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Research on the Impact of Government Talent Policy Subsidies on Enterprise Total Factor Productivity

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Abstract: This study aims to explore the impact of government talent policy funding on enterprise total factor productivity and further analyze the differences in this impact under various conditions. In the empirical section, panel data is used, with listed companies as the research sample, to examine the mechanisms of talent agglomeration, knowledge spillover, and innovation upgrading. After analysis, it is found that government talent policy funding is conducive to improving enterprise total factor productivity, and the impact mechanism aligns with expectations. Large-scale enterprises and those in highly competitive market environments benefit more from policy funding, with this positive effect being particularly significant in non-state-owned enterprises. The research results emphasize that government talent policy funding is an effective tool for promoting enterprise productivity enhancement, exhibiting differentiated effects across various enterprise types and market conditions. This provides empirical evidence for the government to optimize talent policies and offers strategic suggestions for enterprise managers to more effectively utilize policies and resources to enhance enterprise competitiveness.

Keywords: Talent policy funding; total factor productivity; government endorsement; knowledge spillover.

1. Introduction

With the rapid development of the technological revolution, innovation has become a key area of national competition. The report of the 20th National Congress of the Communist Party of China emphasized the need to more effectively integrate educational resources, technological strength, and talent advantages. China has increasingly valued the cultivation and introduction of technological talents, continuously launching multiple policies aimed at stimulating the potential of technological talents and promoting progress in the technological field. For example, at the 2021 National Science and Technology Work Conference, it was proposed to form a new mechanism for the development of technological talents and increase support for young talents, frontline technological talents, and enterprise technological talents.

However, the effects of talent policy funding are not immediate, and their impact on enterprise total factor productivity also varies. Therefore, this study explores the specific pathways through which government talent policy funding affects enterprise total factor productivity and, after further analysis, investigates the differences in such effects. The research finds that government talent policy funding positively affects enterprise total factor productivity, particularly in non-state-owned enterprises, large-scale enterprises, and enterprises in highly competitive market environments, where this positive effect is more pronounced. The research results not only provide references for the government in formulating and optimizing talent-related policies but also offer insights for enterprises to more effectively utilize policy resources.

2. Literature Review and Research Hypotheses

2.1. Talent Policy and Enterprise Development

Government talent incentive measures are closely linked with R&D support policies, forming fiscal incentives for enterprise talent development. These policies aim to cultivate and attract talent through financial assistance, with fiscal support that can immediately provide funds to enterprises, improving their liquidity. These funds are theoretically invested in the enterprise's innovation activities, thereby enhancing productivity. As innovation activities increase, innovation outcomes will enter the market more quickly, bringing new growth points and market opportunities to the enterprise, and further enhancing its overall production capacity. Finally, government talent policies are crucial for enterprises to build a talent intelligence pool and, through a mechanism of sharing risks and benefits, improve the practical application rate of innovation outcomes. This helps enterprises achieve sustained growth in total factor productivity. Based on this, a hypothesis is proposed:

2.2. Government Talent Policy Subsidies Positively Affect Enterprises' Total Factor Productivity

2.3. Knowledge Spillover Effects

Knowledge spillover is an important way for enterprises to acquire resources, and its economic and technological effects are crucial guarantees for the conduct of enterprise innovation activities. Research by Isabel and Marta shows that a certain degree of spillover effects can promote the development of innovation activities among enterprises in science parks and enhance their innovation returns. Unlike innovation willingness, innovation capability is a relatively objective existence. Some scholars believe that "knowledge spillover constitutes the essential characteristic of cluster innovation capability," and spillover effects can enhance enterprises' innovation capability. Some scholars have used statistical data from the United States, the United Kingdom, Japan, France, and Germany to analyze the relationship between intangible assets and productivity, and the results indicate that knowledge spillover effects promote the enhancement of

innovation capability in technology-intensive industries. Through knowledge spillover, enterprises can develop new products or services, expand market share, reduce unit costs, and improve overall productivity. With the development of the digital economy, enterprise digital transformation can enhance production and management efficiency through information technology, promote data-driven decision-making, and thereby improve TFP. The hypothesis of the mediating role of enterprise knowledge spillover is proposed:

H2: Internal knowledge spillover within enterprises plays a mediating role between government talent policy subsidies and enterprise total factor productivity.

2.4. Talent Agglomeration Effect

First, generating scale effects. Endogenous growth theory indicates a high correlation between population size and innovation capability. When scientific and technological talents gather to a certain scale, they can generate scale effects and significantly influence innovation performance.

Second, generating incentive effects. Talent agglomeration and group competition often coexist. As the number of scientific and technological talents increases, competition among groups becomes more intense. Government talent policies, by investing in employee skills and work efficiency, directly enhance the production capacity of enterprises (Mao Qilin, 2019). Technically skilled employees can utilize resources more effectively, and the improvement of human capital is closely linked to enterprise innovation. Employees with professional skills are more likely to engage in research and development, bringing new concepts and technologies, while promoting a learning culture within the organization, thereby enhancing overall operational efficiency. Therefore, simultaneously, human capital investment can improve the research and development environment, thus attracting more talents. Proposing the mediating role hypothesis of enterprise human capital:

H3: Enterprise talent agglomeration plays a mediating role between government talent policy funding and enterprise total factor productivity.

2.5. Innovation-Driven Effects

Talent is the main body of innovation activities. Different types of scientific and technological talents have varying knowledge reserves and skills, leading to differential innovation performance in innovation activities and forming innovation effects. Simultaneously, innovation effects can generate accumulation advantages of innovation under the condition of talent agglomeration through self-feedback mechanisms, thereby effectively promoting enterprise development.

First, promote technological progress and efficiency improvement. Innovation upgrades often involve the introduction and application of new technologies, which can directly enhance technical efficiency in the production process. The agglomeration of scientific and technological talents within a region can drive the innovation of green technologies and the output of green new products, improving the level of technological innovation.

Second, fully realize the value of human resources. Learning and exploration activities in the innovation process help employees expand their knowledge base and enhance their understanding of industry trends and new technologies. At the same time, enterprise innovation often requires new skills and knowledge, prompting employees to participate in training and continuing education, thereby enhancing personal skills and subsequently increasing employee productivity.

Third, improve flexibility and the agglomeration of innovation resources. Innovation upgrades enable enterprises to adapt more quickly to market changes, adjust production strategies and product directions in a timely manner, and enhance responsiveness and flexibility to market changes. New knowledge and technologies can lead enterprises and industries to transform production methods, thereby driving the green transformation of the entire industry, improving regional resource utilization efficiency, and ultimately enhancing enterprise total factor productivity.

H4: Enterprise innovation efficiency plays a mediating role between government talent policy funding and enterprise total factor productivity.

3. Research Design

3.1. Research Methods

This study selects A-share listed enterprises from 2011 to 2022, employs a two-way fixed effects model, and based on the proposed hypotheses, deeply explores the potential pathways through which financing constraints and human capital levels affect enterprises.

3.1.1. Variable Definition

(1) Explained variable: Based on the research of Lu Xiaodong and Lian Yujun et al., this paper uses the LP method to estimate the total factor productivity of enterprises.

$$\ln Y_{ijt} = a0_{jt} + a1_{jt}\ln L_{ijt} + a2_{jt}\ln K_{ijt} + a3_{jt}\ln M_{ijt} + \varepsilon_{ijt} \quad (1)$$

In model (1), Y serves as an indicator of the enterprise's main revenue, measured in billions of yuan. L represents the input of enterprise labor, measured by the number of employees. K refers to the net investment in fixed assets of the enterprise, also measured in billions of yuan. M denotes the enterprise's expenditure on raw materials and services, similarly measured in billions of yuan. The subscript i corresponds to a specific enterprise, the subscript j corresponds to a specific industry, and the subscript t corresponds to a specific time.

(2) Explanatory variable: Government talent policy subsidies. This study uses the subsidies received by enterprises from government talent programs as the measurement indicator. Information on government subsidies was downloaded from the CHOICE terminal database, following the methods of Guo Yue (2018) [1] and Zhou Yan and Pan Yao (2019) [2]. Specifically, keywords such as "talent", "academician", and "doctor" were used for searching. After processing, the final explanatory variables were generated: Dum Talent, indicating whether the company received talent policy support in that year (1 if supported, 0 otherwise), and Sum Talent, representing the logarithm of the sum of funds received from talent policy support plus 1 (if no support was received, this variable is 0).

(3) Mediating variables. ① Knowledge spillover (rd). Drawing on Lin Shanlang's approach, this paper uses the full-time equivalent of R&D personnel in high-tech industries by province (autonomous regions, municipalities) to measure the degree of knowledge spillover. ② Enterprise human capital. Referring to Zhao Can et al., employees are categorized by education level: those with a college degree or above are classified as high-education-level workers (high edu), while

those with a technical secondary school degree or below are classified as low-education-level workers (low edu). ③ Enterprise innovation (ie). In existing research on enterprise innovation, there are two main methods for measuring it: first, using the ratio of R&D expenditure or R&D investment to enterprise operating revenue; second, using the number of patents as a common indicator of enterprise innovation level. The second method can directly reflect the innovation level of enterprises [3], facilitating intuitive measurement and comparison across different enterprises. Therefore, this paper adopts this method and uses the logarithm of the number of invention patents to measure enterprise innovation level.

(4) Control variables. Following Li Wenjing and Zheng Manni (2016) [4] and Zhu Desheng and Zhou Xiao (2016) [5], this paper controls for variables that affect corporate innovation, including company size (Size), asset-liability ratio (Leverage), return on total assets (ROA), among others. Additionally, annual dummy variables (Year) and industry dummy variables (Industry) are controlled for.

Table 1. Variable definitions

Variable Type	Variable Name	Variable Symbol	Variable Definition
Explained Variable	**Total Factor Productivity of Enterprises**	**TFP**	**Measured by the LP method**
Explanatory Variable	Government Talent Policy Subsidy	tal	Using government talent project subsidies received by enterprises as a measurement indicator
Mediating Variable	Knowledge Spillover	rd	Full-time equivalent of R&D personnel in high-tech industries
	Enterprise Talent Agglomeration	hedu	Education level of enterprise employees
	Innovation Efficiency	ie	Logarithm of the number of invention patents of the enterprise
	Enterprise Asset-Liability Ratio	lev	Total liabilities / Total assets (lagged by 1 period)
	Enterprise Size	size	Logarithm of the number of enterprise employees (lagged by 1 period)
	Enterprise Profitability Level	Roa	Return on assets (lagged by 1 period)
Control Variable	Top Management Team Political Connection	TMTPolitical	Number of top management team members with political connections
	State-Owned or Not	attribution1	1 if the controlling shareholder is a state-owned enterprise, 0 if not
	Largest Shareholder's Shareholding Ratio	top1	Shareholding ratio of the largest shareholder
	Marketization Intensity	market	Degree of marketization

3.1.2. Model Construction

This paper primarily investigates the impact of government talent policy subsidies on total factor productivity of enterprises, estimating the corresponding coefficients through a two-way fixed effects model and examining their direction and significance, with the main model being:

$$TFP_{i,t+1} = \beta_0 + \beta_1 Dum\Delta Talent_{it} + \beta_2 Control_{it} + \sum Industry + \sum Tear + \varepsilon_{it} \quad (2)$$

In model (2), subscripts i and t denote the firm and year, respectively. $TFP_{i,t+1}$ represents the total factor productivity of firm i in year $t+1$. Controlit is the set of firm-level control variables, and ε_{it} represents the random error term.

3.1.3. Data Sources

This paper takes China's A-share listed companies as the research object, selects the period from 2011 to 2022 for empirical analysis, and obtains 21,218 sample data after data processing. The financial information data in this paper are sourced from the CSMAR database. Data analysis is conducted using Stata 17.0.

3.2. Empirical Research

3.2.1. Baseline Regression

Table 2. Correlation Analysis

Intfp lp	Intfp lp 1	dum ta-t	lnsum -t	size	pro	attrib-n	lev	roa	top	market	numpol-y
dum talent	**0.100****	**1**									
lnsum talent	0.094***	0.993***	1								
size	-0.682**	-0.056**	-0.049***	1							
attribution	-0.325**	-0.105**	-0.105***	0.332**	-0.060***	1					
lev	-0.451*	-0.079*	-0.075***	0.426**	0.018***	0.320***	1				
roa	-0.040***	0.019***	0.021***	-0.018***	-0.033**	-0.153***	-0.401***	1			
top	-0.260**	-0.033**	-0.032**	0.227**	-0.025***	0.216**	0.049***	0.100***	1		
market	-0.021**	0.064***	0.065**	0.019*	-0.226***	-0.231**	-0.152**	0.106**	-0.022***	1	
numpolicy	0.090***	0.077***	0.077**	-0.045***	0.241**	-0.239**	-0.128**	0.064***	-0.041**	0.438***	1

3.2.2. Further Analysis

Table 3. Benchmark regression results of government talent policy fund on total factor productivity of enterprises

VARIABLES	(1)
	Baseline Regression
	lnutfp_lp
dum_talent	0.029***
	(4.19)
size	-0.099***
	(-64.55)
attribution	-0.026***
	(-6.33)
lev	-0.003***
	(-31.43)
roa	-0.007***
	(-19.35)
top	-0.001***
	(-6.52)
market	-0.005***
	(-4.90)
numpolicy	0.001***
	(3.19)
Constant	3.988***
	(125.53)
Observations	21218
Adjusted R-squared	0.524

t-statistics in parentheses *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

This paper conducts a regression on the model set in the previous section. The marginal coefficient of the explanatory variable, government talent policy funding, is 1.530, and the significance level is 1%, indicating that on average, for every one-level increase in government talent policy funding, enterprise value significantly increases by 1.530, thus validating H1.

3.2.3. Robustness Test

Replacing the Explained Variable

Table 4. Baseline Regression Results

VARIABLES	(1) Alternative Explanatory Variable lntfp_lp
lnsum_talent	**0.002*****
	(4.11)
size	-0.099***
	(-64.58)
attribution	-0.026***
	(-6.33)
lev	-0.003***
	(-31.45)
roa	-0.007***
	(-19.36)
top	-0.001***
	(-6.52)
market	-0.005***
	(-4.90)
numpolicy	0.001***
	(3.19)
Constant	3.989***
	(125.60)
Observations	21218
Adjusted R-squared	0.524

t-statistics in parentheses *** $\rho < 0.01$, ** $\rho < 0.05$, * $\rho < 0.1$

It can be found that replacing the explanatory variable DUM_Talent with SUM_Talent shows that the results remain significant and positive at the 1% level. After winsorizing the variables at 1% and 99% , the results remain significant and positive at the 1% level. The above tests confirm that the results are robust, and the research conclusions remain unchanged.

Table 5. Results of bootstrap sampling

VARIABLES	(1) Results of bootstrap sampling lntfp_lp
dum_talent	0.029***
	(5.65)
size	-0.099***
	(-52.78)
attribution	-0.026***
	(-6.16)
lev	-0.003***
	(-25.92)
roa	-0.007***
	(-14.62)
top	-0.001***
	(-6.71)
market	-0.005***
	(-5.25)
numpolicy	0.001***
	(3.00)
Constant	3.988***
	(104.30)
Replications	3000
Observations	21218
Adjusted R-squared	0.524

z-statistics in parentheses

The coefficient of the variable related to talent is 0.029 and is positive correlation, suggesting that talent has a positive impact on total factor productivity, even after the above test, the results remain robust, and the research conclusion remains unchanged.

3.2.4. Endogeneity Test

Table 6. Instrumental Variable Method Test Results

Lagged explanatory variables as instrumental variables	**(1) first stage dum_talent**	**(2) second stage lntfp_lp**
l.dum_talent	**0.297*** (29.650)**	
dum_talent		0.104*** (4.173)
size	-0.004* (-1.792)	-0.095** (-55.610)
attribution	-0.034*** (-5.359)	-0.026** (-5.431)
lev	-0.000*** (-2.699)	-0.003*** (-29.163)
roa	-0.001 (-1.208)	-0.007** (-16.792)
top	-0.000 (-0.070)	-0.001*** (-5.312)
market	0.000 (0.141)	-0.004** (-3.182)
numpolicy	0.000** (1.983)	0.000*** (2.876)
Constant	0.169*** (3.506)	3.898*** (107.816)
Observations	8,851	8,851
R-squared	0.111	0.508

t-statistics in parentheses *** $\rho < 0.01$, ** $\rho < 0.05$, * $\rho < 0.1$

From the first stage, at the 1% level, the estimated coefficient is significantly positive at 0.297, indicating a strong correlation between the instrumental variable and the explanatory variable dum_talent. In the second stage, the lagged one-period estimated coefficient is 0.104, indicating (at the 1% level, significant and positive, showing that after instrumental variable adjustment, talent has a significant positive impact on total factor productivity.

3.2.5. Heterogeneity Analysis

(1) Heterogeneity of Firm Size

Table 7. Results of Heterogeneity Test for Firm Size

VARIABLES	(1) High Size Group (Above Mean)	(2) Low Size Group (Below Mean)
	lntfp_lp	lntfp_lp
dum_talent	0.024***	0.027***
	(2.01)	(3.43)
size	-0.118***	-0.063***
	(-42.22)	(-16.62)
attribution	-0.019***	-0.038***
	(-3.03)	(-7.24)
lev	-0.004***	-0.003***
	(-19.94)	(-25.08)
roa	-0.011**	-0.005**
	(-16.86)	(-12.86)
top	-0.001***	-0.001***
	(-3.13)	(-5.08)
market	-0.007**	-0.005***
	(-4.11)	(-3.23)
numpolicy	-0.003	0.001**
	(-0.36)	(4.52)
Constant	4.484***	3.229***
	(71.79)	(40.39)
Observations	5,153	5,496
Adjusted R-squared	0.432	0.215

t-statistics in parentheses *** $p < 0.01$, ** $p < 0.05$, $^{*}p < 0.1$

Comparing small-scale enterprises with large-scale enterprises, it can be found that the impact coefficient of government talent policy subsidies on small-scale enterprises is positive, at 1.186, while the impact coefficient on large-scale enterprises is positive, at 1.274, indicating that government talent policy subsidies have a greater effect on large-scale enterprises than on small-scale enterprises. Large-scale enterprises often receive more policy support due to their importance in the national economy and stronger resource integration capabilities. Large-scale enterprises typically hold leadership positions in their industries, and government talent policy subsidies can generate greater industry-wide spillover effects through these enterprises, enabling the integration of supply chain resources. Government subsidies can promote the upgrading and development of the entire industrial chain.

(2) Heterogeneity across Eastern, Central, and Western Regions

Table 8. Results of Enterprise Scale Heterogeneity Test

VARIABLES	(1) Eastern Intfp_lp	(2) Central Intfp_lp	(3) Western Intfp_lp
dum_talent	**0.029*** (3.38)**	**0.013*** (0.92)**	**0.010** (0.56)**
size	-0.101*** (-53.61)	-0.090*** (-25.42)	-0.101*** (-26.51)
pro	0.001** (2.03)	0.001 (1.28)	0.000 (0.39)
attribution	-0.035*** (-6.63)	-0.008 (-0.89)	0.006 (0.67)
lev	-0.003*** (-26.12)	-0.003** (-11.23)	-0.002*** (-10.93)
roa	-0.007*** (-14.04)	-0.007*** (-8.92)	-0.006*** (-8.39)
top	-0.001* (-4.00)	-0.001** (-2.04)	-0.001** (-4.19)
market	0.011*** (6.18)	0.003 (0.60)	-0.011*** (-3.30)
numpolicy	0.001*** (3.39)	0.002*** (4.56)	0.006*** (7.01)
Constant	3.889*** (96.02)	3.693** (48.19)	4.021* (50.00)
Observations	7,176	1,829	1,469
Adjusted R-squared	0.556	0.459	0.500

t-statistics in parentheses *** $\rho < 0.01$ ** $\rho < 0.05$ * $\rho < 0.1$

Compared to the eastern, western, and central regions, the impact is more pronounced in the eastern region, where talent has a significant positive effect on total factor productivity at the 1% level. This may be because the eastern region typically has a more developed economy, with better infrastructure and market systems, which may provide talent with better development opportunities and incentive mechanisms, thereby more effectively promoting the improvement of total factor productivity.

Table 9. Test results of heterogeneity in enterprise nature

	attribution=1	attribution=0
	y6	y7
VARIABLES	lntfp_lp	lntfp_lp
dum_talent	0.028***	0.027***
	(1.91)	(4.04)
size	-0.099***	-0.094**
	(-43.03)	(-46.54)
pro	0.005**	-0.002*
	(5.77)	(-0.26)
lev	-0.003***	-0.004**
	(-16.01)	(-31.42)
roa	-0.006*	-0.008***
	(-9.99)	(-19.06)
top	-0.001**	-0.000
	(-6.23)	(-1.25)
market	-0.008***	-0.003**
	(-4.17)	(-2.28)
numpolicy	0.001**	0.003***
	(1.88)	(2.84)
Constant	3.972***	3.883**
	(82.31)	(91.71)
Observations	5,313	5,336
Adjusted R-squared	0.446	0.518

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

According to the ownership attributes of enterprises, the samples are divided into state-owned enterprises and non-state-owned enterprises. It can be found that the influence coefficient of government talent policy support on state-owned enterprises is positive, and the influence coefficient on non-state-owned enterprises is also positive, that is, the influence of government talent policy support on non-state-owned enterprises is greater than that on state-owned enterprises. This is mainly because non-state-owned enterprises have obvious advantages in market competition, innovation-driven development, and flexibility in resource allocation. These advantages enable government funding to exert greater economic and social benefits in non-state-owned enterprises. The influence of talent funding provided by the government in the private sector often exceeds its effect in the state-owned sector. The reason lies in the fact that private enterprises usually have outstanding advantages in market competition, innovation promotion, and the adaptability of resource allocation (Guo Jinghua et al., 2024) [20]. Compared with state-owned enterprises, non-state-owned enterprises usually rely more on innovation to gain market advantages. Government talent policy support can effectively promote their R&D investment and technological innovation. Non-state-owned enterprises often face more intense market competition, and government talent policy support can significantly enhance the competitiveness of these enterprises. Non-state-owned enterprises are usually more flexible in resource allocation and can respond quickly to market changes. The intervention of government talent policy funding can accelerate this process. It is precisely these strengths that make it easier for government funding in private enterprises to maximize its economic and social benefits.

3.2.6. Mechanism Test

(1) Knowledge Spillover

Table 10. Mechanism Test of the Impact of Knowledge Spillover on Total Factor Productivity of Enterprises

VARIABLES	**(1)**	**(2)**
	y15	**R&D**
	lnftp lp	lnrd
dum_talent	0.029***	0.049***
	(4.19)	(-3.02)
size	-0.099***	-0.081**
	(-64.55)	(-20.77)
pro	0.001**	-0.007***
	(5.57)	(-11.29)
attribution	-0.026***	0.036**
	(-6.33)	(3.55)
lev	-0.003**	0.003***
	(-31.43)	(11.17)
roa	-0.007***	0.006**
	(-19.35)	(7.22)
top	-0.001**	0.001**
	(-6.52)	(4.35)
market	-0.005**	0.389***
	(-4.90)	(145.15)
numpolicy	0.000**	0.009**
	(3.19)	(24.62)
Constant	3.988***	10.463*
	(125.53)	(127.83)
Observations	21218	20,330
Adjusted R-squared	0.524	0.649

t-statistics in parentheses *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

At the 1% level, talent agglomeration (dum_talent) has a direct positive effect on total factor productivity and also a

positive effect on R&D investment. This indicates that talent agglomeration may play a mediating role between government talent policy subsidies and enterprise total factor productivity, that is, H2 is verified. Government talent policy subsidies may promote talent agglomeration, thereby increasing enterprise R&D investment, and ultimately improving enterprise total factor productivity.

(2) Enterprise Talent Agglomeration

Table 11. Mechanism Test of the Impact of Enterprise Talent Agglomeration on Enterprise Total Factor Productivity

VARIABLES	(1)	(2)
	y11	y12
	Intfp lp	College degree or above
dum_talent	0.029***	0.130***
	(4.19)	(4.35)
size	-0.099**	0.633***
	(-64.55)	(87.87)
pro	0.001***	0.009***
	(5.57)	(7.74)
attribution	-0.026***	0.183***
	(-6.33)	(9.92)
lev	-0.003***	0.003**
	(-31.43)	(7.51)
roa	-0.007***	0.030***
	(-19.35)	(18.70)
top	-0.001**	0.002***
	(-6.52)	(2.92)
market	-0.005***	-0.021***
	(-4.90)	(-4.20)
numpolicy	0.001***	-0.009**
	(3.19)	(-13.93)
Constant	3.988**	-7.177***
	(125.53)	(-47.73)
Observations	21218	20,330
Adjusted R-squared	0.524	0.399

t-statistics in parentheses *** $\rho < 0.01$, ** $\rho < 0.05$, * $\rho < 0.1$

It can be found that the coefficient of the impact of government talent policy funding on the SA index is significantly positive, thus H3 is verified, and enterprise human capital plays a mediating role between government talent policy funding and enterprise total factor productivity. By allocating talent policy funds to employee development, the government helps enterprises enhance team professional capabilities and productivity, promoting the improvement of total factor productivity (Chen Xinming et al., 2020)[6]. This support not only improves the financial status and industry reputation of enterprises but also enhances their ability to attract industry elites. With government financial assistance, enterprises can shape a proactive, innovation-driven, and responsible corporate image, attracting top talent (Jiang Fuxiu et al., 2016)[7]. Overall, the optimal allocation of human capital can facilitate the development of new products, accelerate the absorption and development of knowledge, improve the practical conversion rate of innovation outcomes, bring new profit growth points for enterprises, and thereby promote enterprise innovation.

(3) Enterprise innovation efficiency

Table 12. Mechanism test of the impact of enterprise human capital level on enterprise total factor productivity

VARIABLES	(1)	(2)
	Intfp_lp	Mediating IE
dum_talent	0.029***	0.026***
	(4.19)	(11.40)
size	-0.099***	0.012**
	(-64.55)	(22.21)
pro	0.001***	0.001***
	(5.57)	(6.00)
attribution	-0.026**	-0.012***
	(-6.33)	(-8.48)
lev	-0.003***	-0.000**
	(-31.43)	(-5.95)
roa	-0.007**	0.001***
	(-19.35)	(5.07)
top	-0.001***	-0.000***
	(-6.52)	(-3.33)
market	-0.005**	0.004**
	(-4.90)	(10.58)
numpolicy	0.001***	-0.003***
	(3.19)	(-6.01)
Constant	3.988**	-0.165***
	(125.53)	(-14.60)
Observations	21218	20,330
Adjusted R-squared	0.524	0.044

t-statistics in parentheses *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

Taking corporate innovation efficiency as the third mechanism, it can be found that at the 1% level, talent (dum_talent) funding has a significant positive impact on the mediating variable (coefficient of 0.026), i.e., H4 is validated, indicating that talent may promote innovation input. Talent has a direct positive impact on total factor productivity and may also indirectly affect productivity by promoting innovation input (Inie). However, according to the provided data, the direct impact of talent on innovation input is positive, but the direct impact on total factor productivity is greater.

4. Conclusion and Implications

4.1. Research Conclusions

This study takes corporate financing constraints and corporate human capital levels as mediating variables. Through a series of analyses, it can be found that: government talent policy funding has a positive impact on the dependent variable, total factor productivity of enterprises; the effect of government talent policy funding on non-state-owned enterprises is greater than that on state-owned enterprises; the effect of government talent policy funding on large-scale enterprises is greater than that on small-scale enterprises; the effect of government talent policy funding on enterprises in the eastern region is greater than that on enterprises in the central and western regions.

4.2. Research Implications

This study can provide references for relevant departments, with specific suggestions including the following aspects:

First, for the government, when funding enterprises, it should formulate market-adaptive funding strategies based on the enterprise's scale, type, and market environment, ensuring that policies can meet the specific needs of different enterprise groups. It should consider the type of enterprise ownership, as non-state-owned enterprises benefit more from talent policies; therefore, the government should moderately focus on funding and supporting such enterprises, while also paying attention to enterprises of different sizes and providing customized training programs for them.

Second, for enterprises, they should proactively understand and apply for various talent policy funding introduced by the government to obtain government support, including various funds and related resource assistance. In actual operations, they should combine their own characteristics and development goals to customize the most suitable talent development plan for enterprise growth, ensuring the maximization of the utilization efficiency of government funding. They should strengthen employee training, focus on improving employees' capabilities, and ultimately help enhance the enterprise's production efficiency and product quality.

Third, for talents, they should actively understand the government's talent policies and talent projects to fully apply for corresponding projects, utilize government-funded resources and development opportunities, and continuously improve their comprehensive strength, including professional skills and knowledge levels. At the same time, they should actively participate in research and development projects of enterprises or research institutions, enhance their innovation ability and practical experience through practice, and cultivate interdisciplinary and cross-domain capabilities to make themselves more competitive in a changing work environment.

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