RESEARCH ON THE IMPACT OF CEOS’ OVERSEAS EXPERIENCE ON R&D INVESTMENT AND CORPORATE PERFORMANCE OF LISTED COMPANIES

Li Zhang
Dhurakij Pundit University, Bangkok, Thailand

As the most important participant in the implementation of innovation strategy, the CEOs is one of the most important executives of the company. A large number of studies have shown that CEOs with overseas experience have an important impact on the company's decision-making, strategy and performance. However, does the CEOs' overseas experience affect the corporate performance? Does R & D investment play an intermediary role between a CEOs' overseas experience and corporate performance? What factors are regulated when CEOs' overseas experience act on R & D input? This paper is constructed on the basis of the existing relevant literature, based on the resource-based theory, using the gradual regression method to study the influence of the CEOs on R&D investment and the corporate performance, the mediation effect of R & D investment on the CEOs' overseas experience and the corporate performance, and the influence of the CEOs through R&D investment.

Keywords: CEOs’ overseas experience; R&D investment; organizational characteristics

Introduction

China's A-share listed companies are the main implementer of innovation strategy, and senior managers are responsible for the formulation and operation of the company's innovation strategy. To a certain extent, it can be said that senior managers decide the company's innovation strategy (Hao et al., 2018).

Talents with overseas experience are regarded as one of the high-quality human resources in China and the key human capital in the development of a company (Wu & Huang, 2019).

Compared with the internal organizational characteristics of the company, the personality characteristics of the CEO have a greater influence on the business activities of the company (Malmendier et al., 2011), but the uncertainty of innovation activities will lead to a low innovation output rate (Bergemann & Hege, 2005).

Li Zhang
Researcher, International College, Dhurakij Pundit University, Bangkok, Thailand
Research interests: business administration, corporative management, corporate performance
E-mail: 1339174663@qq.com
From this perspective, CEOs’ overseas experience (both working and studying abroad) have more flexible thinking patterns, more diversified information channels, more detailed use of resources, and a stronger sense of innovation than those without such experience.

The high ladder team theory points out that the number, gender, age, salary and other demographic characteristics of senior executives (or senior executives' teams) will affect their behavior patterns and strategic decisions, while senior executives' personal experiences (including work experience, learning experience and life experience) play an important role in their thinking patterns, psychological characteristics and knowledge system (Xu et al., 2005).

To put it simply, the strategic decision of an enterprise is decided by the executive team led by the CEO, and the important strategic decision of the executive team is not only affected by personal experience and other characteristics, but also the result of the executive team headed by the CEO to extract and optimize the external information and internal information of the company. According to the research results of existing scholars, the characteristics of CEOs can have an important impact on corporate performance and corporate value.

So, will the risk-taking and mind-set of overseas talent help the company grow? Does it help the company to carry out innovation activities and improve innovation ability? These are all urgent problems to be solved. Based on this, this paper will explore the relationship between CEOs’ overseas experience and corporate innovation in all Chinese A-share listed companies.

According to the results of existing literature studies, it is basically certain that CEOs can have a certain impact on the company's innovation activities (Zhang & Deng, 2020).

But it remains to be seen why a CEO's overseas experience affects firm performance, in what way, and whether it is influenced by other factors. Therefore, based on the theory of high ladder team and resource based theory, this paper focuses on the following issues:

1) What is the effect of overseas experience of CEO of listed companies on corporate performance?

2) Does R&D investment of listed companies play an intermediary effect between CEO's overseas experience and corporate performance?

3) Under the conditions of organizational characteristics, are ceos' overseas experience affected by R&D investment? Does it ultimately affect company performance?

Literature review

Literature review of CEO’s overseas experience and company performance

Scholars have few research results on top managers and corporate performance. The existing studies generally refer to overseas experience as study abroad experience, life experience and work experience.

Daily et al. (2000) believes that with the increase of the degree of internationalization of companies, hiring ceos with international experience can greatly improve corporate financial performance.

Liu & Kong (2018) analyzed the empirical data and pointed out that, compared with the overseas employment experience of senior managers; their overseas study experience plays a significant role in increasing the salary gap within the company.
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**Literature review of CEO's overseas experience and R&D investment**

In the existing literature, there are many studies on the relationship between senior managers and corporate R&D expenditure, but most of them focus on the role of the executive team and the board of directors on R&D expenditure, and few scholars study the relationship between the characteristics of CEO and R&D expenditure (Huang & Gong, 2019).

According to the resource-based theory, Yang et al. (2018) regard the overseas experience of the senior management team as a special strategic resource. The overseas experience of the senior management team (including working experience and learning experience) is conducive to the company's innovation (R&D investment intensity), and ultimately has a positive impact on the company's innovation performance.

Using the A-share data of Chinese listed companies from 2013 to 2017, Song et al. (2019) empirically found through the panel threshold model that the impact of CEO confidence on company innovation (R&D input) presents a nonlinear threshold effect; Based on the high-ladder team theory, Shi & Liu (2019) conducted an empirical analysis using the panel data of China's private listed companies from 2007 to 2014, and concluded that the CEO's age and educational background have little negative impact on R&D investment, but whether the CEO has overseas experience is of great significance.

**Literature review of R&D investment and corporate performance**

Scholars have produced a lot of research results on corporate innovation and corporate performance, and they have studied them from different levels. Most scholars believe that corporate innovation has a positive impact on corporate performance. However, due to different samples and research methods, a small number of scholars have reached different conclusions.

Garner et al. (2002) took 243 Internet and biopharmaceutical companies as research objects and concluded that the higher the R&D investment, the faster the innovation speed of the company and the more conducive to the improvement of the corporate performance.

With the deepening of research, Zhang & Yan (2020) compare the effects of corporate R&D expenditure and government R&D subsidy on corporate innovation performance and find that corporate R&D expenditure has a smaller and more direct effect on the improvement of corporate performance.

Zhao & Zhang (2021) concluded through empirical analysis that both the increase of R&D investment and the expansion of company scale will promote the innovation performance of the company. In other words, the larger the company scale, the greater the innovation performance brought by R&D investment, and the higher the R&D investment intensity of the company, the more significant the positive correlation between company size and innovation performance.

Throughout the above literature, although there are more or less research results on the factors affecting corporate performance, CEO's overseas experience and corporate performance, CEO's overseas experience and R&D investment, R&D investment and corporate performance, etc., the existing research results have inconsistent conclusions due to different research objects and research methods of scholars.

Further, although there are existing research results on R&D investment and firm performance, there are few studies on the relationship between CEO's overseas experience
and firm performance. Therefore, this paper analyzes the impact of CEO's overseas experience on firm performance as an intermediary variable, which is a useful supplement to the existing literature.

**Hypothesis development**

There are relatively many unilateral studies on CEO's overseas experience, R&D investment and company performance, but there are few studies on whether R&D investment has an intermediary role in CEO's overseas experience and company performance, and which factors affect the intermediary role. Therefore, this part analyzes the relationship based on the high-ladder team theory and resource-based theory, and proposes relevant hypotheses.

**CEO's overseas experience and company performance**

Looking at China's listed companies, the proportion of CEOs' overseas experience in listed companies is increasing. The impact of CEOs' overseas experience on corporate performance is mainly reflected in the following aspects: First, the cognitive structure and value concept brought by overseas experience background are conducive to the improvement of corporate performance.

According to the theory of the high ladder team, compared with CEOs without overseas experience, CEOs' overseas experience not only possess professional knowledge and skills but also broaden their horizons, which is conducive to the formation of a systematic and comprehensive, conscious and innovative way of thinking, but also helps to improve their ability to analyze problems, solve problems and communicate across cultures (Zhou et al., 2020).

Second, CEOs' overseas experience contributes to the improvement of company performance due to their relatively complete knowledge and skills and strong management ability. CEOs’ overseas experience receive good foreign education and access to advanced technology management experience, and they have the opportunity to introduce cutting-edge knowledge, advanced technology and management concepts into their companies after returning to China, thus improving company performance (Liu et al., 2021); CEOs’ overseas experience can introduce foreign advanced management concepts, knowledge and technologies into the company and apply them in the company's production and operation activities, which can narrow the technological gap between domestic and foreign companies (Huang & Ge, 2018).

Therefore, the inimitability of CEOs' overseas experience as human capital makes them an advantage in the continuous competition of the company, and this competitive advantage will gradually be transformed into the excellent performance of the company, which can bring sustainable business performance for the company. Based on the above analysis, this paper proposes the following hypothesis:

**H1**: CEO's overseas experience has a significant effect on corporate performance.

**The mediating role of R&D investment**

CEOs’ overseas experience have a significant impact on R&D investment and corporate performance, so CEOs' overseas experience will also improve corporate performance by increasing R&D investment. First, the innovative knowledge and skills advantages brought by CEO's overseas experience are conducive to the improvement of company performance.
In the context of the rapid development of the digital economy, the lack of innovation ability is an important determinant that hinders the transformation and upgrading of listed companies and the enhancement of comprehensive competitiveness.

Therefore, listed companies should actively improve their overall innovation ability (Tang & Yu, 2021). Through the analysis of existing research results, it is found that the internal factors affecting R&D investment include top management, corporate strategy, corporate governance structure, corporate scale, etc., but top management plays a key role in the development of corporate innovation activities and the enhancement of employees' innovation consciousness. Based on the above analysis, as the most core senior manager (Liang et al., 2021), CEO's overseas experience is more conducive to the formulation and implementation of the company's innovation strategy and the increase of innovation investment. Whether it is new product development, new service improvement or production cost reduction, it is comprehensively reflected in the improvement of the company's production efficiency and competitiveness. It is conducive to the improvement of company performance.

Second, CEO's overseas experience improves the company's innovation efficiency and promotes the corporate performance. Innovation activities can also help to optimize the combination of the company's resources and improve the use efficiency (Guo et al., 2017). Overseas CEOs actively carry out innovation activities to improve resource utilization and production technology level, and ultimately help the company to increase performance and realize enterprise value.

CEOs’ overseas experience can better guide the company's awareness of independent innovation (He et al., 2019), realize the improvement of enterprise value, further improve the company's ranking and discourse power in the industry, and finally significantly improve the corporate performance (Liu et al., 2020).

Therefore, CEO's overseas experience has a positive indirect impact on the improvement of company performance through increasing R&D investment, so hypothesis 2 is proposed in this paper.

H2: R&D investment has a significant mediating effect between CEO's overseas experience and company performance.

The regulating effect of the combination of two functions

First, the combination of the two roles gives the CEO more power and makes it easier to promote the company's innovation activities. Compared with the separation of the two roles, the two-in-one CEO has more power, at this time the leadership of the listed company is more concentrated, and the CEO has a greater say in the company's major strategic decisions. The professional ethics, career pursuit, work belief and professional ethics of a CEO with overseas experience will promote his/her dedicated operation and management of the company and optimize the allocation of existing resources of the company (Boyd, 1995), so as to maximize the development of the company's innovation activities, and the CEO with the dual role is more likely to use his/her power to promote the implementation of innovation.

Accelerate R&D investment; Second, CEOs with dual roles carry higher expectations and are more motivated to increase R&D investment. Compared with the CEO with the separation of the two roles, the listed company gives the CEO with the combination of the
two roles higher compensation, but also gives the expectation of improving the corporate performance. Innovation activities are highly uncertain, and innovation investment is the sunk cost of the company with a long time cycle and high risk. In this case, compared with the separation of the two roles, the CEO who combines the two roles has a higher risk tolerance (Li & Tang, 2010), which is conducive to the formulation and execution of the company's innovation decision, and thus the increase of the company's R&D investment. Based on the above analysis, compared with the separation of the two roles, the integration of the two roles is conducive to the increase of R&D investment of CEO overseas experience. Therefore, the hypothesis of this paper is as follows:

H3: The combination of the two roles has a positive moderating effect on the relationship between CEO's overseas experience and R&D investment.

Regulation of redundant resources
Redundant resources are a kind of actual or potential idle resources in enterprises, which can be used freely by enterprises (Bourgeois, 1981). The effect of redundant resources on the relationship between CEO's overseas experience and R&D investment is as follows:

First, redundant resources provide a resource base for CEO overseas experience to invest in R&D. The innovation activities carried out by the company are of great uncertainty and long-term nature. Usually, the implementation of the innovation strategy of the company is carried out under the condition that the normal production and operation management activities of the company are not affected. However, when the organizational resources are limited, the company can only ensure the normal production and operation activities and have no time to carry out the innovation strategy of the company. The uncertainty of the company's innovation activities requires the company to have sufficient resources to support, and the company's redundant resources are the basis and guarantee for CEOs' overseas experience to formulate and implement innovation strategies (Yuan et al., 2021).

Second, redundant resources provide the possibility for CEO overseas experience to carry out multi-project R&D activities. Redundant resources can, to some extent, alleviate the contradictions between various objectives within the organization, help form a strong cohesion, and help listed companies face the challenges brought by changes in internal and external environments (Zhang et al., 2017).

As the most important strategic buffer resources for companies, redundant resources are conducive to the development of innovation activities. Increase R&D investment (Tan & Peng, 2003).

Redundant resources provide conditions for CEOs' overseas experience to isolate different innovation behaviors, and at the same time provide necessary organizational resources for coordination among different innovation behaviors, thus promoting innovation (Chenlu et al., 2017).

To sum up, the more redundant resources a company has, the greater the resource advantage required for innovation activities, and CEOs' overseas experience are more confident to increase R&D investment. Therefore, hypothesis 4 is proposed in this paper:

H4: Redundant resources have a positive moderating effect on the relationship between CEO's overseas experience and R&D investment.
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Research design

The focus of this part is to take the A-share listed companies in Shanghai and Shenzhen of China as samples, select the data of relevant variables from the National Tai’an database, and establish the model.

Sample selection and data sources

This paper takes Shanghai and Shenzhen A-share listed companies as the research object, and uses STATA15.0 version software to analyze the unbalanced panel data of listed companies. The CEO related data, R&D investment, and financial data (all A-share listed companies from 2008 to 2020) used in this paper are from the Guotai’an Database (CSMAR), which is summarized into the initial data set based on the CEO’s overseas experience years and the stock code matching relevant data of listed companies.

In order to ensure the validity of the data, this paper adopts the following steps to correct the original data:

First, due to the particularity of banking, insurance and other financial industries, their financial data are not comparable with other industries, so the sample data of listed companies in the financial industry are excluded according to the Industry Classification Guidelines of listed companies issued by the China Securities Regulatory Commission (revised in 2022);

Second, the original data set is sorted out according to the CEO's overseas experience years and stock codes of listed companies;

Third, for the absence of a few years of data of individual companies, we can use other ways or channels to supplement as much as possible, and eliminate those that cannot be supplemented;

Fourth, in order to avoid the influence brought by extreme values in quantitative analysis, the key continuous variables were treated with 1% winsorize (Rui & Tian, 2020).

In this paper, SPSS and STATA software were used in the process of data processing and empirical test. After sorting out the above data, this paper finally determined the observation values of 14165 of 2,553 listed companies in Shanghai and Shenzhen.

Variables

Dependent variable

The explained variable in this paper is corporate performance. Referring to the study of Chari et al. (2008), TobinQ is used in this paper to represent corporate performance, and TobinQ refers to the ratio of stock market value to the replacement cost of corporate assets. Relevant data are filtered from the data of listed companies in the CSMAR database.

Independent variable

The measure of the CEO's overseas experience is expressed by setting a dummy variable, which is assigned a value of 1 if the CEO has overseas experience, and 0 otherwise. The basis for judging whether the CEO of a listed company has overseas experience is the column of CEO overseas experience in the corporate governance database of CSMAR.
Mediating variable
The intermediary variable is R&D investment, which is expressed by R&D investment intensity (R&D investment). Since the research on CEO's overseas experience and corporate performance in this paper is based on the perspective of innovation investment, based on the global standard determined by OECD and the practice of Chen & Miller (2007), it adopts the form of the percentage of R&D investment in the operating income of the current year. That is, research and development expenses at the end of the year/business income of the year to indicate the intensity of research and development investment of the company in the year.

Moderating variables
Isdual is one of the variables of the company's internal governance structure, that is, the combination of chairman and CEO is 1, otherwise it is 0. Relevant data come from CSMAR's corporate governance database (Chen et al., 2012).
In this paper, Redund refers to the measurement method of Bourgeois (1981) on redundant resources, expressed by the ratio of current assets to current liabilities, and the data are collected from the CSMAR corporate governance database.

Control variables
In addition to being affected by CEO's overseas experience, corporate performance is also related to other factors at the company level or CEO's personal characteristics. In order to better estimate the impact of CEO's overseas experience on corporate performance, the following control variables (controlsi, t) are selected in this paper with reference to the current relevant research literature on influencing factors of corporate performance: Ownership concentration, that is, the proportion of the largest shareholder (Top), the proportion of CEO (CEOtop), the growth of the company (salesr), financial leverage (lev), the company's operating Cash flow (Cash), the nature of property rights (Equity), etc. In addition, this paper also controls the fixed effect of Industry and Year (Industry, Year) in the regression, as shown in Tab. 1.

The empirical analysis
Based on the above research hypotheses and research design, this part focuses on empirical testing and analysis, mainly carrying out descriptive statistical analysis, correlation test, Hausmann test, etc., and conducting hypothesis testing for all research hypotheses and analyzing empirical results.

Descriptive statistical analysis
Based on the previous study hypothesis and study design, this part focuses on empirical test and analysis, mainly descriptive statistical analysis, correlation test, Houseman test, etc., and hypothesis test for all study hypotheses, and analyzes the empirical results.
According to the descriptive statistical analysis results of the main variables in Table 2, the mean value of the dummy variable of CEO overseas experience is 0.093, indicating that 9.3% of the companies in the sample have ceos who have studied or worked abroad. The results depend on:
(1) The sample of this paper started from 2008, because of the implementation of the strategy of strengthening talent in the new era and the return of a large number of people with overseas experience, which increased the proportion of overseas experience in the formation of listed companies;
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(2) This article uses the professional database of Guotai’an, and the data is more complete.

Table 1 - Summary of variables
(results of author’s survey)

<table>
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<tr>
<th>Variable type</th>
<th>Variable name</th>
<th>Variable symbol</th>
<th>definition and measurement method</th>
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<tbody>
<tr>
<td>Dependent variable</td>
<td>corporate performance</td>
<td>TobinQ</td>
<td>The ratio of stock market value to replacement cost of assets</td>
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<tr>
<td>Independent variable</td>
<td>CEO's overseas experience</td>
<td>Ovesea</td>
<td>The value of CEO with overseas working experience and study experience in that year is 1, otherwise the value is 0, dumb variable</td>
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<td>Mediating variable</td>
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<td>Rds</td>
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<td>Moderating variables</td>
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<td>Isdual</td>
<td>The combination of chairman and CEO is 1, otherwise it is 0</td>
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<td>Redund</td>
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<td>Control variables</td>
<td>Ownership concentration</td>
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<td>Number of shares held by the largest shareholder/total share capital</td>
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<td>CEO shareholding ratio</td>
<td>CEOtop</td>
<td>Number of shares held by CEO/total equity</td>
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<td></td>
<td>Company growth</td>
<td>Salesr</td>
<td>Revenue growth rate</td>
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<td>Company operating cash flow</td>
<td>Cash</td>
<td>Net cash flow from operating activities/total assets at end of period</td>
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<td></td>
<td>Financial leverage</td>
<td>Lev</td>
<td>Total liabilities/total assets</td>
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<td></td>
<td>Property right nature</td>
<td>Equity</td>
<td>1 for state-owned enterprises and 0 for non-state-owned enterprises</td>
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<td>CEO gender</td>
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<td>If the observed value belongs to the industry, take 1, otherwise take 0</td>
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<td>year</td>
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<td>Take 1 if the observed value belongs to the year, 0 if not</td>
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The mean value of corporate performance (TobinQ) of listed companies is 1.970, but the standard deviation of corporate performance (TobinQ) is 1.060, which indicates that the value of corporate performance (TobinQ) of different companies varies greatly. The average R&D investment is 4.26%, indicating that the innovation investment intensity of China's A-share listed companies is still at a low level, which is not high compared with that of developed countries.

Its standard deviation is 3.95, indicating that some of China's listed companies have carried out high intensity innovation, but there are also some companies with less R&D investment or innovation investment close to zero, and different listed companies attach great differences to innovation investment.

The adjustment variable of dual roles is "0" and "1" dummy variable, and its mean value is 0.322, which means that about 32.20% of ceos in the total sample are dual roles, that is to say, the proportion of ceos in listed companies with dual roles is about 1/3. The mean value of redundant resources is 2.66, and the standard deviation is 2.66. From the distribution characteristics such as the discrete trend of data, the redundant resources of listed companies have great differences.

**Correlation analysis**

Correlation analysis is mainly used to reflect the degree of closeness between variables. Stata 15.0 was used to conduct correlation analysis, and the results obtained were specifically shown in Table 3. The correlation coefficients among explained variables, explanatory variables and control variables were all small, less than 0.5, indicating that the possibility of severe multicollinearity among variables was small.

The variance inflation factor will be used to further test the multicollinearity. It can be seen from Table 3 that CEO's overseas experience and Tobin Q are significant at the 1% level, and the correlation coefficient of the two is 0.041, which is significantly not 0.
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<th>TobinQ</th>
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Note 1: *. At level 0.1 (two-tailed), the correlation is significant. **. At 0.05 level (two-tailed), the correlation was significant. ***. At 0.01 level (two-tailed), the correlation was significant.
Note 2: The data source is this study
Judging from the correlation coefficient, it indicates that there is a close positive correlation between the two variables of CEO's overseas experience and corporate performance (Tobin Q), which is consistent with the conclusion of hypothesis 1.

The two regulating variables involved in organizational characteristics are as follows: the correlation coefficient between Isdual and R&D investment is 0.154, which is significantly positive at 1% level, indicating that listed companies with dual CEO roles are more inclined to increase R&D investment.

The correlation coefficient between redundant resources and R&D investment is 0.305, which is significantly positive at 1% level, indicating that more redundant resources are beneficial to the increase of R&D investment of listed companies.

CEO's overseas experience is correlated with control variables, such as the shareholding ratio of the largest shareholder, CEO shareholding ratio, financial leverage, company growth, company operating cash flow, etc. Although the correlation between CEO gender and company performance is not significant, it is correlated with regulatory variables and other control variables, so all of them are controlled in this study.

**Hausmann test**

In order to make a better empirical analysis of unbalanced panel data, this paper first conducts Hausmann test to determine whether to adopt random effect model or fixed effect model. In this paper, with the help of STATA software, it can be seen that the chi-square statistic chi2 (13) = 288.53, and the corresponding ad joint probability Prob>chi2 =0.0000, which indicates that the null hypothesis that there is no systematic difference between the coefficients of random effects and fixed effects can be rejected, that is, If the random effects model is used to analyze the relationship between CEO's overseas experience and company performance, the estimated results will be inconsistent, so the fixed effects model is more appropriate for regression analysis.

Therefore, this paper uses the fixed effect model for empirical analysis.

**Hypothesis Testing**

Tab. 4 shows the regression results of CEO's overseas experience on the performance of listed companies. The independent variable is CEO's overseas experience, the dependent variable is the performance of listed companies expressed by Tobin's Q value, and the variables such as the shareholding ratio of the largest shareholder, the shareholding ratio of CEO, the asset-liability ratio, the growth of the company, the operating cash flow of the company, and the nature of corporate ownership are analyzed by multiple regression.

The results show that the β coefficient of CEO's overseas experience is 0.1088, which is significant at the 5% level, and the goodness of fit R2 is 0.1502, which can better explain the explained variables.

The coefficient of CEO's overseas experience is significantly positive, indicating that CEO's overseas experience is significantly positively correlated with the performance of listed companies. In other words, CEO's overseas experience can improve the performance of listed companies and increase the proportion of listed companies' market value to the replacement cost of capital, indicating that there is a significant positive relationship between CEO's overseas experience and company performance. In other words, when the CEO has overseas experience, it is more conducive to improving the corporate performance than no overseas experience, H1 is verified.
RESEARCH ON THE IMPACT OF CEOS’

Table 4 - Test results of main effect and mediating effect (results of author’s survey)

<table>
<thead>
<tr>
<th>variable</th>
<th>model1 TobinQ&lt;sub&gt;t+1&lt;/sub&gt;</th>
<th>model2 Rds</th>
<th>model3 TobinQ&lt;sub&gt;t+1&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>-0.0138*** (-6.56)</td>
<td>-0.0022 (-0.68)</td>
<td>-0.0131* (-2.90)</td>
</tr>
<tr>
<td>CEOtop</td>
<td>-0.0039** (-2.16)</td>
<td>-0.0027 (-0.94)</td>
<td>-0.0002 (-0.58)</td>
</tr>
<tr>
<td>Salesr</td>
<td>0.3919** (12.77)</td>
<td>-1.0093 (-18.53)</td>
<td>0.0128 (1.73)</td>
</tr>
<tr>
<td>Cash</td>
<td>-0.0031 (-1.53)</td>
<td>-0.0134*** (-4.26)</td>
<td>0.0005 (1.30)</td>
</tr>
<tr>
<td>Lev</td>
<td>-0.0021 (-0.02)</td>
<td>-1.6433*** (-9.90)</td>
<td>-1.1763*** (-7.60)</td>
</tr>
<tr>
<td>Equity</td>
<td>-0.1836 (-1.87)</td>
<td>-0.3682* (-2.30)</td>
<td>-0.1887 (-0.86)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0006 (-0.25)</td>
<td>0.0019 (0.48)</td>
<td>-0.0013 (-2.20)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.1533 (1.75)</td>
<td>-0.0494 (-0.39)</td>
<td>0.0052 (0.27)</td>
</tr>
<tr>
<td>year</td>
<td>Controls</td>
<td>Controls</td>
<td>Controls</td>
</tr>
<tr>
<td>Industry</td>
<td>Controls</td>
<td>Controls</td>
<td>Controls</td>
</tr>
<tr>
<td>Oversea</td>
<td>0.1088 (2.21)</td>
<td>0.0026 (2.03)</td>
<td>0.0322 (2.26)</td>
</tr>
<tr>
<td>Rds</td>
<td>0.0158** (4.53)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>-3.5020*** (-3.53)</td>
<td>-8.0603*** (-24.65)</td>
<td>-6.0607*** (-5.98)</td>
</tr>
<tr>
<td>R&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.1502</td>
<td>0.0983</td>
<td>0.1858</td>
</tr>
<tr>
<td>F</td>
<td>32.17***</td>
<td>26.94***</td>
<td>36.28***</td>
</tr>
</tbody>
</table>

Note 1: *, **, *** indicate significant at the level of 5%, 1%, and 0.1% respectively
Note 2: The data source is this study

In order to examine the mediating effect of R&D investment on CEO's overseas experience and firm performance, this paper adopts a three-step method. The test results are shown in Tab. 4. Compared with model 3 and model 1, although the regression coefficient of CEO overseas experience is significantly positive, it decreases from $\beta=0.1088$ in model 1 to $\beta=0.0322$ in model 5, but is significant at the 5% level. After adding the intermediary variable of R&D investment intensity, the significant reduction of the regression coefficient of this independent variable indicates that, the positive impact of CEO's overseas experience on firm performance was significantly reduced.

Based on the above analysis results and the judgment criteria of intermediary effect proposed by Baron and Kenny (1986), it can be concluded that the R&D investment in this paper has a partial intermediary effect on the relationship between CEO's overseas experience and company performance, but not a complete intermediary effect.

Therefore, H2 is assumed to be valid.
Adjustment effect test of tissue characteristics

(1) The moderating effect of the combination of two jobs on the relationship between CEO's overseas experience and R&D investment

Table 5 - The moderating effect of organizational characteristics on CEO overseas experience and R&D investment
(results of author’s survey)

<table>
<thead>
<tr>
<th>variable</th>
<th>model4</th>
<th>model5</th>
<th>model6</th>
<th>model7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rds</td>
<td>Rds</td>
<td>Rds</td>
<td>Rds</td>
</tr>
<tr>
<td>Top</td>
<td>-0.0317*** (10.39)</td>
<td>-0.0316*** (10.37)</td>
<td>-0.0306*** (-9.97)</td>
<td>-0.0306*** (-9.99)</td>
</tr>
<tr>
<td>CEOtop</td>
<td>-0.0188*** (5.84)</td>
<td>-0.0185 (5.75)</td>
<td>-0.0145** (4.93)</td>
<td>-0.0145** (4.92)</td>
</tr>
<tr>
<td>Salser</td>
<td>-1.0643*** (-19.06)</td>
<td>-1.0623*** (-19.03)</td>
<td>-1.0868*** (-19.34)</td>
<td>-1.0865*** (-19.33)</td>
</tr>
<tr>
<td>Cash</td>
<td>0.0088** (2.75)</td>
<td>0.0090** (2.79)</td>
<td>-0.0093** (-2.90)</td>
<td>-0.0094** (-2.90)</td>
</tr>
<tr>
<td>Lev</td>
<td>-0.7329*** (-4.41)</td>
<td>-0.7374*** (-4.44)</td>
<td>1.1051*** (5.65)</td>
<td>1.1062*** (5.66)</td>
</tr>
<tr>
<td>Equity</td>
<td>-0.4801** (-2.92)</td>
<td>-0.4748** (-2.89)</td>
<td>-0.4966** (-3.03)</td>
<td>-0.4986** (-3.04)</td>
</tr>
<tr>
<td>Age</td>
<td>0.0257*** (6.20)</td>
<td>0.0257*** (6.21)</td>
<td>0.0266*** (6.57)</td>
<td>0.0266*** (6.55)</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.0567 (-0.43)</td>
<td>-0.0481 (-0.37)</td>
<td>-0.0501 (-0.38)</td>
<td>-0.0493 (-0.38)</td>
</tr>
<tr>
<td>Year</td>
<td>Controls</td>
<td>Controls</td>
<td>Controls</td>
<td>Controls</td>
</tr>
<tr>
<td>Industry</td>
<td>Controls</td>
<td>Controls</td>
<td>Controls</td>
<td>Controls</td>
</tr>
<tr>
<td>Oversea</td>
<td>0.1397** (2.49)</td>
<td>0.1405 (2.50)</td>
<td>0.1374 (1.46)</td>
<td>0.1331 (1.41)</td>
</tr>
<tr>
<td>Isdual</td>
<td>0.1721 (2.42)</td>
<td>0.1660 (2.33)</td>
<td>0.1709 (2.33)</td>
<td>0.1698 (2.33)</td>
</tr>
<tr>
<td>Oversea*Isdual</td>
<td>0.3919 (2.18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redund</td>
<td></td>
<td>0.0392*** (3.56)</td>
<td>0.0145*** (3.59)</td>
<td></td>
</tr>
<tr>
<td>Oversea*Redund</td>
<td></td>
<td>0.0131 (0.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>4.8421*** (17.86)</td>
<td>4.8287*** (17.81)</td>
<td>5.0423*** (18.00)</td>
<td>5.0491*** (18.00)</td>
</tr>
<tr>
<td>R²</td>
<td>0.1463</td>
<td>0.1551</td>
<td>0.1258</td>
<td>0.1361</td>
</tr>
<tr>
<td>F</td>
<td>16.89***</td>
<td>19.47**</td>
<td>25.31***</td>
<td>27.56***</td>
</tr>
</tbody>
</table>

Note 1: *, **, *** indicate significant at the level of 5%, 1%, and 0.1% respectively
Note 2: The data source is this study

It can be seen from the results in Tab. 5 that model 4 adds the combination of two roles as a regulatory variable on the basis of model 3, while Model 5 can be used to test the adjustment effect after adding the interaction term of CEO's overseas experience and the combination of two roles on the basis of model 4.

The goodness of fit R² of model 5 is 0.1551 (p<0.01). The regression coefficient β=0.3919 of the interaction term between CEO's overseas experience and dual job integration...
is significant at 5% level. The results show that dual job integration plays a positive moderating role in the relationship between CEO's overseas experience and R&D investment, which verifies hypothesis H6.

(2) The moderating effect of redundant resources on the relationship between CEO's overseas experience and R&D investment

From the empirical analysis results in Tab. 5, it can be seen that the adjustment effect can be tested after model 6 adds the redundant resource of the regulatory variable on the basis of model 3, and model 7 adds the interaction term between CEO's overseas experience and the redundant resource on the basis of model 6. Among them, the goodness of fit R² of model 7 is 0.1361. The regression coefficient β=0.0131 of the interaction term between CEO's overseas experience and redundant resources is not significant, which indicates that redundant resources have no significant positive moderating effect on the relationship between CEO's overseas experience and R&D investment, and hypothesis H4 cannot be verified.

The adjustment effect of redundant resources on CEO's overseas experience and R&D investment is not significant, which may be due to the following reasons: This paper uses the measurement method of redundant resources in existing literature for reference, that is, the ratio of current assets to current liabilities represents redundant resources. Under the condition of a certain current liabilities, the more current assets indicate the more redundant resources of the company. Current assets mainly include monetary funds, short-term investments, inventories, accounts receivable, etc.

If a listed company has less monetary fund’s and more accounts receivable and notes receivable in the composition of redundant resources, then even if the listed company has more redundant resources on the book, it cannot immediately convert accounts receivable and notes receivable into funds for the use of the CEO with overseas experience.

Direct increase in R&D investment.

Robustness test

In order to ensure the reliability of the conclusions in this paper, this paper tested the robustness of the model by replacing the measurement indicators of variables (Yang et al., 2020).

The selection of corporate performance indicators was replaced from the TobinQ value with the representation of net interest rate on total assets (ROA) (Qi et al., 2021).

At the same time, the intermediary variable (R&D investment) is replaced by the ratio of R&D expenditure to operating income (Rds) to the ratio of R&D expenditure to total assets (Rdz). After replacing the variables, the hierarchical regression analysis was carried out according to the original empirical analysis steps.

According to the Robustness test results, it can be seen that the overseas experience of CEOs of listed companies is still significantly positively correlated with company performance, and the overseas experience of CEOs is still significantly positively correlated with R&D investment.

After adding the intermediary variable of R&D investment, the overseas experience of CEOs is transmitted to company performance through R&D investment.

That is, R&D investment still plays a part of the intermediary role.

Therefore, the results of the robustness test confirm the conclusions in the empirical analysis.
Robustness test of the moderating effect of tissue characteristics

In order to ensure the reliability of the conclusions in this paper, this paper tested the robustness of the model by replacing the measurement indicators of variables (Yang et al., 2020).

The selection of R & D investment indicators was replaced from Rds (ratio of R & D expenditure at the end of the year to the operating income of the year) to Rdz (percentage of R & D expenditure to total assets). After replacing variables, hierarchical regression analysis was carried out according to the original empirical analysis steps. According to the regression results, when changing the evaluation method of R&D input, only the coefficients of corresponding explanatory variables and interaction terms change, and the empirical results remain unchanged, indicating that the results of the model are stable.

Research conclusions and discussion

Research conclusions

In the era of rapid development of digital economy, listed companies face fierce market competition, the key to survival and development of companies is to use their unique resources to constantly innovate to adapt to the changing market demand. CEO's overseas experience is a kind of special high-quality resource. CEO's overseas experience can make use of the advantages brought by this resource to their personal way of thinking, knowledge and skills to actively promote the company's innovation activities, increase R&D investment, and promote the improvement of company performance.

Therefore, this paper not only theoretically analyzes the relationship between CEO's overseas experience, R&D investment and corporate performance, but more importantly, takes China's Shanghai and Shenzhen A-share listed companies as the research object, and analyzes the main effect, intermediary effect and regulatory effect respectively.

Using 14,165 unbalanced panel data from 2553 listed companies from 2008 to 2020, this paper separately analyzes the impact of CEO's overseas experience on R&D investment and company performance, and draws the following conclusions.

First, CEO's overseas experience (including study experience and work experience) has a positive impact on R&D investment, which indicates that the more knowledge and skills CEO has mastered in overseas work and study environment, the more inclined he is to promote the company to carry out innovation activities and increase R&D investment.

Second, R&D investment plays an intermediary role between CEO's overseas experience (including work experience and study experience) and company performance. In other words, for CEOs' overseas experience, their innovation consciousness and risk tolerance drive them to actively carry out innovation activities and increase R&D investment, which is ultimately conducive to the improvement of company performance.

Thirdly, the intensity of R&D investment by CEOs' overseas experience is also affected by organizational characteristics.

Through the moderating effect analysis and the moderating intermediary effect analysis, the empirical results show that organizational inertia and the combination of two roles in organizational characteristics positively regulate the relationship between CEO's overseas experience and R&D investment, but the moderating effect of redundant resources is not significant.

The empirical results verify the hypothesis.
Research prospects

Although this paper uses large sample data of Shanghai and Shenzhen A-share listed companies in China for empirical research, there are still some areas to be improved, which is also the direction of future research.

First, when studying the relationship between CEO's overseas experience and corporate performance, this paper did not distinguish the impact of CEO's overseas learning experience and work experience on R&D investment and corporate performance. In the future, the impact of CEO's overseas working experience and learning experience on R&D investment and corporate performance can be further studied.

Even more in-depth research on the role of different levels of CEO learning experience on innovation investment and company performance.

Second, when exploring the mediating effect of CEO's overseas experience on company performance through R&D investment, this paper only analyzes the mediating effect of R&D investment. In the future, the intermediary effect can be analyzed from the perspective of innovation output, or the intermediary effect can be analyzed from the perspective of innovation input and innovation output.

Third, when exploring the moderating effect of the relationship between CEO's overseas experience and R&D investment, this paper analyzes the moderating effect from three aspects of the company's internal environment (organizational inertia, integration of two jobs, redundant resources, etc.).

In the future, it can further study the specific reasons for the differences in the relationship between the above variables in different regions and different property rights companies (such as state-owned enterprises and non-state-owned enterprises).

References:


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