidies, R&D investment and enterprise value[J]. Accounting and Economic Research,2016,30(04):68-80.
- 6. Wang Nucheng. Research on the correlation between R&D investment and enterprise growth [J]. Scientific Management Research,2001(03): 13- 16.
- 7. Jun Huang, Guoliang He.Corporate Social Responsibility, Technological Innovation and Enterprise Value[J].Soft Science,2017,31(07):93–97.
- 8. Matthias Olga and Fouweather Ian. The Long Game: Technological Innovation and the Transformation of Business Performance[J]. International Journal of Technology and Human Interaction (IJTHI), 2021, 17(2): 60-78.
- 9. The effects of owner identity and external governance systems on R&D investments: A study of Western European firms[J]. Federico Munari, Raffaele Oriani, Maurizio Sobrero. Research Policy. 2010 (8)
- Cheng Ping, Yan Lu. Research on Performance Evaluation of Enterprise R&D Projects Based on CART Decision Tree Algorithm [J/OL]. Monthly Journal of Finance and Accounting: 1–8 [2022–12–02].

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.

