Research Article

Influencing Factors and Multiple Paths of Entrepreneurship in High-Tech Enterprises: A Fuzzy-Set Qualitative Comparative Analysis of Configuration

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This paper selects 93 high-tech enterprises listed in 2019 in China's A-share market and comprehensively integrates six variables on three levels, namely, internal guarantee, internal incentives, and external institutions, through fuzzy-set qualitative comparative analysis (fsQCA). On this basis, a discussion was conducted about the multiple concurrent factors and various paths stimulating entrepreneurship. The results show that (1) a single factor does not necessarily lead to high entrepreneurship; (2) high entrepreneurship could be stimulated by four paths: driving mechanism with salary incentive as the core and market mechanism as the support, driving mechanism with government intervention and market mechanism as synergistic drivers, driving mechanism with equity and control power as dual drivers under external institutions, and driving mechanism with external institutions and internal incentives as joint drivers; (3) market competition plays an indispensable role in stimulating entrepreneurship, while management capability suppresses entrepreneurship; (4) nonhigh entrepreneurship could be generated by five paths, which are asymmetric relative to the configurations of high entrepreneurship.

1. Introduction

Recent decades have witnessed the burgeoning of Internet technology and related industries. In the booming high-tech industry, entrepreneurship, i.e., the spirit of innovation, flourishes, as evidenced by the deployment of new supply-demand chains, the organization of new technological processes, the pilot of new business models, and the opening of new consumer markets. The rising waves of innovation and entrepreneurship vividly depict how entrepreneurs take on challenges and pursue innovation.

The current era is featured by volatility, uncertainty, complexity, and ambiguity (VUCA). Entrepreneurship becomes the secret of sustained growth of high-tech enterprises and directly motivates the enterprises to make cutting-edge innovations. Instead of a personality, entrepreneurship is an action [1].

Entrepreneurs are rational actors based on institutions, seeking profits under the framework of institutions. They follow the trend under the constraints of institutional environment. Entrepreneurship requires a suitable institutional space. In essence, the institutional framework is a set of internal incentives, which determines the direction and density of entrepreneurial activities [2]. In the institutional environment, the changes in the internal incentives induce the configuration direction, degree of release, and evolution of entrepreneurship and thus affect the innovative and entrepreneurial behaviors of entrepreneurs [3]. In short, the internal system of an enterprise needs to shift its focus from agency cost to providing entrepreneurs with human capital incentives. In the meantime, the uncertainty of external institutions tests entrepreneurs' courage to change and innovate all the time.

In the future, the era of digital intelligence will enter a new stage of development, and the industrial Internet will bring new market growth space. Entrepreneurship is a must for the rising tide of technological innovations. Properly combining the internal and external institutional drivers of entrepreneurship is of great practical significance to create a healthy growth environment for entrepreneurs, enhance the internal vitality and creativity of high-tech enterprises, and achieve high-quality development of high-tech industries.

In the literature, the influencing factors of the entrepreneurship of high-tech enterprises are mostly studied on three levels: attributes of personal potential, internal incentives within enterprises, and external institutions. Most of the previous studies focus on measuring the net effect of individual influencing factors. But a few have investigated the coupling between multiple factors.

This paper believes that entrepreneurs are gifted to cope with external uncertainty. To achieve success, the internal guarantee of management capability is indispensable. In addition, the internal incentives within enterprises and external institutions also serve as key drivers. Against this backdrop, entrepreneurship must act under the premise of following the institutional environment. In this paper, internal guarantee, internal incentives, and external institutions are refined into six factors for deep consideration: management capability, control power incentive, equity incentive, salary incentive, government intervention, and market competition. Then, a qualitative comparative analysis (fsQCA) was carried out to comprehensively analyze the relationship between the multiple paths of the six antecedent factors and entrepreneurship, aiming to find the optimal element combination that stimulates entrepreneurship. This research attempts to answer the following questions: what are the paths that stimulate entrepreneurship of high-tech enterprises? Which paths can stimulate a high level of entrepreneurship? Which paths can suppress entrepreneurship?

2. Literature Review and Model Construction

2.1. Literature Review.
Undoubtedly, various factors could affect the behavior of entrepreneurs, which in turn impacts the formation and release entrepreneurship. Since entrepreneurs are the subjects of entrepreneurship, many scholars have focused on the individual features of entrepreneurs [4–6].

Admittedly, entrepreneurship is premised on the necessary individual features. However, entrepreneurs, as the soul of technological innovation, cannot release a huge amount of spiritual energy, unless the external institutions are suitable. The institutional environment interacts with the individual features of entrepreneurs, in order to affect the behavior of entrepreneurship [7].

The numerous studies on external institutions mainly unload around single factors such as government intervention [8], market environment [3], finance [9], law [10], and the composite factor of business environment [11, 12]. A positive institutional environment can improve entrepreneurial conditions and release the "positive energy" contained in entrepreneurship, which will act on entrepreneurship [13].

In addition, some scholars emphasized on the internal institutions of the enterprise. Li and Wang [14] held that the innovation spirit of entrepreneurs should be cultivated from the perspective of corporate governance, aiming to maximize the innovation utility of entrepreneurs. Li et al. [15] suggested that the traditional corporate governance stresses the control power and neglects the significance of enterprises in entrepreneurial creation of rents. Some scholars mentioned the influence of salary and equity on entrepreneurship, but failed to achieve fruitful results.

In summary, the previous research on entrepreneurship mostly concentrates on one of the following aspects: individual factors, internal governance, internal incentives, and external institutions. However, entrepreneurship could be affected by a dazzling array of factors. It is a complex process under the coupling effect of multiple factors. Entrepreneurship cannot be interpreted systematically with a single factor or by simply adding up the effects of single factors. To motivate entrepreneurship, it is necessary to analyze its various drivers on multiple levels and in multiple dimensions, while considering the dynamicity and synergy between the relevant factors.

QCA method was developed by Ragin, a famous sociologist. Once it was launched, it has attracted extensive attention. This method was mainly used in political science and sociology at the beginning of its establishment and has been more and more used in management in recent years [16–18]. Unlike the mainstream single causal model, QCA breaks the assumption of additivity between variables and highlights the overall consideration of antecedents.

FsQCA is a type of QCA. Considering that it can deal with both kind problems and degree problems and has the advantage of dealing with diversified conditional data types [19]. With the aid of fsQCA, this paper summarizes six factors on three levels, namely, management capability, internal incentives, and external institutions, and tries to look for effective paths that stimulate the entrepreneurship of high-tech enterprises from a fresh perspective.

2.2. Model Construction

2.2.1. Management Capability and Entrepreneurship.
Li et al. [20] found that entrepreneurs form the spirits of learning, cooperative, risk-taking, and responsibility through resource acquisition and risk evaluation and thus enhance their management capability. With a strong management capability, an enterprise can make correct decisions in information collection, judgement, and processing, grasp the uncertain direction of the market, and effectively protect and nurture entrepreneurship [21].

In general, a capable management should take a proactive attitude towards innovation. After all, they are able and confident to engage in risky activities, master technologies, understand industry trends, and make good predictions of market demand. Hence, innovation activities by the capable management are relatively meaningful and substantive [22].

Nevertheless, a capable management tends to be risk-averse. They are very cautious about innovation activities and prefer to invest a few fixed assets in a short cycle or maintain a positive cash flow. As a result, a strong management capability might suppress the innovation investment and innovation performance of enterprises [23]. Taking high-tech enterprises as samples, Deng and Li [24] discovered that management capability could inhibit corporate innovation investment.

Entrepreneurs are obliged to handle uncertainties. Besides the courage to make "disruptive innovations," entrepreneurs must have powerful risk-hedging ability to resist environmental impact and ensure enterprise survival. Management capability can effectively balance and support entrepreneurs' spirit of adventure and turn their dreams into reality.

2.2.2. Internal Incentives and Entrepreneurship

(1) Control Power Incentive and Entrepreneurship. Nowadays, entrepreneurs dominate the governance of more and more enterprises. The power space directly affects how well entrepreneurs untap their potentials. For high-tech enterprises with a strong demand for innovation, entrepreneurs must seize the key resource of control power. Otherwise, they will not have the autonomy in management, not to mention pushing forward innovation activities through exclusive use of corporate assets.

In essence, the control power is an incentive that satisfies the needs of entrepreneurship. It is fundamental to the realization of entrepreneurship [25]. With control power, entrepreneurs can fully exert their talents, control others, realize their own goals, and obtain psychological benefits from that power. According to the upper echelon theory, senior directors eyeing entrepreneurship are inclined to use their power to create values for the enterprise, rather than seek personal wealth [26].

In high-tech enterprises, entrepreneurship is a high-level production factor in value creation. To ensure effective returns of investment, venture capitalists often entrust entrepreneurs with more control power, allowing the latter to fully pursue entrepreneurship and untap their potentials. This is the result of the game between monetary capital and human capital in the new economic era. Often, entrepreneurship is protected by optimizing the configuration of control power. In terms of equity structure, the optimization turns "same share with the same right" into "unequal voting rights." For example, some high-tech enterprises design their governance structure by listing on both A-share and B-share markets or choosing the copartnership system. This echoes with the global trend of corporate governance: the shift from traditional shareholder-centrism to entrepreneur-centrism.

(2) Equity Incentive and Entrepreneurship. Technological innovation is a long-term process. Equity incentive provides enterprises with a long-term tool to motivate and retain management and core employees. The equity incentive system signifies the people-first reorientation of business management. The aim of this incentive is to enhance the sense of ownership through interest sharing, boost the internal driving force of

persistent innovation, and shape the enterprise into a community of shared interest. Gu [27] empirically discovered that the development of private high-tech enterprises often depends on the human capital value of entrepreneurs. This feature makes the long-term tool of equity incentive, an effective means to stimulate entrepreneurship. Su [28] empirically demonstrated the risk-incentive effect of equity incentive, forcing the management to focus on long-term corporate interest.

Nonetheless, when it is adopted by most high-tech enterprises, equity incentive might cease to be effective if its system is not updated timely as in Huawei. A stationary system of equity incentive will make senior directors or core employees complacent with equity income and stop pursuing entrepreneurship. Li and Zhang [29] pointed out the inverted U-shaped relationship between equity incentive and risk-taking of senior directors: before reaching a critical point, the shareholding by senior directors can significantly reduce the agency cost, bolster the risk-taking spirit of the executive team, and thus contribute to entrepreneurship. Once reaching that point, the senior directors will be risk-averse and reluctant to pursue entrepreneurship.

(3) Salary Incentive and Entrepreneurship. Salary is the most direct chip that fulfills the exchange between enterprises and the human capital of entrepreneurs. The capability and contribution of an entrepreneur can be best measured by a fair and reasonable salary. A high salary, as a fair compensation for capabilities or qualities, gives rare talents the feeling that their work is worthwhile, brings them the basic sense of security, and indirectly results in a sense of accompaniment. If the salary mechanism is fair and reasonable, the senior directors will not easily leave, and their team will become more stable [30].

In particular, the returns of corporate innovation have a certain delay and uncertainty. Monetary salary is an insurable compensation for risk-taking senior directors. Salary increases could make up for the loss of entrepreneurs, as they give up short-term income for innovation investment and encourage enterprises to invest in some risky projects, providing a way to suppress the risk-aversion of enterprises.

Li and Song [31] manifested that the monetary salary incentive for senior directors has a significant positive relationship with research and development (R&D) investment. A high salary and performance sensitivity will lead to more risky decisions, and more R&D investment [32]. This is particularly true for high-tech enterprises, which advocate the engineering culture. Their reward systems tend to be simple and crude. The motivation of high salary is not to be underestimated. On the dynamicity of corporate development cycle, Gu et al. [33] investigated the relationship between salary incentive model and corporate innovation investment and learned that monetary salary incentive is more effective than equity incentive.

2.2.3. External Institutions and Entrepreneurship

(1) Government Intervention and Entrepreneurship. Government intervention in innovation activities is an important supplementary solution to market failure and

insufficient corporate innovation [34]. Owing to the need for sustained innovation, high-tech enterprises need to be aided by reasonable and stable subsidies from the government, which help to lower innovation cost and boost innovation input. Because economic growth is an appraisal item of government performance, many local governments in China support innovation by setting up various high-tech development zones and organizing largescale investment promotion activities. All these measures promote the growth of entrepreneurship.

However, how government intervention affects entrepreneurship remains a controversial topic. Zhang [35] proposed that excessive government intervention leaves enterprises a space for rent-seeking, which suppresses entrepreneurship. Shao [36] learned that entrepreneurship would be suppressed by distorted government-enterprise relationship and excessive intervention of the market by local governments. The excessive intervention must be reduced to ensure the generation and growth of entrepreneurship.

In factor, entrepreneurship encouragement is a systematic work, calling for the transformation of both government and market. As an invisible hand, government intervention is undergoing a gradual institutional reform. In recent years, many high-tech breakthroughs in China are driven by government supports. The government provides more and more favorable policies and infrastructure for high-tech enterprises to pursue innovation. These are essential supports and promoters for active entrepreneurship.

(2) Market Competition and Entrepreneurship. High-tech industrial innovation is dominated by market forces. The market mechanism follows the logic of autonomy. The flow and allocation efficiency of resources are achieved through the economic governance in the form of the market competition between products and factors. Because innovation activities are naturally disruptive, market competition will eliminate less innovative low-tech enterprises and transfer their market shares to highly innovative high-tech enterprises [37]. The transfer helps to divert resources to entrepreneurs and better incentivize them to pursue innovation. In this way, entrepreneurs are guided to invest resources to innovation activities that create wealth.

Marketization weakens the distortion of government intervention on resource allocation and, to a certain extent, impedes corrupt officials to seek rent, using key resources [38]. Besides, marketization eliminates the differential treatments to enterprises in market entry, credit supply, and interest and protects the creativity of private entrepreneurs.

In a region with intense market competition, the market plays a great role in resource allocation and enhances the ability of private entrepreneurs to configure production factors in the market, creating a good atmosphere of innovation and entrepreneurship. Yang et al. [39] discovered that, in a region with strong market competition, the factor market is not highly distorted, and government subsidies greatly promote corporate innovation performance. Liu et al. [40] held that tax incentive can better stimulate innovation input in a highly marketized region.

Through the above analysis, this paper views management capability as the internal guarantee of entrepreneurship and identifies six factors on the three levels, namely, management capability, internal incentives, and external institutions. Then, a thorough discussion was held to analyze the relationship between entrepreneurship and the multiple paths composed of the six antecedent factors, looking for the most effective element combination for entrepreneurship. The theoretical model is presented in Figure 1.

It should be noted that subject to the complex linking between the six conditions and the lack of analysis on the configuration of entrepreneurship in existing literature, this paper can only discuss the direct relationship between the six factors and entrepreneurship from three levels. There is no doubt that these six direct connections are only a subset of all configurations. In addition, the existing research conclusions on the above relationship are still inconsistent or even contradictory. This also promotes this paper to adopt a new research paradigm to further explore the formation path of entrepreneurship in high-tech enterprises.

3. Methodology

3.1. Method Selection. Our research approach, fsQCA, differs from the mainstream single causal model, in which it searches for the most effective antecedent combination that leads to the outcome variable. fsQCA stresses the complexity of antecedent variables, rather than looking for the best casual variable that best fits the data. From the angle of configuration, this approach emphasizes on the interdependence and complexity of causal variables, which helps to explore the complex antecedent derivers of the entrepreneurship in high-tech enterprises, as well as the multiple equivalent paths that stimulate high and nonhigh entrepreneurships.

3.2. Data Collection. Compared with enterprises in other industries, high-tech enterprises are active in innovation and have more practical significance about entrepreneurship. Referring to the Catalog for the Statistics and Classification of High-Tech Industries (China's National Bureau of Statistics), Industry Classification Standard 2012 (China Securities Regulatory Commission), and Li and Liu's [41] definition of high-tech enterprises, four types of high-tech enterprises were selected from China's A-share listed high-tech enterprises in 2019: (1) instrument and meter manufacturers, (2) medicine manufacturers, (3) computer, communication, and other electronic equipment manufacturers, and (4) software and information technology service providers. Note that the high-tech enterprises are all recognized by the High-Tech Enterprise Accreditation and Management Website.

The research data were mainly collected from China Stock Market and Accounting Research (CSMAR) Database and National Bureau of Statistics. The special treatment (ST), delisting risk (*ST), and particular transfer (PT) enterprises were removed, because their data might not be authentic or continuous. Finally, 93 enterprises were taken as research
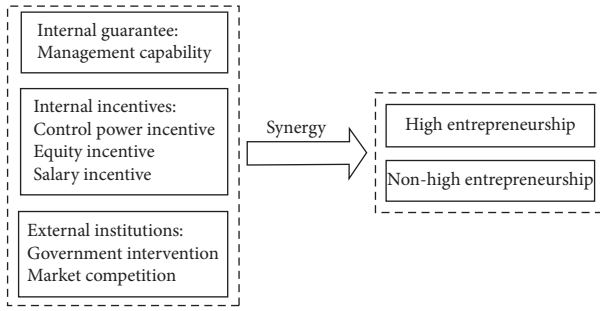
FIGURE 1: Analysis model: configuration effects of antecedent variables on entrepreneurship. Source: plotted by the authors.

samples. The sample size reaches the medium level required by fsQCA.

3.3. Variable Measurement

3.3.1. Outcome Variable. Although the definition of entrepreneurship varies with the time, innovative spirit is always recognized as a core feature of entrepreneurship. Drawing on the measuring methods of Wen and Feng [42], this paper measures entrepreneurship as the ratio of R&D fee to sales.

3.3.2. Antecedent Variables

(1) Management Capability. Management capability was measured by data envelopment analysis (DEA) Tobit model. Firstly, the operating efficiency of an enterprise was calculated through DEA:

$$\text{Maxeff} = \frac{\text{sales}}{x_1 \text{Cost} + x_2 \text{Sama} + x_3 \text{Instan} + x_4 \text{PPE} + x_5 \text{GW} + x_6 \text{R\&D}},$$
(1)

where sales is the main business income, the output of DEA; cost is the main business cost; Sama is the sum of management fee and sales fee; Instan is the net value of intangible asset; PPE is the net value of fixed assets; R&D is the R&D fee; and GW is the net goodwill. The parameters in the denominator are the inputs of DEA.

Next, the Tobit model was adopted to separate the efficiency generated by the enterprise itself and the efficiency generated by management capability from the operating efficiency:

$$\text{eff} = a_0 + a_1 \text{size} + a_2 \text{ms} + a_3 \text{cfi} + a_4 \text{age} + a_5 \text{hhi} + e, \quad (2)$$

where size is corporate scale; ms is the market share; cfi is the free cash flow; age is the years of being listed; and hhi is the concentration ratio of industry. These five parameters are factors of the enterprise itself.

(2) Control Power Incentive. Inspired by Zhao et al.'s [43] measurement of senior directors' control power, this paper chooses five indices to assess control power incentive from two dimensions: control power structure, and ownership structure: ① Chief Executive Officer (CEO) duality (if the CEO also serves as the Chairman, CEO duality = 1; otherwise, CEO

duality = 0); ② CEO working part time outside (WPO) (if the CEO works part time outside, WPO = 1; otherwise, WPO = 0); ③ board size, which is measured by the number of directors; the more the directors, the less concentrated the board power, and the greater the power of the management; ④ CEO tenure, which is measured by the years of the term of the CEO; ⑤ equity dispersion, which is measured by dividing the total shares held by the second to the tenth largest shareholders with the shares held by the largest shareholder; the greater the ratio, the more dispersed the equity, and the greater the control power of the management. Referring to Zhou et al. [44], the five indices were weighted by entropy method to obtain the composite index of senior directors' control power.

(3) Salary Incentive and Equity Incentive. The salary incentive was measured by the log of the total salary of the top three senior directors. The equity incentive was measured by the ratio of the shares held by senior directors to the total stock issue of the enterprise.

(4) Government Intervention and Market Competition. Government intervention was measured by the ratio of local fiscal expenditure to local gross domestic product (GDP). The market environment was described by the level of marketization, which was measured by industry concentration. The latter was computed with the industry Herfindahl–Hirschman Index (HHI). The greater the HHI, the weaker the market competition. Hence, the reciprocal of the HHI was adopted for data processing. The main variables are explained in Table 1.

3.4. Variable Calibration. The variables were calibrated into a fuzzy set through direct calibration. Referring to Fiss et al. [45], the three anchor points for the full membership, intersection points, and full nonmembership between the outcome variable and the six antecedent variables were set as the upper quartile (75%), the mean of upper and lower quartiles, and the lower quartile (25%) of the samples. The nonhigh entrepreneurship was calibrated, using the nonset of high entrepreneurship. The calibration anchor points of each variable are displayed in Table 2.

4. Empirical Analysis

4.1. Necessity Analysis on Conditions. Before the fuzzy set truth table analysis, the necessary conditions of each antecedent variable should be tested, to prevent them to be canceled out by simple solutions. This paper performs the necessary condition analysis through fsQCA. As shown in Table 3, the consistency of the necessity of every single condition was smaller than 0.9. The low consistency indicates that the condition is not necessary for entrepreneurship. Hence, a single antecedent variable has a weak explanatory power of entrepreneurship.

4.2. Configuration Analysis. The data on the 93 listed private high-tech enterprises were processed on fsQCA software. Then, the conditional configuration leading to high and nonhigh entrepreneurships was analyzed, revealing the

TABLE 1: Definition of main variables.

Type	Name	Sign	Measurement
Outcome variable	Entrepreneurship	ES	R&D fee/sales
	Management capability	MA	Obtained by DEA-Tobit
	Control power incentive	EC	Computed by assigning different weights to the five indices by entropy method
Antecedent variables	Equity incentive	Mh	Shares held by senior directors/total stock issue
	Salary incentive	Pay	Log of the total salary of the top three senior directors
	Government intervention	Gov	Local fiscal expenditure/local GDP
	Market competition	Comp	Reciprocal of industry HHI

Note: the signs of the outcome variable and antecedent variables are mostly the abbreviations of the English names of the variables. Data source: the data were organized by the authors.

TABLE 2: Values of anchor points.

Set	Fuzzy set calibration		
	Full nonmembership	Intersection points	Full membership
Entrepreneurship	0.050	0.090	0.130
Management capability	−0.064	−0.011	0.043
Control power incentive	0.005	0.012	0.019
Salary incentive	14.294	14.668	15.042
Equity incentive	0.009	0.107	0.204
Government intervention	0.161	0.185	0.209
Market competition	19.916	24.111	28.305

TABLE 3: Necessity test of single conditions.

Antecedent variable	Outcome variable	
	High entrepreneurship	Nonhigh entrepreneurship
Management capability	0.439	0.671
~Management capability	0.660	0.411
Salary incentive	0.590	0.470
~Salary incentive	0.501	0.606
Equity incentive	0.532	0.451
~Equity incentive	0.555	0.622
Control power incentive	0.484	0.428
~Control power incentive	0.599	0.641
Government intervention	0.604	0.464
~Government intervention	0.472	0.600
Market competition	0.731	0.462
~Market competition	0.320	0.580

composite paths of elements that stimulate high entrepreneurship. Considering the distribution of sample data, the original consistency threshold was set to 0.8, the frequency threshold to 1, and proportional reduction in inconsistency (PRI) to 0.7. In addition, the intermediate solution and simple solution were adopted to recognize the core conditions and boundary conditions. The empirical results are displayed in Table 4. It can be concluded that four configurations (S1–4) lead to high entrepreneurship, and five (NS1–5) lead to nonhigh entrepreneurship.

4.2.1. Driving Mechanisms of High Entrepreneurship

(1) Driving Mechanism with Salary Incentive as the Core and Market Mechanism as the Support. S1: Pay × Comp × ~ EC × ~ MA × ~ Gov, suggesting that a high entrepreneurship can be stimulated by the configuration with high salary incentive, high market competition, nonhigh control power, and nonhigh management capability as the core conditions and nonhigh government intervention as the boundary condition.

In the path, internal incentives and external institutions are not diverse. The free competition and profit-seeking property of the market mechanism agree with the entrepreneurs' pursuit of maximum wealth. That is, a high-tech enterprise in a highly competitive environment can stimulate a high entrepreneurship merely through the internal incentive of high salary.

Following the logic of autonomy, the market mechanism injects vigor into the free flow of production factors, promotes the regularization of corporate innovation, and boosts the innovation by entrepreneurs. As an effective monetary incentive of the enterprise, salary incentive is the manifestation of market contract mechanism within the enterprise. It is essentially a compensation for the wealth creation capability

TABLE 4: Configurations leading to high and nonhigh entrepreneurships.

	High entrepreneurship				Nonhigh entrepreneurship				
	S1	S2	S3	S4	NS1	NS2	NS3	NS4	NS5
Pay	●			●	⊗	●	⊗	⊗	⊗
Mh		⊗	●	●	⊗		⊗	⊗	●
EC	⊗	⊗	•	●	⊗	⊗	⊗		●
MA	⊗	⊗	⊗	●		●	●	●	●
Gov	⊗	●	●	●			⊗	●	⊗
Comp	●	●	●	•	⊗	⊗		⊗	⊗
Consistency	0.90	0.97	0.85	0.86	0.90	0.87	0.89	0.97	0.85
Original coverage	0.15	0.17	0.17	0.10	0.20	0.16	0.14	0.12	0.07
Unique coverage	0.11	0.13	0.08	0.02	0.06	0.11	0.08	0.02	0.05
Overall consistency	0.88				0.87				
Overall coverage	0.42				0.45				

Note: ● means the variable exists; ⊗ means the variable is missing. Large circles standard for core conditions, and small circles stand for boundary conditions. Spacings mean the variables could exist or could not exist, i.e., the presence/absence of the variables does not affect the results.

of entrepreneurs. To a certain extent, salary incentive suppresses the risk aversion of entrepreneurs. Therefore, it is important to take salary incentive as a means of exciting entrepreneurship. During the excitation, the enterprise should make monetary investment in the scare human capital.

(2) Driving Mechanism with Government Intervention and Market Mechanism as Synergistic Drivers. S2: Gov × Comp × ~ MA × ~ EC × ~ Mh, suggesting that a high entrepreneurship can be stimulated by the configuration with high government intervention, high market competition, nonhigh management capability, and nonhigh control power incentive as the core conditions and nonhigh equity incentive as the boundary condition.

This path emphasizes the importance of external institutions, that is, when the external market competition and government intervention are high, a high entrepreneurship can be stimulated, regardless of the levels of internal incentives or management capability. In fact, this is related to innovation features of high-tech enterprises. Due to continuous innovation, these enterprises are highly sensitive to external market environment and policies. The innovation chain is not complete before the products enter the market. Marketization is necessary for any innovation to yield economic benefits and pass effectiveness test. High-competitive products and factors market can inject vitality to corporate development.

The government should also play its role. Necessary policies and funds must be in place to support the R&D and commercialization of innovative industries, thereby promoting and driving innovation. Recent years has seen a boom of electric vehicles, solar energy, and cellphone and electronics in China. The rapid development of these high technologies is impossible without the efforts of the government. Without the collaboration of external institutions, even if the internal incentives are perfect, enterprises cannot smoothly implement entrepreneurial innovation nor effectively advance entrepreneurship.

(3) Driving Mechanism with Equity and Control Power as Dual Drivers under External Institutions. S3: Gov × Comp × Mh × ~ MA × EC, suggesting that a high entrepreneurship can be stimulated by the configuration with high government intervention, high market competition, high equity incentive, and nonhigh management capability as the core conditions and high control power as the boundary condition. In other words, when the enterprise is protected by external institutions like high market competition and high government intervention, entrepreneurship can be effectively stimulated by the internal incentives of equity and control power.

In this path, external institutions are not enough to safeguard the continuous innovation of high-tech enterprises. The uncertainty and high risks of innovation call for long-term efforts and investment from the enterprises. Equity incentive, as a long-acting internal tool, acts as golden handcuffs in an enterprise and ensures the goals of senior directors which are consistent with the interest of shareholders. Of course, senior directors should be given necessary control power to fully unleash entrepreneurship.

(4) Driving Mechanism with External Institutions and Internal Incentives as Joint Drivers. S4: Pay × Mh × EC × Gov × Comp, suggesting that a high entrepreneurship can be stimulated by the configuration with high salary incentive, high equity incentive, high control power incentive, and high market competition as the core conditions and high government intervention as the boundary condition. In other words, on the premise of highly competitive market and high government intervention, complete internal incentives can stimulate high entrepreneurship.

In this path, the incentive factors act as a common driver, which guides innovation resources towards the productive area under a highly competitive market. The high government intervention is reflected as preferential policies for innovation, such as subsidies and tax reductions.

In addition, enterprises fully recognize the importance of human capital value of entrepreneurs and provide comprehensive incentives for culturing entrepreneurship. The short-term incentive of salary is integrated with the long-term incentive of equity. The timely monetary compensation gives senior directors the sense of occupational security and propels them to use their innovation talents on long-term strategic planning for the enterprises. Furthermore, control power incentive enables senior directors to smoothly utilize their valuable human capital value, giving full play to entrepreneurship.

The comparison between configurations S3 and S4 reveals the interplay between the various conditions:

Firstly, equity incentive and control power incentive compete each other. When one of the two conditions

does not exist, the two configurations will not appear. This means control power incentive and equity incentive have different utilities. The "golden handcuffs" effect of equity incentive can effectively curb senior directors' misuse of control power. Therefore, equity incentive and control power incentive must exist at the same time.

Second, high salary incentive and nonhigh management capability can replace each other. Although equity incentive and control power incentive can form a synergy, these two internal incentives are not enough to constitute a sufficient conditional combination of high entrepreneurship, unless guaranteed by high salary incentive and nonhigh management capability. High salary incentive makes internal incentives more complete, while nonhigh management capability prevents excessively high management capability, which may suppress entrepreneurship. However, the two guarantees need not present at the same time.

4.2.2. Driving Mechanisms of Nonhigh Entrepreneurship.
This paper also tests the five conditional configurations leading to nonhigh entrepreneurship of high-tech enterprises.

The first configuration NS1 shows that high entrepreneurship cannot be stimulated, when the enterprise lacks complete internal incentives, and the external market is not highly competitive. It is manifested in the overall lack of internal and external incentive mechanism.

The second configuration NS2 shows that, when the enterprise has a high management capability and faces a weak market competition, even if the internal incentive of high salary is available, high entrepreneurship will not be effectively stimulated, as long as the senior directors lack control power incentive. It shows that control incentive and external market competition environment are very important to stimulate entrepreneurship.

The third configuration NS3 shows that, when the enterprise has a strong management capability, an excessive risk aversion will be induced by management capability, if the internal incentives are not complete and the external government intervention is weak. This is not conducive to the cultivation of entrepreneurship. It shows that the lack of internal incentive mechanism and external lack of appropriate government intervention will also inhibit entrepreneurship.

The fourth configuration NS4 shows that, when the enterprise has a strong management capability, if the market is not competitive and internal incentives are lacking, it is difficult to realize high entrepreneurship, even if government intervention is high externally. It belongs to the lack of internal and external incentive mechanism.

The fifth configuration NS5 shows that, when the enterprise has a strong management capability and a low equity incentive and faces a weak government intervention and a less competitive market, the entrepreneurship will be low even if the control power and salary incentive are high. It also belongs to the lack of internal and external incentive mechanism.

NS1–NS5 have two points in common:

First, none of these configurations contain highly competitive market. Hence, the absence of high market competition can lead to low entrepreneurship. The degree of market competition is critical to the entrepreneurship of high-tech enterprises. If government intervention is improper, the industrial innovation ecology might degrade and the resource allocation could be distorted, which actually harms the formation and development of innovation-centered entrepreneurship.

Second, four of these configurations indicate that a high management capability brings low entrepreneurship. Therefore, the growing management capability will enhance the risk-aversion amidst an uncertain environment and increase the tendency of risk avoidance, making the enterprise more cautious and reasonable about innovation activities. To a certain extent, management capacity balances the risk-taking spirit of entrepreneurs and the ensuring risk hedging ability safeguards corporate survival.

5. Conclusions, Revelations, and Prospects

5.1. Conclusions.
Taking high-tech enterprises listed in 2019 as the samples and from the perspective of configuration, this paper carries out an fsQCA on the multiple concurrent conditions that affects entrepreneurship, focusing on three levels, namely, management capability, internal incentives, and external institutions. The main conclusions are as follows:

(1) The analysis on multifactor coupling effects reveals four paths that stimulate high entrepreneurship in high-tech enterprises: driving mechanism with salary incentive as the core and market mechanism as the support, driving mechanism with government intervention and market mechanism as synergistic drivers, driving mechanism with equity and control power as dual drivers under external institutions, and driving mechanism with external institutions and internal incentives as joint drivers. The four paths indicate that high entrepreneurship can be realized in multiple means.

(2) A single factor does not constitute the necessary condition for high entrepreneurship, but the factor of high market competition plays an indispensable role in stimulating entrepreneurship. If the market is not highly competitive, even perfect internal incentives and strong government intervention cannot effectively evoke entrepreneurship. On the stage of high-tech innovation, market competition is a nonnegligible force.

(3) High management capability constrains entrepreneurship. A capable management tends to identify innovation opportunities rationally. They are more risk-averse facing an uncertain environment and put goals at first in decision-making. Hence, a high

management capability suppresses the risk-taking and adventure spirits of entrepreneurs.

(4) The paths toward high entrepreneurship are nonsymmetric with those toward nonhigh entrepreneurship.

5.2. Revelations. This research provides a theoretical reference for more refined understanding of the complex causality of the driving mechanisms for high-tech entrepreneurship.

On the microlevel, there are two revelations. First, enterprises need to clarify the statuses and functions of internal guarantees, internal incentives, and external institutions in entrepreneurship excitation. In terms of corporate governance, entrepreneurs should be placed at the center of control power allocation, and salary and equity incentives should be utilized reasonably, making institutional innovation as the fundamental driver of entrepreneurship situation and protection.

Second, the suppression of management capability on entrepreneurship should be viewed reasonably. Despite the suppression effect, management capability makes enterprises more cautious and rational about innovation activities and balances the risk-taking spirit of entrepreneurs, serving as a guarantee for corporate survival and development. This is in line with Peter F. Drucker's ideal of putting entrepreneurs at the center of corporate governance.

There are also two macrolevel revelations. First, market competition is critical to high-tech enterprises' entrepreneurship. If government intervention is improper, the industrial innovation ecology might degrade and the resource allocation could be distorted, which actually harm the formation and development of innovation-centered entrepreneurship.

Second, it is necessary to pay attention to the key role of the market in the innovation of high-tech industry and rely on market mechanism to guide innovation and entrepreneurship. Apart from that, the government must fully exert its promoting and driving effects on innovation. For example, the government needs to provide necessary policies and funds to support the R&D and commercialization of high-tech industries and encourage and support entrepreneurship by creating a good business environment.

5.3. Limitations and Prospects. First, this paper systematically analyzes the guarantees and stimuli of entrepreneurship from multiple angles. But the perspectives and framework are not perfect. In future, the research framework will be expanded to cover more novel influencing factors and incorporate antecedent combinations on more levels, in order to further explore the paths for high-tech enterprises to realize entrepreneurship. Besides, the number of antecedent conditions in this paper is limited by the sample size.

Second, the entrepreneurship of high-tech enterprises was measured by innovation, which is indeed the core connotation of entrepreneurship. However, innovation does not have a fixed connotation. The understanding and interpretation of entrepreneurship are highly subjective. Besides, with the passage of time, more and more theories and measuring standards have emerged for entrepreneurship. Hence, new connotations should be considered in entrepreneurship research, in the light of the new economic environment and the trends of the times.

Third, this paper only studies static data, without exploring dynamic time series with fsQCA. In future, the data will be collected across multiple periods for sequential fsQCA, such as to examine how various factors dynamically influence entrepreneurship over the time.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

References

[1] P. F. Drucker, *Innovation and Entrepreneurship*, Machinery Industry Press, Beijing, China, 2009.

[2] W. J. Baumol, "Entrepreneurship: productive, unproductive, and destructive," *Journal of Political Economy*, vol. 98, no. 5, pp. 893–921, 1990.

[3] J. J. Cheng, "Institution evolution, entrepreneurship and the development of private economy," *Economic management*, vol. 38, no. 8, pp. 39–54, 2016.

[4] S. Shane and N. Nicolaou, "Creative personality, opportunity recognition and the tendency to start businesses: a study of their Genetic Predispositions," *Journal of Business Venturing*, vol. 30, no. 3, pp. 407–419, 2015.

[5] X. Zhang and D. H. Ding, "Entrepreneurial leadership, strategic flexibility and corporate entrepreneurship," *Journal of South China University of Technology*, vol. 18, no. 4, pp. 10–20, 2016.

[6] J. Wang and W. Liu, "The emergence of entrepreneurship: an integrated framework," *Management modernization*, vol. 4, pp. 118–121, 2019.

[7] Zh. Xie and J. Zhang, "Business environment, entrepreneurship and real economy development: micro evidence from Chinese listed companies," *Journal of Industrial Technological Economics*, vol. 38, no. 5, pp. 89–96, 2019.

[8] X. L. Wang and L. J. Ma, "Research on the impact of government regulation on entrepreneurship-based on provincial

panel data in China," *Journal of Tongji University*, vol. 30, no. 2, pp. 107–117, 2019.

[9] C. H. Jiang, N. D. Zhou, and L. Y. Zhang, "Dynamic changes and policy support of entrepreneurship in China," *Financial research*, vol. 5, pp. 69–72, 2012.

[10] Y. A. Chen and X. P. Zhao, "Institutional environment and entrepreneurship: a research on its mechanism, effect and policy," *Science Research Management*, vol. 40, no. 5, pp. 90–100, 2019.

[11] D. S. Zhao, Y. Dou, and J. M. Zhang, "Business environment and green economic growth: based on the mediating effect and suppressing effect of entrepreneurship," *Economic problem exploration*, vol. 2, pp. 66–77, 2021.

[12] J. Lu and Z. Tao, "Determinants of entrepreneurial activities in China," *Journal of Business Venturing*, vol. 25, no. 3, pp. 261–273, 2010.

[13] D. C. North, *Institutions, Institutional Change and Economic Performance*, pp. 20–23, Cambridge University Press, Cambridge, UK, 1990.

[14] W. A. Li and H. Wang, "Entrepreneur innovation spirit cultivation: a corporate governance perspective," *Nankai Economic Studies*, vol. 2, pp. 56–59, 2003.

[15] X. C. Li, Q. Su, and W. Z. Dong, "Corporate governance and entrepreneurship," *Economic Research Journal*, vol. 2, pp. 57–68, 2006.

[16] P. C. Fiss, "A set-theoretic approach to organizational configurations," *Academy of Management Review*, vol. 32, no. 4, pp. 1180–1198, 2007.

[17] V. F. Misangyi and A. G. Acharya, "Substitutes or complements? A configurational examination of corporate governance mechanisms," *Academy of Management Journal*, vol. 57, no. 6, pp. 1681–1705, 2014.

[18] T. Greckhamer, "CEO compensation in relation to worker compensation across countries: the configurational impact of country-level institutions," *Strategic Management Journal*, vol. 37, no. 4, pp. 793–815, 2016.

[19] M. Zhang, H. L. Lan, W. H. Chen, and P. Zeng, "Research on the antecedent configuration and performance of strategic change," *Journal of management world*, vol. 9, pp. 168–185, 2020.

[20] Y. S. Li, Y. Y. Yang, and W. T. Wang, "The inheritance path and roadblock of the socioemotional wealth in family business: based on multiple case studies," *Journal of Management Case Studies*, vol. 13, no. 1, pp. 37–52, 2020.

[21] Y. Ji and Y. H. Bai, "Innovation capacity, uncertainty tolerance and entrepreneurial intention," *Science Research Management*, vol. 39, pp. 226–235, 2018.

[22] P. Demerjian, B. Lev, and S. McVay, "Quantifying managerial ability: a new measure and validity tests," *Management Science*, vol. 58, no. 7, pp. 1229–1248, 2012.

[23] S. L. Chao and Z. C. Yin, "Management ability, innovation input and enterprise innovation performance: based on equity incentive and executive human capital adjustment effect," *Journal of Hunan University of Technology*, vol. 34, no. 3, pp. 69–75, 2020.

[24] F. Deng and Y. H. Li, "Managerial ability, ownership and innovation investment: empirical evidence based of high-tech listed companies," *Journal of Industrial Technological Economics*, vol. 38, no. 1, pp. 19–26, 2019.

[25] Q. H. Huang, "Control rights as the promotion and restriction factors of entrepreneurs: theoretical analysis and practical significance," *Economic Research Journal*, vol. 1, pp. 41–47, 2000.

[26] C. Y. Jiang, "The influences of elements of a top management team on corporate entrepreneurship: an empirical study of private small-and-medium size high-tech firms in Yangzi River Delta," *Nankai Business Review*, vol. 14, no. 3, pp. 72–84, 2011.

[27] J. J. Gu, *Entrepreneurship, Incentive Mechanism and Enterprise Performance*, Nanjing University, Nanjing, China, 2018.

[28] K. Su, "Management equity incentive, risk taking and efficiency capital allocation," *Journal of Management Science*, vol. 28, no. 3, pp. 14–25, 2015.

[29] X. R. Li and R. J. Zhang, "Equity incentives influence risk-taking: agency cost or risk averse?" *Accounting Research*, vol. 1, pp. 57–63, 2014.

[30] G. Xiong, A. Li, and X. T. Wang, "An analysis of wage gap and turnover decisions based on Tri-reference Point theory," *Advances in Psychological Science*, vol. 22, no. 9, pp. 1363–1371, 2014.

[31] C. T. Li and M. Song, "Innovation activities in Chinese manufacturing firms: the roles of frim ownership and CEO incentives," *Economic Research Journal*, vol. 45, no. 5, pp. 55–67, 2010.

[32] J. Coles, N. Daniel, and L. Naveen, "Managerial incentives and risk-taking☆," *Journal of Financial Economics*, vol. 79, no. 2, pp. 431–468, 2006.

[33] F. Gu, L. Zhang, and F. Y. Zhang, "Life cycle, executive compensation incentive and enterprise innovation investment: empirical evidence from GEM listed companies," *Journal of Zhongnan University of Economics and Law*, vol. 1, pp. 146–156, 2018.

[34] X. Y. Bai, Y. Y. Wang, and X. Su, "R&D subsidies or tax incentives: an empirical analysis of government intervention on enterprise innovation performance and innovation quality," *Science Research Management*, vol. 40, no. 6, pp. 9–18, 2019.

[35] W. Y. Zhang, "Government intervention inhibits entrepreneurship," *Business Week*, vol. 11, p. 25, 2012.

[36] C. L. Shao, "Entrepreneurial role orientation and the institutional change with Chinese characteristics: an empirical test based on Chinese provincial-level data," *Contemporary Economic Management*, vol. 37, no. 11, pp. 20–28, 2015.

[37] Z. Jian, L. P. Tan, and D. G. Lu, "Creativity and destructiveness of market competition and upgrading of technology," *China Industrial Economics*, vol. 5, pp. 16–34, 2017.

[38] H. J. Li, "Marketization, corruption and entrepreneurship," *Economic Science*, vol. 1, pp. 99–111, 2013.

[39] Y. Yang, J. Wei, and L. J. Luo, "Who is using government subsidies for innovation——joint moderating effect of ownership and factor market distortions," *Management World*, vol. 188, no. 1, pp. 75–86, 2015.

[40] F. Liu, Z. H. Yang, and X. Yang, "Institutional environment, tax incentives and enterprise innovation investment," *Management Review*, vol. 28, no. 2, pp. 61–73, 2016.

[41] W. X. Li and Y. Liu, "Technology innovation, corporate social responsibility and corporate competence: an empirical analysis based on data from listed companies," *Science of Science and Management of S.&. T*, vol. 38, no. 1, pp. 154–165, 2017.

[42] J. Wen and G. F. Feng, "Heterogeneous institutional investor, nature of firm and independent innovation," *Economic Research Journal*, vol. 47, no. 3, pp. 53–64, 2012.

[43] C. Zhao, D. M. Yang, and W. Cao, "Administrative power, control power and management corruption in state-owned enterprises," *Journal of Finance and Economics*, vol. 5, pp. 78–89, 2015.

[44] X. P. Zhou, Y. J. Pi, and R. F. Liu, "Entrepreneurship, investment efficiency and enterprise value," *Journal of Finance and Economics*, vol. 2, pp. 45–51, 2020.

[45] P. C. Fiss, "Building better causal theories: a fuzzy set approach to typologies in organization research," *Academy of Management Journal*, vol. 54, no. 54, pp. 393–420, 2011.