Article

Signal or Noise? Entrepreneurial Attention Allocation and Technological Innovation

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Abstract

Entrepreneurial decision-making plays a crucial role in shaping firm-level innovation, yet how entrepreneurs allocate their attention remains an underexplored determinant of technological progress. This study examines the relationship between entrepreneurial attention allocation and firm innovation, leveraging a panel dataset of Chinese publicly listed firms from 2015 to 2019. We introduce a measure of entrepreneurial attention to innovation-related discourse based on textual analysis of firms' annual reports. This measure is derived from existing data. Our findings indicate that firms where entrepreneurs devote greater attention to innovation exhibit significantly higher levels of R&D investment and patenting activity. These effects persist across alternative specifications and robustness checks. Furthermore, we find that firms with greater social media exposure, government R&D subsidies, and younger entrepreneurs exhibit a more pronounced innovation response to attention allocation.

Keywords: Entrepreneurial attention allocation, Technological innovation, Social media, Government subsidies

1   Introduction

Entrepreneurship and technological innovation are widely recognized as key drivers of economic growth (Schumpeter, 2013; Romer, 1990). A large body of research has examined how financial constraints, institutional environments, and human capital shape firm-level innovation (Hall & Lerner, 2010; Aghion et al., 2023). However, an emerging literature suggests that cognitive factors, particularly how decision-makers allocate their attention, play a critical role in guiding entrepreneurial decision-making and innovation strategies (Ocasio, 1997; Pedersen et al., 2021). Despite its theoretical significance, empirical evidence on the relationship between entrepreneurial attention and firm innovation remains scarce. This study seeks to bridge this gap by examining whether and how the way entrepreneurs al-

locate their cognitive resources influences firm-level technological innovation.

Attention is a scarce resource in decision-making（Kahneman, 1973）, and its allocation shapes how entrepreneurs identify and pursue opportunities（Shepherd et al., 2017）. Entrepreneurs face vast amounts of information but must selectively focus on signals that are most relevant to their strategic objectives. While prior research has explored the role of managerial myopia and investor attention in capital markets（Hirshleifer et al., 2013; Ben-David et al., 2022）, limited attention has been paid to how entrepreneurs direct their focus toward innovation. If entrepreneurial attention allocation is a key determinant of strategic decision-making, firms whose leaders prioritize innovation-related topics may exhibit stronger innovation performance.

Recently, Yu, Li, and Li（2024）develop a novel measure of entrepreneurial attention based on textual analysis of publicly listed firms' "Management Discussion and Analysis （MD&A）" sections in annual reports. Specifically, they construct an innovation-related attention index using a machine-learning-based lexicon approach, capturing the extent to which entrepreneurs emphasize innovation-related topics in corporate disclosures. Using a panel dataset covering Chinese firms from 2015 to 2019, we analyze the relationship between entrepreneurial attention and firm-level innovation outcomes, measured by R&D expenditures, total patent applications, and invention patents. Our empirical strategy accounts for firm fixed effects, industry trends, and potential endogeneity concerns.

Our findings reveal three key insights. First, firms where entrepreneurs allocate greater attention to innovation exhibit significantly higher levels of R&D investment and patenting activity. This effect remains robust after controlling for alternative measures of attention and innovation outputs. Second, external factors moderate the relationship between entrepreneurial attention and innovation. Firms receiving greater social media attention experience a stronger relationship between attention allocation and innovation, consistent with the notion that public scrutiny reinforces strategic commitments. Additionally, government R&D subsidies amplify the impact of entrepreneurial attention on innovation, suggesting that financial support enhances the effectiveness of strategic focus. Third, entrepreneur characteristics influence attention allocation effects — firms led by younger entrepreneurs exhibit a stronger response, likely reflecting differences in cognitive flexibility and risk-taking behavior.

This study contributes to the literature in several ways. First, it extends the growing research on managerial attention and firm performance by introducing a new measure of entrepreneurial attention in the context of innovation. While prior studies have examined investor and managerial attention in financial markets, we provide empirical evidence on how entrepreneurial cognition shapes firm innovation outcomes. Second, we highlight the role of external conditions in shaping attention allocation. Specifically, we examine the impact of social media attention and government subsidies. These factors moderate the effectiveness of attention allocation. Third, we contribute to the literature on entrepreneurship

and technological change by emphasizing cognitive resource allocation as a key determinant of firm-level innovation.

The remainder of this paper is structured as follows. Section 2 reviews the relevant literature and develops our hypotheses. Section 3 describes the data sources, variable construction, and empirical methodology. Section 4 presents the baseline results and robustness checks. Section 5 explores the moderating role of social media exposure, government support, and entrepreneur characteristics. Section 6 concludes with implication.

2　Literature review and hypothesis development

Attention is a scarce cognitive resource in today's information-rich environment. Simon （1996） famously argued that "a wealth of information creates a poverty of attention," implying that how decision makers allocate their limited focus is crucial. Although much of the early work on attention was developed in a general organizational context, recent finance research provides empirical evidence that limited attention plays a key role in market outcomes. For example, Da, Engelberg, and Gao （2011） demonstrate that investor attention influences stock price dynamics, while Barber and Odean （2008） document that individual investors' trading behavior is significantly affected by the signals they attend to. Such findings suggest that, similarly, entrepreneurs must selectively focus on specific external signals to identify promising technological opportunities.

Technological innovation is widely recognized as a major driver of economic growth. Romer （1990） and Aghion and Howitt （1992） demonstrate that creative destruction drives endogenous technological change and fuels long-run growth. In the entrepreneurial context, effective attention allocation can determine whether an entrepreneur discerns a "signal" worthy of pursuing innovative ideas. In other words, the process by which entrepreneurs filter and prioritize incoming information is likely to influence the speed and radicality of technological innovation.

Recent studies further suggest that the benefits of effective attention allocation extend beyond simply recognizing valuable information （Shepherd et al., 2017）. A disciplined approach to managing attention can help mitigate the risk of information overload, enabling entrepreneurs to concentrate on signals that are most likely to yield technological breakthroughs. Efficient resource allocation can accelerate both the pace and impact of innovation. Moreover, the relationship between entrepreneurial attention and innovation is likely to be influenced by firm-specific factors such as managerial experience, organizational culture, and competitive dynamics （Opland et al., 2022）. Entrepreneurs who maintain a clear focus on pertinent signals are better positioned to detect early signs of disruptive change and capitalize on emerging opportunities （Nadkarni & Chen, 2014）. This focused attention

not only facilitates the identification of novel ideas but also helps in translating these insights into practical and effective innovations. When entrepreneurs effectively manage their limited cognitive resources, they filter out irrelevant noise. They focus on meaningful signals that help them discover high-quality technological opportunities（Chen et al., 2015）. This approach improves both the speed and radicality of innovation within their firms. Thus, we propose the first hypothesis.

H1: Entrepreneurial attention allocation is positively associated with technological innovation.

Social media has substantially reshaped how entrepreneurs make decisions by providing ready access to market information, fostering collaboration, and enhancing customer engagement. These platforms serve as versatile channels that enable entrepreneurs to quickly detect emerging trends and assess the viability of new ideas（Giudice et al., 2019）. In addition, networks such as Twitter and LinkedIn facilitate the sharing of knowledge and the expansion of professional contacts, thereby potentially strengthening innovative capacity. However, excessive engagement on these platforms can result in information overload, detracting from core innovation activities.

Government policies like R&D subsidies have long been used to stimulate innovation by easing resource constraints. Evidence from Italian firms indicates that R&D subsidies can lead to improved innovation outcomes（Bronzini et al., 2016）. Furthermore, these subsidies may alter the effect of entrepreneurial attention on innovation by reducing financial barriers and allowing for increased investment in experimental activities. Liu and Xu（2024） further document that firms receiving government subsidies tend to invest more in R&D and achieve higher levels of innovation compared to non-subsidized firms, suggesting that alleviating financial constraints enhances the effectiveness of focused entrepreneurial efforts.

The age of an entrepreneur also influences cognitive flexibility, risk tolerance, and decision-making processes. Younger entrepreneurs are typically more inclined to take risks and adapt to new technologies, which can drive breakthrough innovations（Zheng et al., 2020）. In contrast, older entrepreneurs often draw on extensive experience, industry knowledge, and strategic foresight to promote incremental innovations（Kruger & Steyn, 2019）. Nonetheless, age-related cognitive biases may impede the acceptance of disruptive innovations, with the effect varying according to industry dynamics and the capacity to integrate new insights. Based on above discussions, we propose the following hypotheses:

H2a: The positive impact of entrepreneurial attention on innovation is stronger in firms that attract greater social attention.

H2b: The effect of entrepreneurial attention on innovation is more pronounced in firms receiving government subsidies.

H2c: The influence of entrepreneurial attention on innovation is greater in firms led by younger entrepreneurs.

3　Empirical strategy

3.1　Data Sources and Sample Selection

This study employs a sample of Chinese publicly listed companies covering the period from 2015 to 2019. We focus on these firms for two primary reasons. First, the China Securities Regulatory Commission imposes strict disclosure standards and timelines, which helps ensure that the data are both timely and reliable. Second, the annual reports of these companies are publicly available and highly transparent, especially the management discussion and analysis sections. These sections are prepared and reviewed by management and therefore offer a credible reflection of how entrepreneurial attention is allocated.

Our analysis primarily draws on data from three sources. The National Intellectual Property Office supplies detailed information on patents and innovation provides information related to patents and innovation. The CAMAR database supplements this with details on corporate operations and research and development expenditures. Finally, annual reports, accessed via the CNINFO website, supply the textual data from the management discussion sections that we use to construct our measure of entrepreneurial attention allocation.
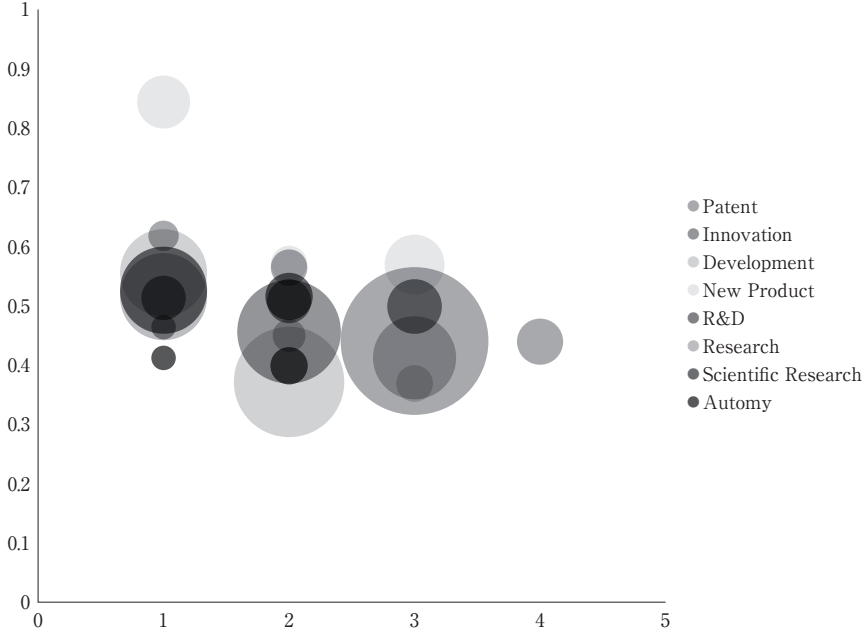
3.2　Variable Definition

Dependent variable: Technological innovation

This study measures firm-level innovation performance using a multi-dimensional framework. First, we consider innovation inputs by examining R&D expenditures, which directly reflect the allocation of resources toward innovation. For innovation outputs, we rely on the number of patent applications rather than granted patents. Prior research（e.g., Hall and Harhoff, 2012）indicates that granted patent counts can be affected by factors such as annual fees, examination procedures, and networking effects, potentially obscuring the true level of innovative activity. In the Chinese patent system, patents are categorized as invention, utility model, or design patents. Given that invention patents generally signal higher technical quality and greater innovation, we use both the overall count of patent applications and the count of invention patent applications as measures of output.

To evaluate the efficiency with which firms convert R&D investments into innovative outputs, we construct an indicator defined as the ratio of the logarithm of patent applications to the logarithm of R&D expenditures. This ratio captures the elasticity of innovation output with respect to R&D input — that is, it represents the percentage change in patent output associated with a 1 % increase in R&D spending（Hirshleifer et al., 2013）.

Independent variable: Entrepreneurial Attention Allocation

Prior research suggests that corporate annual reports effectively reflect the traits and

Figure 1 Word Cloud

conditions of entrepreneurs (Marquez-Illescas et al., 2019). This study focuses on the Management Discussion and Analysis (MD&A) section of listed companies' annual reports for textual analysis. Moreover, the construction of the entrepreneurial attention variable follows the data and methodology outlined by Yu, Li, and Li (2024). This approach provides the foundation for our measurement of entrepreneurial attention.

The initial task in our analysis is to build a lexicon for "innovation attention." Drawing on the approach of Brochet et al. (2015), we employ the Word2vec machine learning model to identify synonymous terms. This technique minimizes the subjectivity inherent in manually curated lexicons and overcomes the limitations of traditional synonym tools (LeCun et al., 2015). By training the model on our corpus, we generate a vector space where each word is represented by a vector, and the distances between these vectors indicate semantic similarity. Figure 1 presents a word cloud that emphasizes the frequency of key terms related to entrepreneurial attention allocation, thereby reinforcing the validity of our lexicon.

The lexicon is developed in three stages. First, we adopt a set of "innovation attention" terms, including "innovation," "autonomy," "R&D," "scientific research," "new product," "technology," "development," "research," and "patent." Second, we use the Continuous Bag-of-Words (CBOW) model in Word2vec on our corpus of Chinese annual reports to identify additional terms semantically close to the baseline words. Candidate terms are retained if they appear at least 1,000 times in the corpus and exhibit a similarity score of 30% or higher relative to the corresponding baseline term. Third, three experts from both academia and industry review these candidates, leading to the inclusion of additional terms such as "invention" and "technological achievement". Figure 2 illustrates the association between the similarity scores of the expanded word set and their overall frequency, demonstrating that our term selection process effectively captures the most semantically pertinent expressions in corporate disclosures.

We then create two dictionaries: one for the baseline terms and another for the expanded

Figure 2　Entrepreneurial Attention Allocation: Expansion Word Similarity and Total
　　　　　　　Word Frequency

set. Using these dictionaries, we calculate word frequencies in the MD&A sections. The primary indicator is the ratio（multiplied by 100）of the total frequency of lexicon terms to the overall word count in the MD&A, which serves as a measure of the entrepreneur's allocation of innovation attention. To ensure robustness, we also construct two alternative measures: one excluding numerical data and another excluding both numerical and English content. Higher values of these indicators indicate a greater emphasis on innovation by the entrepreneur. The definitions of key variables can be found in Appendix A.

3.3　Descriptive Statistics

Table 1 reports summary statistics. Innovation outputs（lnpatent and lninvent）exhibit mean values of 2.897 and 2.183, respectively, which are comparable to those reported in previous literature. While R&D expenditure, expressed as lnrd, averages 18.145. Entrepreneurial attention shows a mean of 1.790（SD＝0.826）, reflecting diverse attention allocation among firms. The remaining variables are distributed within reasonable ranges.

3.4　Model Specification

Following previous studies, we estimate the following regression model:

$$Innovation_{i,t} = \beta_0 + \beta Entrepreneurial\ Attention_{i,t} + \gamma X_{i,t} + \alpha_i + \delta_t + \varepsilon_{i,t} \qquad (1)$$

where i indexes firm and t indexes year. $Innovation_{i,t}$ represents the firm's innovation ac-

Table 1 Summary statistics

VarName	Obs	Mean	SD	Min	Max
lnpatent	9449	2.8970	1.7613	0.0000	9.6992
lninvent	9449	2.1826	1.6064	0.0000	8.9177
lnrd	8638	18.1451	1.5272	5.0938	23.5283
efficiency1	8547	0.1634	0.0846	0.0000	0.6151
efficiency2	8547	0.1276	0.0788	0.0000	0.5711
entrepreneurial attention	9355	1.7898	0.8256	0.0000	5.3379
size	9449	22.3311	1.2134	15.9792	28.2526
age	9449	2.9318	0.2936	1.9459	3.9703
roe	9449	0.0011	0.9541	-66.5353	0.9900
leverage	9449	0.4221	0.1979	0.0084	0.9952
dur	9449	0.2760	0.4470	0.0000	1.0000
boardsize	9449	2.1158	0.1927	1.3863	2.8332

tivity, measured by innovation input, innovation output, and innovation efficiency. *Entrepreneurial Attention*$_{i,t}$ captures the firm's allocation of entrepreneurial attention. $X_{i,t}$ is a vector of control variables, including firm size (size), firm age (age), return on equity (roe), capital structure (leverage), CEO duality (dur), and board size (boardsize). Additionally, firm fixed effects (α_i) control for time-invariant firm characteristics, while year fixed effects (δ_t) absorb common shocks across all firms in a given year. The coefficient of interest is β, which captures the impact of entrepreneurial attention allocation on firm innovation. ε_{it} represents the random error term. Standard errors are clustered at the firm level to account for within-firm correlation.

4 Entrepreneurial attention allocation and technological innovation

4.1 Baseline results

We first examine the impact of entrepreneurial attention allocation on technological innovation. The results are reported in table 2. We measure firms' innovation activities by patent applications, invention outputs, and R&D expenditures. In columns (1) and (2), where the dependent variables are the logarithms of patent applications and invention outputs, the coefficients on entrepreneurial attention are positive and statistically significant. Specifically, a one-unit increase in entrepreneurial attention corresponds to a 9.6% rise in patent applications and an 8.7% increase in invention outputs, suggesting that firms directing more focus toward innovation tend to produce greater technological outputs.

Column (3) employs the logarithm of R&D expenditure as the dependent variable, yielding an estimated coefficient of 0.098. This result implies that a one-unit increase in entrepreneurial attention is associated with a 9.8% rise in R&D spending. The consistent posi-

Table 2　Entrepreneurial attention allocation and technological innovation

VARIABLES	(1) lnpatent	(2) lninvent	(3) lnrd
Entrepreneurial attention	0.096*** (0.023)	0.087*** (0.022)	0.098*** (0.014)
size	0.451*** (0.054)	0.428*** (0.055)	0.702*** (0.052)
age	−1.288*** (0.417)	−0.851** (0.407)	−0.078 (0.286)
roe	−0.014 (0.074)	−0.002 (0.063)	−0.169*** (0.051)
leverage	−0.172 (0.145)	−0.200 (0.134)	−0.248** (0.123)
dur	0.030 (0.035)	0.018 (0.031)	−0.025 (0.024)
boardsize	0.267** (0.112)	0.214** (0.109)	0.199** (0.080)
Constant	−4.065** (1.667)	−5.423*** (1.735)	2.215 (1.368)
Observations	9,355	9,355	8,525
Firm fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
r2_a	0.822	0.815	0.917

Robust standard errors in parentheses, ***$p<0.01$, **$p<0.05$, *$p<0.1$

tive associations across these innovation measures lend support to Hypothesis 1, indicating that targeted entrepreneurial attention enhances the efficient allocation of resources toward innovation.

4.2　Entrepreneurial attention allocation and R&D efficiency

To verify the robustness of our results, we also evaluate firm-level innovation efficiency as the dependent variable in our regression models（see Table 3）. We operationalize innovation efficiency using two measures. The first measure, denoted as *efficiency1,* is defined as the ratio of total patent applications to R&D expenditures. The second measure, referred to as *efficiency2,* is the ratio of invention patent applications to R&D expenditures.

In Column 1, the coefficient on entrepreneurial attention is 0.005（SE＝0.001）. In Column 2, the corresponding coefficient is 0.004. Both coefficients are statistically significant, indicating that entrepreneurial attention markedly improves innovation efficiency. Entrepreneurial attention not only positively affects traditional innovation outputs and R&D expenditures but also significantly enhances the efficiency of innovation investments.

4.3　Alternative measures of entrepreneurial attention

Table 4 reports regression results using an alternative measure of entrepreneurial attention based on an extended dictionary. The coefficients for lnpatent and lninv are 0.268 and 0.260, respectively, both significant at the 1 % level, while the coefficient for lnrd is negli-

Table 3　Entrepreneurial attention allocation and R&D efficiency

VARIABLES	(1) efficiency1	(2) efficiency2
Entrepreneurial attention	0.005*** (0.001)	0.004*** (0.001)
size	0.024*** (0.003)	0.023*** (0.003)
age	−0.044* (0.025)	−0.037 (0.024)
roe	0.003 (0.005)	0.002 (0.004)
leverage	−0.006 (0.009)	−0.008 (0.008)
dur	0.002 (0.002)	0.001 (0.002)
boardsize	0.010 (0.007)	0.013* (0.007)
Constant	−0.280*** (0.104)	−0.319*** (0.102)
Observations	8,421	8,421
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
r2_a	0.756	0.753

Robust standard errors in parentheses, ***p<0.01, **p<0.05, *p<0.1

Table 4　Robustness test: Alternative measurements of dependent variable

VARIABLES	(1) lnpatent	(2) lninvent	(3) lnrd
Entrepreneurial attention (extend dictionary)	0.268*** (0.072)	0.260*** (0.071)	0.008 (0.043)
size	0.451*** (0.055)	0.428*** (0.055)	0.702*** (0.052)
age	−1.341*** (0.418)	−0.898** (0.406)	−0.111 (0.287)
roe	−0.002 (0.074)	0.008 (0.064)	−0.155*** (0.052)
leverage	−0.161 (0.146)	−0.188 (0.135)	−0.258** (0.124)
dur	0.032 (0.035)	0.020 (0.031)	−0.026 (0.024)
boardsize	0.272** (0.112)	0.218** (0.109)	0.208** (0.082)
Constant	−3.829** (1.670)	−5.213*** (1.734)	2.466* (1.379)
Observations	9,355	9,355	8,525
Firm fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
r2_a	0.822	0.815	0.916

Robust standard errors in parentheses, ***p<0.01, **p<0.05, *p<0.1

gible at 0.008. The extended dictionary was developed in three stages（see variable description）, ensuring its robustness. These findings further confirm the positive impact of entrepreneurial attention on firm innovation.

5　Social media, subsidy, and entrepreneur's age

5.1　Social media, entrepreneurial attention allocation, and technological innovation

Previous studies suggest that media coverage can reduce entrepreneurs' short-term focus and thereby encourage innovation（Guo et al., 2019）. Similarly, increased analyst scrutiny appears to strengthen external oversight and promote innovative outcomes. In this section, we examine whether social attention moderates the relationship between entrepreneurial attention and technological innovation. We measure social attention by social media and analyst coverage. To measure media attention, we calculate the logarithm of the total number of online news reports for each listed firm（*media attention*）. These counts are obtained by aggregating articles from Baidu News that mention the firm's stock code, abbreviation, or full name in their headlines. In addition, we assess analyst attention by counting the number of research reports published about the firm（*analyst coverage*）.

We first divide the sample into two groups based on the annual median level of social attention: one group with high social attention and another with low social attention. We then perform group-specific regressions using Model（1）, with the results summarized in Table 5. Columns（1）and（2）display the moderating effects of media attention, while columns（3）and（4）present the effects related to analyst attention.

The results show that the positive influence of entrepreneurial attention on innovation is not significant among firms with low social attention. In contrast, firms that receive high social attention continue to exhibit a significant positive relationship between entrepreneurial attention and innovation. These findings suggest that higher levels of social attention enhance the beneficial effects of entrepreneurial focus on innovation. The increased oversight from both social media and analysts may prompt managers to avoid short-term investments, thus supporting our hypothesis H2a.

5.2　Subsidy, entrepreneurial attention allocation, and technological innovation

Prior research suggests that government R&D subsidies not only improve firms' internal cash flows and innovation capacity（Cappelen et al., 2012; Howell, 2017）but also enhance access to external financing through signaling effects, thereby encouraging further R&D investment（Kleer, 2010）. These effects become particularly important during economic downturns（Aghion et al., 2013; Howell, 2017）.

Table 5 Social media, entrepreneurial attention allocation, and technological innovation

VARIABLES	lnpatent	lnpatent	lnpatent	lnpatent
	(1)	(2)	(3)	(4)
	high media attention	high media attention	High analyst coverage	low analyst coverage
Entrepreneurial attention	0.369*** (0.104)	0.151 (0.099)	0.219* (0.116)	0.176 (0.118)
size	0.453*** (0.074)	0.441*** (0.084)	0.592*** (0.099)	0.534*** (0.105)
age	−0.786 (0.571)	−1.824*** (0.608)	−1.008* (0.600)	−1.170* (0.664)
roe	0.033 (0.082)	−0.128 (0.131)	0.019 (0.126)	−0.033 (0.114)
leverage	−0.377* (0.204)	−0.029 (0.212)	−0.504** (0.242)	−0.175 (0.238)
dur	−0.002 (0.049)	0.073 (0.051)	0.031 (0.059)	−0.027 (0.057)
boardsize	0.085 (0.152)	0.461*** (0.172)	0.356* (0.183)	0.059 (0.188)
Constant	−4.982** (2.323)	−2.665 (2.432)	−7.732*** (2.744)	−5.698* (2.973)
Observations	4,601	4,634	3,574	3,632
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
r2_a	0.854	0.771	0.846	0.780

Robust standard errors in parentheses, ***$p<0.01$, **$p<0.05$, *$p<0.1$

In this study, we examine the notes section of annual reports to identify government subsidy projects related to innovation using targeted keyword searches. We sum the identified amounts to compute each listed firm's total annual innovation subsidy. Firms are then categorized into two groups — those that receive government R&D subsidies and those that do not using a binary variable (*subsidy*). We estimate group-specific regressions with Model（1）and further interact the subsidy variable with our measure of entrepreneurial attention to assess whether subsidies enhance the positive effect of entrepreneurial attention on innovation.

Table 6 presents the moderating effect of government R&D subsidies on the link between entrepreneurial attention and innovation. The results in columns（1）and（2）show that entrepreneurial attention is positively related to innovation regardless of subsidy status. However, the coefficient for entrepreneurial attention is larger in the subsidized group （0.123***）than in the non-subsidized group（0.076**）, indicating a stronger impact when subsidies are provided. Moreover, column（3）confirms the robustness of this interaction effect, thereby supporting hypothesis H2b.

Table 6　Subsidy, entrepreneurial attention allocation, and technological innovation

VARIABLES	lnpatent	lnpatent	lnpatent
	(1)	(2)	(3)
	subsidy＝1	subsidy＝0	
Entrepreneurial attention* subsidy			0.220** (0.112)
Entrepreneurial attention	0.123*** (0.035)	0.076** (0.031)	0.089*** (0.024)
size	0.562*** (0.097)	0.389*** (0.063)	0.451*** (0.054)
age	−0.815 (0.671)	−1.609*** (0.537)	−1.303*** (0.416)
roe	−0.039 (0.127)	0.007 (0.089)	−0.014 (0.074)
leverage	0.132 (0.238)	−0.362** (0.181)	−0.167 (0.145)
dur	0.067 (0.053)	0.006 (0.047)	0.032 (0.035)
boardsize	0.335** (0.165)	0.218 (0.153)	0.267** (0.113)
Constant	−7.962*** (2.772)	−1.707 (2.122)	−4.046** (1.665)
Observations	3,771	5,584	9,355
Firm fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
r2_a	0.797	0.830	0.822

Robust standard errors in parentheses, ***p＜0.01, **p＜0.05, *p＜0.1

5.3　Entrepreneur's age, entrepreneurial attention allocation, and technological innovation

　　Entrepreneur plays a key role in driving firm innovation, yet differences in characteristics such as age and prior experiences can influence its impact on innovation. Prior research indicates that older entrepreneurs tend to exhibit lower risk tolerance （Soubelet, 2011）.

　　In our analysis, we split the sample into two groups based on the median value of entrepreneur's age. Firms with younger entrepreneurs are assigned a value of 0, while those with older entrepreneurs receive a value of 1. We then conduct group-specific regressions using Model （1） and create an interaction term between the age indicator and our measure of entrepreneurial attention to examine the moderating role of age.

　　Table 7 presents the results of this analysis. The findings in columns （1） and （2） reveal that entrepreneurial attention has a positive effect on innovation for both younger and older entrepreneurs. However, a comparison of the regression coefficients suggests that the positive impact of entrepreneurial attention is weaker for older entrepreneurs. Additionally, column （3） shows a negative coefficient for the interaction term, reinforcing the conclusion that the beneficial effect of entrepreneurial attention on innovation declines with increasing

Table 7　Entrepreneur's age, entrepreneurial attention allocation, and technological innovation

VARIABLES	lnpatent	lnpatent	lnpatent
	(1)	(2)	(3)
	younger entrepreneurs	older entrepreneurs	
Entrepreneurial attention* entrepreneur's age			−0.051 (0.053)
Entrepreneurial attention	0.144*** (0.038)	0.083** (0.037)	0.140*** (0.038)
size	0.483*** (0.092)	0.433*** (0.071)	0.456*** (0.060)
age	−0.985 (0.635)	−1.710** (0.674)	−1.357*** (0.464)
roe	−0.164 (0.105)	0.200 (0.124)	0.011 (0.082)
leverage	−0.080 (0.221)	−0.207 (0.224)	−0.139 (0.158)
dur	−0.020 (0.057)	0.052 (0.057)	0.014 (0.040)
boardsize	0.331* (0.183)	0.183 (0.169)	0.247** (0.124)
Constant	−6.016** (2.631)	−2.221 (2.551)	−4.032** (1.841)
Observations	3,939	3,860	7,799
Firm fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
r2_a	0.792	0.818	0.805

Robust standard errors in parentheses, ***$p<0.01$, **$p<0.05$, *$p<0.1$

age, thereby supporting Hypothesis 2c.

6　Summary

In this study, we explore the influence entrepreneurial attention allocation on technological innovation. Our analysis confirms that entrepreneurial attention has a positive effect on technological innovation, as reflected in higher numbers of patent applications, increased invention outputs, and greater R&D spending. The baseline results indicate that firms exhibiting stronger entrepreneurial focus tend to achieve better innovation outcomes.

Further, the relationship between entrepreneurial attention and innovation is influenced by several factors. For instance, increased social media exposure strengthens this effect; firms under greater public scrutiny appear to benefit from enhanced external oversight and accountability, which in turn promotes innovation. Similarly, government R&D subsidies bolster the positive impact of entrepreneurial attention. The presence of these subsidies improves internal cash flows and access to external financing, encouraging firms to invest more in innovative activities.

Moreover, the entrepreneur's age plays a moderating role. While entrepreneurial attention generally fosters innovation, its effect is more pronounced among younger entrepreneurs. Older entrepreneurs, who typically display lower risk tolerance, seem to respond less strongly to increased entrepreneurial attention.

Overall, these findings underscore the complex nature of innovation processes. They suggest that the benefits of entrepreneurial attention depend not only on firm-level characteristics but also on the broader external environment. This environment is shaped by factors such as social media exposure, government support, and individual traits like the entrepreneur's age. These insights provide important guidance for policymakers and practitioners seeking to promote technological advancement.

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Appendix

Appendix A Definition of variables

Variables	Definition
lnpatent	Natural logarithm of the total patent applications plus one
lninvent	Natural logarithm of the invention patent applications plus one
lnrd	Natural logarithm of the Research and development（R&D）expenditures plus one
entrepreneurial attention	Firm's allocation of entrepreneurial attention, measured by related dictionaries
size	Firm size, measured by the natural logarithm of total assets.
age	Firm age, approximated by the number of years listed from A-share.
roe	Return on equity, calculated as net income divided by average shareholders' equity.
leverage	Capital structure, measured by the ratio of total liabilities to total assets
dur	CEO duality, a binary variable that takes the value 1 if the CEO also serves as the chair of the board, and 0 otherwise
boardsize	Board size, defined as the total number of directors on the firm's board