Government Subsidy, Executive Compensation and R&D Input—Empirical Study on a-share Listed Company

Xiaoyang Zhao, Qiaoyan Cai Fang and Zhaoyang Xu

ABSTRACT

Based on the panel data of a A-share listed company in 2014-2016, this paper studies the relationship between government subsidy and R&D input by using Non-linear regression model. The research shows that government subsidy can promote the investment of research and development; The relationship between the government subsidy and R&D input has a positive moderating effect in private enterprises, and the executive compensation in the state-owned enterprise has a negative moderating effect on the relationship between the two. The conclusion of the research has some enlightenment in improving the innovation ability and the efficiency of the listed companies in our country.1

KEYWORDS

Government subsidy, executive compensation, R&D input

INTRODUCTION

The theory of new economic growth holds that enterprise's R&D is an important index of enterprise innovation capability Evaluation, which is related to the future development of enterprises. The research of Xu Xiaowen and Min

1Xiaoyang Zhao, Fangqiaoyan Cai, Zhaoyang Xu, School of Accounting, Wuhan Textile University, Wuhan, Hubei Province, China, 430200
Fanping (2010) shows that: the high input and the uncertainty of the result of technological innovation lead to the lack of innovation input power of enterprises. In addition, the research of Lu Jiayu and Xia Qiafang (2017) shows that nearly half (49.25%) of enterprises with research and development activities in China are unstable. Therefore, Governments have given support to the innovation of enterprises. Principal-Agent theory holds that there is a principal-agent relationship between managers and shareholders. The innovation activities in enterprises have the characteristics of high investment, long cycle and high risk. The executives consider their own benefit to make different decision, which leads to the choice of different innovation activities due to the asymmetry of information and the difference of risk preference between management and owner. Executive compensation that as a short-term incentive of corporate governance can alleviate the problem of agency in enterprises due to. Wang Yanni (2011) believes that executive incentive and R&D input are positively correlated and the incentive effect is more evident in state-owned enterprises.

Based on the above analysis, this paper will take the 2014-2016 China A-share listed companies as a sample to discussion of government subsidies, executive pay and R&D input of the relationship between the three.

LITERATURE REVIEW AND RESEARCH HYPOTHESIS

Government Subsidies and R&D Input

The main projects of enterprises receiving government subsidy are financial interest discount, policy subsidy, research and development subsidy and free transfer of non-monetary assets. The research and development subsidies can enable enterprises to obtain cash flow directly and enhance purchasing power of enterprises. Arrow Research found that government subsidies will diversify the investment risk of innovative activities, so that more enterprises to participate in the market competition. Which can promote the emergence of new technologies and new products. Xu Guoyi selected from 2007-2010 China's 194 listed companies as a research sample, indicating that R&D subsidies could promote the enterprise research and development investment. Many enterprises are often difficult to obtain financing from outside to support their research and development projects. The government subsidy not only can make up the fund gap which the enterprise research and development investment needs. Based on the above analysis, this paper raises the hypothesis H1:

Assumption H1: Under other conditions, government subsidy is positively correlated with the R&D input of the enterprise.
The Moderating Effect of Executive Compensation

According to the principal-agent theory and signaling theory, the executives of enterprises are likely to produce moral hazard and adverse selection because of their own interests. Reasonable executive pay can not only motivate executives to better govern the company, but also encourage executives to focus more on enterprise innovation activities. At the same time, government also supports the innovation and development of enterprises through the form of government subsidy. Ren Yunhai (2010) research shows that the state-owned nature of the control is not conducive to research and development input. But compared to non-state-owned enterprises, has more resources to increase enterprise innovation investment. Miao Shujuan (2017) research shows that the ultimate state control power weakens the relationship between executive pay and R&D input. Based on the above analysis, this paper raises the hypothesis H2a:

Assumption H2a: Under other conditions, executive pay has a negative moderating effect on the relationship between government subsidy and research and development investment in state-owned enterprises.

Private-sector executives are expected to aim for the future and current economic benefits of their companies compared with state-owned companies. It is more important to realize the benefits and personal value that the enterprise's research and development activities expect to gain when a senior executive makes a decision to invest in research and development. Executive pay is linked to corporate value in private enterprises. So companies usually make a reasonable salary system to avoid the phenomenon of agency problems. Since executive pay is generally higher in non-state-owned enterprises and few executives use government subsidies to increase their incomes. So the government subsidies are largely invested in the innovation activities. Based on the above analysis, this paper raises the hypothesis H2b:

Assuming H2b: Under other conditions, executive pay has a positive moderating effect on the relationship between government subsidy and R&D input in private enterprises.

RESEARCH AND DESIGN

Sample Selection and Data Source

This article selects A-share listed companies that have continued to operate from 2014 to 2016 as research samples and on this basis carries on the screening: (1) Excluding companies with special circumstances such as ST, PT or major changes. (2) Excluding companies with less investment in R&D such as finance, real estate, retail sales, clothing and textiles, and services. The final selection of
eligible companies a total of 1084, of which 308 state-owned enterprises, private enterprises 776 and the panel data a total of 3,252. To eliminate the exception value, 1% of all variables are indented. The financial data are derived from the Oriental Wealth Choice database. The data processing software used was Stata11.0.

Variable Definition

(1) Explained variable: R&D input (R&D). According to the methods of most domestic and foreign scholars (Guo Yan, 2017; Lin, 2007), we use the research and development input/operating income to measure. (2) Explanatory variable: Government subsidies (SUB). In the article, the government subsidy mainly refers to the subsidy that the enterprise obtains from the innovation activity. But it excludes the tax preferential subsidy of the sale and so on. (3) Moderating variable: Executive compensation (PAY). Select the total amount of the top three executive compensation to take the logarithm as the incentive index. (4) Control variables: Choosing the company size, Growth, asset-liability ratio, profitability and asset turnover as control variables.

Model Building

\[
R&D = \alpha_0 + \alpha_1 \text{SUB} + \alpha_2 \text{SIZE} + \alpha_3 \text{GROW} + \alpha_4 \text{LEV} + \alpha_5 \text{ROA} + \alpha_6 \text{AT} + \varepsilon
\]  

(1)

\[
R&D = \beta_1 + \beta_2 \text{SUB} + \beta_3 \text{PAY} + \beta_4 \text{SUB} * \text{PAY} + \beta_5 \text{SIZE} + \beta_6 \text{LEV} + \beta_7 \text{ROA} + \beta_8 \text{AT} + \varepsilon
\]  

(2)

EMPIRICAL ANALYSIS

Descriptive Statistical Analysis

Descriptive statistics show that the mean value of R&D is 0.0511626. And there is a large difference between the minimum and maximum values. This shows that different industries, companies have great differences in R&D investment intensity. There is also a big gap between the mean and the standard deviation for the government grant (SUB) and the executive pay (PAY). It could suggest that there may be a significant difference between the government subsidy and the amount of executive compensation that the company receives because of the different ownership.
Regression Analysis

Using the Stata11.0 software to return the sample, the coefficient of the government subsidies (sub) is 0.00922, and the significant test at 1% level. It is shown from table I that the model (1) has a positive correlation with the R&D input. The more government R&D grants the company receives, the more sufficient the company’s innovative R&D funds. And the innovation ability is improved. Assumption H1 is validated.

The Regulation Variable executive compensation (PAY) was introduced in the Model (2). According to the result of the group regression of Table I model (2), it is found that the SUB*PAY coefficient for state-owned enterprises and executive compensation is -0.00398 which passing a significant test at the 5% level. It shows that the executive has the power to use the government subsidy to increase their hidden welfare. And it will inevitably lead to the reduction of investment in enterprise research and development. So the assuming H2a has been validated. The regression results of private enterprises show that SUB*PAY passes the significance test at the 5% level with a coefficient of 0.00295 in the model (2). Which indicates that the executive pay has a positive moderating effect on the relationship between government subsidy and R&D input in private enterprises. So the assuming H2B is verified. Executive pay is tied to the value of the firm in private enterprises and the company's executive pay is above average. As executives receive incentives for remuneration, they will make more reasonable use of government subsidy funds to increase corporate R&D efforts. And it can increase corporate value.

CONCLUSIONS

This paper selects the 2014-2016 data of A-share listed companies to empirically study the relationship between government subsidies and R&D investment and examine the regulatory effect of executive compensation on the relationship between the two. The results show that: (1) Government subsidy is positively correlated with the investment of enterprise innovation. The more the government subsidy the more independent research and development investment. (2) Executive compensation has a negative moderating effect on the relationship between government subsidy and R&D input in state-owned enterprises. (3) Executive compensation has a positive moderating effect on the relationship between government subsidy and R&D input in private enterprises.
<table>
<thead>
<tr>
<th>variable</th>
<th>Model (1)</th>
<th>Model (2)</th>
<th>Model (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full sample</td>
<td>State-owned enterprises</td>
<td>Private enterprises</td>
</tr>
<tr>
<td></td>
<td>R&amp;D</td>
<td>R&amp;D</td>
<td>R&amp;D</td>
</tr>
<tr>
<td>SUB</td>
<td>0.00922*** (0.000700)</td>
<td>0.00894*** (0.000979)</td>
<td>0.00729*** (0.000906)</td>
</tr>
<tr>
<td>PAY</td>
<td>0.0136*** (0.00200)</td>
<td>0.0161*** (0.00151)</td>
<td>0.00303*** (0.00123)</td>
</tr>
<tr>
<td>SUB*PAY</td>
<td>-0.00398** (0.00160)</td>
<td>0.00303*** (0.00123)</td>
<td>0.000434*** (0.00434)</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.0123*** (0.000945)</td>
<td>-0.0137*** (0.00125)</td>
<td>-0.0160*** (0.00134)</td>
</tr>
<tr>
<td>GROW</td>
<td>5.79e-05*** (1.99e-05)</td>
<td>0.000190*** (6.25e-05)</td>
<td>4.04e-05* (2.11e-05)</td>
</tr>
<tr>
<td>LEV</td>
<td>-0.000457*** (4.64e-05)</td>
<td>-0.000110 (6.77e-05)</td>
<td>-0.000434*** (5.89e-05)</td>
</tr>
<tr>
<td>ROA</td>
<td>-0.000186 (0.000145)</td>
<td>-0.000349 (0.000225)</td>
<td>-0.000518*** (0.000182)</td>
</tr>
<tr>
<td>AT</td>
<td>-0.0339*** (0.00211)</td>
<td>-0.0233*** (0.00262)</td>
<td>-0.0455*** (0.00292)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.209*** (0.0154)</td>
<td>0.0238 (0.0290)</td>
<td>0.0999*** (0.0267)</td>
</tr>
<tr>
<td>Observations</td>
<td>3,252</td>
<td>924</td>
<td>2,328</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.225</td>
<td>0.252</td>
<td>0.261</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

ACKNOWLEDGEMENTS

The Ministry of Education Humanities and Social Science Planning Project “Based on the Construction of a Case Base for Research into the Acceptance Mechanism of Manufacturing Transnational M&A (14YJA630074).
REFERENCES