

## Research Article

# Experienced CEO and Factor Productivity Improvement: Re-Examination of Experience Trap

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We examine the role of experienced CEO in the CEO succession and their contributions to the performance of focal firms. We utilize the propensity score matching with difference in differences (PSM-DID) model to evaluate to what extent experienced CEO succession affects the total factor productivity (TFP) growth. Based on the analysis of 1,675 listed manufacturing companies in China, results show that experienced CEO in succession significantly improves firms' TFP. Our analysis demonstrates that, on average, the event of hiring an experienced CEO succession yields a 3.1% increase in TFP improvement compared with nonsuccession firms. This positive effect can be continued for three years. Furthermore, the heterogeneous effect of experienced CEO succession on TFP is shown between different categories of focal firms (i.e., high-tech versus low-tech enterprises).

## 1. Introduction

In corporate governance and business management, one of the long-term challenges to the management team is the chief executive officer (CEO) succession [1]. Candidates who are experienced or rookies have possible benefits and downsides for the management team of private enterprises or the board of directors of publicly traded firms. Such choices are even more complicated and challenging for business firms in emerging countries [2].

In comparison to the liability of alienness (unfamiliarity with the focal firm), the management team or board of directors believes that the liability of newness (lack of experience or capabilities) may provide more obstacles to the business operations following the CEO succession. The past performance and records of the experienced CEO candidates can be tracked in the disclosed information, such as the annual reports of the listed company they worked for, or articles in the business media [3, 4]. Skills and capabilities have grown increasingly vital as the corporate environment has become more turbulent in recent years. It might be because businesses are becoming increasingly hesitant to

take the risk of hiring someone who has no prior experience in the field [3, 4]. When compared with the affordable possible learning costs to adapt to the focal business's setting, CEO candidates with experience may provide greater potential benefits to the focal firm [5].

Furthermore, from a contextual standpoint, the possible problem of cultural fit between external experienced CEO candidates and the focal firm may be overcome at a low cost [6] because CEOs may reshape and integrate with the organizational culture with effort in order to adapt to the changing environment [7]. For public firms, CEO candidates with prior experience can provide a better way for management team's decision-making [8, 9]. An experienced CEO can apply the advanced management experience learned in the previous company to the current enterprise, so as to avoid the blindness of innovation activities when investing in R&D [10]. As suggested in Reference [11], the aggregate total factor productivity (TFP) of China's manufacturing firms could increase by 30%-50% if the resource misallocation is reduced. Secondly, a new broom sweeps clean. An experienced CEO tends to increase their R&D investment and innovation output to improve their

profitability and competitiveness in the industry for their own career development. The abovementioned measures will enhance the innovation capacity of the enterprise, and the process of improving the innovation capacity of the enterprise is often accompanied by the improvement of technological level and productivity. As a result, experienced CEO candidates may help the focal firms' TFP.

However, the established studies on experienced CEOs and firm performance remain mixed. Some existing literature on experienced CEOs and firm performance mainly explores the positive role of relevant experiences of CEOs in firm performance [12–14]. Other studies have found that prior experience might have a detrimental influence on business performance [15], raising the question of whether an experienced CEO can bring positive effects to the focal firm in the CEO succession. Some research studies on CEO succession suggest that previous CEO experiences hurt the successor firm's performance [15, 16]. It might be partially because the past experience of CEOs may not be easily utilized in the new context of the successor firm [15], or partially due to the rigidity or inertia of experienced CEOs in learning and acquiring new knowledge of the successor firm [17–19].

Furthermore, studies on the influence of experienced CEOs on organizational success have traditionally relied heavily on financial measurements (ROA, ROE, and Tobin's Q). As performance metrics, ROE, and Tobin's Q have obvious deficiencies. To begin with, the majority of the aforementioned indicators are derived from financial statements and have a time lag, so they can only represent the enterprise's past production and operational conditions and cannot provide more future information. Second, while China has been steadily strengthening its oversight of accounting information in recent years, the practice of manipulating earning management has remained uncommon. Many businesses continue to whitewash their financial statements by adjusting expenses through real earning management. Although Tobin Q is forward-looking, market players' maturity and emotional shifts may cause it to be overstated or underestimated [20]. TFP may represent the firm's operational circumstances in a more complete way and objectively evaluate the company's performance as a comprehensive indicator to quantify the input-output efficiency of a company [21]. TFP can give additional explanations for the variation in the market value of different firms than standard performance metrics (ROA, ROE, and Tobin's Q). A company's output efficiency is the foundation of its income and profit, as well as its fundamental capacity to turn production materials into output. The level of total factor productivity reflects the level of the fundamental ability of factor transformation [22]. Companies with better corporate governance and operation management have higher efficiency in utilizing factors of production such as labor and capital [23]. To achieve high-quality development, China's industrial businesses must undergo transformation and upgrade. As one of the most essential human resources in a company, the CEO has a significant impact on how the firm makes choices and how it operates and manages. It also has an important impact on the company's total factor

productivity. Therefore, analyzing the CEO's corporate governance ability and comprehensive resource utilization efficiency is easier when total factor productivity is used as a proxy for financial indicators to gauge corporate success.

Besides, previous research on experienced CEO and company performance mostly focusses on developed-country contexts, leaving experienced CEOs and companies in developing markets relatively unstudied. We still do not know much about how experienced CEO candidates contribute to firm performance in a developing market. As a result, we use listed companies in China as our empirical sample to examine how experienced CEOs influence the performance of the CEO succession firm.

The contribution of this study is threefold. First, we examine the role of an experienced CEO in firm performance when facing CEO succession. As the existing studies on such a correlation are mixed, we analyze the outsider experienced CEO from both function and context perspectives. Moreover, different from previous studies, we treat the outsider experienced CEO in CEO succession as a natural experiment and adopt the PSM-DID method to control econometric problems such as the sample selection problem. Our finding shows that the outsider-experienced CEO in CEO succession can significantly improve 3.1% of firms' TFP, which can last for three years. Second, previous research focuses mainly on advanced economies such as America [19] and South Korea [4], whose capital markets and institutional backgrounds are well established. However, extant studies cannot give guidelines to emerging markets such as China, India, and Brazil. Hence, in this study, we shift our focus to examine to what extent outsider-experienced CEO impacts firm performance in the Chinese market. Given the growth of the Chinese capital market, CEO succession and outsider-experienced CEO succession are becoming increasingly common. However, empirical studies based on developing countries are largely ignored. Thus, our study sheds new insights into the studies of CEO succession and outsider-experienced CEOs. Third, the heterogeneous effects of outsider-experienced CEO on TFP among different technological sectors and institutional backgrounds are discussed to test the robustness of the results.

## 2. Literature Review

CEOs are widely considered as one of the most important human resources of a business firm [24, 25]. They play an important role in managing business firms and are responsible for the business activities of firms due to their rich knowledge resources and cognitive abilities. Established studies show that professional experience contributes significantly to building the capabilities of CEOs [28]. As a result, management teams pick CEOs with caution in order to effectively manage business activities and achieve better results than their competitors. In this case, CEO succession is one of the most challenging management issues in both academia and practice [1]. Due to the unique skills of CEOs, companies facing CEO succession prefer to hire existing CEOs from other companies who can demonstrate their

qualifications and capabilities, largely due to their professional experience and partially due to their track records in the job [29]. In addition to their competencies, other significant functions and values of CEOs in commercial enterprises are also addressed in the literature [6]. According to some research, CEOs may be capable of establishing corporate culture and procedures as a result of their strong personal styles and characteristics [6, 30, 31]. Other studies show that the characteristics of CEOs affect their strategic choices [32], which eventually influence the performance of business firms, such as exploration or exploitation, which may lead to the difference in the short-term and long-term performance difference. For business owners (not necessarily the professional managers such as CEOs), the performance of business firms such as the total factor productivity (TFP) is one of the most important concerns when picking up the CEO. It is widely accepted that total factor productivity (TFP) is one of the most important core driving forces for firms' development and economic growth. Since Solow [33] proposed this concept, total factor productivity has always been an important topic in academia and industry. In this study, it is calculated by the Levinsohn–Petrin method [34] at the firm level.

Strong leadership with logical decision-making is essential at the top management team, where the CEO plays the most crucial role in increasing the TFP of business enterprises. However, existing research also shows that managers' cognitive capacities are restricted [35] and that businesses may not have unlimited resources [36]. Thus, to compete in turbulent business environments and achieve above average performance, CEOs have to utilize the resources of the focal firm with the required capabilities [37, 38], build and change the organizational routines to fit the environment, or renew the business model [39]. It implies that experienced CEOs possess more external knowledge and information than those hired from the firm's internal ranks [29], and thus, are better equipped to expand the resource base of the firm and promote innovation, learning, and high performance [40, 41]. Both the internal requirements of focal firms and the demands of the external business environment indicate that experienced CEOs are better off than inexperienced ones.

Experienced CEOs are valuable for business firms, not only because their past records are more visible but also because of the capabilities accumulated during their past experiences in managing a business firm [29]. Even with the mistakes and lessons from their previous career, experienced CEOs may know how to avoid such mistakes in the new position if hired as the CEO of a new firm. Moreover, when focal firms go through the CEO succession, top management team and board of directors are more sensitive in selecting the outsider-experienced CEOs. This may bring both opportunities and challenges to the experienced CEO candidates. On the one hand, the new position of CEO may give the experienced candidates a chance to take more innovative actions due to their entrepreneurial spirits. On the other hand, the new position may also bring the experienced candidates the challenges of liability of alliance and strategic fit [6]. In the long term, the possible obstacles may be overcome since CEOs have the capability to change corporate culture [25].

Existing studies already show that experienced CEOs bring positive outcomes to the focal firm [13, 14]. However, some other studies also find that experienced CEOs may not meet the expectations of the business owners of the focal firm. For instance, some experienced CEOs can finally hinder performance in the successor firm. This might be partially because the experienced CEO after succession failed to manage the liability of alienness/strangers, or partially because the experienced CEO did not successfully address the inertia that resulted from the past career in the previous business firm. So far, the empirical studies of experienced CEOs and firm performance are mixed.

When it comes to selecting a successor CEO, however, the management team and board of directors continue to favor experienced CEO candidates. Existing research also suggests that in CEO succession, the experienced CEO is a desirable profile of the focal business (Hamori and Koyuncu, 2015). But due to the inertia problems, some experienced CEOs may be more difficult in acquiring new knowledge [17–19]. In this sense, whether an experienced CEO can overcome the inertia and fit the new position of the succession firm will influence the performance of the focal firm. Moreover, the majority of established studies on the mixed empirical results on the correlation between experienced CEO and firm performance are based on the contexts of developed countries. To date, we still know little about how an experienced CEO may contribute to the firm's performance when facing CEO succession.

In recent years, the research on the influencing factors of total factor productivity has been the focus of academic circles. Most of these literature studies focus on the external environment of enterprise operation and internal R&D and technology and discuss the influencing mechanism of enterprise resource allocation efficiency by focusing on trade system, infrastructure, human capital, and enterprise R&D. Coe and Helpman [42], Fernandes and Paunov [43], Huang et al. [44], and Ahsan [45] looked into the impact on TFP from the perspective of trade systems, such as technology spillover, tariff reduction, and market segmentation of import and export commodities, as well as FDI, whereas Hulten et al. [46], Montolio and Solé-Ollé [47], Song and Liu [48], and others focused on infrastructure, such as transportation, energy, communication, and financial services. If the samples of enterprises in the same country or region, system, location, infrastructure, and other external objective factors have a systemic or approximate homogeneous influence on the total factor productivity of the enterprise, then enterprises in total factor productivity of heterogeneous characteristics and enterprise's own human capital and technological innovation are closely related to internal factors such as management ability. However, there hasn't been enough focus on the link between the CEO and total factor productivity in the context of internal factors.

### 3. Model Specification and Data Description

*3.1. Model Specification with PSM-DID Procedure.* Endogeneity issues may occur from sample selection bias or missing variables if traditional econometric methods are

employed directly to estimate the impact of experienced CEO succession on organizational performance. Due to the sample selection bias, existing studies failed to separate manager effects from firm effects, which eventually led to a biased conclusion. In addition, since the majority of earlier research on experienced CEOs did not take into consideration the company's beginning condition, we will not be able to identify whether the ultimate result is due to the company's starting operational status or the CEO. To avoid these biases, in this paper, we can properly discern the TFP changes induced by personal characteristics of CEOs using the quasirational experiment of PSM-DID.

Heckman et al. [49] were the first to suggest merging the PSM and DID models, pointing out that the PSM model may pick the control group for the DID model, giving the PSM-DID model a theoretical foundation. Propensity score matching (PSM) and difference-in-differences (DID) make up the PSM-DID model. The models (difference-in-differences, or DID for short) are integrated. Screening control items for the treated people is the responsibility of the front-end PSM model. The back-end DID model is in charge of determining the impact of policy shocks on this basis. Following the DID procedure, samples are divided into two groups. The treated group was composed of firms where experienced CEO succession occurred, whereas the control group consisted of organizations where experienced CEO succession did not exist. We construct a binary dummy variable  $DCEO_i = \{0, 1\}$  when enterprise  $i$  is the experienced CEO succession enterprise,  $DCEO_i = 1$ ; otherwise,  $DCEO_i = 0$ . Specifically, in our sample period, if an enterprise CEO changed during the period  $t$ , and the succeeding CEO has experience in other listed companies during period  $t - j$ , then we define it as experienced CEO succession firm. Otherwise, it is defined as a nonexperienced succession enterprise. In addition, we construct binary dummy variables  $DT_t = \{0, 1\}$ , where  $DT_t = 0$  and  $DT_t = 1$  represent before and after experienced CEO succession, respectively. Further, the change in TFP of enterprise  $i$  in the two periods of  $DT_t = 0$  and  $DT_t = 1$  can be expressed as  $\Delta TPF_{it}$ . Nonparametric techniques (TFP index and data envelopment analysis (DEA)) and parametric approaches (estimation of the production function and stochastic frontier analysis (SFA)) are the two main paths in the literature for measuring TFP. OLS estimation, the Olley and Pakes method [50], and the Levinsohn and Petrin approach [34] are all common methods for estimating the production function. To estimate the production function, the classic ordinary least square (OLS) method was widely used (Timmer, 1991). However, using this method might lead to a variety of estimating issues, such as the simultaneity problem and sample selectivity bias (Van, 2012). Unobserved firm productivity shocks can be approximated by a nonparametric function of an observable firm characteristic—specifically, an intermediate input—and, as a result, unbiased estimates of production function coefficients can be obtained, according to Levinsohn and Petrin's estimation methodology [34]. The change of TFP of the enterprise undergoing CEO succession in the two periods can be expressed as  $\Delta TPF_{it}^1$ , whereas the change of TFP of the nonexperienced

CEO succession enterprise in the two periods can be expressed as  $\Delta TPF_{it}^0$ . Accordingly, the actual impact of an experienced CEO on TFP is as follows:

$$\lambda = E(\lambda_i | DCEO = 1) = E(\Delta TPF_{it}^1 | DCEO_i = 1) - E(\Delta TPF_{it}^0 | DCEO_i = 1). \quad (1)$$

In equation (1),  $E(\Delta TPF_{it}^0 | DCEO_i = 1)$  is “counterfactual,” that is, observing the change in TFP of an experienced succession firm in the absence of hiring an experienced CEO is impossible. If the average TFP change of companies with nonexperienced succession during the observation period  $E(\Delta TPF_{it}^0 | DCEO_i = 0)$  is directly selected as an approximate substitute, then bias will be generated due to the characteristic differences between companies. To solve this problem, we use nearest neighbor matching to find the optimal control group (nonexperienced CEO succession firm) for the treated group (experienced CEO succession firm). The selection of matching variables is an important step in nearest neighbor matching. According to existing theories and empirical research literature, the following variables affecting the TFP of enterprises are selected as matching variables: The asset-liability ratio (LA) is measured by the ratio of total liabilities to total assets. When an enterprise is faced with a high debt ratio, it often leads to the CEO's replacement. Capital intensity (CIR) is measured as the ratio of fixed assets to the number of employees (in logarithmic form). Enterprise size (size) is measured by the logarithm of enterprise sales. Enterprise age (age), the survival time in the market, affects an enterprise's production experience, research and development ability, and also the enterprise's decisions regarding personnel. Corporate profit margin (profit) is measured by the ratio of operating profit divided by business sales. The ownership structure (SOE) is measured by whether the ownership structure is a state-owned enterprise. In addition, TFP variables were added to ensure that no systematic difference exists in productivity between the treatment and control groups. Next, the logit method is used to estimate the following model:

$$p(DCEO_{it} = 1) = \phi(LA_{it-1}, CIR_{it-1}, Size_{it-1}, Age_{it-1}, Profit_{it-1}, SOE_{it-1}, TFP_{it-1}). \quad (2)$$

The probability prediction value  $\hat{p}$  can be obtained after the estimation of equation (2). We use  $\hat{p}_i$  and  $\hat{p}_j$  to represent the propensity scores of the treatment group and the control group, respectively. The latest matching model is as follows:

$$\Theta(i) = \min_j \|\hat{p}_i - \hat{p}_j\|, j \in (DCEO = 0). \quad (3)$$

$\Theta(i)$  represents the matching set from the control enterprise corresponding to the treatment group, and for each treatment group  $i$ , only a unique control group  $j$  falls into the set.

After the above nearest neighbor matching, we can obtain the set of pregroup enterprises like matched control group enterprises  $\Theta(i)$ , and their TFP variation

$E(\Delta TPF_{it}^0 | DCEO_i = 0, i \in \Theta(i))$  can be better substituted as  $E(\Delta TPF_{it}^0 | DCEO_i = 1)$ . Therefore, equation (1) is transformed into the following equation:

$$\lambda = E(\lambda_i | DCEO = 1) = E(\Delta TPF_{it}^1 | DCEO_i = 1) - E(\Delta TPF_{it}^0 | DCEO_i = 0, i \in \Theta(i)). \quad (4)$$

Equation (4) is equivalent to the following empirical model:

$$TFP_{it} = \alpha_0 + \alpha_1 \bullet DCEO + \alpha_2 \bullet DT + \delta \bullet DCEO_t \times DT_t + \varepsilon_{it}. \quad (5)$$

In equation (5),  $i, t$  represent the enterprise and year, respectively, whereas the binary dummy variable  $DCEO = 1$  represents the experienced CEO succession enterprises (treated group).  $DCEO = 0$  is propensity matching to obtain nonexperienced CEO succession enterprises (control group) and  $\varepsilon_{it}$  is the random error. The estimated coefficient of  $DCEO_t \times DT_t$  describes the impact of experienced CEO succession on firm TFP. Specifically, in equation (5), for the enterprises in the treatment group, their TFP at  $DT = 0$  is  $E(\Delta TPF_{it}^1 | DCEO_i = 1, DT = 0) = \alpha_0 + \alpha_1$ , and their TFP at  $DT = 1$  is  $E(\Delta TPF_{it}^1 | DCEO_i = 1, DT = 1) = \alpha_0 + \alpha_1 + \alpha_2 + \delta$ , that is, the TFP change of the enterprises in the treatment group in the two periods is as follows:

$$E(\Delta TPF_{it}^1 | DCEO_i = 1, DT = 1) - E(\Delta TPF_{it}^1 | DCEO_i = 1, DT = 0) = \alpha_2 + \delta. \quad (6)$$

In addition, for the control group enterprise, the TFP of when  $DT = 0$  is  $E(\Delta TPF_{it}^0 | DCEO_i = 0, DT = 0), i \in \Theta(i) = \alpha_0$ , and the TFP is  $E(\Delta TPF_{it}^1 | DCEO_i = 0, DT = 1, i \in \Theta(i)) =$

$\alpha_0 + \alpha_1$  when  $DT = 1$ , that is, the TFP change of the control group enterprise in two periods is as follows:

$$E(\Delta TPF_{it}^0 | DCEO_i = 0, DT = 0, i \in \Theta(i)) = E(\Delta TPF_{it}^0 | DCEO_i = 0, DT = 0, i \in \Theta(i)) - E(\Delta TPF_{it}^0 | DCEO_i = 0, DT = 0, i \in \Theta(i)) = \alpha_2. \quad (7)$$

Equation (6) minus equation (7) gives the following equation:

$$E(\Delta TPF_{it}^0 | DCEO_i = 1, DT = 0) - E(\Delta TPF_{it}^0 | DCEO_i = 0, i \in \Theta(i)) = \delta. \quad (8)$$

Combining equation (4), we can obtain  $\delta = E(\lambda_i | DCEO = 1) = \lambda$ . If  $\delta > 0$ , which means the TFP growth of enterprises in the treatment group is greater than that of enterprises in the control group after the experienced CEO succession, then the experienced CEO improves the TFP of enterprises. For robustness, we add the set of control variables  $X_{it}$  on the basis of equation (5), such as LA, CIR, size, age, profit, SOE, and enterprise nature (HiTech). In addition, we controlled for industry characteristics  $\nu_s$  and regional characteristics  $\nu_r$ . To make the model easy to understand, we set  $DCEO_t \times DT_t = DID$ . The coefficient of  $DID$ ,  $\delta$ , represents the impact of hiring an experienced CEO on the enterprise. Finally, the DID model used for estimation is as follows:

$$TFP_{it} = \alpha_0 + \alpha_1 DCEO + \alpha_2 DT + \delta DID_t + \beta X_{it} + \nu_s + \nu_r + \varepsilon_{it}. \quad (9)$$

**3.2. Data Description.** The WIND and CSMAR databases provided the sample data for this investigation. Panel data from 2010 to 2019 were chosen as samples in this article,

taking into account the impact of the global financial crisis from 2007 to 2009 and the COVID-19 epidemic in 2020. The “Database on Governance Structure of Chinese Listed Companies” in the CSMAR databases contains basic information about management personnel of Chinese listed companies, such as annual salaries, shareholdings, changes in shareholding structure, changes in chairman and general manager, and shareholder meetings. To make the subsequent analysis conclusion accurate and credible, “ST” (the Shanghai and Shenzhen Stock Exchanges shall give special treatment to the stocks of listed companies with abnormal financial conditions or other conditions) samples of the current year were deleted. The industry categorization standard of CSRC (2012) was used to filter listed manufacturing companies, and a total of 1,675 listed manufacturing companies were finally studied in this research. The descriptive statistics of the main variables are presented in Table 1. Succession has been experienced by a total of 118 companies, accounting for 8.45 percent of all observations. State-owned firms account for 35.52 percent of the sample, whereas high-tech enterprises account for 40.1 percent of the sample.

TABLE 1: Descriptive statistics of variables.

	Mean	SD	Min	Max	Skewness	Kurtosis
TFP	15.970	0.962	11.260	20.56	0.467	3.678
DCEO	0.0845	0.278	0	1	2.987	9.922
LA	0.413	0.199	0.007	1.758	0.314	2.745
CIR	12.580	0.903	4.835	17.69	-0.0327	4.209
Size	21.600	1.355	16.34	27.51	0.520	3.655
Age	17.560	5.563	2	64	1.190	8.843
Profit	0.065	0.501	-35.480	8.062	-57.300	4.021
SOE	0.355	0.479	0	1	0.605	1.366
Hitech	0.401	0.490	0	1	0.406	1.165

## 4. Result Analysis

*4.1. Baseline Regression.* In this paper, we use the DID method to examine the effect of experienced CEO succession on TFP. Comparing the difference in TFP level among the same or similar firms with and without experienced CEO succession is better. However, this cannot be observed simultaneously in reality. To overcome systematic differences in the listed manufacturing firms we selected and to reduce the bias of the DID estimation, PSM is used to improve the efficiency of the traditional DID method [51]. To fulfil this goal, we constructed a “counterfactual” control sample (the nonexperienced CEO succession group) for the treatment group (the experienced CEO succession group). To match experienced succession companies with nonexperienced succession firms, we employed the PSM approach. To begin with, we estimated the propensity scores of the listed manufacturing enterprises in China using both logit and probit regressions. Then, using kernel matching, we chose nonexperienced succession companies with individual characteristics that were similar to the succession experienced companies. The variables (i.e., LA, CIR, size, age, profit, and SOE) affecting TFP are selected as matching variables. In addition, TFP variables were added to ensure that no systematic difference exists in productivity between the treatment and control groups. Next, the logit method is used to estimate the following model: We compared the treatment groups year by year to acquire reliable matching findings and then summarized the matching data for each year. As an example, Table 2 presents comparisons of primary indicators before and after matching between the treatment and control groups in 2010. It shows that for the previous matching sample, significant differences exist between CEO succession enterprises and non-CEO succession enterprises in terms of asset-liability ratio, capital intensity, enterprise size, profit margin, and other variables. Figure 1 illustrates the difference in terms of the trend and score value of nuclear density before and after PSM matching. However, such a difference sharply diminishes after PSM matching. This result reflects a good matching effect.

Table 3 reports the estimated results of the impact of experienced CEO succession on the firms’ TFP by using PSM-DID regression. To make the results comparable and robust, we use two PSM matching methods, namely, nearest neighbor matching and radius matching. We just use the control variables in columns (1) and (4). We examined the

TABLE 2: Balance test of variables before and after PSM.

Variable	Unmatched Matched	Treated	Control	% Bias	bias	t-test (t)
LA	U	0.48251	0.41356	34.4	94.7	3.18
	M	0.48251	0.47885	1.8		0.13
CIR	U	12.47	12.387	8.6	27.2	0.86
	M	12.47	12.41	6.3		0.45
Size	U	22.089	21.427	47.6	96.9	4.79
	M	22.089	22.069	1.5		0.10
Age	U	14.97	14.114	16.7	76.6	1.68
	M	14.97	15.17	-3.9		-0.28
Profit	U	0.05402	0.08915	-8.9	32.2	-0.74
	M	0.05402	0.08525	-6.1		-0.56
SOE	U	0.77	0.39344	82.4	94.7	7.14
	M	0.77	0.75	4.4		0.33
TFP	U	16.284	15.883	40.2	93.0	4.05
	M	16.284	16.256	2.8		0.19

DID variable with the time-fixed effect and industry-fixed effect controlled in columns (2) and (5). In columns (3) and (6), we further control for the regional-based variable. All the regression results among different models show a consistent coefficient, which implies the robustness of our results. The estimated coefficient of DID is positive and significant at the 0.01 statistical level, indicating that experienced CEO succession significantly improves firm’s TFP compared with nonexperienced succession companies. According to Table 3, experienced CEO succession, on average, increases the TFP by 3.1% compared with firms where experienced CEO succession does not occur. All the coefficients for control variables are consistent with the usual expectation.

*4.2. Parallel Trend Test.* In the DID method, the parallel trend assumption indicates that the treatment and control groups should have a consistent evolutionary trend prior to the succession of an experienced CEO. Prior to experienced succession implementation, an event study approach was employed to further assess the endogenous issue produced by discrepancies between the treatment and control groups. The event study regression model specification is presented in equation (10):

$$TFP_{it} = \alpha_0 + \sum_{k=-2}^5 \delta_k \cdot DCEO_t \times DT_t^k + \varepsilon_{it}, \quad (10)$$

where  $k$  represents the time difference from the year of experienced CEO succession. If  $k$  is negative, then it indicates the number of years before experienced succession; if  $k$  is positive, then it indicates the number of years after experienced succession. The year 0 is the baseline time period, and the dynamic effects in a  $[-2, 5]$  time period were examined.

Only the treated group was used as the sample, and equation (6) was applied for regression and reporting the coefficients of experienced CEO succession to be measured relative to a baseline time period. Figure 2 shows the result of

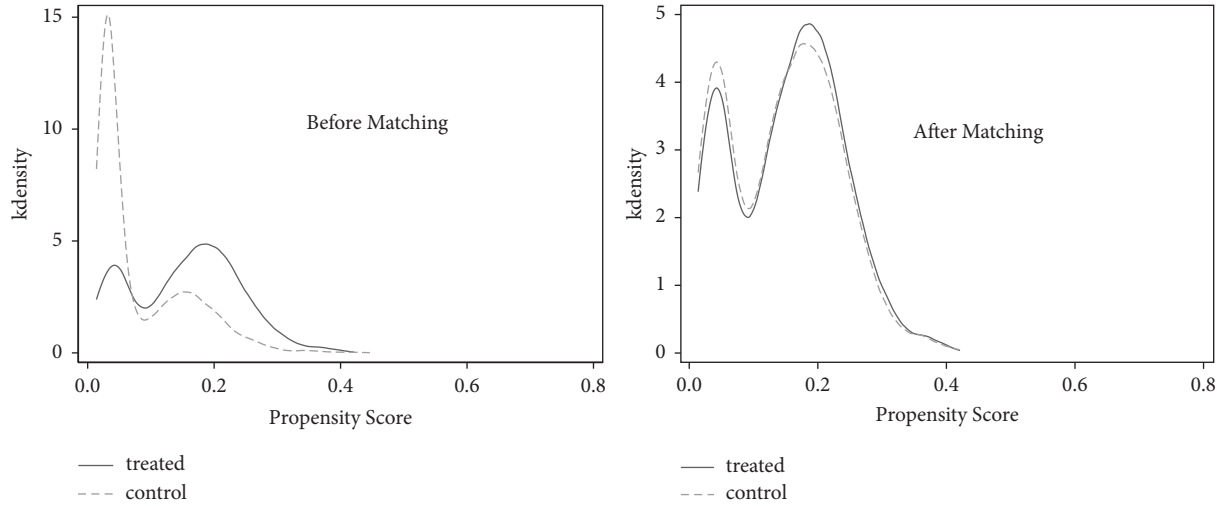


FIGURE 1: Kernel density plot with a comparison of the two groups (treated vs. control) before (left) and after (right) propensity score matching.

TABLE 3: Regression results: the impact of experienced CEO succession on TFP.

	Nearest neighbor matching			Radius matching		
	(1)	(2)	(3)	(4)	(5)	(6)
DID		0.031*** (0.008)	0.031*** (0.008)		0.033*** (0.008)	0.033*** (0.008)
LA	-0.137*** (0.011)	-0.147*** (0.011)	-0.150*** (0.011)	-0.133*** (0.011)	-0.143*** (0.011)	-0.156*** (0.011)
CIR	-0.079*** (0.003)	-0.073*** (0.003)	-0.075*** (0.003)	-0.079*** (0.002)	-0.076*** (0.003)	-0.076*** (0.003)
Size	0.754*** (0.002)	0.771*** (0.003)	0.773*** (0.003)	0.750*** (0.002)	0.767*** (0.003)	0.771*** (0.003)
Age	-0.002*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)	-0.002*** (0.000)	-0.004*** (0.001)	-0.005*** (0.001)
Profit	0.106*** (0.008)	0.087*** (0.008)	0.086*** (0.008)	0.102*** (0.007)	0.088*** (0.007)	0.086*** (0.007)
SOE	-0.037*** (0.008)	-0.018 (0.010)	-0.024** (0.010)	-0.045*** (0.008)	-0.018 * (0.010)	-0.029*** (0.010)
Constant	0.776*** (0.051)	0.367*** (0.061)	0.443*** (0.067)	0.874*** (0.051)	0.506*** (0.060)	0.528*** (0.066)
Time	No	Yes	Yes	No	Yes	Yes
Industry	No	Yes	Yes	No	Yes	Yes
Regional	No	No	Yes	No	No	Yes
Observations	11,711	11,711	11,711	12,371	12,371	12,371
$\chi^2$	142493***	8189***	4294***	144494***	8225***	3945***
R-squared	0.921	0.924	0.925	0.917	0.920	0.922

Note: standard errors in parentheses;  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$ .

the parallel trend test. In the 1 to 3 years following experienced CEO succession, the coefficients of experienced CEO succession on boosting TFP increased significantly. All pretreatment coefficients were close to zero and statistically insignificant in all years before year 0. This result suggests that the TFP of these firms remained constant before the succession of an experienced CEO, and no significant difference existed in the change trend between the treated group and the control group. As a result, dynamic trend indicates that the DID method in this paper satisfies the parallel trend condition. Furthermore, the coefficients of the

postsuccession period were positive and mostly statistically significant, indicating that the TFP increased after the hiring of an experienced CEO.

**4.3. Placebo Test.** Following Topalova [52], we performed a placebo test by using a fictitious succession time. We also carried out a regression analysis if the experienced CEO succession happens one year earlier and two years earlier. The estimations are likely to be skewed when the coefficients are similar to those obtained with the actual pre- and

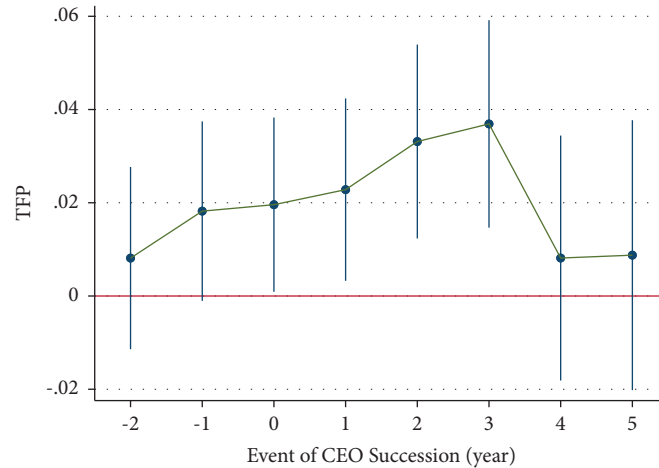


FIGURE 2: Event study analysis of experienced CEO succession.

TABLE 4: Coefficient of the placebo test.

	Nearest neighbor matching TFP	Radius matching TFP
d_2	0.008 (0.012)	0.009 (0.012)
d_1	0.018 (0.012)	0.020 (0.012)
d0	0.020* (0.011)	0.020* (0.012)
d1	0.023* (0.012)	0.024** (0.012)
d2	0.033*** (0.013)	0.035*** (0.013)
d3	0.037*** (0.014)	0.038*** (0.014)
d4	0.008 (0.016)	0.010 (0.017)
d5	0.009 (0.018)	0.010 (0.018)
Observations	11,711	12,371
$\chi^2$	5578***	5603***
R-squared	0.924	0.920

Note: standard errors in parentheses;  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$ .

postsuccession data. The rationale for this is that even if we use the year in which the experienced succession did not occur, the results will still be consistent with the basic regression. The estimated coefficients after the change of succession year are not significant, as shown in Table 4, which is inconsistent with the results of the basic regression, indicating that the findings in Table 3 are reliable.

**4.4. Heterogeneity Analysis.** Table 5 reports the heterogeneity tests for different firm types. According to the announcement of high-tech enterprise recognition reported by itself, we sort out enterprises that have obtained the high and new technology enterprise qualification list and recode the recognition time. On this basis, companies that had experienced CEO succession are divided into two types: high-

tech enterprises and nonhigh-tech enterprises. In Table 5, the heterogeneous impact of experienced CEO succession on different type firms was examined. Column (1) reports the effects of high-tech enterprises, and the coefficient of the experienced CEO succession is 0.045. The sample in column (2) consists of nonhigh-tech enterprises, and the coefficient of the experienced CEO succession is 0.032. The regression results show that experienced CEO succession significantly promotes TFP in high-tech and nonhigh-tech enterprises. However, compared with nonhigh-tech enterprises, the promotion effect of experienced CEO succession in high-tech enterprises is greater. This may be because high-tech enterprises pay more attention to innovative activities, and the arrival of a new CEO will be more conducive to enterprises to carry out innovative activities. In a high-tech industry with high dynamism and instability, under the



TABLE 5: Heterogeneity results for high-tech and nonhigh-tech enterprises.

Variable	Nearest neighbor matching		Radius matching	
	High-tech (1)	Nonhigh-tech (2)	High-tech (3)	Nonhigh-tech (4)
dceodt	0.045*** (0.013)	0.032*** (0.010)	0.046*** (0.013)	0.031*** (0.010)
LOAR	-0.130*** (0.018)	-0.176*** (0.015)	-0.133*** (0.018)	-0.176*** (0.015)
CI	-0.068*** (0.004)	-0.077*** (0.004)	-0.061*** (0.004)	-0.084*** (0.003)
Size	0.796*** (0.005)	0.766*** (0.004)	0.788*** (0.005)	0.768*** (0.004)
Age	-0.007*** (0.002)	-0.002*** (0.001)	-0.007*** (0.002)	-0.002*** (0.001)
Profit	0.074*** (0.011)	0.084*** (0.010)	0.073*** (0.010)	0.086*** (0.009)
SOE	-0.002 (0.019)	-0.042*** (0.012)	-0.015 (0.020)	-0.042*** (0.012)
Constant	-0.292** (0.121)	0.629*** (0.088)	-0.209* (0.121)	0.633*** (0.087)
Observations	4,684	7,027	4,972	7,995
$\chi^2$	2339***	2274***	1869***	2987***
R-squared	0.930	0.918	0.925	0.925

Note: standard errors in parentheses;  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$ .

circumstances, the experience of a prior CEO might be more valuable.

## 5. Conclusion and Discussion

In this study, we examine the relationship between the role of experienced CEO candidates in the CEO succession and the TFP of the focal firms, as the established studies fail to reach a consensus on the influence of experienced CEO candidates on the focal firm's performance when facing succession. To obtain a robust conclusion, we adopt the PSM-DID model to understand the research question based on the context of listed firms in an emerging market. We provide empirical evidence from the micro level to objectively evaluate the contributions of CEO candidates with experience in the CEO succession of listed Chinese manufacturing companies. Our finding shows that hiring an experienced CEO is an important channel to improve firms' performance. Specifically, our analysis demonstrates that, on average, the experienced CEO in CEO succession yields a 3.1% increase in TFP improvement compared with non-experienced succession firms. This positive effect can be continued for four years. The following decreasing performance after the experienced CEO takes the new CEO position in the focal firm is partially due to the changing environment with new demands and partially because of the CEO's becoming more ambitious after the positive performance, which leads to the strategic goal of the experienced CEO changes. Our results provide new insights into experienced CEO succession literature and firm performance in general.

To investigate the robust effects of experienced CEOs in CEO succession on the focal firm's TFP, we classified the samples and tested the heterogeneous effect of experienced

CEO succession on firm TFP by using the PSM-DID procedure. Compared with state-owned listed companies, CEO succession of private companies can effectively promote the improvement of TFP. In terms of the nature of the firm, the effect of an experienced CEO in CEO succession on the TFP of high-tech enterprises is higher than that of nonhigh-tech enterprises. Private enterprises and high-tech enterprises have a more dynamic environment that makes experienced CEOs are less likely to prevent the focal firm's performance. Working in more challenging and complex environments, in which CEOs are less likely to rely on simplified prescriptions or pasted personal experience, a CEO needs to upgrade their skills and acquire new knowledge to adapt to the changing environment. Higher dynamic environments effectively prevent a CEO from following decision-making shortcuts, such as the previous routines outside of the boundary of the focal firm. As a consequence, an experienced CEO will have to explore new business practices or mindsets to solve the emerging challenges and issues.

Experience trap not founded in the Chinese context. Previous research proposes contradictory perspectives. Some studies hold that experienced managers can become unknowingly "trapped" in their past ways of success. Therefore, these managers can fail to adapt to environmental changes, ultimately leading to unsatisfactory performance. However, the mobility between CEOs of listed companies has significantly promoted the TFP of enterprises and maintained a sustainable growth trend in the next four years, that is, the experience trap is not found in this paper. Previous research proposes contradictory perspectives on the experienced CEOs in CEO succession. Some studies hold that experienced managers can become unknowingly "trapped" in their past ways of success, such as inertia. Therefore, these managers can fail to adapt to environmental

changes, ultimately leading to unsatisfactory performance. However, the succession between experienced CEOs of listed companies has significantly promoted the TFP of the focal firms and maintains a sustainable growth trend in the next three years. CEOs are the most valuable human capital that contains an individual's knowledge, skills, experiences, and capabilities. CEOs have accumulated skills through professions and careers. Managers' skills are classified into generic skills, firm-specific skills, and industry-specific skills. Firm-specific human capital is useful only to firms that provide it and is not transferable, whereas industry-specific human capital can be transferred within an industry but has less transferability across industries. Generic, or general, skills are those that can be transferred across organizations and industries. In the Chinese market, due to the immature capital market environment, CEOs are busy dealing with institutional investors, government departments, and shareholders; hence, generic skills become more important. Such portability in generic skills gives the potential of experienced CEOs to better survive and perform in the CEO succession of focal firms. After succession, experienced CEOs are outsiders to their new organizations, and their early strategic changes are likely to be adaptive because they bring new ideas and are less likely to be influenced by the status quo, which will likely have a positive effect on organizational performance.

We acknowledge the possible geographical/cultural biases in this research stream. However, these biases go beyond the research question addressed in this study. Therefore, we encourage future research to encompass a broader range of subjects from various geographies, ethnicities/races, and cultures [53].

## Data Availability

Some or all the data, models, or code that support the findings of this study are available from the corresponding author, Chengpeng Zhu, upon reasonable request (chengpengzhu@foxmail.com).

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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