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Credential Inflation, Labor Misallocation, and Firm Total Factor Productivity Loss: An Empirical Study Based on Chinese Listed Companies

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Abstract: The continuous imbalance between supply and demand in the labor market in recent years has made the credential inflation become more severe. This paper uses the panel data of Chinese A-share listed companies from 2015 to 2024 empirically analyzes the impact of credential inflation on total factor productivity (TFP) of enterprises. The study found that increasing credential inflation is associated with a significant reduction in firm TFP, with labor misallocation played a mediating role inside. The results of heterogeneity analysis show that the efficiency loss of state-owned enterprises and high-tech enterprises is more substantial. Through combing the micro-level firm analysis with the macro resource-misallocation framework, this paper links individual-level wage penalties, firm-level productivity effects, and research on perceived overqualification, providing empirical evidence for optimizing the allocation of labor resources.

Keywords: Credential inflation; labor misallocation; total factor productivity; listed firms; mediating effect.

1. Introduction

1.1. Research Background

The domestic job situation is worsening and companies are increasingly using educational qualifications as a screening requirement. This results in the unreasonable increasing of educational requirements for many jobs and the outcome is that highly educated people are employed in jobs that demand little or no ability. This situation is a consequence of labour misallocation, often referred to as 'over-education' or 'skill underutilisation'.

Credential inflation may have a detrimental impact on total factor productivity (TFP) through a reduced value of education and through the internal allocation of human capital in firms [14, 19, 45]. Previous research has paid less attention to effects on company-level productivity and the mechanisms underlying them, with most studies focusing on consequences at the individual level, such as decreased pay and job satisfaction. Thus, it is of great theoretical and practical importance to study how far inflation leads to misallocation of labour resources and efficiency losses.

1.2. Research Objectives

This paper aims to address three questions: (1) Does the credential inflation affect a firm's Total Factor Productivity (TFP)? (2) If so, through what mechanisms does this effect manifest? (3) Are there differences in this impact across different ownership structures and industries? Specifically, we examine the direct impact of credential inflation on corporate TFP, investigate the mediating role of labor misallocation, and conduct heterogeneity analyses based on firm ownership types and industry characteristics.

1.3. Research Methods

In this study, we use data from China A-share listed firms for the period of 2015–2024 and drop financial enterprises and ST/*ST/PT corporations and observations with incomplete data. We also winsorize continuous variables at the 1% tails. The final sample consists of 29,521 firm-year observations. The firm TFP is computed using the Levinsohn & Petrin (2003) approach (LP). The share of employees having a bachelor's degree or higher is a proxy measure for credential inflation. We quantify labor misallocation by the firm-average salary of employees divided by the industry mean (a price-deviation measure). All regressions cluster standard errors at the company level and control for industry and year fixed effects. We use stepwise and baseline mediation regressions with a substituted dependent variable and a different sample period as robustness tests. Ownership type and industry variables are used for heterogeneity analyses.

1.4. Structure

The subsequent part of this paper is organized as follows. Chapter 2 examines the relevant literature, identifies research gaps and summarizes the modest contribution of this work; Chapter 3 discusses theoretical mechanisms and research hypotheses; Chapter 4 deals with the research design, sample selection, definition of variables and the model specification; Chapter 5 discusses the empirical results; Chapter 6 compares results with the existing literature and points out limitations; Chapter 7 concludes the whole study and makes policy recommendations.

2. Literature Review

2.1. Theoretical Foundations

The theoretical basis of this paper is mainly based on three interrelated theories: Human Capital Theory, Signal Theory and Resource Misallocation Theory. The theory of Human Capital believes that education can improve personal productivity and income level [6]. However, when educational attainment exceeds job requirements - that is, the so-called "credential inflation" - the marginal return on education will decline [9]. Signal Theory further points out that when the credentials continue to inflate, its information value in the labor market will become weaker, which will lead to low matching efficiency between workers and positions

[48]. The theory of Resource Misallocation explains how labor misallocation leads to the loss of overall productivity from a macroeconomic perspective [22, 42]. These theoretical strands converge in the present study: credential inflation distorts the signaling function of education, leading to labor misallocation within firms and, ultimately, to reductions in total factor productivity.

2.2. Existing Research and Main Findings

2.2.1. Studies on Credential Inflation

The empirical research of credential inflation began with the systematic measurement of "over education" and its wage consequences. Duncan and Hoffman (1981) provided basic evidence. They found that when workers' job requirements are lower than their actual qualifications, the return of these redundant education is significantly lower. This finding establishes the core empirical rule of "wage penalty". Subsequent studies further confirmed that this phenomenon is very common and persistent in the labor market: the career development of over educated workers is limited, and the wage growth is relatively slow, although their mobility may be stronger [45]; Moreover, the wage penalty of over education has been confirmed in most developed economies. Researchers have used a variety of measurement methods, including realized-matching, self-assessment and job analysis method [19, 21].

But it is important to highlight that educational mismatch is not the same as skill mismatch. Allen and van der Velden (2001) showed that over-educated workers are able to use general abilities in jobs that demand lower levels of education, which reduces salary penalties [3]. This means that the impact of credential inflation on productivity is much more related to the job-skills match than to the formal education gap itself.

As for domestic research, Chinese labor market is likewise plagued by educational mismatch and employment mismatch, including the vertical mismatch of educational levels and the horizontal mismatch of professional sectors [30]. Sector employment patterns are also important: it is easier for people with higher educational levels to find employment in manufacturing, intermediate services and high-end services [40], so growth in these sectors can lessen the incidence of over-education. The income losses and the decline of job satisfaction due to over-education have been found consistently using different measuring methodologies [24]. The Chinese higher education system has grown quickly during the past two decades, breaking the link between university diplomas and better work chances As a result, there is a growing proportion of graduates employed in the informal sectors, non-urban areas or non-public sectors [50].

However, the present study has several limitations as well. Most studies are concerned with salary effects at the individual level and not with productivity effects at the company level. While prior studies have shown that the increasing cost of labor and pricing distortions induce firms to innovate [33, 35], the effect of the credential inflation on total factor productivity has not yet gotten enough attention.

2.2.2. Related Research on Labor Misallocation

Labor misallocation is a multidimensional phenomenon encompassing multiple dimensions such as education, skills, occupation and industry [38]. The economic consequences of this misallocation can be examined at two levels: at the macro level, where resources and labor are improperly allocated across different industries and enterprises; and at the micro level, where internal production efficiency within firms is compromised.

At the macro level, there is a severe misallocation of resources in China's and India's manufacturing sectors, which significantly hampers overall total factor productivity (TFP), with labor misallocation being one of the key contributing factors [22]. Also noted that improper resource allocation resulting from policy distortions is the primary cause of TFP disparities between countries [42]. Based on this framework, an additional relevant investigation found that the misallocation of Chinese labor between companies of different ownership types significantly reduces the overall TFP [51]. More recent scholars have studied more specific channels of distortion. For example, if the wage level at the firm level deviates from that at the industry level (which can be regarded as a measure of the labor misallocation), firms increase R&D investment to cope with rising labor cost, which in turn stimulates innovation to some extent [35]. Another scholar argued that distortions in factor markets are detrimental to the efficiency of innovation in high-tech industries [12]. Similarly, some scholars also argued that Chinese innovation output suffers from efficiency losses due to factor distortions [4]. In addition, the misallocation of financial resources also boosts company financing costs and hampers innovation [26].

Overall, the above findings suggest that labor market imbalances do cause substantial productivity losses. But most of the studies treat the misallocation of labor as an exogenous allocation problem; that is, they focus on the consequences of misallocations but not the causes of misallocations, in particular, whether the decline in educational qualifications aggravates misallocations by distorting firm hiring practices and job assignment patterns.

2.2.3. Educational Disallocation, and TFP

Whether over-education will damage the TFP of enterprises has not been determined by the existing research. Some studies have found that over education has no significant negative impact on productivity, and even has a positive effect in some situations [25, 36]; However, other studies have found significant negative effects [37, 43]. These differences are largely due to the differences in industry composition, measurement methods and labor market system.

It should be noted that most existing studies are based on European data. The European labor market is more flexible, and over educated employees can find matching jobs by changing jobs, so the mismatch effect is diluted. However, there is a significant institutional segmentation in China's labor market - the household registration system restricts cross regional mobility, and ownership barriers hinder the flow of talent between state-owned enterprises and private enterprises - once highly educated employees are wrongly assigned to low skilled positions, it is difficult to get out in time, and the mismatch lasts longer. In addition, the expansion of higher education in China is far faster than the speed of industrial upgrading, and the expansion of academic qualifications is more serious and lasting than that in Europe. Therefore, the negative productivity effect of over education in the Chinese context may be more prominent.

In China, previous studies have mainly focused on the impact of technological innovation, capital allocation and institutional factors on TFP, but there is still little evidence on how academic expansion affects enterprise TFP through labor misallocation channels. Specifically, enterprises unreasonably raise the education threshold in recruitment, which leads to the misallocation between highly educated

employees and job requirements, resulting in the loss of productivity - this mechanism has not been systematically studied with the data of a large sample of listed companies.

2.2.4. Firm-Level Over-education

The issue of educational misallocation at the firm level has another crucial dimension: how employees perceive "excessive qualifications," and how this subjective perception influences work performance through psychological and behavioral mechanisms.

Perceived over-qualification and employee outcomes. Organizational Behavior examines how employees perceive "over-qualification" and how it affects their work performance and attitude. Perceived over-qualification can lead to reduced organizational commitment, psychological stress, unproductive actions, and more innovation and initiative [17]. It also negatively affects job satisfaction, organizational commitment, and task performance but positively predicts creativity and proactive work behaviors [20]. "Over-qualification" would trigger two pathways simultaneously as one negative pathway, which reduces task performance and creativity through cynicism; the other positive pathway, which enhances task performance and creativity via constructive bias [34].

Also anger toward employment conditions can account for the negative effects of perceived over-qualification [13].

Micro-level mechanisms and theoretical frameworks. To explain such effects, we need to turn further back to the Person-Environment Fit Theory. This theory conceptualizes perceived over-qualification as a type of person-job mismatch, when an individual has more competencies than the work requires. Employees respond to such misallocations with various coping techniques, typically through two ways: defensive tactics and adaptive strategies. Different coping strategies naturally lead to different performance outcomes.

The theoretical framework also indicates that organizational management strategies could help alleviate misallocation in productivity outcomes. In accordance with this idea, previous research have shown that on-the-job training, effective supervision and stronger managerial competence are all related with lower levels of educational mismatch [10, 11]. Other studies found that high quality managers can facilitate employee-job fit through lateral movement and promotions [39].

2.3. Research Gaps and Contribution

After analyzing the existing literature we can identify four significant gaps that this study addresses.

First, there has been many studies on the wage penalty consequences of over-education at the individual level, but the direct impact of credential inflation on TFP at the firm level is still largely unexplored. Existing studies have explored the impact of labor market distortions on innovation [35], or the impact of resource misallocation on aggregate TFP [22], but the channels via which credential inflation undermines corporate productivity have not been extensively studied.

Second, the existing literature on labor misallocation in China mostly focuses on the macro-level resource allocation problems such as labor allocation across different ownership types and industries [12, 51], and labor misallocation is often seen as an exogenous distortion factor. Little attention is paid to the issue of credential inflation as prelude to labor misallocation—especially how rising educational requirements in corporate recruitment influence internal job allocations.

Third, most studies have focused solely on a single dimension of misallocation and neglects the interrelations among the several aspects. Cridential inflation could affect many areas of labor allocation at the same time and its impact on productivity may rely on the interplay between educational mismatch and skill usage. Hence, a more comprehensive evaluation approach is required to explore the propagation of cridential inflation across different channels in the labor market and its subsequent impact on the TFP of enterprises.

Fourth, micro-level repercussions of educational mismatch in firms have been rarely addressed in the context of China. In fact, empirical evidence from European research utilizing matched employer-employee data has already found a link between over-education and firm productivity [25, 36, 37]. Organizational behavior research also identified two psychological mechanisms via which perceived over-qualification affects employee performance [17, 34]. However, these perspectives have not been incorporated into the analysis of Chinese listed businesses to date. There is a dearth of empirical data on how cridential inflation translates into internal labor mis-allocations and productivity losses.

This paper contributes to the literature in three aspects. First, it builds a measure of education level inflation at the company level and measures its effect on TFP, and integrate the findings from individual-level wage studies with a comprehensive analysis of resource misallocation at the macro level; Second, the paper finds that labor misallocation is the mediating mechanism via which inflation of education levels influences TFP, giving empirical evidence for this transmission path at the macro level; Third, it further explores the heterogeneity of this effect for different ownership types and industries, providing more specific policy implications on how to overcome productivity loss caused by education level inflation. This paper links two long-standing and distinct academic topics by merging the macro-level framework of resource misallocation with the micro-firm analysis.

3. Theoretical Mechanisms and Research Hypotheses

3.1. The Impact of Credential Inflation on Labor Misallocation

In markets with oversupply of labor, companies receive high volume of resumes which required increased filter costs. In order to address this problem, employers continuously raise recuriting standard on educational background requirement even when the job actual conditioning demands remain unchanged. Consequently, highly educated individuals are assigned to positions that do not match their human capital levels, resulting in over-education or skill redundancy [14, 48].

That is, credential inflation significantly weakens the signaling function of educational qualifications and distorts the allocation of human resources inside firms. Instead, highly educated people in low-skilled jobs are not able to exploit their knowledge and innovative capacity fully while less qualified workers are pushed out of these jobs, aggravating the structural imbalances of the labor market. The more the competition, the larger the motivation for enterprises to increase academic obstacles, which implies more severe credential inflation and worse internal labor misallocation.

Based on this analysis, Hypothesis 1 is proposed: the higher the proportion of employees with a bachelor's degree or above

within an enterprise (indicating greater credential inflation), the more pronounced the degree of labor misallocation becomes.

3.2. Mediating Mechanism Analysis

The marginal returns of human capital go down when highly educated people get jobs that are not competent and that don't use their professional skills. Education only increases productivity if it matches work needs, according to human capital theory[6]. Overeducation is linked with worse job satisfaction, lower organizational commitment and higher turnover rates [21, 24]. Organizations suffer lower production due to increased recruitment, training and coordination costs.

The enhacement of academic standards, by increasing recruiting hurdles, worsens labor misallocation, which may decrease Total Factor Productivity (TFP) through two mechanisms. The first is about morale and turnover. Employees with a high level of education in low-skilled jobs are often frustrated which leads to less identification with the firm and less commitment, higher turnover rates and, thus, higher recruitment and coordination costs for firms [16, 21]. The second is the experience crowding-out effect. The high educational thresholds may cause the marginalization of capable veteran employees with lower education, as newly-hired people with higher education tend to lack the tacit knowledge collected by these workers [49]. Although this study does not examine directly these two channels, the intermediary effect of labor misallocation lends indirect evidence to their existence. Thus, we propose Hypothesis 2: credential inflation indirectly affects firm-level TFP by increasing internal labour misallocation inside firms.

4. Model Specification and Empirical Strategy

4.1. Model Specification

To examine the direct effect of credential inflation on TFP and the mediating role of labor misallocation, we construct the following econometric models.

4.1.1. Baseline Regression Model

$$TFP_{it} = \beta_0 + \beta_1 BD_{it} + \sum \gamma_j Controls_{it} + IndustryFE + YearFE + \varepsilon_{it} \quad (1)$$

Where TFP_{it} represents the total factor productivity of firm i in year t; BD_{it} denotes credential inflation, measured as the proportion of employees with a bachelor's degree or higher; $Controls_{it}$ includes firm size (Size), leverage (Lev), ownership concentration (Top1), board size (Board), proportion of independent directors (Indep), and CEO-chair duality (Dual). $Industry_{FE}$ and $Year_{FE}$ are industry and year fixed effects, and ε_{it} is the error term. The coefficient β_1 captures the marginal effect of credential inflation on TFP; a significantly negative β_1 indicates that credential inflation suppresses TFP.

4.1.2. Mediation Effect Model

$$LM_{it} = \alpha_0 + \alpha_1 BD_{it} + \sum \gamma_j Controls_{it} + IndustryFE + YearFE + \varepsilon_{it} \quad (2)$$

$$TFP_{it} = \delta_0 + \delta_1 BD_{it} + \delta_2 LM_{it} + \sum \gamma_j Controls_{it} + IndustryFE + YearFE + \varepsilon_{it} \quad (3)$$

Where LM_{it} is the labor misallocation variable, and the other symbols are the same as in model (1). Model (2) tests whether credential inflation exacerbates labor misallocation ; a significantly positive α_1 indicates that Credential Inflation exacerbates labor misallocation. Model (3) adds labor misallocation to the baseline. If δ_2 is significantly negative and $|\delta_1| < |\beta_1|$, this suggests that labor misallocation plays a mediating role between Credential Inflation and TFP, i.e., Credential Inflation partially suppresses TFP by exacerbating labor misallocation.

All regressions employ firm-level clustered robust standard errors and include industry and year fixed effects to account for heteroskedasticity, serial correlation, and unobserved heterogeneity.

4.2. Variable Definitions and Data Sources

4.2.1. Variable Definitions

(1) Dependent Variable: Total Factor Productivity (TFP)

TFP reflects the portion of output not explained by measured inputs (capital, labor, intermediate inputs). We estimate TFP using the Levinsohn & Petrin (2003) method, which addresses the endogeneity of input choices by using intermediate inputs as a proxy for unobserved productivity shocks, effectively correcting simultaneity bias, and is widely used and robust in micro-level firm productivity studies.

$$Y_{it} = \beta_o + \beta_k K_{it} + \beta_l L_{it} + \beta_m M_{it} + \omega_{it} + \eta_{it}$$

Where Y_{it} is the natural logarithm of operating revenue; K_{it} is the natural logarithm of fixed assets; L_{it} is the natural logarithm of total employees; M_{it} is the natural logarithm of intermediate inputs, calculated as the sum of operating costs, selling expenses, administrative expenses, and financial expenses minus depreciation, amortization, and cash paid to employees; ω_{it} is firm productivity; and η_{it} is the error term.

(2) Core Explanatory Variable: Credential Inflation (BD)

Credential inflation reflects the irrational inflation of educational signals when the supply of highly educated labor exceeds demand for high-quality jobs. Under asymmetric information, firms raise credential thresholds to reduce screening costs, weakening the screening function of educational credentials [9, 48]. We proxy credential inflation by the share of employees with a bachelor's degree or higher. A higher proportion indicates greater pressure from credential inflation. This firm-level measure captures the aggregate extent of irrational credential-threshold elevation against the backdrop of macro-level supply-demand imbalances [30].

(3) Mediator Variable: Labor Misallocation (LM)

Labor misallocation denotes a systemic misallocation between workers' skills or educational levels and job requirements. Following the price-deviation approach of Lyu & Wang (2019):

$$LM_{it} = \frac{Wage_{it}}{Wage_{jt}}$$

Where $Wage_{it}$ is the average employee compensation of firm i in year t (cash paid to employees divided by total employees), and $Wage_{jt}$ is the average compensation of industry j in year t.

Interpretation: $LM_{it} = 1$ indicates no price-based misallocation; $LM_{it} > 1$ indicates possible overvaluation of labor costs (positive misallocation); $LM_{it} < 1$ indicates possible undervaluation (negative misallocation).

Using price deviation to proxy labor misallocation assumes labor homogeneity within the same industry. Under perfect competition, homogeneous labor earns the same wage. In

practice, institutional frictions (e.g., hukou, ownership discrimination) and information asymmetry cause systematic wage deviations. In our context, credential inflation forces highly educated workers into low-skill positions, so their marginal product falls below what comparable workers earn elsewhere—a quantity misallocation captured by LM deviating from 1. Thus, the price-deviation measure is theoretically sound and data-feasible [22, 35, 44].

(4) Control Variables

To mitigate omitted variable bias, we control for six firm-level characteristics commonly associated with productivity.

Firm size (Size): Natural logarithm of total assets. Economies of scale may enhance productivity, while agency costs could offset this advantage.

Leverage (Lev): Total liabilities divided by total assets. Moderate leverage may improve capital allocation, but excessive debt can hamper investment.

Ownership concentration (Top1): Shareholding ratio of the largest shareholder. Concentrated ownership can mitigate agency problems but may also lead to expropriation.

Board size (Board): Natural logarithm of the number of directors. Larger boards may bring more expertise but also incur higher coordination costs.

Proportion of independent directors (Indep): Ratio of independent directors to total board members. A higher ratio strengthens board independence but may increase communication costs.

CEO-chair duality (Dual): Dummy variable = 1 if the CEO and board chair are the same person, otherwise 0. This dual role may improve decision speed but weaken board oversight.

4.2.2. Data Sources

The sample comprises Chinese A-share listed companies from 2015–2024. We exclude financial sector firms, ST/*ST/PT companies, and observations with missing values for key variables. All continuous variables are winsorized at the 1st and 99th percentiles, yielding an unbalanced panel of 29,521 firm-year observations. For heterogeneity analyses, firms are classified as state-owned enterprises (SOEs) and non-SOEs by ownership type, and as high-tech and non-high-tech enterprises following national criteria for high-tech enterprise recognition. Financial data, corporate governance data, and employee education data are sourced from the CSMAR database; employee education structure data are manually compiled from firms' annual reports.

5. Empirical Results

To address endogeneity issues arising from omitted variables and reverse causality, all regressions in this study employ cluster-robust standard errors at the firm level while controlling for industry and year fixed effects. The explanatory variables utilize current-period data. Furthermore, we conducted multiple alternative specifications to test the robustness of the results.

5.1. Descriptive Statistics

Table 1 provides the descriptive statistical results of the main variables used in this study.

First, the mean value for Total Factor Productivity (TFP) is 8.752 with a standard deviation of 0.865 and the values ranging from 5.326 to 12.790, which shows considerable variation in the efficiency of production across the firms included in the sample. Credential inflation (BD) shows a mean of 0.326, standard deviation of 0.223, ranging from 0.002 to 1.000, reflecting notable differences in the proportion of bachelor's degree holders among employees across firms and highlighting diversity in labor structure and recruitment preferences. Labor Misallocation (LM) measures a mean of 0.290, standard deviation of 0.249, ranging from 0.004 to 1.786, demonstrating substantial variations in how firm-level labor compensation deviates from industry averages, with some firms exhibiting particularly severe misallocation issues. Overall, each variable exhibits sufficient variability without evident outliers or skewness, indicating robust data quality suitable for subsequent multiple regression analyses and mediation effect tests.

Table 1. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
TFP	29521	8.752	0.865	5.326	12.790
BD	29521	0.326	0.223	0.002	1.000
LM	29521	0.290	0.249	0.004	1.786
Size	29521	22.260	1.129	17.640	28.190
Lev	29521	0.408	0.200	0.014	1.957
Top1	29521	0.326	0.146	0.018	0.900
Board	29521	2.098	0.194	1.386	2.890
Indep	29521	0.378	0.053	0.143	0.800
Dual	29521	0.333	0.471	0.000	1.000

5.2. Baseline Regression Results

Table 2 reports the estimation results of the effect of Credential Inflation on total factor productivity. Column (1) includes only the core explanatory variable BD, with industry and year fixed effects controlled but no control variables, Column (2) progressively introduces control variables based on Column (1). Both models control for industry and year fixed effects. The models in both columns pass the F-test, and the R-squared increases from 0.198 to 0.698, indicating that the inclusion of control variables effectively improves the model's explanatory power. Given that the direction and significance of the coefficient on the core explanatory variable are largely consistent across Columns (1) and (2), the following discussion focuses on the estimation results in Column (2). The empirical results for the full sample show:

Credential inflation significantly reduces TFP. The BD coefficient is significantly negative at the 1% level in both columns (-0.345 in Column (1) and -0.107 in Column (2)). A one-standard-deviation increase in BD (0.223) is associated with a 0.024 (0.27%) decrease in TFP relative to its mean. Thus, the baseline conclusions of this paper preliminarily validate the research hypothesis that the irrational inflation of credential signals impairs firms' overall production efficiency. This finding lays the groundwork for further exploration of the underlying transmission mechanisms (e.g., labor misallocation). Also supports signaling theory: overused credential signals lose their informational value, harming human capital allocation and firm productivity.

Table 2. Baseline Regression Results

	(1)	(2)
	TFP	TFP
BD	-0.345***	-0.107***
	(0.061)	(0.037)
Size		0.576***
		(0.007)
Lev		0.358***
		(0.036)
Top1		0.212***
		(0.044)
Board		-0.078**
		(0.038)
Indep		-0.220*
		(0.126)
Dual		-0.016
		(0.011)
Industry FE	Yes	Yes
Year FE	Yes	Yes
_cons	8.865***	-3.987***
	(0.022)	(0.179)
N	29521	29521
R2	0.198	0.698

Note: Parentheses report firm-level clustered robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5.3. Robustness Test

5.3.1. Replacing the Dependent Variable

Table 3 reports the estimation results after replacing the dependent variable.

Table 3. Robustness Test – Replacing the Dependent Variable

	(1)	(2)
	TFP_OLS	TFP_OLS
BD	-0.579***	-0.289***
	(0.069)	(0.035)
Size		0.716***
		(0.007)
Lev		0.415***
		(0.035)
Top1		0.236***
		(0.042)
Board		-0.032
		(0.036)
Indep		-0.143
		(0.120)
Dual		-0.026**
		(0.011)
Industry FE	Yes	Yes
Year FE	Yes	Yes
_cons	10.457***	-5.698***
	(0.026)	(0.173)
N	29521	29521
R2	0.218	0.791

Note: Parentheses report firm-level clustered robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Results are qualitatively similar across specifications; we discuss the full model (Column (2)). After replacing TFP (LP method) with TFP estimated by the OLS residual method, the BD coefficient remains significantly negative at the 1% level (−0.289 in Column (2)), consistent with the baseline. This confirms that the negative effect of credential inflation on TFP is not driven by the choice of TFP estimation method.

5.3.2. Alternative Measure of Credential Inflation

A potential concern with the baseline BD measure is that a higher proportion of bachelor's-degree holders may reflect genuine skill upgrading associated with technological progress rather than irrational credential inflation. To address this concern, we construct an alternative measure—excess credential share (BD2)—defined as the difference between a firm's bachelor's-degree share and the median bachelor's-degree share of its industry-year cell:

Table 4 reports the results of re-estimating Equation (1) with BD2 as the core explanatory variable.

In both specifications, the coefficient on BD2 is significantly negative at the 1% level (−0.337 in Column (1) and −0.098 in Column (2)), closely matching the baseline results.

Table 4. Robustness Test – Alternative measure of credential inflation

	(1)	(2)
	TFP_LP	TFP_LP
BD2	-0.337***	-0.098***
	(0.061)	(0.037)
Size		0.576***
		(0.007)
Lev		0.359***
		(0.036)
Top1		0.212***
		(0.044)
Board		-0.078**
		(0.038)
Indep		-0.221*
		(0.126)
Dual		-0.016
		(0.011)
_cons	8.759***	-4.020***
	(0.011)	(0.179)
N	29521	29521
R^2	0.198	0.698

Note: Parentheses report firm-level clustered robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5.3.3. Changing the Sample Period

The COVID-19 pandemic (2020–2022) had significant macroeconomic and labor market impacts, potentially biasing the estimates. To rule out this potential interference, we excluded the sample observations from 2020–2022 and re-ran the regressions using the remaining years (2015–2019 and 2023–2024).

Table 5 reports the estimation results after changing the sample period. The robustness test results show: Excluding the pandemic years (2020-2022), the BD coefficient is still negative and significant at the 5% level (−0.093 in Column (2)). Although the magnitude is smaller, the direction and significance remain unchanged, indicating that the baseline

conclusion is not driven by the COVID-19 shock.

Table 5. Robustness Test – Changing the Sample Period

	(1)	(2)
	TFP	TFP
BD	-0.354***	-0.093**
	(0.062)	(0.038)
Size		0.567***
		(0.008)
Lev		0.364***
		(0.037)
Top1		0.214***
		(0.045)
Board		-0.052
		(0.040)
Indep		-0.235*
		(0.135)
Dual		-0.018
		(0.012)
Industry FE	Yes	Yes
Year FE	Yes	Yes
_cons	8.848***	-3.880***
	(0.023)	(0.187)
N	19550	19550
R2	0.199	0.696

Note: Parentheses report firm-level clustered robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5.3.4. Instrumental Variable Estimation

Table 6. Instrumental variable estimation

	(1)	(2)
	BD	TFP_LP
IV	0.962***	
	(0.003)	
BD		-0.130***
		(0.041)
Size	0.001**	0.579***
	(0.000)	(0.008)
Lev	-0.009***	0.339***
	(0.002)	(0.037)
Top1	0.007***	0.194***
	(0.002)	(0.047)
Board	0.007***	-0.067*
	(0.002)	(0.040)
Indep	0.009	-0.150
	(0.007)	(0.133)
Dual	-0.000	-0.017
	(0.001)	(0.012)
Kleibergen-Paap rk LM statistic	1099.228***	
Kleibergen-Paap rk Wald F statistic	9.7e+04 {16.38}	
_cons	-0.011	
	(0.009)	
N	23450	23450
R2	0.954	0.702

Note: Parentheses report firm-level clustered robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Considering the endogeneity caused by reverse causality and omitted variables, this paper adopts the one-period lagged explanatory variable as the instrumental variable. As shown in Table 6, Column (2) shows that both the Kleibergen-Paap LM testis (1099.228, significant at 1%) for underidentification and the Kleibergen-Paap rk Wald F test (97,000, far exceeding the Stock-Yogo critical value of 16.38) for weak identification reject the null hypothesis, which verifies the validity of the selected instrumental variable. Meanwhile, Column (2) presents the coefficient of BD remains statistically significant at the 1% level. This further confirms that credential depreciation reduces firms' total factor productivity.

5.4. Heterogeneity Analysis

5.4.1. Heterogeneity by Ownership Type

Firms with different ownership types exhibit significant differences in employment systems, compensation structures, and hiring decisions, therefore, the effect of Credential Inflation on TFP may vary by ownership type. This study divides the sample into state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) and conducts separate regressions. The results are shown in Table 7. Column (1) reports the results for SOEs, and Column (2) for non-SOEs. Both regressions control for industry and year fixed effects, and both models pass the F-test. Given that the direction and significance of the coefficient on the core explanatory variable are largely consistent across the two groups, the following discussion compares the estimation results in Columns (1) and (2). The ownership heterogeneity analysis reveals: the BD coefficient is significantly negative in both groups, but the absolute value of the coefficient is notably larger for SOEs than for non-SOEs. In the SOE sample, the BD coefficient is -0.178 (significant at the 5% level), in the non-SOE sample, the BD coefficient is -0.109 (significant at the 5% level). This indicates that the negative effect of Credential Inflation on TFP is stronger in SOEs.

Table 7. Heterogeneity Analysis – Ownership Type

	(1)	(2)
	SOEs	Non-SOEs
BD	-0.178**	-0.109**
	(0.077)	(0.043)
Size	0.583***	0.573***
	(0.014)	(0.009)
Lev	0.268***	0.355***
	(0.074)	(0.039)
Top1	0.266***	0.190***
	(0.088)	(0.051)
Board	-0.119	-0.081*
	(0.075)	(0.044)
Indep	-0.020	-0.335**
	(0.216)	(0.152)
Dual	-0.019	-0.011
	(0.030)	(0.012)
Industry FE	Yes	Yes
Year FE	Yes	Yes
_cons	-4.119***	-3.856***
	(0.330)	(0.214)
N	8012	21507
R2	0.716	0.677

Note: Parentheses report firm-level clustered robust

standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5.4.2. Heterogeneity by Industry

High-tech enterprises and non-high-tech enterprises differ significantly in terms of technological intensity, human capital requirements, and job skill demands, thus, the effect of Credential Inflation may vary by industry characteristics. This study divides the sample into high-tech enterprises and non-high-tech enterprises. The regression results are shown in Table 8. Column (1) reports the results for high-tech enterprises, and Column (2) for non-high-tech enterprises. Both regressions control for industry and year fixed effects, and both models pass the F-test. Given that the direction and significance of the coefficient on the core explanatory variable differ markedly between the two groups, the following discussion compares the estimation results in Columns (1) and (2). The industry heterogeneity analysis reveals:

First, the BD coefficient is significantly negative in the high-tech enterprise sample but insignificant in the non-high-tech enterprise sample. For high-tech enterprises, the BD coefficient is -0.127 (significant at the 1% level), for non-high-tech enterprises, the BD coefficient is -0.049 and fails to reach statistical significance. This suggests that the negative effect of Credential Inflation on TFP is primarily present in high-tech enterprises.

Table 8. Heterogeneity Analysis –High-Tech Industry

	(1)	(2)
	High-Tech Enterprises	Non-High-Tech Enterprises
BD	-0.127***	-0.049
	(0.043)	(0.071)
Size	0.592***	0.552***
	(0.009)	(0.013)
Lev	0.407***	0.263***
	(0.041)	(0.067)
Top1	0.264***	0.149**
	(0.052)	(0.076)
Board	-0.071	-0.094
	(0.045)	(0.065)
Indep	-0.335**	0.005
	(0.150)	(0.221)
Dual	-0.025*	0.006
	(0.013)	(0.021)
Industry FE	Yes	Yes
Year FE	Yes	Yes
_cons	-4.328***	-3.483***
	(0.207)	(0.323)
N	19213	10308
R2	0.714	0.659

Note: Parentheses report firm-level clustered robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5.5. Mechanism Analysis

5.5.1. Mediation Effect

Two findings emerge from the mediation analysis. First, credential inflation significantly exacerbates labor misallocation: the BD coefficient in Column (1) is 0.039 (significant at 5%), confirming that a higher share of bachelor's-degree holders is associated with greater labor misallocation. This validates Hypothesis 1. Second, labor misallocation significantly reduces TFP: the LM coefficient in Column (2) is -0.110 (significant at 1%), while the BD coefficient falls to -0.103—smaller in absolute value than the baseline (-0.107). Since α_1 and δ_2 are both significant and the direct effect of BD weakens upon introducing the mediator, labor misallocation partially mediates the negative effect of credential inflation on TFP. This validates Hypothesis 2.

Table 9. Mechanism Analysis

	(1)	(2)
	LM	TFP
BD	0.039**	-0.103***
	(0.016)	(0.037)
LM		-0.110***
		(0.031)
Size	-0.003	0.575***
	(0.002)	(0.007)
Lev	-0.008	0.357***
	(0.012)	(0.035)
Top1	-0.010	0.211***
	(0.015)	(0.044)
Board	0.003	-0.077**
	(0.013)	(0.038)
Indep	-0.001	-0.220*
	(0.043)	(0.126)
Dual	0.002	-0.016
	(0.004)	(0.011)
Industry FE	Yes	Yes
Year FE	Yes	Yes
_cons	0.325***	-3.952***
	(0.059)	(0.179)
N	29521	29521
R2	0.062	0.699

Note: Parentheses report firm-level clustered robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

5.5.2. Bootstrap Mediation Test

To further validate the mediating role of labor misallocation, we perform a bootstrap mediation analysis with 1,000 replications [41]. Table 10 reports the bootstrap results. The indirect effect (the product of the BD→LM path and the LM→TFP path) is −0.0085, with a standard error of 0.0016 and a z-statistic of −5.31 (significant at the 1% level). The 95% confidence interval [−0.0116, −0.0053] does not contain zero, confirming that the mediating effect of labor misallocation is statistically significant. The results corroborate the stepwise regression findings and enhance confidence in the robustness of the mediation mechanism.

Table 10. Bootstrap mediation test

	Observed	Bootstrap			Normal	based
	coefficient	std. err.	z	P>z	[95% conf.	interval]
Ind_eff	-0.0085	0.0016	-5.3100	0.0000	-0.0116	-0.0053
Dir_eff	-0.2568	0.0142	-18.0700	0.0000	-0.2847	-0.2290

Summary. Credential inflation significantly reduces firm TFP, and this negative effect is partially transmitted through labor misallocation. The conclusion remains robust after replacing the dependent variable and altering the sample period. The effect is more pronounced in state-owned enterprises and high-tech firms.

6. Discussion

6.1. Comparison with Existing Studies

6.1.1. Consistency with Existing Literature

Resource misallocation theory. This study finds that credential inflation decreases firms' total factor productivity (TFP), adding to the current literature in two ways. On the one hand, the macroeconomic misallocation literature has shown that the aggregate TFP declines when the production factors are misallocated to inefficient uses. This paper further identifies the irrational elevation of educational thresholds as a specific micro-level cause of the misallocation. Nevertheless, evidence from within companies backs up the findings of cross-sectional studies that labor misallocation across ownership structures reduces TFP, implying that allocation distortions are damaging to output in both the cross-sector and intra-firm contexts [51]. The mutual reinforcement of macroeconomic and microeconomic evidence further shows that labor market distortions are a major restraint on economic efficiency.

Signaling theory under extreme conditions. The results presented in this study show a boundary condition of signaling theory [48]. According to signaling theory, education background might improve the matching efficiency under information asymmetry. But when there are too many degree holders, firms have to raise recruiting requirements, leading to the abuse of educational signals and eventually destroying their screening value and reducing the efficiency of the allocation process. This conclusion points out that "alienation" in the conditions of labor surplus. The screening value of academic certificates is gradually eroded given that the education expansion pace is faster than that of industrial upgrading, a characteristic of China's labor market over the past few decades [19, 21]. What is intended to be a signal for efficient matching becomes a source of distortion.

Micro-level transmission channels. The theoretical framework of this study offers two micro-level routes to explain the transmission of educational attainment inflation into losses of Total Factor Productivity (TFP). First, the "morale-leaving" channel: when highly educated employees are put in low-skilled jobs they tend to be frustrated, with reduced job satisfaction and reduced organizational identification, which increases turnover and corporate recruitment and coordination costs [16, 21]. The second is the "experience crowding-out" channel: increased education requirements may push out talented but less-educated veteran workers with useful tacit knowledge, replaced by over-educated workers who lack the skills to do the job [49]. However, the empirical research verifies the importance of labor misallocation as a mediating variable, but does not directly test the underlying behavioral mechanisms. In future research, these transmission mechanisms should be traced with micro-level data such as employee turnover rates, training expenses, management expense ratios, and per capita patent output to reinforce the causal link between cridential inflation at the recruitment stage and efficiency loss in the production process.

6.1.2. Differences from Existing Literature

Over-education and productivity (Western studies). As noted in the literature review, existing studies on the influence of over-education on company Total Factor Productivity (TFP) have reached different conclusions: some find positive or minor impacts [25, 36] while some have shown negative effects [37, 43]. Using data of listed businesses in China, this article supports the latter notion that cridential inflation has a considerable negative influence on the TFP. Why did the same phenomenon lead to different results in Europe and China? We identify for three basic reasons.

First, differences in labor market flexibility. European countries tend to have relatively flexible labor markets, with less impediments to the mobility of personnel across firms and industries. Therefore, the over-educated employees can find a proper position by changing jobs, which dilutes the misallocation effect. However, institutional segmentation in China (the household registration system limits mobility across places and ownership barriers impede the movement of talents between state-owned and private businesses) leads to higher adjustment costs and longer misallocation. When highly educated people are assigned to low-skilled roles in China, they have difficulty to make quick transitions. The sustained misallocation brings more serious damage to corporate efficiency.

Second, the nature and severity of educational over-qualification vary significantly. In the West, over-education is often viewed as a short-term, transitional phenomenon – young individuals may have greater educational levels when they enter the labour market, but this misallocation lessens with experience and job mobility over time. However, in China the expansion of higher education has significantly exceeded the pace of industry upgrading, creating a structural and ongoing mismatch between educated supply and labor demand. Educational over-qualification is not only a problem of the "onboarding transition period" of a person, but it is a systemic feature of the whole labour market, with hence more severe negative implications.

Third, the measurement methods capture different dimensions. Most of the research in the West apply self-assessment or job analysis to uncover over-education. These methods analyze the fit between individual educational qualifications and employment requirements. This paper uses an enterprise-level measure, i.e., the ratio of employees with bachelor's degrees and a price-deviation misallocation indicator, which can reflect the aggregate misallocation bias caused by the systematic improvement of educational thresholds for corporate recruitment, and such a bias may be more severe and persistent than the misallocation at the individual level.

Over-education and Wages. Some labor economics

research has indicated that after controlling for individual fixed variables, over-education is not associated with pay penalties, suggesting that the costs of over-education may be lower than previously thought. This study reveals that over-education has a significantly negative impact on TFP, however this conclusion is not inconsistent to the evidence shown above. The answer is to be found in the nature of the dependent variables: salaries reflect private gains from individual marginal productivity whereas TFP reflects total company resource allocation efficiency. Misallocation can still reduce corporate efficiency in several ways even when individual wages are unaffected—for example, when firms pay competitive wages to keep highly educated workers—including greater coordination costs, lower employee morale, higher turnover and training costs, and underutilization of specialized human capital. The societal cost of over-education (measured by TFP) may thus be substantially higher than the private cost (measured by salaries). This distinction is essential in comprehending the economic implications of cridential inflation in a comprehensive manner.

6.2. Heterogeneity Discussion

The TFP losses have been much significant in state-owned enterprises and high-tech companies, which epitomize the joint impact of different institutional and technological constraints.

SOEs: policy burden and employment rigidity. Different from the market-oriented recruitment rationale of private firms [23, 32], state-owned enterprises have the political and social obligation to guarantee the permanence of employment. Their institutional function requires them to absorb large labor supply and to rely only on credentials as a filting standard. However, the number of high-level skill-demanding positions in these firms is restricted, and thus it is not possible to absorb such a big pool of highly educated individuals, and many highly qualified personnel are sent to low-skilled jobs. Furthermore, the high costs of human reorganization and poor internal mobility in SOEs imply that misaligned talent cannot be reassigned quickly, thus aggravating negative productivity consequences [47]. This process is in line with the basic "policy burden" hypothesis in the literature of state-owned firms [31, 52].

High-tech firms: skill specificity. High-tech enterprises are significantly reliant on specialized human resources. The R&D and technical positions of high-tech enterprises have strong enterprise-specific and industry-specific characteristics and knowledge transfer among enterprises is very limited [1, 12]. Educational growth that leads to hiring highly educated people for non-technical jobs leads to underutilization of professional abilities, idle human capital, and a corresponding decline in innovation potential [25, 36]. By contrast, the production processes of non-high-tech enterprises are relatively standardized and have less stringent skill requirements, leading to smaller efficiency losses from misallocation of human capital, consistent with the empirical evidence that "skill mismatch incurs higher costs in technology-intensive industries" [43].

In summary, the influence of cridential inflation on productivity depends on the regulatory costs of state owned firms and the skill specialization in high tech industries. This implies that labor market inefficiencies impact company efficiency through different channels, and a case-by-case analysis is warranted.

6.3. Limitations

Limitations of the present investigation are as follows. First, the measure of credential inflation is the percentage of employees who have a bachelor's degree, with no distinctions made about the academic specialty, the level of the school, or the skills required for the job. Labor misallocation is measured by price deviation indicators, which may ignore quantity mismatch. Future study may be able to use more detailed data for multidimensional measurement such as occupational classification standards. Second, the sample is limited to China A-share listed firms. Further validation is needed to generalize the research findings to small and medium-sized organizations or unlisted companies. The HR management of listed businesses is largely standardized, but the negative consequences of credential inflation may be more serious in small enterprises with lower adjustment capacities.

Third, this study examines only labor misallocation as the sole mediating channel. Cridential inflation may also influence productivity through employee incentives, organizational culture, or internal training programs. Fourth, static panel models cannot portray dynamic evolution processes. The influence of cridential inflation on TFP might be nonlinear and threshold effect. These issues should be further investigated in future studies with longer time window or dynamic panel methodologies.

6.4. Implications

6.4.1. Theoretical Contributions

The study provides three main contributions. First, it connects the cridential inflation to corporate total factor productivity (TFP), expanding the research on over-education from the individual wage penalty to the corporate social cost, thus extending the signal theory and human capital theory from job matching to production efficiency. Second, it identifies labour misallocation as a mediator through which cridential inflation affects productivity, complementing the literature on the causes of misallocation—current studies focus mostly on its repercussions and pay less attention to how it originates. Third, the heterogeneous effects of ownership structure and industry type indicate that the institutional environment and technological characteristics have a moderating role in the effect of cridential inflation on productivity, and the study provides insights from institutional economics and industrial organization to resource misallocation theory.

6.4.2. Practical Implications

For policymakers, this study finds that credential inflation decline corporate productivity through workforce misallocation. It suggests that blind expansion of higher education without industry upgrading could result in the "education investment trap". The government should improve the vocational education and skills certification system, minimize the absolute weight of academic qualifications in recruitment, and build a varied competency evaluation system.

For enterprises, recruitment criteria should not be limited to the education qualifications right from the start, but should be based on the actual skills required. State-owned enterprises should remove restrictions on workforce adjustment and improve internal talent mobility; high-tech companies should build a dual-track career development system (technical and managerial tracks) to prevent highly qualified professionals from being assigned to low-skilled positions.

For individuals, workers should seek practical skills and professional capabilities, not a "educational arms race" at the expense of the real worth of human capital.

6.5. Future Research Directions

(1) Micro-level generation mechanisms and firm coping strategies. This paper investigates the adverse impact of credential inflation on TFP, yet the detailed mechanisms linked to its development in the company are still a "black box". Future study might explore when and why organizations raise educational requirements, either due to selection demands in light of information asymmetry or imitative rivalry, and how different kinds of firms adjust accordingly. This could be done through case studies or surveys.

(2) Long-term dynamics and threshold effects. The sample of this study is from 2015 to 2024, although the effect of credential inflation on TFP may be a cumulative process and may have nonlinear or threshold effects. Future research should investigate if negative impacts speed up as the share of highly educated workers exceeds a particular crucial threshold using longer time windows, panel threshold models or time changing coefficient models.

(3) Multi-dimensional misallocation coupling. Labor misallocation is seen as a single mediating variable. In fact, enterprises often confront numerous distortions at the same time such as capital mismatch, labor misallocation and technical mismatch, which are intertwined. Future study should consider multiple mismatch indicators and use either multiple mediation models or structural equation models to explain how these mismatches interact across dimensions and together effect productivity.

(4) Deepening heterogeneity and boundary conditions. In addition to ownership structure and industry type, Other elements that may affect the consequences of credential inflation are ownership structure, industry type, the development level of regional labor markets, the intensity of industry competition, the structure of the product market, and the stage of the company life cycle. Future research should include these aspects in order to establish systematic boundary conditions.

(5) Natural experiments and causal identification. The recent educational reforms in China, such as the "Double First-Class" program, vocational education reform, the "Double Reduction" policy, and the expansion of graduate enrollment, have offered chances for causal identification under quasi-experimental settings. These policy shocks can be used for more robust causal inference in future studies.

(6) International comparisons and institutional environments. Credential Inflation is a global phenomena, yet there are considerable cross-national disparities in the educational systems, labor protection regimes, and cultural traditions. Cross-country comparative studies, for example, looking at whether Germany's dual vocational education system reduces credential inflation or how East Asian economies cope with over-education, can demonstrate the moderating role of institutional environments and provide international references for policy-making.

7. Conclusion

7.1. Research Conclusions

Using panel data from Chinese A-share listed firms from 2015 to 2024, this study investigates the impact of credential inflation on firm TFP and its transmission mechanisms. Three main findings emerge. First, credential inflation significantly reduces firm TFP; this conclusion is robust to alternative TFP measures, an alternative measure of credential inflation (excess credential share), and sample periods, and is confirmed by instrumental variable estimation. Second, labor misallocation partially mediates this negative effect: credential inflation worsens labor misallocation, which in tum reduces TFP. Third, the negative effect is stronger in state-owned enterprises than in non-state-owned enterprises and is significant only in high-tech enterprises. Firms with rigid employment systems and high dependence on specialized human capital are thus more vulnerable to the productivity costs of credential inflation.

7.2. Policy Recommendations

State owned enterprises. We should shift the focus of performance appraisal from the number of redundant workforce to the quality of job matching, and reduce the tendency of excessive enrollment expansion due to policy pressure. Improve the flexibility of the internal labor market through the job rotation plan and the internal talent market, so that the mismatch situation will not last forever.

High tech enterprises. During recruitment, we should use more assessment tools based on skills and abilities (such as vocational qualification certification and project-based assessment) to reduce excessive dependence on academic qualifications. Establish a dual track career development channel with parallel technical sequence and management sequence to prevent highly educated talents from being assigned to mismatched positions.

Government and education system. We should improve the labor market information platform, reduce the screening cost of enterprises and improve the matching efficiency. At the same time, we should expand the coverage of vocational education and skill certification system, provide diversified paths for talent development, and alleviate the over education pressure caused by the disconnection between higher education expansion and industrial upgrading from the supply side. For individuals, we should treat the competition of academic qualifications rationally, and focus on practical ability and lifelong learning, rather than blindly pursuing the stacking of academic qualifications.

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