



What is the role of government trust in a firm's R&D investments? Evidence from SMEs

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ABSTRACT

We examine how government trust shapes the R&D behaviors of small and medium enterprises (SMEs). To study this, we use data collected on 3045 Chinese SMEs to find that for every standard deviation increase in the government trust index, an SME has a 23.9% increase in their R&D investments. Our findings are robust after accounting for endogeneity using an instrumental variable and controlling for the impact of social trust. We further discover that SME owners who are more motivated to conduct innovation will make more R&D investments when they trust the government, driven in part by their willingness to take more risks. Finally, the effect of government trust on R&D investments is less salient when the region has a high marketization level.

1. Introduction

Firms operate in societies that shape business environments in both official and unofficial capacities. While regulatory policies clearly affect firms' behaviors and practices, the government can impact firms in other ways, such as taxes, subsidies, and consulting services to firms. Previous studies suggest that across different societal cultures, social trust—the degree to which individuals have confidence in their greater communities—plays a key role in the process of how firms choose to operate. For instance, firms located in high social trust regions are less likely to commit financial and securities violations (Dong, Han, Ke, & Chan, 2018; Qiu, Yu, & Chan, 2021), and more likely to pay taxes (Xia, Cao, & Chan, 2017). They benefit in additional ways such as receiving more informal financing in trade credit (Wu, Firth, & Rui, 2014), attracting migrating workers (Liu, Ye, & Feng, 2019), conducting more R&D investments (Ndubuisi, 2020), and adjusting faster toward its target capital structure (Xia, Chan, Cao, & Tan, 2021). Currently, the social trust literature encompasses the trust-based relationships among all stakeholders in the region. In its breadth, researchers have overlooked a key external stakeholder of firms, which is the large effect of government and the notion of political trust by the market participants.

When social and political trust are taken together, this forms the basis of government trust (i.e., the trust toward a government by its constituents). Surprisingly few studies have focused on government trust, though inroads have suggested the critical role of a government on aspects including firms' behavior and practices, local economic development (Kaplanova, 2016), and societal decisions at large (Wagenaar & Keren, 1986). Moreover, much of the literature focuses more on a public administration perspective by studying the

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contributing factors of government trust (Chen & Sun, 2019; Lee, 2019; Ma & Christensen, 2019; Zhang & Kim, 2018; Zhao & Hu, 2017). We attribute the relative lack of studies on the subject of government trust on firm behavior to the relative unavailability of reliable government trust metrics.

In our paper, we argue that government trust is particularly effective in shaping a small or medium firm's long-term strategy, behavior, and practices. For these long-term business strategies, such as R&D investments, the firm must leverage or follow government policies to maximize their chance of success. For instance, Lin, Wu, and Wu (2021) document that China's patent subsidy policy increased both quality and quantity of patents. The positive effect of government subsidy policy implicitly requires government trust by firms. In particular, small and medium enterprises (SMEs) have small sizes and unique operating challenges that magnify the impact of government policies relative to their larger competitors. In both scenarios, government trust plays a pivotal role for SMEs to execute specific business strategies and decisions for its long-term success.

The purpose of this study is to examine the impact of government trust in the location of an SME on its R&D investments. Leveraging the recently available China Micro and Small Enterprise Survey (CMES) and the China Household Finance Survey (CHFS), we obtain the information of SME owners and their practices as well as the government trust level of locations of SMEs.¹ In particular, we focus on R&D investments, given their importance to both SMEs and the economic development of a country (Li, Hu, & Li, 2022). We draw from stakeholder theory (Phillips, 2003) to show that the government is a pivotal stakeholder of SMEs. The government uses economic policies to provide innovation-friendly platforms, tax incentives, or subsidies to facilitate SMEs to engage in R&D investments and position themselves for long-term innovation success. Without government trust, SMEs may question the continuity of these policies and adopt a "wait and see" approach that leads to fewer R&D investments. To better understand the context around government trust and SME investments, we test one main hypothesis and two related but supplemental hypotheses.

First, we find that an atmosphere of high government trust in the region where a firm is located translates into greater R&D investments for the SMEs. These results are economically significant: for a one standard deviation increase in the government trust index, an SME has 23.9% increase in the standard deviation of R&D investments. Our findings are robust after accounting for endogeneity and controlling for the impact of social trust. Second, the SME owner's desire to innovate mediates the effect of government trust on a SME's R&D investments. That is, when there is a high level of government trust, SME owners with greater desire to innovate make more R&D investments, as they feel that their future working environments will be stable and reliable. Finally, the effect of government trust on R&D investments is less salient when the region has aspects that encourage greater government trust (such as high marketization level). Collectively, government trust contributes to a SME's R&D investments even more than social trust.

We make two contributions. First, we advance the literature on how societal culture affects a firm's behavior and practices. Prior studies related to government trust focus on a public administration perspective without examining business decisions made by firms (Chen & Sun, 2019; Lee, 2019; Ma & Christensen, 2019; Zhang & Kim, 2018; Zhao & Hu, 2017). Specifically, we demonstrate how government trust has an economically significant impact on a firm's behavior and practices, finding that government trust has an even greater impact than social trust on an SME's R&D investments. Our exploratory findings confirm that the government is an essential stakeholder of SMEs and their business decisions; moreover, unlike other constituents, governments are uniquely able to influence the R&D behavior of these firms. Hence, our study also contributes to the broad literature of how local government impacts SME investments (Bach, 2019). Second, our findings have a public policy implication. Policies that aim to spark innovation through investments in R&D, such as regulations around tax incentives, are more effective if the local government is trusted by its constituents. Consequently, we contribute to the literature on the role of government in promoting SME development by suggesting that governments should strive to be viewed as trustworthy by SMEs, adopting practices that ultimately boost the economic development of a country. In addition to the tangible support such as tax or subsidies, the intangible support of a government in terms of a trustworthy business platform is critical.

2. Literature review and hypothesis development

2.1. Government trust

Firms invest in innovation with a long-term perspective; they must have faith in the stability of their society if they are willing to spend money on potentially risky R&D investments. While there are several factors that affect the context in which firms operate, governments play a key role, offering a unique sense of stability and assurance. Thus, government trust, or the trust toward a government by its constituents, is essential.

Government trust builds on two well-established components: 1) social trust and 2) political trust. Social trust represents whether citizens have confidence in their social community and other individuals within it, while political trust represents how citizens view their government and its institutions (OECD, 2013). To date, several studies have begun to link social trust and firm behavior (Chen & Peng, 2020; Ndubuisi, 2020; Weiss, Anisimova, & Shirokova, 2019; Xia et al., 2021). However, this oversight of political trust in managerial research is problematic. More specifically, government trust needs to incorporate not just whether citizens trust their local communities but also the broader institutions surrounding them.

Trust toward a government thus needs to account for perceptions of the many processes that governments oversee, including legislation, enforcement, and justice, which are separate from the communities in which individuals reside. For example, individuals

¹ The government trust index is from the China Household Finance Survey (CHFS). The index integrates social trust and political trust into a single measure of government trust that can be used to understand subsequent firm performance.

and firms may not trust their government to fairly legislate laws, enforce them, and judge the various outcomes (that is, having low political trust), even if these same individuals and firms trust their local communities (that is, having high social trust). In one notable example, local governments that expropriate land should not be surprised when their citizens are more likely to come into conflict with local government officials (Sha, 2023). The reverse is likely to be true: individuals and firms may not have built up social trust, yet have a high degree of political trust. Government trust, comprising both concepts, is therefore needed to understand both how governments should rule their firms, as well as how firms should operate under the jurisdiction of their specific governments.

2.2. The impact of government trust on firms

While trust in government is somewhat subjective and may vary from individual to individual (Easton, 1965), there are many ways that governments can try to increase the extent to which they are trusted by their constituents. Well-known tactics to enhance government trust include increasing political participation, removing corruption, upholding promises regarding military and economic policies, and ensuring that their people are educated and well-fed (Donovan & Bowler, 2004; Tolbert & Mossberger, 2006; Zhang & Kim, 2018). Occasionally, governments may also rely on media and other communication venues to influence citizens and decrease the perception of political risk, thereby affecting the level of government trust (Chen & Sun, 2019; Lee, 2019).

However, government trust cannot be taken for granted. Multiple studies have shown that when the government is known to have caused harm to the population (e.g., through forced labor camps or by engaging in a cultural revolution), past trauma remains, and a lack of government trust persists. Bai and Wu (2020) find that individuals who were exposed to higher revolutionary intensity during the cultural revolution have lower levels of generalized trust several decades later. Nikolova, Popova, and Otrachshenko (2022) find that individuals who live near former gulags have lower social trust and civic engagement. Other work suggests that government trust is hard to manufacture: even when the government has previously been effective, providing such information to the populace has limited effects on support for current policy and government trust (Khan, Nasim, Shaikat, & Stegmann, 2021).

Government trust is particularly important when considering economic performance: when economic performance is strong, individuals and firms tend to have more trust toward their government. In contrast, a variety of factors may decrease government trust: decreasing social capital (Mansbridge, 1997), increasing political party polarization (King, 1997), and decreased participation from ordinary citizens in political affairs (Hibbing & Theiss-Morse, 1998). Beyond these events, however, the actual presence of trust in government is particularly important to firms for several reasons.

First, government trust is needed to maintain stability (Tolbert & Mossberger, 2006). Trustworthy governments can lower transaction costs at all levels of society (Fukuyama, 1995). During times of external stability, firms can develop deep routines that help them with survival, including processes related to manufacturing, distribution, and innovation. In addition, governments may even try to promote overall economic wellbeing by increasing jobs using awards and investments (Lerner, 1999) with varying degrees of success (Lanahan, Joshi, & Johnson, 2021).

Moreover, an increase in government trust is linked with increased cooperation with laws and regulations (Ayres & Braithwaite, 1992; Tolbert & Mossberger, 2006). Firms operate within the constraints of their society, and so firms are most successful when they believe these constraints are legitimate and meaningful (Levi & Stoker, 2000). Firms must also value adherence to the rule of law if they are to lean on the government for investment decisions, and they are less likely to be deterred by risks linked to decisions based on investment and consumption (Blind, 2007; Dasgupta, 2009).

Finally, in the event of a crisis, trust toward a government is especially critical (Ma & Christensen, 2019). Governments that can manage upheavals such as natural disasters, economic shocks, or political changes can maintain stability and legitimacy over time. For example, during the initial COVID-19 crisis, high-trust regions were more likely to obey government policies to decrease mobility and stay in place (Bargain & Aminjonov, 2020). On the other hand, countries that are in critical fiscal trouble have a negative relationship with government trust (OECD, 2013). Government trust, therefore, is a critical component to the survival and growth of firms. As an important external stakeholder of an SME, we expect that government trust will play a significant role in an SME's operating strategy.

2.3. R&D investment and innovation

Wei, Xie, and Zhang (2017) articulate that the factors behind the fast economic growth in China are cheap labor and capital. Sustaining the Chinese economic growth relies on the total factor productivity growth rate. However, its patenting strategy favors state-owned firms with heavy subsidies, leading to inefficient allocation of resources. The author suggests a review of such policies to offer non-state-owned firms more access to government resources. Koenig, Storesletten, Song, and Zilibotti (2022) offer a complementary study. They show that innovation is the engine of economic growth. While the change in allocation does not help innovation, it can contribute to better total factor productivity. In addition, Zhang, Yu, and Zhong (2022) show that SOEs, on average, exhibit better innovation than those of non-SOEs. These SOEs are believed to perform better due to their enhanced R&D capability.

The recent focus on R&D and patents has resulted in some positive findings. Hu, Zhang, and Zhao (2017) examine the contributing factors of the recent patent surge in China. The authors report that these new patents primarily derive from firms without previous patents. In addition, the correlations between patents and R&D and patents and labor productivity are low. They conclude that the increase in Chinese patenting is due to firms seeking patents in their operation. Liu, Wang, Chan, and Fung (2021) find that government land supply and allocated R&D subsidies positively contribute to corporate R&D investments and regional innovation. Yang, Zheng, and Zhou (2022) report a positive impact of broadband internet on corporate innovation in China. Specifically, every 1% increase in broadband internet penetration rate leads to 1.4% increase in patents.

The status of family firms also matters. Li, Hu, and Li (2022) document that family firms have significantly lower R&D investments

and patents than non-family firms in China due to generally poor quality management of the former. Similarly, [Cheng, Li, Liu, & Liu \(2022\)](#) report that previously SOE-transformed family firms have fewer but higher quality patents than those entrepreneurial family firms. The authors find that previously SOE-transformed family firms are more likely to hire professional managers and are subject to less intervention from family members. Furthermore, [Li, Mbanyele, and Sun \(2022\)](#) show that a management team's R&D hand-on experience positively impacts innovation productivity.

Finally, an emerging body of literature studies the impact of R&D tax incentives on innovation. Specifically, [Jia and Ma \(2017\)](#) document that the increase in tax deductions on R&D expenditure encourages Chinese firms to carry out more R&D investment. Similarly, [Chen and Yang \(2019\)](#) show that the tax incentives of R&D promote corporate R&D and patents in China. Collectively, the literature suggests that there are various drivers to promote innovation in terms of corporate R&D and patents. However, the role of government trust is not clearly linked to corporate R&D investment.

2.4. The impact of government trust on SME R&D investments and innovation

2.4.1. Main hypothesis

Government is an important stakeholder of a firm ([Phillips, 2003](#)), and government trust is particularly salient to SMEs, as these smaller firms have clear barriers to investing in R&D and innovation ([Link & Scott, 2010](#)). SME owners, when facing business decisions in times of uncertainty, naturally evaluate whether their local governments are trustworthy. SMEs that have both social and political trust are more likely to engage in practices that increase their long-term sustainable competitive advantage. For example, they may increase activities related to corporate social responsibility ([Chen & Peng, 2020](#)). In contrast, firms that lack trust toward their government are more likely to hunker down to prepare for short-term instability.

More specifically, a SME owner with high levels of government trust is more motivated to increase innovation efforts toward long-term survival, thus investing more in R&D. [Ndubuisi \(2020\)](#) found that such firms may access external finance to fund promising R&D investments, which requires confidence in the long-term stability of the firm's environment. Another option is for firms to look to national licensing arrangements to increase their innovativeness ([Savic, Smith, & Bournakis, 2020](#)). Compared to a larger and more established firm, an SME will pay particular attention to the role of government in its operating environment. Due to the highly uncertain nature of R&D investments, the SME owner will heavily scrutinize the genuine nature of government policies. Thus, government trust is essential. Our core testable hypothesis is:

H1. SMEs with high levels of government trust engage in more R&D investments compared to SMEs with low levels of government trust.

2.4.2. Supplemental related hypotheses

The upper echelons theory suggests that the personal experience of top executives shapes their managerial styles and practices ([Hambrick, 2007](#); [Hambrick & Mason, 1984](#)). Previous studies document that business decisions at the corporate level reflect executives' personal characteristics and experiences, such as military expertise ([Benmelech & Frydman, 2015](#)) and childhood famine ([Feng & Johansson, 2018](#)). [Liu, Liu, and Zhang \(2021\)](#) contend that the upper echelons theory is more salient among SMEs, because an SME owner is the chief executive of a relatively smaller firm. Hence, we examine the extent to which the personal characteristics of the SME owner mediate the effect of government trust on the SME's R&D investments. To do so, we focus on an SME owner's willingness to engage in risk-taking activities. Successful R&D investments presuppose a desire to engage in risky innovation. Consequently, SME owners must first feel secure about the working environment and optimistic about the prospects of the business before undertaking more risks (in the form of long-term projects). As greater government trust implies a more stable business environment, an SME owner with greater government trust should increase R&D investment. We thus propose a second testable hypothesis as follows:

H2. Having government trust improves the SME's owner's attitude or willingness toward risk taking, which mediates the effect of government trust on SME R&D investments.

Besides government trust, a local government has several aspects that affect SMEs' business environment. The effect of government trust on SME R&D investments depends on the role of local market mechanisms, such that an SME can reasonably operate with basic economic and legal business environment to enforce contracts. Previous studies suggest that local marketization level plays a role in China's urban economic growth and development ([Wong, Li, Peng, & Kong, 2021](#)), corporate inefficient investment ([Hou, Tang, Wang, & Xiong, 2021](#)), enhanced punishment on firms by securities regulators ([Gong, Huang, Wu, Tian, & Li, 2021](#)), among other aspects.

We use marketization level to gauge the effectiveness of an SME's economic and legal business environment. A high marketization level suggests a market is subject to less government intervention, engages in more non-state-owned business activities, has better product and factor markets, and better enforces contractual rights. Each of these elements are factors that improve the business environment in which an SME is located. For instance, SMEs that operate in areas with high marketization enjoy the benefits of an efficient economy that can settle contractual disputes through a market-oriented mechanism or a court system. Similarly, a high legal protection environment protects property rights of SME owners, promoting the welfare of ongoing businesses.

Consequently, we hypothesize that, for a given level of government trust, the effect of government trust on R&D investments is less salient when the location of an SME has high marketization level. These improved economic and legal business conditions (better marketization) allow SMEs to operate and function normally so that they do not need to leverage the positive effect of the local government trust on the SMEs to engage in risk taking and R&D investments. Our third testable hypothesis is:

H3. Conditional on a specific level of economic and legal business environment (such as marketization level), the effect of

government trust on R&D investments is less salient when operating within a better economic and legal business environment.

3. Research design

3.1. Model

We use a multiple regression model to examine H1, simplified here for concision:

$$RD_i = \alpha_0 + \alpha_1 GOVTRUST_i + CONTROL1 + CONTROL2 + CONTROL3 + PROVINCE^* INDUSTRY + \mu_i \quad (1)$$

where RD_i is the natural logarithm of 1 plus the i^{th} SME's R&D investments, and $GOVTRUST_i$ is the government trust level of the county where the SME is located.

$CONTROL1$ comprises a set of the SME owner's characteristics. Age (AGE), gender ($MALE$), and college education ($COLLEGE$) are important demographics related to managerial style (Liu, Wang, et al., 2021). SMEs that are privately owned ($PRIVATE OWNED$) may have different goals from SOEs. $WORKED$ and $STARTUP$ help to assess the experience of the SME owner. $GOVTWORK$ controls for the owner's government experience that may affect the owner's R&D behavior. We also include previous full time working experience ($WORKED$), previous startup experience ($STARTUP$), and government work experience ($GOVTWORK$).

$CONTROL2$ represents a set of SME characteristics including the firm's sales ($LNSALES$), financial leverage ($LEVERAGE$), return on assets (ROA), located in the middle part of China ($MIDDLE$), and located in the western part of China ($WEST$). $LNSALES$, $LEVERAGE$, and ROA account for a SME's ability to fund R&D.

For $CONTROL3$, we account for the level of economic development in a region including: the per capita GDP in a county ($LNPDP$), the natural logarithm of the county population ($LNPOP$), the secondary sector to GDP ratio in a county ($SECONDGDP$), the fixed asset investments to GDP ratio in a county ($INVESTMENTGDP$), the fiscal spending to GDP ratio in a county ($FISCALGDP$), the river density of a prefecture level city in which a county located ($DENSITY$). Taken together, these variables better clarify how the level of economic development in a region, the R&D investment of its enterprises, the level of government trust, and its level of economic development all interact with each other.

Last, we control for province-industry fixed effects in Eq. (1). We present definitions of all variables in Appendix A. Because some SMEs have zero R&D investments, we use TOBIT to estimate Eq. (1) to mitigate potential censored sample bias, and we calculate standard errors using robust estimates clustered at county-level. If H1 is valid, SMEs with higher level of government trust engage in more R&D investments, and α_1 should be positive and significant.

3.2. Data

We obtained SME related data from the CMES, which was started in 2015 by Southwestern University of Finance and Economics in China and has been used to examine various research questions among individuals and SME owners. For example, Lin, Peng, and Wu (2022) use CMES data to document how digital finance positively impacts SMEs' new investment projects. The survey added detailed questions on SMEs related to activities along their value chain, including but not limited to: production and operation, human resource management, employee training, R&D and innovation, financing, and organizational management. 5500 SMEs responded to the survey in 2015.² As some questions did not have responses, our study ultimately relied on 3045 responses. We present the frequency distribution of the SME owners in Appendix B.

To determine government trust data based on the location of the respondents, we used the CHFS, also conducted by Southwestern University of Finance and Economics in China.³ Here, a survey instrument was used to construct a county level government trust index in two steps. First, it randomly divided respondents in the same county into two subsamples, A and B. Subsample A was asked the following question (note that the scores are in front of the possible answers).

Among doctors, scientists, teachers, and lawyers, how many of these categories do you trust?

- 0. None of them
- 1. Only one of them
- 2. Two of them
- 3. Three of them
- 4. All four

Subsample B was asked the following question (with the score in front, emphasis ours):

Among doctors, scientists, teachers, lawyers, and local (district or county) government officials, how many of these categories do you trust?

² Based on a proportional sampling, Southwestern University of Finance and Economics sent field workers to directly visit SMEs to increase response rates and verify their responses. The survey covered all provinces and autonomous regions except for Tibet and Xinjiang. After the survey, there were quality control checks to ensure data integrity (<https://chfs.swufe.edu.cn/researchcenter/intro.html>).

³ CHFS and CMES were carried out in almost identical districts and counties.

Table 1
Summary statistics.

Variables	N	Mean	Std. Dev.	Min	P25	Median	P75	Max
Firm variables								
<i>RD</i>	3045	3.023	5.079	0.000	0.000	0.000	8.700	14.509
<i>RD (before the natural logarithm)</i>	3045	76,034	283,436	0.000	0.000	0.000	6000	2,000,000
<i>LNSALES</i>	3045	13.817	3.151	0.000	12.612	14.221	15.607	18.826
<i>PRIVATE_OWNED</i>	3045	0.968	0.175	0.000	1.000	1.000	1.000	1.000
<i>STARTUP</i>	3045	0.374	0.484	0.000	0.000	0.000	1.000	1.000
<i>WORKED</i>	3045	0.711	0.453	0.000	0.000	1.000	1.000	1.000
<i>GOVTWORK</i>	3045	0.095	0.293	0.000	0.000	0.000	0.000	1.000
<i>LEVERAGE</i>	3045	0.158	0.595	0.000	0.000	0.000	0.036	4.800
<i>ROA</i>	3045	0.288	1.200	-1.600	0.000	0.000	0.200	9.302
<i>SUBSIDY</i>	3045	0.033	0.179	0.000	0.000	0.000	0.000	1.000
<i>AGE</i>	3045	43.877	9.927	24.000	37.000	44.000	50.000	69.000
<i>MALE</i>	3045	0.826	0.379	0.000	1.000	1.000	1.000	1.000
<i>COLLEGE</i>	3045	0.488	0.500	0.000	0.000	0.000	1.000	1.000
Channel variables								
<i>RDWILL</i>	3045	0.500	0.500	0.000	0.000	0.000	1.000	1.000
<i>RDINFOR</i>	3045	0.719	1.269	0.000	0.000	0.000	1.000	5.000
<i>FORMALFINANCE</i>	3045	0.289	0.454	0.000	0.000	0.000	1.000	1.000
<i>RDPROTECT</i>	3045	0.087	0.281	0.000	0.000	0.000	0.000	1.000
Regional variables								
<i>GOVTRUST</i>	3045	0.304	0.304	-0.537	0.078	0.304	0.487	1.266
<i>SOCTRUST</i>	3045	1.206	0.227	0.622	1.119	1.211	1.373	1.877
<i>LNP GDP</i>	3045	10.971	0.647	9.287	10.652	11.087	11.493	12.143
<i>LNPOP</i>	3045	9.873	4.239	2.996	4.736	12.314	13.433	14.332
<i>SECOND GDP</i>	3045	43.404	8.909	21.310	38.323	44.830	49.380	60.776
<i>INVESTMENT GDP</i>	3045	64.487	27.478	16.982	42.600	68.986	85.232	161.951
<i>FISCAL GDP</i>	3045	12.405	6.664	4.148	7.436	11.065	18.285	39.360
<i>DENSITY</i>	3045	0.097	0.042	0.038	0.071	0.081	0.114	0.184
<i>MKINDEX</i>	3045	7.989	1.668	4.040	6.790	7.930	9.630	9.780
<i>BIRTHRATIO</i>	1424	1.209	0.375	0.354	1.033	1.220	1.485	1.959

Table 1 presents the summary statistics of the sample. Variable definitions are presented in [Appendix A](#).

0. None of them
1. Only one of them
2. Two of them
3. Three of them
4. Four of them
5. All five

We thus calculated the government trust index for a county (*GOVTRUST*) by subtracting the mean value of subsample A from the mean value of subsample B. This approach is similar to the one chosen by [Meng, Pan, and Yang \(2017\)](#). Government trust is derived from the respondents' perception at the county level. Similar to other studies in social trust ([Xia et al., 2017](#); [Xia et al., 2021](#)), the level of analysis of government trust is the county in which an SME is located.⁴

To account for the effect of social trust, the CMES also asked about a related statement on social trust (*SOCTRUST*) in a county. Specifically, respondents were asked to assign a value of 1 to 5 on the following question:

What is your trust level for a stranger?

1. Very low
2. Low
3. Average
4. High
5. Very high

The mean value of the respondents in each county gives the social trust level of the county.

⁴ There may be two interpretations of government trust calculated from the CHFS data. On the one hand, people will trust the government more when the government greatly intervenes in the economy and provides more public services (assuming that the government trust index is large enough). On the other hand, people will also trust the government more when the government slightly intervenes in the economy and the public expectation of the economy is more stable. To account for the effect of a general government trust, we control for the fiscal expenditure of the government and marketization index in a region. Thus, our government trust index captures the general attitude of citizens' government trust beyond both interpretations. In addition, we use a government trust index that excludes the firm owners' sample.

4. Results and discussions

4.1. Summary statistics and correlations

We present the summary statistics of the sample in [Table 1](#). The mean, median, and standard deviation of *RD* (before taking the natural logarithm) are 76,034, 0, and 283,436 yuan, respectively. This means that some firms do not have any R&D investments and that R&D investments vary widely. In terms of *GOVTRUST*, the mean and standard deviations are 0.304 and 0.304, indicating that differences are modest across counties.⁵

4.2. Baseline results

We present the baseline results for Eq. (1) in Panel A of [Table 2](#) using two simplified models and the full model for robustness using Tobit estimation method. The coefficients of *GOVTRUST* are consistently positive and significant (p -value < 0.05).⁶ The results support H1: SMEs in high government trust counties make more R&D investments. Consistent with intuition, the control variables carry the expected signs: for example, the coefficients of *LNP**GDP*, *INVESTMENTGDP*, *LNSALES*, *PRIVATE_OWNED*, *STARTUP*, *WORKED*, *MALE*, and *COLLEGE* are positive and significant. When the SME is in a county with high per capital GDP, high fixed asset investments, or high marketization level, the owner makes more R&D investments. Similarly, when the SME is privately owned, its R&D is higher. In addition, if owner has start-up experience, work experience, male, or a college degree, the SME makes more R&D investments. In Panel B, we calculate the marginal effects of *GOVTRUST* and other control variables on an SME's R&D investment.

More interestingly, the findings are economically significant. In column (3), the coefficient of *GOVTRUST* is 3.035. This means that for one standard deviation increase in government trust index (0.304), a firm has a 23.9% increase in R&D investments (0.787×0.304). Given there are many potential individual and firm-specific factors that contribute to R&D investments, a 23.9% increase is large. The results support H1.⁷

4.3. Robustness checks

4.3.1. Reliability analysis

We conduct two reliability analyses by dropping a set of data at a time. In [Appendix C](#) ([Appendix D](#)), each line represents the 95% confidence interval estimate on the coefficient of government trust (*GOVTRUST*) is the baseline regression equation by dropping the data in one province or autonomous region (one industry) at a time. In both Appendices, most of the lines in the 95% estimates of the coefficients are above zero, suggesting that government trust has a positive effect on an SME's R&D. In addition, our findings remain intact if we drop data from one province, one industry at a time.

4.3.2. Endogeneity mitigation

It is possible that owners with innovative mindsets choose to locate their SMEs in a high government trust county. To mitigate this endogeneity, we use an instrumental variable (IV) for *GOVTRUST* in each county. Specifically, we use the birth ratio during the Great Famine years of 1959–1961 (*BIRTHRATIO*). It is the total number of newborns to total population from 1959 to 1961 ([Meng et al., 2017](#)). The Great Famine was a hard time for newborns. Eventually, those children grew into adults who were skeptical about their local governments due to their sufferings during their childhood years. The individuals born in those years tend to have low government trust, but their birth ratios do not directly impact a firm's R&D. When taken in aggregate, a high *BIRTHRATIO* suggests low general government trust, and vice versa. The variable meets the exogenous requirement because the birth ratio was determined in 1959–1961, but *BIRTHRATIO* is negatively correlated with *GOVTRUST* and thus meeting the relevancy requirement. The logic is similar to that of [Nikolova et al. \(2022\)](#), who found that residents who lived near Stalin-era labor camps exhibited less government trust, as well as that of [Nunn and Wantchekon \(2011\)](#), who document that when an individual's ancestors were slaves, they do not trust the government. When taken holistically, this suggests that social norms, beliefs, and value shape an individual's trust level. It is clear that adverse historical events can impact government trust many years later.

We present our findings in [Table 3](#). In column (1), as expected, the coefficient of *BIRTHRATIO* negatively predicts *GOVTRUST*. Then, we use predicted *GOVTRUST* (*GOVTRUST_PRED*) in column (2) as the explanatory variable in Eq. (1). The coefficients of *GOVTRUST_PRED* are positively significant at the 5% level. Thus, the support of H1 is robust to endogeneity.

⁵ We examine variance inflation factors among the control variables, and the mean is 1.62, suggesting that multicollinearity among control variables is not severe.

⁶ We eliminate those counties with a small number of observations in the CHFS data. Essentially, we conduct reduced sample tests by eliminating (1) the 10% sample with the least number of interviewed households in the sample area and county, and (2) the 25% sample with the least number of interviewed households in the sample area and county. The results are qualitatively identical to those in [Table 2](#).

⁷ We conduct additional analyses using patent applications for SMEs, which we collected using data from CMES. The results suggest that the coefficients of *GOVTRUST* are insignificant. We conjecture that because the patent question in the CMES is a “Yes” or “No” question (Question D1010: the SME owner was asked whether the SME applied any patent), this dummy variable may not fully capture SMEs' innovation output.

Table 2
The effects of government trust on R&D investment.

Panel A: The impact of government trust on SMEs' R&D investment.			
	(1)	(2)	(3)
	<i>RD</i>	<i>RD</i>	<i>RD</i>
	<i>TOBIT</i>	<i>TOBIT</i>	<i>TOBIT</i>
<i>GOVTRUST</i>	3.388** (2.23)	3.390** (2.44)	3.035** (2.12)
<i>LNPGDP</i>	6.142*** (3.35)	4.888*** (2.90)	3.853** (2.32)
<i>LNPOP</i>	-0.292 (-1.49)	-0.260 (-1.31)	-0.299 (-1.51)
<i>SECONDDGDP</i>	0.061 (0.60)	0.050 (0.54)	0.103 (1.08)
<i>INVESTMENTGDP</i>	0.115** (2.35)	0.095** (2.19)	0.090** (2.19)
<i>FISCALGDP</i>	0.210** (2.04)	0.171* (1.72)	0.124 (1.16)
<i>DENSITY</i>	-11.648 (-0.56)	12.399 (0.62)	12.429 (0.61)
<i>LNSALES</i>		0.839*** (6.06)	0.822*** (6.01)
<i>PRIVATE_OWNED</i>		4.618* (1.80)	4.661* (1.86)
<i>STARTUP</i>		3.438*** (5.90)	3.471*** (6.07)
<i>WORKED</i>		2.094*** (2.76)	1.761** (2.37)
<i>GOVWORK</i>		-0.064 (-0.06)	-0.114 (-0.10)
<i>LEVERAGE</i>		-0.490 (-0.88)	-0.472 (-0.88)
<i>ROA</i>		0.467 (1.45)	0.452 (1.44)
<i>SUBSIDY</i>		11.400*** (10.86)	11.092*** (11.30)
<i>AGE</i>			-0.130*** (-4.35)
<i>MALE</i>			1.791** (2.26)
<i>COLLEGE</i>			3.027*** (4.62)
Intercept	-76.456*** (-3.61)	-83.830*** (-4.30)	-68.018*** (-3.50)
Province*Industry fixed effects	Yes	Yes	Yes
N	3045	3045	3045
Pseudo R ²	0.080	0.101	0.107
Log likelihood	-4072	-3975	-3952

Panel B: The marginal effects of government trust on SMEs' R&D investment.

	(1)	(2)	(3)
	<i>RD</i>	<i>RD</i>	<i>RD</i>
	<i>TOBIT</i>	<i>TOBIT</i>	<i>TOBIT</i>
<i>GOVTRUST</i>	0.867** (2.21)	0.878** (2.42)	0.787** (2.11)
<i>LNPGDP</i>	1.572*** (3.30)	1.266*** (2.87)	0.999** (2.30)
<i>LNPOP</i>	-0.075 (-1.48)	-0.067 (-1.31)	-0.078 (-1.51)
<i>SECONDDGDP</i>	0.015 (0.60)	0.013 (0.54)	0.027 (1.08)
<i>INVESTMENTGDP</i>	0.029** (2.34)	0.025** (2.18)	0.023** (2.18)
<i>FISCALGDP</i>	0.054** (2.04)	0.044* (1.72)	0.032 (1.16)
<i>DENSITY</i>	-2.982	3.210	3.222

(continued on next page)

Table 2 (continued)

Panel B: The marginal effects of government trust on SMEs' R&D investment.			
	(1)	(2)	(3)
	RD	RD	RD
	TOBIT	TOBIT	TOBIT
<i>LNSALES</i>	(−0.56)	(0.62) 0.217*** (6.03)	(0.61) 0.213*** (5.94)
<i>PRIVATE_OWNED</i>		1.195* (1.80)	1.208* (1.87)
<i>STARTUP</i>		0.890*** (6.04)	0.900*** (6.20)
<i>WORKED</i>		0.542*** (2.74)	0.457** (2.36)
<i>GOVTRUST</i>		−0.017 (−0.06)	−0.030 (−0.10)
<i>LEVERAGE</i>		−0.127 (−0.88)	−0.122 (−0.88)
<i>ROA</i>		0.121 (1.45)	0.117 (1.44)
<i>SUBSIDY</i>		2.951*** (12.55)	2.875*** (12.90)
<i>AGE</i>			−0.034*** (−4.24)
<i>MALE</i>			0.464** (2.26)
<i>COLLEGE</i>			0.785*** (4.71)
Province*Industry fixed effects	Yes	Yes	Yes
N	3045	3045	3045
Pseudo R ²	0.080	0.101	0.107
Log likelihood	−4072	−3975	−3952

Panel A of Table 2 presents the regression results for the impact of government trust on SMEs' R&D investment using Tobit analysis. Panel B calculates the marginal effects of each variable in explaining SMEs' R&D investment using Tobit analysis. Variable definitions are presented in Appendix A. ***, **, and * indicate 1%, 5%, and 10%, respectively. All standard errors are clustered at the county level.

4.3.3. Robustness checks: alternative estimation

We conduct several additional robustness checks and present the results in Table 4. In column (1), we exclude the Beijing, Shanghai, Chongqing, and Tianjin samples. The coefficient of *GOVTRUST* continues to be positively significant at the 1% level. In column (2), we consider whether a firm has innovation as the dependent variable and uses the Probit model to estimate it. The result is similar to those in Table 2. For column (3), we adopt a Poisson maximal estimation. The findings are qualitatively similar to those in Table 2.

4.4. Transmission mechanism

An SME owner has full discretion in the firm's management. As a result, the motivation of the owner plays a critical role in firm operations. If the owner highly trusts that the government will provide a stable long-term business environment, it is likely that the owner is willing to take more risk. The owner's risk-taking attitude is affected by the perception of government trust. At the same time, the owner's increased risk preference will likely lead to investment in R&D projects, which involve higher risk but may generate more profits for the SME in the long run. As a result, the owner's desire to conduct innovation projects is likely linked to government trust. We expect that government trust plays a key role in driving the risk attitude (*RDWILL*) of the owner that in turn affects R&D investment.

In addition to the SME owners' *RDWILL*, we explore these owners' attitude toward the following: government R&D information understanding (*RDINFOR*), formal financing demand (*FORMALFINANCE*), and intellectual property right protection (*RDPROTECT*) as additional mechanisms. For the owners' attitude toward government R&D information understanding, if SME owners have thorough knowledge on the government's tax or subsidy program, they can anticipate what they can leverage from the government support. We propose that this knowledge of SME owners depends, in part, on the owners' government trust. We contend that if owners lack government trust, the tax policy or subsidy becomes less effective in promoting R&D investment and innovation because the SME owners do not necessarily believe the government programs be sustainable in the future. This concept echoes the model in Akcigit, Hanley, and Stantcheva (2002), who derive an optimal tax and subsidy policy to stimulate corporate R&D investments when firms are heterogeneous and face uncertainty over time.

Moreover, formal financing demand—such as bank loans—are directly linked to financial constraints related to funding R&D projects. Innovation projects have uncertainty and require substantial investments upfront. Brown, Martinsson, and Petersen (2012) and Sakai (2020) document that financial constraint plays a critical role in a firm's R&D investment and a country's investment level.

Table 3
Instrument variable (IV) method for the effect of government trust on R&D.

	(1)	(2)
	<i>GOVTRUST</i>	<i>RD</i>
	<i>IV-TOBIT</i>	
<i>GOVTRUST_PRED</i>		20.036** (2.46)
<i>BIRTHRATIO</i>	-0.615*** (-4.16)	
<i>LNPGDP</i>	0.075* (1.75)	13.887*** (6.57)
<i>LNPOP</i>	-0.026*** (-3.78)	-0.783*** (-2.67)
<i>SECONDGDP</i>	0.018* (1.67)	0.622** (2.30)
<i>INVESTMENTGDP</i>	0.010** (2.04)	0.191* (1.81)
<i>FISCALGDP</i>	-0.009* (-1.81)	0.390 (1.41)
<i>DENSITY</i>	0.600 (0.40)	-42.202 (-1.01)
<i>LNSALES</i>	-0.000 (-0.55)	0.715*** (4.65)
<i>PRIVATE_OWNED</i>	0.010 (1.02)	6.028 (1.53)
<i>STARTUP</i>	-0.004 (-0.97)	3.452*** (4.63)
<i>WORKED</i>	-0.006*** (-3.29)	2.353* (1.92)
<i>GOVTWORK</i>	0.011 (1.48)	-1.070 (-0.58)
<i>LEVERAGE</i>	0.002 (1.02)	-0.481 (-0.63)
<i>ROA</i>	-0.004* (-1.94)	0.583 (1.16)
<i>SUBSIDY</i>	-0.005 (-1.12)	11.229*** (6.29)
<i>AGE</i>	-0.000* (-1.83)	-0.110** (-2.23)
<i>MALE</i>	-0.000 (-0.07)	3.832*** (3.63)
<i>COLLEGE</i>	-0.001 (-0.33)	3.446*** (2.69)
Intercept	0.141 (0.29)	-212.459*** (-6.31)
Province *Industry fixed effects	Yes	Yes
N	1424	1424
F test	15.31	
Wald test: $\chi^2(1)$	2.67	
P value	0.102	
Log likelihood		83

Table 3 presents the regression results for the impact of government trust on SMEs' R&D investment using an IV. We use the natural logarithm of the household registration index (*H_INDEX*) in a county as the IV for *GOVTRUST*. *GOVTRUST_PRED* is the predicted value of *GOVTRUST* based on column (1). Variable definitions are presented in Appendix A. ***, **, and * indicate 1%, 5%, and 10%, respectively. All standard errors are clustered at the county level. We notice that there are fewer observations in the IV analysis than in the baseline equation because China's administrative divisions were adjusted several times. In applying an IV approach, we only keep those districts and counties whose administrative divisions have not been changed. If a local administrative division was adjusted, its name and jurisdiction of the local government changed. The process may lead people who had experienced the Great Famine to change their attitudes toward the local government.

We build on these studies to propose that when an SME has received bank loans, the owner can access formal financial channels from banks that ease the financial constraints for the SME to conduct R&D investment. Yet, while trust in government is needed to sustain the bank loans for SMEs, governments may force banks not to extend loans to SMEs due to monetary policy uncertainty.

Lastly, we consider intellectual property right protection. R&D projects have great uncertainty and substantial cost. If the intellectual property right protection is strong, an SME is incentivized to engage in innovation activities because it can reasonably expect positive outcomes. Lin, Lin, and Song (2010) report findings that are consistent with this view. Because these property rights are

Table 4
Robustness check: alternative estimation methods.

	(1)	(2)	(3)
	<i>RD</i>	<i>RD</i>	<i>RD</i>
	<i>TOBIT</i>	<i>PROBIT</i>	<i>PPLM</i>
<i>GOVTRUST</i>	6.795** (2.52)	0.280** (1.99)	0.294* (1.89)
<i>LNPGDP</i>	4.633*** (3.01)	0.383** (2.22)	0.322** (2.20)
<i>LNPOP</i>	-0.328* (-1.80)	-0.033 (-1.63)	-0.027 (-1.32)
<i>SECONDGDP</i>	0.065 (0.69)	0.009 (0.90)	0.013 (1.29)
<i>INVESTMENTGDP</i>	0.101*** (2.74)	0.009** (2.13)	0.008** (2.20)
<i>FISCALGDP</i>	0.102 (0.95)	0.009 (0.89)	0.012 (1.03)
<i>DENSITY</i>	15.589 (0.75)	1.657 (0.76)	1.164 (0.62)
<i>LNSALES</i>	0.870*** (5.76)	0.073*** (5.45)	0.097*** (5.35)
<i>PRIVATE_OWNED</i>	3.607 (1.29)	0.396* (1.69)	0.486* (1.75)
<i>STARTUP</i>	3.710*** (5.72)	0.328*** (6.21)	0.299*** (5.49)
<i>WORKED</i>	1.642* (1.77)	0.170** (2.40)	0.188** (2.47)
<i>GOVTWORK</i>	-0.629 (-0.53)	-0.013 (-0.12)	0.008 (0.08)
<i>LEVERAGE</i>	-0.053 (-0.09)	-0.048 (-0.98)	-0.043 (-0.77)
<i>ROA</i>	0.532 (1.64)	0.041 (1.34)	0.054* (1.86)
<i>SUBSIDY</i>	10.785*** (9.74)	1.926*** (8.03)	0.727*** (10.46)
<i>AGE</i>	-0.106*** (-2.64)	-0.012*** (-4.00)	-0.012*** (-4.21)
<i>MALE</i>	2.349*** (2.60)	0.161** (2.13)	0.167** (2.06)
<i>COLLEGE</i>	2.656*** (3.86)	0.278*** (4.30)	0.278*** (4.38)
Intercept	-30.336*** (-5.03)	-2.789*** (-4.87)	-1.726** (-2.55)
Province *Industry fixed effects	Yes	Yes	Yes
N	2180	2766	2779
Pseudo R ²	0.112	0.218	0.216
Log likelihood	-2876	-1303	-10,303

Table 4 presents the regression results for the impact of government trust on SMEs' R&D investment using Tobit analysis. Column (1) is the result excluding the Beijing, Shanghai, Chongqing and Tianjin samples. Column (2) takes whether the company has innovation as the explained variable and uses the Probit model to estimate it. Column (3) is the result using Poisson maximal estimation. Variable definitions are presented in [Appendix A](#). ***, **, and * indicate 1%, 5%, and 10%, respectively. All standard errors are clustered at the county level.

enforced by the government, we argue that a strong government trust is needed to drive SME owners to believe in the enforcement of the intellectual property rights.

In the CMES (Statement D3016: What are the determinants of R&D and innovation?), respondents offer their responses: (1) no need to innovate, (2) no willingness to innovate, (3) lack R&D funding, (4) lack R&D staff, (5) R&D is risky, (6) lack market information to conduct innovation, (7) R&D results can be mimicked by others, (8) lack intellectual property right protection, (9) government policy restriction, and (10) other. If an SME owner chose neither (1) nor (2), the value of *RDWILL* is 1 and 0 otherwise. For *RDINFOR*, we use the CMES (Statement D3001: Do you know whether the government has R&D tax policies such as: R&D expenses are 50% tax deductible, R&D fixed assets depreciation can be accelerated, or subsidy?) Respondents offer their responses: (1) Absolutely do not know, (2) do not know, (3) neutral, (4) know, and (5) clearly know. With respect to *FORMALFINANCE*, if an SME has received bank loans, the value is 1 and 0 otherwise. For *RDPROTECT*, we refer to response to D3016; if the respondent chose (8), the value of *RDPROTECT* is 1 and 0 otherwise.

We conducted a successive test for the mediation effect ([Barron & Kenny, 1986](#); [Judd & Kenny, 1981](#)). We explore the impact of government trust on *RDWILL*, *RDINFOR*, *FORMALFINANCE*, and *RDPROTECT* using Eq. (1). We use these four variables to replace *RD*. The results in Panel A of [Table 5](#) show that only the coefficient of *GOVTRUST* is positively significant at the 5% level in column (1) when the dependent variable is *RDWILL*. In contrast, the coefficients of *GOVTRUST* are insignificant when *RDINFOR*,

Table 5
Mechanism for the effect of government trust on R&D investment.

Panel A: The first stage of successive test: the impact of government trust on willingness to risk-taking, access to policy information, formal financial demand, and property rights protection.

	(1)	(2)	(3)	(4)
	<i>RDWILL</i>	<i>RDINFOR</i>	<i>FORMALFINANCE</i>	<i>RDPROTECT</i>
	<i>OLS</i>	<i>OLS</i>	<i>OLS</i>	<i>OLS</i>
<i>GOVTRUST</i>	0.089** (2.39)	0.022 (0.63)	-0.028 (-0.93)	0.027 (1.26)
<i>LNPGDP</i>	0.049 (1.34)	0.112* (2.00)	-0.047 (-1.56)	0.063*** (2.75)
<i>LNPOP</i>	-0.005 (-0.86)	-0.008 (-0.93)	-0.014*** (-3.38)	-0.002 (-0.82)
<i>SECONDGDP</i>	0.001 (0.38)	0.007* (1.95)	0.003* (1.78)	0.000 (0.27)
<i>INVESTMENTGDP</i>	0.001 (1.42)	0.003* (1.93)	0.001* (1.98)	0.002** (2.49)
<i>FISCALGDP</i>	0.002 (0.62)	0.005 (0.85)	-0.002 (-0.80)	-0.000 (-0.04)
<i>DENSITY</i>	0.070 (0.17)	-1.586 (-1.47)	0.030 (0.08)	0.046 (0.16)
<i>LNSALES</i>	0.005** (2.15)	0.014** (2.62)	0.019*** (6.03)	0.004** (2.13)
<i>PRIVATE_OWNED</i>	0.089 (1.54)	0.008 (0.20)	0.077 (1.63)	-0.001 (-0.03)
<i>STARTUP</i>	0.086*** (4.03)	0.089*** (2.71)	0.041** (2.37)	0.035*** (2.68)
<i>WORKED</i>	0.041** (2.19)	-0.012 (-0.34)	0.021 (1.30)	0.017 (1.63)
<i>GOVTWORK</i>	-0.041 (-1.31)	0.078 (1.47)	0.028 (1.03)	-0.007 (-0.39)
<i>LEVERAGE</i>	0.017 (1.22)	-0.021 (-1.13)	0.198*** (11.96)	0.002 (0.25)
<i>ROA</i>	-0.006 (-0.88)	-0.004 (-0.48)	-0.024*** (-4.63)	0.002 (0.44)
<i>SUBSIDY</i>	0.197*** (4.10)	1.526*** (10.83)	0.058 (1.19)	0.117** (2.50)
<i>AGE</i>	-0.006*** (-5.77)	0.002 (1.28)	0.000 (0.23)	-0.000 (-0.59)
<i>MALE</i>	0.015 (0.53)	-0.025 (-0.69)	0.037* (1.84)	-0.012 (-0.85)
<i>COLLEGE</i>	0.030 (1.49)	0.112*** (3.21)	-0.002 (-0.11)	0.015 (1.08)
Intercept	-0.085 (-0.21)	-0.020 (-0.03)	0.432 (1.18)	-0.729** (-2.45)
Province *Industry fixed effects	Yes	Yes	Yes	Yes
N	3045	3045	3045	3045
Adj. R ²	0.072	0.669	0.248	0.039

Panel B: Second stage of successive test.

	(1)
	<i>RD</i>
	<i>TOBIT</i>
<i>GOVTRUST</i>	2.445 (1.63)
<i>RDWILL</i>	7.653*** (12.07)
<i>LNPGDP</i>	3.364** (2.19)
<i>LNPOP</i>	-0.222 (-1.22)
<i>SECONDGDP</i>	0.086 (1.02)
<i>INVESTMENTGDP</i>	0.088** (2.29)
<i>FISCALGDP</i>	0.110

(continued on next page)

Table 5 (continued)

Panel B: Second stage of successive test.	
	(1)
	RD
	TOBIT
	(1.16)
DENSITY	12.074 (0.68)
LNSALES	0.779*** (5.89)
PRIVATE_OWNED	3.995 (1.63)
STARTUP	2.983*** (5.62)
WORKED	1.528** (2.09)
GOVTWORK	0.366 (0.33)
LEVERAGE	-0.584 (-1.09)
ROA	0.460 (1.47)
SUBSIDY	9.675*** (11.40)
AGE	-0.081*** (-2.73)
MALE	1.448** (2.03)
COLLEGE	2.835*** (4.61)
Intercept	-66.684*** (-3.72)
Province *Industry fixed effects	Yes
N	3045
Log likelihood	-3869

Table 5 presents the results for four possible channels, including willingness to risk-taking, access to policy information, formal financial demand, and property rights protection by ordinary least squares. Variable definitions are presented in Appendix A. ***, **, and * indicate 1%, 5%, and 10%, respectively. All standard errors are clustered at the county level.

FORMALFINANCE, and RDPROTECT are dependent variables in columns (2) to (4). Using OLS and Probit yield qualitatively similar results. Because Probit drops some observations due to the unchanged dependent variable within province and industry, we conservatively report OLS results. We conclude that, while conceptually possible, the owners' trust toward a government does not significantly impact their attitude toward government R&D information understanding, formal financing demand, or intellectual property right protection. We conjecture that SMEs, due to their small scale: 1) may not have sufficient resources to comprehend government R&D information understanding, and 2) generally struggle to acquire formal financing irrespective to the government trust level. For intellectual property right protection (RDPROTECT), the coefficient of GOVTRUST in column (4) of Table 5 while insignificant, is positive and close to 10% significance. Therefore, the insignificance of the coefficient can be attributed to large variations in government trust levels among the locations of SMEs (as shown in Table 1). Hence, the results in Table 5 suggest that, for SMEs, the transmission mechanism primarily depends on the SME owner's willingness to conduct R&D. The conclusion is consistent with the notion that SME owners are the most important individual and resource of the firm.

We document that SME owners' attitude toward risk-taking is the mechanism for the impact of government trust on SMEs' R&D investment in Panel B of Table 5. The coefficient of RDWILL is positively significant, suggesting RDWILL fully mediates the impact of government trust on R&D investment.⁸ The findings offer support for H2: *having government trust improves the SME's owner's willingness toward risk taking, which mediates the effect of government trust on SME R&D investments.*

4.5. Accounting for social trust

Using public firms in 20 OECD countries, Ndubuisi (2020) reports that if a firm is in an area with high social trust, it conducts more R&D investments. Hence, social trust may play a role in a firm's R&D investments. We accordingly augment Eq. (1) with the social trust of the county (SOCTRUST). We present the results for the two different versions of Eq. (1) in Table 6. In both columns, the coefficients

⁸ It is likely that when an SME has a high R&D investment, its RDWILL is also high. To alleviate the endogenous concern, we include firms with zero R&D investment as alternative estimation in Panel A of Table 5. The results are qualitatively the same in Panels A and B of Table 5.

Table 6
Accounting for social trust.

	(1)	(2)
	RD	RD
	TOBIT	TOBIT
<i>GOVTRUST</i>		3.662** (2.56)
<i>SOCTRUST</i>	−3.015 (−1.13)	−4.247 (−1.60)
<i>LNPGDP</i>	3.500** (2.21)	4.304*** (2.95)
<i>LNPOP</i>	−0.244 (−1.25)	−0.254 (−1.43)
<i>SECONDGDP</i>	0.126 (1.42)	0.096 (1.10)
<i>INVESTMENTGDP</i>	0.080* (1.90)	0.093** (2.50)
<i>FISCALGDP</i>	0.135 (1.25)	0.115 (1.09)
<i>DENSITY</i>	12.090 (0.62)	16.713 (0.86)
<i>LNSALES</i>	0.825*** (5.99)	0.827*** (6.02)
<i>PRIVATE_OWNED</i>	4.744* (1.91)	4.686* (1.88)
<i>STARTUP</i>	3.461*** (5.99)	3.437*** (6.01)
<i>WORKED</i>	1.713** (2.32)	1.743** (2.34)
<i>GOVTWORK</i>	−0.079 (−0.07)	−0.129 (−0.12)
<i>LEVERAGE</i>	−0.487 (−0.91)	−0.459 (−0.85)
<i>ROA</i>	0.448 (1.43)	0.448 (1.42)
<i>SUBSIDY</i>	10.935*** (11.20)	10.955*** (11.18)
<i>AGE</i>	−0.130*** (−4.32)	−0.129*** (−4.30)
<i>MALE</i>	1.854** (2.35)	1.785** (2.25)
<i>COLLEGE</i>	3.086*** (4.71)	3.040*** (4.67)
Intercept	−60.636*** (−2.98)	−67.278*** (−3.63)
Province *Industry fixed effects	Yes	Yes
N	3045	3045
Pseudo R ²	0.106	0.107
Log likelihood	−3953	−3950

Table 6 presents the impact of government trust on SMEs' R&D investment by Tobit analysis after controlling the effect of social trust. Variable definitions are presented in Appendix A. ***, **, and * indicate 1%, 5%, and 10%, respectively. All standard errors are clustered at the county level.

of *SOCTRUST* are either insignificant or negatively significant. We attribute the difference between our findings and those of Ndubuisi (2020) to the nature of our study, suggesting that social trust may not be as important as other variables in explaining R&D investments among SMEs. Most importantly, the coefficient of *GOVTRUST* remain positive (p -value < 0.05) after accounting for social trust in column (2). Overall, the findings suggest that government trust plays a more prominent role than social trust in explaining a SME's R&D investments and corroborates our logic of the importance of government trust in SMEs.

4.6. Cross-sectional analysis

In addition, there are other business environmental factors that contribute to SME operations, especially when SMEs are in emerging markets. Besides government trust, other elements may shape a firm's business environment. According to Wang, Fan, and Yu (2017), the marketization level of a provincial administrative region that may impact the way a firm operates.

Allen, Qian, and Qian (2005) and Yuan and Wen (2018) suggest that China does not have a well-developed legal and financial system. We expect that the government's dominant role in the economic environment of an SME moderates the impact of government trust on SMEs' R&D investments. When a region has a high marketization level, SMEs operate in a progressive business environment.

Table 7
Cross-sectional analysis.

	(1)	(2)	(3)
	<i>RD</i>	<i>RD</i>	<i>RD</i>
	Low marketization	High marketization	
<i>GOVTRUST</i>	7.495*** (2.97)	1.779 (1.35)	7.973** (2.43)
<i>GOVTRUST</i> × <i>HIGH_MKINDEX</i>			-6.596* (-1.83)
<i>LNPGDP</i>	-0.650 (-0.23)	8.257*** (8.82)	4.240*** (2.89)
<i>LNPOP</i>	0.308 (1.18)	-0.960*** (-5.54)	-0.293 (-1.50)
<i>SECONDDGDP</i>	0.370*** (4.72)	0.567*** (4.22)	0.122 (1.39)
<i>INVESTMENTGDP</i>	0.073*** (2.63)	0.266*** (10.26)	0.095*** (2.71)
<i>FISCALGDP</i>	-0.114 (-0.85)	0.869*** (6.43)	0.098 (0.89)
<i>DENSITY</i>	2.664 (0.10)	10.810 (1.01)	2.610 (0.14)
<i>LNSALES</i>	0.704*** (3.66)	0.882*** (4.39)	0.815*** (5.91)
<i>PRIVATE_OWNED</i>	4.665 (1.44)	4.667 (1.26)	4.562* (1.83)
<i>STARTUP</i>	3.576*** (3.41)	3.477*** (5.19)	3.461*** (6.05)
<i>WORKED</i>	0.810 (0.68)	2.485*** (2.87)	1.747** (2.35)
<i>GOVWORK</i>	0.105 (0.07)	-0.796 (-0.52)	-0.103 (-0.09)
<i>LEVERAGE</i>	-0.692 (-0.81)	-0.401 (-0.54)	-0.491 (-0.91)
<i>ROA</i>	0.799*** (2.70)	0.302 (0.68)	0.470 (1.51)
<i>SUBSIDY</i>	11.795*** (7.07)	10.695*** (8.74)	11.111*** (11.27)
<i>AGE</i>	-0.029 (-0.55)	-0.187*** (-5.60)	-0.131*** (-4.39)
<i>MALE</i>	2.788** (2.20)	1.208 (1.28)	1.788** (2.28)
<i>COLLEGE</i>	3.383*** (3.89)	2.819*** (2.96)	3.041*** (4.64)
Intercept	-39.096 (-1.42)	-142.516*** (-10.56)	-71.267*** (-4.12)
Industry fixed effects	Yes	Yes	Yes
N	1340	1705	3045
Pseudo R ²	0.126	0.099	0.107
Log likelihood	-1564	-2371	-3950

Table 7 presents the moderating effect of the *MKINDEX* for the impact of government trust on SMEs' R&D investment by Tobit analysis. *HIGH_MKINDEX* is a (0/1) indicator variable. *HIGH_MKINDEX* = 1 (0) means that *MKINDEX* is greater (less) than its median. Variable definitions are presented in Appendix A. ***, **, and * indicate 1%, 5%, and 10%, respectively. All standard errors are clustered at the county level.

For any contractual dispute with another firm or government, an SME has a proper low-cost channel to seek justice. Therefore, we conjecture that the impact of government trust on an SME's R&D investments may be less salient because the SME can rely more on the market and legal protection in evaluating their R&D investment decision.

To examine the possible moderating effect of these elements, we modify Eq. (1) as follows:

$$RD_i = \beta_0 + \beta_1 GOVTRUST_i + \beta_2 MKINDEX_i + \beta_3 (GOVTRUST_i * HIGH_MKINDEX_i) + CONTROL + INDUSTRY + \mu_i \tag{2}$$

To mitigate multicollinearity among *GOVTRUST*, *MKINDEX*, and (*GOVTRUST*_{*i*}×*MKINDEX*), we use an indicator variable *HIGH_MKINDEX* to substitute *MKINDEX* in Eq. (2). *HIGH_MKINDEX* is a (1,0) indicator variable with a value of 1 if a firm is in the subsample of above-median *MKINDEX*. We expect marketization level to reduce the positive impact of government trust on a SME's R&D investments. Hence, β_3 is negative and significant.

We present the findings in Table 7 that use subsamples of high and low marketization level using the median of *MKINDEX*. The findings suggest that the coefficients of *GOVTRUST* remain positively significant at the 5% level in column (1) for the low-marketization subsample or in column (3) with the full sample while using Eq. (2). In addition, we define *HIGH_MKINDEX* as a (1, 0) indicator variable with a value of 1 if a firm is in the subsample of above median *MKINDEX*. The coefficient of

$GOVTRUST*HIGH_MKINDEX$ is negatively significant at the 10% level. Hence, conditional on government trust, when a SME is in a region with a high marketization level, it makes fewer R&D investments. Overall, these results are consistent with H3.

5. Discussion and conclusion

We use survey data to better understand the impact of government trust on R&D investments. As government trust plays a key role in maintaining stability of the environment, it will affect an SME's operations and practices in a particularly acute manner due to the size and resources of SMEs. Our findings suggest that when an SME operates in an environment with high government trust, it makes more R&D investments that help keep the firm more competitive over time. In practice, this confirms that a highly trustworthy local government provides a safe and supportive environment for firms to take risks. Without a high level of government trust, SMEs will likely take a short-term view of the business and deploy their funds elsewhere, instead of investing in risky or uncertain long-term projects like R&D. Furthermore, given sufficient government trust, some SME owners may become more willing to take risks, highlighting the important effect of government trust on firm behaviors.

We further demonstrate that firms in a high government trust area will likely increase their risk-taking behavior. This result is intuitive but empirically important: as SMEs feel more secure in their operations, they will be more optimistic and willing to take more risk through longer-term projects involving R&D. Moreover, we build on the current literature on social trust to show that social trust alone cannot motivate SMEs to engage in more R&D.

There are two potential limitations. First, due to the limited studies on government trust and innovation, our study is exploratory in nature. Given that the existing literature on firm behavior has generally undervalued the role of government trust, our theoretical contribution is important because we shed light on the influence that government trust can have on R&D investments. Second, we focus on Chinese SMEs, instead of all SMEs. However, this allows us to be more precise in our design. Future research may draw on our findings to include different countries, as well as expand our sample to study mature and emerging economies. Moreover, our choice of China is especially important given its sizeable economic influence on the greater global scale, as well as its current demographic makeup. Previous studies have shown that younger, more educated, and well-paid citizens in China are less likely to trust their government (Zhao & Hu, 2017). In light of this finding, our study is especially critical. While all countries can benefit from our study to understand how they can aid their country's economic growth, China in particular may want to invest more in measures that help build long-term trust in their local governments.

Declaration of Competing Interest

The authors report that there are no competing interests to declare.

Data availability

Data will be made available on request.

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Appendix A. Variable definitions

Appendix A

presents the definitions of variables.

Variables	Definitions	Data Source
Firm variables		
<i>RD</i>	The natural logarithm of 1 plus R&D expenditure	CMES
<i>PRIVATE_OWNED</i>	If the SME is privately-owned, the value is 1 and 0 otherwise	CMES
<i>STARTUP</i>	If the SME owner had startup experience, the value is 1 and 0 otherwise	CMES
<i>WORKED</i>	If the SME owner had work experience, the value is 1 and 0 otherwise	CMES
<i>GOVWORK</i>	If the SME owner had government work experience, the value is 1 and 0 otherwise	CMES
<i>LNSALES</i>	The natural logarithm of the SME's sales	CMES
<i>LEVERAGE</i>	Financial leverage of the SME	CMES
<i>ROA</i>	Return on assets of the SME	CMES
<i>SUBSIDY</i>	If the SME receives government subsidies, the value is 1 and 0 otherwise	CMES
<i>AGE</i>	The age of SME owner	CMES

(continued on next page)

Appendix A (continued)

Variables	Definitions	Data Source
<i>MALE</i>	If the gender of the SME owner is male, the value is 1 and 0 otherwise	CMES
<i>COLLEGE</i>	If the SME owner has a college degree, the value is 1 and 0 otherwise	CMES
Channel variables		
<i>RDWILL</i>	In the CMES (Statement D3016: What are the determinants of R&D and innovation?), respondents offer their responses: (1) no need to innovate, (2) not willing to innovate, (3) lack R&D funding, (4) lack R&D staff, (5) R&D is risky, (6) lack market information to conduct innovation, (7) R&D results can be mimicked by others, (8) lack intellectual property right protection, (9) government policy restriction, and (10) other. If an SME owner chose neither (1) nor (2), the value of <i>RDWILL</i> is 1 and 0 otherwise.	CMES
<i>RDINFOR</i>	In the CMES (Statement D3001: Do you know whether the government has R&D tax policies such as: R&D expenses are 50% tax deductible, R&D fixed assets depreciation can be accelerated, or subsidy?) Respondents offer their responses: (1) Absolutely do not know, (2) do not know, (3) neutral, (4) know, and (5) clearly know.	CMES
<i>FORMALFINANCE</i>	If an SME has received bank loans, the value is 1 and 0 otherwise.	CMES
<i>RDPROTECT</i>	Referring to response to D3016, if the respondent chose (8), the value of <i>RDPROTECT</i> is 1 and 0 otherwise.	CMES
Regional variables		
<i>SOCTRUST</i>	Social trust level per county, based on the CMES	CHFS
<i>GOVTRUST</i>	Government trust level in a county in which an SME is located	CHFS
<i>LNPGDP</i>	Per capita GDP in a county	China Statistical Yearbook (<i>County Level</i>) & China City Statistical Yearbook
<i>LNPOP</i>	County population in natural logarithm	China Statistical Yearbook (<i>County Level</i>) & China City Statistical Yearbook
<i>SECONDNGDP</i>	Secondary sector to GDP ratio in a county (%)	China Statistical Yearbook (<i>County Level</i>) & China City Statistical Yearbook
<i>INVESTMENTGDP</i>	Fixed asset investments to GDP ratio in a county (%)	China Statistical Yearbook (<i>County Level</i>) & China City Statistical Yearbook
<i>FISCALGDP</i>	Fiscal spending to GDP ratio in a county (%)	China Statistical Yearbook (<i>County Level</i>) & China City Statistical Yearbook
<i>DENSITY</i>	River density of a prefecture level city in which a county located, which is the total lengths of rivers to total area	Baidu Maps
<i>MKINDEX</i>	Marketization index of the province where the SME is located. A high index suggests high marketization	Wang et al. (2017)
<i>BIRTHRATIO</i>	The birth ratio during the Great Famine years of 1959–1961, which is the total number of newborns to total population from 1959 to 1961, gathered from the 1990 Census	1990 Population Census

Appendix B. Frequency distribution of respondents

Appendix shows the frequency distribution of respondents.

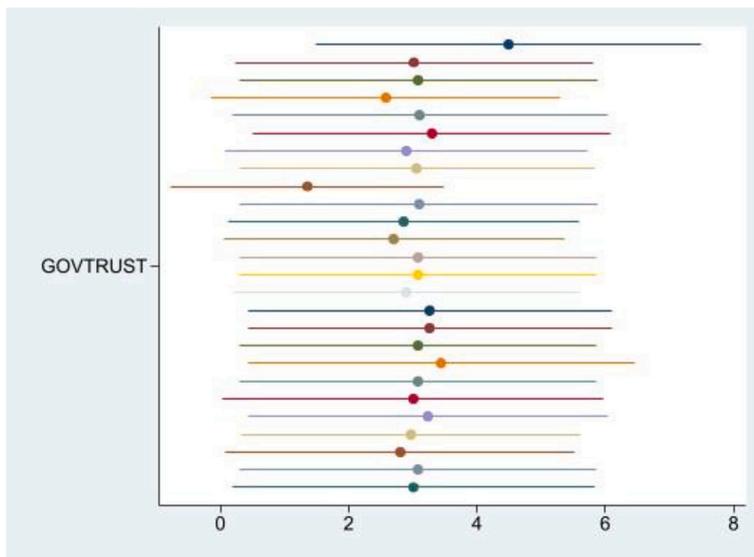
Province and autonomous cities	N	Percentage (%)
Anhui	91	2.99
Beijing	154	5.06
Chongqing	251	8.24
Fujian	87	2.86
Gansu	97	3.19
Guangdong	200	6.57
Guangxi	15	0.49
Guizhou	66	2.17
Hebei	33	1.08
Heilongjiang	57	1.87
Hubei	170	5.58
Hunan	104	3.42
Inner Mongolia	11	0.36
Jiangsu	207	6.8
Jiangxi	58	1.9
Jilin	47	1.54
Liaoning	121	3.97
Ningxia	57	1.87
Shaanxi	25	0.82
Shandong	147	4.83
Shanghai	340	11.17
Shanxi	33	1.08
Sichuan	112	3.68
Tianjin	120	3.94

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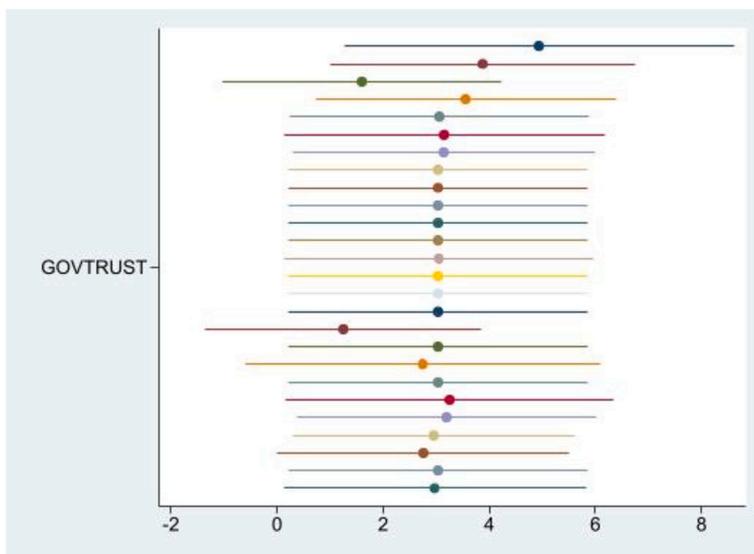
Province and autonomous cities	N	Percentage (%)
Yunnan	96	3.15
Zhejiang	346	11.36
Total	3045	100

Appendix C. Reliability test by dropping data in one province at a time



Each line represents the 95% confidence interval estimate on the coefficient of government trust (*GOVTRUST*) is the baseline equation by dropping the data in one province at a time.

Appendix D. Reliability test by dropping data in one industry at a time



Each line represents the 95% confidence interval estimate on the coefficient of government trust (*GOVTRUST*) is the baseline equation by dropping the data in one industry at a time.

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