

# The Impact of Executives' Overseas Background on Corporate Green Innovation: Empirical Evidence from A-share Listed Companies

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**Abstract.** Green innovation serves as a crucial driver to expedite the establishment of a new development paradigm. The incentivization of green innovation within enterprises constitutes a pivotal topic within contemporary academic discourse. Based on the A-share listed companies in Shanghai and Shenzhen from 2008 to 2019, this paper empirically examines the impact of executives with overseas background on corporate innovation activities. It is found that the higher the proportion of overseas executives, the stronger the green innovation of enterprises, i.e., executives with overseas background can significantly promote green innovation of enterprises, and this conclusion still holds after a series of robustness tests. Heterogeneity analysis reveals that the incentive effect of executives' overseas experience on firms' green innovation is more pronounced in state-owned and finance-constrained firms. The conclusion of this paper reveals the micro-mechanism of green innovation promoted by executives with overseas background, expands the research related to executive characteristics and green innovation, and provides relevant policy suggestions for promoting China's "innovation-driven" strategy and the realization of the "dual-carbon" goal.

**Keywords:** overseas background ; executives; green innovation;

## 1 Introduction

It is clearly stated in the report of the 20th Party Congress that "we should accelerate the construction of a new development pattern, strive to promote high-quality development, promote green development, and promote the harmonious coexistence of human beings and nature". Enterprises serve as the primary actors in the execution of the innovation-driven development strategy. Green innovation holds substantial significance in enhancing the competitiveness of enterprises, facilitating the elevation of the value chain, and contributing to the high-quality development of the economy. In recent years, scholars have increasingly recognized the significance of green innovation and have taken a comprehensive approach to examine its influencing factors. From a theoretical perspective, talent emerges as a pivotal resource for the effective implementation of a nation's innovation-driven strategy. Beyond research and development (R&D) professionals directly engaged in innovation activities, corporate executives, serving as decision-makers in corporate management, wield an indispensable influence throughout the entire corporate innovation process. A significant number of overseas talents are opting to return to their home countries for career development, driven by the escalating uncertainty in the international environment. More and more

enterprises tend to recruit international talents into their management. Can these overseas talents drive the green innovation of enterprises? In this context, exploring the specific channels through which executives with overseas backgrounds can exert an impact becomes of great practical significance. Studying the influence of such executives on corporate innovation provides insights into the mechanisms at play.

This paper conducts an empirical examination of the impact of executives with overseas backgrounds on corporate innovation activities. The research sample comprises A-share listed companies in Shanghai and Shenzhen from 2008 to 2019. The possible contributions of this paper are (1) focusing on the driving factors of corporate green innovation on the overseas background of executives, which broadens the perspective of previous research on the influencing factors of corporate green innovation. (2) At the practical level, the findings of this paper help to provide empirical insights for enterprises to realize green innovation development from the micro-strategic decision-making level. In addition, this paper also analyzes the heterogeneity from the perspectives of the nature of enterprise property rights and financing constraints, which provides decision-making references for enterprises in different internal and external environments to select the best talents.

## **2 Theoretical analysis and research hypothesis**

Hambrick and Mason's senior echelon theory posits that heterogeneous characteristics, including managers' values and cognitive structures, impact corporate decisions. Given that innovation activities constitute a significant corporate decision, they are greatly influenced by managerial attributes. The amalgamation of diverse production factors places heightened demands on enterprise managers in terms of professional knowledge, vision, and experience. Executives with overseas backgrounds are better positioned to meet these requirements.

Initially, executives with international backgrounds bring advanced expertise and rich experience, contributing to the formulation of well-informed and scientifically grounded corporate decisions. According to the Schumpeter's Hypotheses, innovation is the introduction of newly discovered production factors into the production system, or the optimization of the combination of production factors, so as to establish a new production function to achieve higher value creation. Stein (1988) pointed out that due to the high risk and uncertainty of innovation activities, under the pressure of performance, the management often chooses to sacrifice long-term interests to pursue the rapid realization of short-term benefits, and then tends to adopt a cautious and conservative short-sighted approach, and ultimately inhibit enterprise innovation.[8] The advanced knowledge and skills brought by executives' overseas study and work experience, as well as their broadened horizons, are conducive to optimizing the management decision-making of the enterprise's innovation activities; Bebhuk et al.'s "absorptive capacity" theory, in addition to the enterprise's own knowledge and capabilities, managers' ability to identify and utilize external knowledge greatly affects the level of enterprise development, which is affected by managers' own cognition, and executives with overseas backgrounds are more likely to "internalize" advanced technologies from outside the enterprise, and promote the development of the enterprise by virtue of the effective identification and full utilization of external knowledge.[4] Executives with overseas backgrounds, owing to their international experience, possess more sophisticated perspectives

and attribute greater significance to the role of green innovation activities in the long-term development of the enterprise. They exhibit an enhanced capability to navigate the risks associated with green innovation initiatives, strategically allocate resources to support the implementation of green innovation activities, and drive investment in innovation resources to enhance the overall innovation capacity of the enterprise. Consequently, this facilitates and promotes green innovation activities.

Secondly, executives with overseas backgrounds have more self-confidence, dare to take risks and other personal character traits, which also promote corporate innovation to a certain extent. Executives with overseas work experience tend to be more open, have a higher risk appetite, are willing to take the initiative to bear greater risks[1], and are more willing to increase investment in R&D and innovation in enterprise management[2]. The characteristic of "double externality" of green innovation makes it have higher risk characteristics and resource demand compared with general technological innovation, and it may be more easily affected by the executives' own preference, cognition and values and other personality factors.

Based on the above two analyses, the following hypotheses are proposed in this paper:

H1 : Other things being equal, executives with overseas backgrounds help promote corporate green innovation.

### **3 Research design**

#### **3.1 Data sources and sample selection**

In order to avoid the impact of the new crown epidemic, this paper selects the data of Chinese A-share listed companies in Shanghai and Shenzhen from 2008 to 2019 as the initial sample, and follows the following criteria to screen the data as follows:(1) exclude the samples of listed companies in the financial and insurance industries; (2) exclude the samples of ST and \*ST type of firms; (3) delete the samples with missing observations of the variables; and (4) in order to eliminate the influence of extreme values, the all continuous variables at the 1% level to shrink the tail. After the above screening, a total of 20,331 samples are obtained in this paper. The data of green innovation in this paper comes from China Research Data Service Platform (CNRDS), and the rest of the data comes from Cathay Pacific Database (CSMAR) and Wind Database (Wind).

#### **3.2 Variable design**

##### **1. Explained variables**

The explanatory variable in this paper is green innovation (Green), with reference to the study of Zhang Yuming et al.[3], The level of green innovation for the enterprise is gauged by selecting the company's green patent applications in the current year. This value is defined as the sum of the independently and jointly filed green invention patents and green utility models in the current year. The variable is denoted as "Green" and is obtained by adding one to the number of green patent applications and then taking the natural logarithm.

## 2.Explanatory variables

In this paper, executives' overseas background (denoted as "Oversea") is quantified as the ratio of executives with international experience to the overall number of executives within the company. While the term "executives" in prior studies generally encompasses directors, supervisors, and senior managers, this paper refines the definition to specifically encompass directors (excluding independent directors) and senior managers as corporate executives. The study focuses on executives with more than one year of study or work experience in countries or regions outside mainland China.[6]

## 3. Control variables

In order to control for other indicators of economic characteristics affecting the green innovation capacity of enterprises, this paper adds the following basic characteristics of the company as control variables: level of debt (Debt), size of the enterprise (Size), years of experience of the enterprise (Age), growth rate of operating income (Growth), board size (Board), Cash Asset Ratio (Cash), Return on Total Assets (Roa), and Percentage of Independent Directors (Bind) .In addition, this paper sets year (Year) and industry (Ind) dummy variables to control for the effects of yearly trends and inter-industry gaps.The descriptive statistics of each major variable are shown in Table 1.[7][5]

**Table 1.** Definition of control variables

Variable symbol	Variable Definition
Debt	Total liabilities/total assets
Size	Ln (total assets + 1)
Age	Current year - year of registration +1
Growth	Operating income for the current year / Operating income for the previous year - 1
Board	Ln (number of board members + 1)
Cash	Net cash flow/total assets
Roa	Net profit/total assets
Bind	Number of independent directors / Number of all directors
Year	Annual fixed effects
Ind	industry fixed effect

## 4. Modeling

To assess the influence of executives' overseas experience on corporate green innovation, this paper formulates equation (1) for testing.

$$Green_{i,t} = \beta_0 + \beta_1 Oversea_{i,t} + \sum Controls_{i,t} + \sum Year + \sum Ind + \varepsilon_{i,t} \quad (1)$$

In equation (1), the explanatory variable of the model is the green innovation of enterprises  $Green_{i,t}$ , the core explanatory variable is the proportion of enterprises with executives from overseas background  $Oversea_{i,t}$ , the coefficient  $\beta_1$  reflects the impact of enterprises' overseas executives on green innovation,  $Controls_{i,t}$  denotes the control variables, Year and Ind denote the year fixed effect and the industry fixed effect, respectively, and denote the random

perturbation term, and  $\varepsilon_{i,t}$  denotes the effect of the listed companies and the time of day, respectively. listed companies, and time.

## 4 Analysis of empirical results

### 4.1 Baseline regression analysis

Table 1 exhibits the regression outcomes concerning executives' overseas background and corporate green innovation. The coefficient of the variable "executives' overseas background" consistently shows a significant positive effect, irrespective of the inclusion of control variables. This indicates that a higher proportion of executives with overseas backgrounds in the overall executive team correlates with increased involvement in the company's green innovation activities. The validation of hypothesis H1 is supported by these findings.

**Table 1.** Executives' Overseas Background and Corporate Green Innovation

	(1)	(2)	(3)
variant	<i>Green</i>	<i>Green</i>	<i>Green</i>
<i>Oversea</i>	1.288*** (12.793)	0.620*** (6.836)	0.182** (2.181)
Control variable	<i>No</i>	<i>Yes</i>	<i>Yes</i>
Fixed effects	<i>No</i>	<i>No</i>	<i>Yes</i>
<i>_cons</i>	0.676*** (66.750)	-7.100*** (-35.266)	-8.011*** (-42.551)
<i>adj.R</i> <sup>2</sup>	0.009	0.179	0.335

Note: t-values are in parentheses. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% levels, respectively. Same table below.

Column (1) shows the regression results with only the core explanatory variables, with control variables added in column (2) and industry-year fixed effects in column (3).

### 4.2 Endogenous issues

The decision of firms to hire executives with overseas backgrounds may introduce an endogeneity issue, where firms with greater innovative capabilities might be inclined to recruit executives with overseas experience. This creates challenges for causal identification. To address potential endogeneity, this paper utilizes the instrumental variable "Entryport" corresponding to the end of the Qing Dynasty. Subsequently, it re-evaluates the correlation between executives with overseas backgrounds and firms' green innovation using the two-stage least squares (2SLS) method. Specifically, the dummy variable Entryport takes the value of 1 if the firm's headquarters is located in the province where British leaseholds were established at the end of the Qing Dynasty; otherwise, it takes the value of 0.<sup>1</sup> This strategy is

<sup>1</sup> Upon review, the leaseholds established by the British at the end of the Qing Dynasty were located in Xiamen, Hankou, Jiujiang, Zhenjiang, Guangzhou, Weihaiwei, Tianjin, and Shanghai, respectively.

implemented to mitigate the potential impact of endogeneity on the research findings. The leasehold areas, characterized by openness and diversity, were early adopters of Western economy and culture. These regions engaged with Western business management and values at an earlier stage, resulting in a higher percentage of students studying abroad and a greater number of "returnees" joining local enterprises upon completing their studies. Simultaneously, the establishment of the border area at the end of the Qing Dynasty is historically entrenched, and the demarcation of borders does not directly influence the green innovation activities of enterprises. This fulfills the exogenous constraints of the instrumental variables.

The regression outcomes are presented in Table 2. In both regressions, both instrumental variables demonstrate significant positive effects at the 1% significance level. This implies that executives with overseas backgrounds can notably enhance the levels of green innovation within firms, even after addressing potential endogeneity issues in the model. These findings align seamlessly with the earlier conclusions.

**Table 2.** Endogeneity analysis

	(1)	(2)
variant	<i>Oversea</i>	<i>Green</i>
<i>Entryport</i>	0.014*** (12.203)	
<i>Oversea</i>		5.830*** (5.651)
Control variable	Yes	Yes
Fixed effects	Yes	Yes
_cons	-0.182*** (-11.745)	-7.046*** (-26.831)
Weak Instrumental Variable Test F-value	148.923	

## 5 Heterogeneity analysis

### 5.1 Property rights heterogeneity

Different nature of enterprise ownership may have different impacts on the overseas executives' innovation effect. In this paper, the sample is categorized into two groups: state-owned enterprises and non-state-owned enterprises. The outcomes of the regression analysis are presented in Table 3. It can be seen that compared with non-state-owned enterprises, the promotion effect of overseas executives in state-owned enterprises on the company's green innovation activities is more significant.

## 5.2 Heterogeneity of financing constraints

Financing constraints have always been an important problem plaguing corporate innovation. This paper applies the more representative SA index to measure the financing constraint.<sup>2</sup> Table 3 divides the sample into two groups according to the size of financing constraints. The result suggests that executive overseas experience plays a stronger role in firms with large financing constraints.

For firms with large financing constraints, returnee executives have rich resources such as overseas social networks, which can effectively alleviate the pressure of exogenous financing faced by the firms, and at the same time prevent the firms from choosing to suspend R&D due to the lack of funds, which is conducive to the innovative development of the firms. However, for enterprises facing less financing constraints, their financing needs have already been fully satisfied, and overseas executives have little effect on the optimization of the internal governance of the enterprise.

**Table 3.** Results of heterogeneity analysis

variant	(1) nationalized business	(2) non-state enterprise	(1) High financing constraints	(2) Small financing constraints
<i>Oversea</i>	0.242 (1.387)	0.184* (1.948)	0.399*** (3.441)	-0.041 (-0.343)
<i>Controls</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Fixed effects	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>_cons</i>	-8.167*** (-28.707)	-6.661*** (-24.111)	-7.875*** (-32.369)	-8.078*** (-26.460)
<i>N</i>	7396	12577	10219	10112
<i>adj.R<sup>2</sup></i>	0.432	0.262	0.395	0.274

## 6 Conclusions

Drawing on data from Chinese A-share listed companies in Shanghai and Shenzhen between 2008 and 2019, this paper empirically investigates the influence of executives with overseas backgrounds on corporate green innovation. The study's results reveal that: firstly, executives with overseas working or studying backgrounds significantly contribute to the advancement of corporate green innovation. Secondly, the heterogeneity test indicates that the impact of executives with overseas backgrounds on corporate innovation is more pronounced in non-state-owned firms compared to state-owned ones. Additionally, the effect of executives' overseas experience is more robust in firms with substantial financing constraints.

<sup>2</sup> The median of SA is taken, and values greater than the median are taken as 1, otherwise they are taken as 0.

## 7 Policy suggestion

Building upon the aforementioned findings, this paper outlines the following policy implications:

Firstly, for enterprises, it is important to attach great importance to the strategic value of green transformation and green innovation under the new development strategy, effectively promote the transformation of the traditional innovation system of enterprises to the green technological innovation system with a sustainable strategy orientation from the level of strategic decision-making of executives and pay attention to the strategic significance of green innovation in shaping the competitiveness of the country and enterprises.

Secondly, the positive role of returnee talents in promoting enterprise innovation is obvious, the relevant government departments at the policy level can continue to strengthen the strategy of talent introduction, create a good talent environment to attract more overseas talents and better stimulate their innovative vitality, to furnish ample elements of talent for enterprise innovation, and to stimulate the innovative vitality of the market theme.

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