



The Impact of the Construction of Entrepreneurship and Innovation Demonstration Bases on Technology Investment Performance: Based on the Evidence of the First Batch of Entrepreneurship and Innovation Bases

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Abstract. To give full play to the driving role of mass entrepreneurship and innovation demonstration bases in promoting reform, stabilizing employment and strengthening momentum, this paper adopts the difference-in-differences method to prove that the establishment of mass entrepreneurship and innovation demonstration bases is conducive to the improvement of regional technology investment performance. From the perspective of regional differences, there are certain differences in the policies of entrepreneurship and innovation demonstration bases in eastern and central regions, northeastern regions and western regions. Based on the regression results of this paper, in order to promote the economic development of each region, the government should continue to implement policies to encourage innovation and entrepreneurship, so as to improve the performance of technology investment.

Keywords: DID · Policy evaluation · Innovative development · Performance of technology investment

1 Introduction

As the tide of innovation and entrepreneurship has been set off in China, entrepreneurship and innovation demonstration bases have been built in various regions. At present, the domestic research on mass entrepreneurship and innovation focuses on the impact of innovation and entrepreneurship on economic growth, the impact of innovation and entrepreneurship on regional development, the evaluation of the results of the implementation of innovation and entrepreneurship policies, and the impact of innovation and entrepreneurship on enterprise development.

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Concerning the entrepreneurship and innovation demonstration base, Zhisheng Hong et al. (2021) studied the entrepreneurship and innovation demonstration base based on the policy diffusion research theory, and believed that the entrepreneurship and innovation demonstration base has a good foundation for promoting the construction of the country [1]. The construction of entrepreneurship and innovation demonstration bases is to promote economic development, and enterprises are the micro subjects of economic development. Yu Zhao et al. (2022) analyzed the changes in the financial data of listed enterprises in the entrepreneurship and innovation demonstration base, and believed that the construction of the entrepreneurship and innovation demonstration base had a positive effect on the company's performance, reflecting the effectiveness of the construction of the entrepreneurship and innovation demonstration base [2]. There are large differences in the economic development of different regions in China. Based on the case study of the development of entrepreneurship and innovation demonstration bases under the Belt and Road Initiative, Yu and Jin (2021) found that the construction of entrepreneurship and innovation demonstration bases has a spatial spillover effect, which not only promotes the level of innovation and entrepreneurship in local cities, but also has a positive impact on adjacent cities [3]. In terms of the impact of mass entrepreneurship and innovation on economic development, Zhang et al. (2017), from a global perspective, found that countries at different stages of development have different levels of entrepreneurial activities [4]. Zheng et al. (2019) analyzed the questionnaire survey data based on the multi-level fuzzy comprehensive evaluation method, and believed that mass entrepreneurship and innovation played an ideal role in driving economic development [5]. Xingbang He (2019) said that the improvement of entrepreneurial quality can significantly increase the efficiency of economic growth, promote the upgrading of industrial structure, promote the level of green development and improve the level of social welfare [6]; Junhua Guo (2020) et al. said that the establishment of regional demonstration bases for entrepreneurship and innovation has a significant role in promoting the innovation ability and innovation investment of the city where it is located. The innovation promotion effect of the regional demonstration bases for entrepreneurship and innovation in the central and western regions is more obvious [7]. At the same time, the improvement of entrepreneurial quality also reduces the fairness of income distribution to a certain extent.

This paper adopts the difference-in-differences method to prove that the establishment of mass entrepreneurship and innovation demonstration bases is conducive to the improvement of regional technology investment performance. The results pass the parallel trend test and placebo test, and the instrumental variable method is used to verify the robustness of the results. There are some differences between the northeast regions. Based on the regression results of this paper, in order to promote the economic development of each region, the government should continue to implement policies to encourage innovation and entrepreneurship, so as to improve the performance of technology investment. Under the combined effect of promoting innovation and entrepreneurship and improving market structure, it will promote local economic development.

2 Research Hypotheses

In order to give full play to the driving role of mass entrepreneurship and innovation demonstration bases in promoting reform, stabilizing employment and strengthening driving forces, further promote the in-depth development of mass entrepreneurship and

innovation, stimulate market vitality and social creativity to a greater extent, and support employment and market entities with new driving forces, we have decided to build demonstration bases for entrepreneurship and innovation.

The policy of “mass innovation and mass entrepreneurship” advocated by China is effectively conducive to the construction of regional entrepreneurship and innovation bases, accelerating economic development, transforming the mode of economic development, and seeking higher-quality development. The construction of entrepreneurship and innovation bases often requires the use of more resources such as infrastructure and the input of the government. Innovation can create a more favorable environment for investment. Innovation opens up new consumer markets, promotes productivity improvement and economic growth, and promotes the prosperity and vitality of market players; The construction of entrepreneurship and innovation demonstration bases is not only conducive to the improvement of the ability of enterprises and other micro-entities of innovation, but also conducive to the development of the region. Yuan et al. (2022) believed that the high-tech attributes of enterprises and the local innovation environment would strengthen the urban peer effect of enterprises’ innovation investment [8]. Based on the above research, this paper proposes the following hypothesis:

Hypothesis 1: The construction of entrepreneurship and innovation demonstration bases is conducive to the improvement of regional innovation capacity.

Hypothesis 2: The construction of entrepreneurship and innovation demonstration bases is conducive to the improvement of technology transformation performance in the region.

3 Empirical Analysis

3.1 Model Setting

$$gtech = a + Treat_i * Time_i + X_{it} + \eta + \gamma + \varepsilon \quad (1)$$

Explained variable: technology investment performance (*gtech*), which is obtained by dividing the amount of transaction investment in the technology market by the GDP of the local area.

The core variable *Treat_i* represents the dummy variable of policy impact (city is set to 1 in the treatment group and 0 in the control group), *Time_i* represents the dummy variable of Time group (time is set to 0 before 2016 and 1 after 2016), and *Treat_i * Time_i* is the core variable of this paper. *X_{it}* represents the control variables at the city-year level, including:

Regional economic level (*lgdp*): it is expressed as the log value of gross regional product. Infrastructure construction (*road*): Road density reflects the level of urban infrastructure construction, and a city with better infrastructure is more likely to attract investment. In this paper, it is represented by the road density of the region

Government investment level (*lgov*): In Keynesian macroeconomics, fiscal and tax policies will crowd out private investment, and the driving effect of government policies on investment. At the same time, private investment will flow to enterprises in the entrepreneurship and innovation bases, weakening the crowding-out effect of the government. In this paper, the logarithm of the amount of the district budget is used

Table 1. Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>gtech</i>	680	0.012	0.022	0.001	0.175
<i>road</i>	680	13.274	4.797	3.870	26.780
<i>lgov</i>	680	7.316	1.198	4.094	9.325
<i>lgdp</i>	680	8.715	1.276	4.769	10.983
<i>lpeople</i>	680	8.001	0.922	5.553	9.204
<i>linvent</i>	680	8.354	1.861	1.946	11.970
<i>lres</i>	680	13.156	2.116	0	17.183

Population (*lpeople*): The higher the population density is, the more the corresponding labor force will be, which will attract investment, which is expressed as the logarithm of the permanent resident population of the region

Innovation capability (*linvent*): it is represented by the number of local invention patents granted

Research input (*lres*): it is expressed as the logarithm of research funding

In addition, η denotes city fixed effects, γ denotes time fixed effects, and ε is the disturbance term.

3.2 Sample Selection and Descriptive Statistics

In this paper, the macro public data of cities and provinces in thirty-one provinces in China from 2001 to 2021 are selected as the research objects. The descriptive statistics of the variables are shown in Table 1.

3.3 Parallel Trend Test

The parallel trend test is the premise of DID, and the results of the parallel test are shown in Fig. 1. Before the implementation of the policy, the estimated coefficient of the core variable is close to 0 and insignificant, satisfying the hypothesis of parallel trend.

3.4 Basic Regression

In order to evaluate the impact of the construction of entrepreneurship and innovation demonstration base on technology investment performance, this paper uses the DID method, and the results are shown in Table 2. Column (1) shows the regression results without adding control variables, and Column (2) shows the regression results with adding control variables. It has preliminarily verified that the construction of entrepreneurship and innovation demonstration bases has a significantly positive impact on the level of foreign investment. The government establishes entrepreneurship and innovation bases in each region in the sample and implements supportive policies for entrepreneurship and innovation in each region in the sample. These measures have

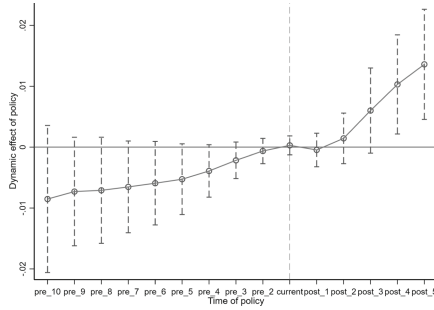


Fig. 1. Parallel trend test

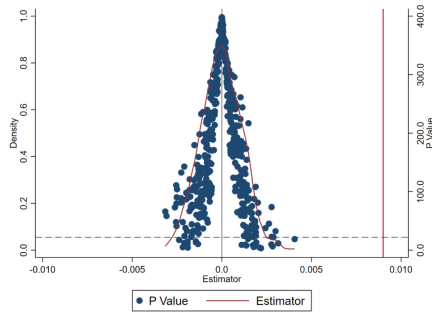


Fig. 2. Placebo test

played a particularly important role in supporting the development of local innovative enterprises and technology industry. These policies are greatly beneficial to the local economic development.

4 Robustness Test

In addition to meeting the parallel trend test, a series of validity tests are also needed. This paper selects the placebo test, changes the core variable, changes the sample range and the double-term difference to prove the robustness of the results of this paper.

4.1 Placebo Test

In DID, in addition to parallel trend test, placebo test is also needed to avoid the interference of other policies or random factors. In this paper, 500 “pseudo policies” are made, and the distribution of the estimated coefficients and the corresponding p-value are shown in Fig. 2. In addition, in order to eliminate the interference of policies, we wind-down the sample, and the sample time is changed to 2007–2020. The results are shown in Column (1) of Table 3, and the regression results of core variables are still significant.

Table 2. Basic regression^a

VARIABLES	(1)	(2)
	gtech	gtech
did	0.011** (0.005)	0.010*** (0.003)
Constant	0.010*** (0.001)	0.041 (0.117)
Control	0.010***	0.041
Observations	680	680
R-squared	0.84	0.86
Region FE	YES	YES
Year FE	YES	YES
Adjustment r^2	0.825	0.847

^a Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, the same as in Table 2.

4.2 Changing the Sample Scope

Due to the small population in the areas west of the Heihe Tengchong Line, it is difficult to play the role of talents in the construction of the mass entrepreneurship and innovation demonstration base, which will affect the policy evaluation effect of this paper. The results are shown in Column (2) of Table 3. After changing the sample scope, the impact of entrepreneurship and innovation demonstration bases on technology investment performance is still significant, which once again proves the validity of the conclusions in this paper.

4.3 Double-Maturity Difference in Differences

The data period of this paper is from 2000 to 2021, which covers a long time. Therefore, to avoid serial correlation in the benchmark regression, this paper uses two-period DID regression, that is, the sample is divided into two time periods with 2016 as the boundary, and the data of the two time periods are averaged. The results are shown in Column (3) of Table 3, and the core coefficient is still significantly positive, excluding the influence of serial correlation on the results of this paper.

4.4 Changing Core Variables

In order to eliminate the influence of the specificity of variables on the regression results, we directly use the quantity of technology investment efficiency per capita instead. The results are shown in Column (4) of Table 3.

Table 3. Robustness test

VARIABLES	(1)	(2)	(3)	(4)	(5)
	wind-down the sample	Heihe - Tengchong line	Double maturity	Changing core variables	Lag term
	gtech	gtech	gtech	atech	gtech
did	0.007*** (0.003)	0.008** (0.004)	0.008** (0.004)	0.157** (0.071)	0.009** (0.003)
Constant	0.144 (0.243)	-0.008 (0.154)	0.125 (0.219)	1.435 (2.352)	-0.133 (0.252)
Control variable	YES	YES	YES	YES	YES
Observations	372	550	62	680	649
R-squared	0.95	0.87	0.93	0.70	0.87
Region FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Adjustment r^2	0.946	0.852	0.818	0.668	0.862

4.5 Lag Term

In this paper, the control variables are lagged by one period, and the core variables are found to be significant at the 5% confidence level, which initially solves the error of regression results caused by endogeneity.

4.6 Instrumental Variable Method

To drop the influence of endogeneity on the regression results, we used the regional scientific research funding expenditure as the instrumental variable of the policy. From the perspective of government policy, fiscal policy is the most basic foothold for the government to establish innovation and entrepreneurship bases and encourage local innovation and entrepreneurship activities. On the one hand, local innovative enterprises and high-tech industries will be exempted from tax to a certain extent. On the other hand, the government's local fiscal expenditure has also increased to a certain extent, including subsidies for innovation and entrepreneurship activities, investment in local infrastructure construction and a series of expenditures. The relationship between the core variable and the regional scientific research funding expenditure is strongly correlated, see the mechanism analysis for details, See the first column of Table 4. The regression results show that the core variable is still significant under the instrumental variable method. It proves that the construction of entrepreneurship and innovation demonstration base has a positive effect on the improvement of regional technology investment performance.

Table 4. Regression of instrumental variables

VARIABLES	(1)	(2)
	lsci	gtech
did	0.493*** (0.146)	0.020*** (0.008)
Observations	680	680
R-squared		0.71
Company FE	YES	YES
Year FE	YES	YES
Adjustment r^2	0.946	0.673
Underidentification test		8.187**
Cragg-Donald Wald F statistic ^a		69.315
Kleibergen-Paap rk Wald F statistic		23.642

^a 10% maximal IV size is 16.38.

4.7 Heterogeneity Analysis

China has a vast territory, and the central and western regions will have different impacts due to their development conditions. The heterogeneity test of the policy of mass entrepreneurship and innovation demonstration base is further conducted, and the results are shown in Columns (1) to (4) of Table 5. The results of equation grouping regression show that there are certain differences in the policies of mass entrepreneurship and innovation demonstration bases with different regions in the eastern, central, northeastern and western regions. The regression results show that there are quantitative and qualitative differences in the impact of mass entrepreneurship and innovation policies on technology investment performance in different regions. Specifically, the relationship between policy implementation and technology investment performance is the most obvious in the western region. Although the positive relationship between policy implementation and technology investment performance is also obvious in the eastern and central regions, the implementation of mass entrepreneurship and innovation policy has a smaller promoting effect on technology investment performance than in the central region. Different from the eastern, central and western regions, the results of the implementation intensity of mass entrepreneurship and innovation policies and the level of technology investment performance are not significant.

5 Policy Recommendations and Conclusions

To give full play to the driving role of mass entrepreneurship and innovation demonstration bases in promoting reform, stabilizing employment and strengthening momentum, this paper adopts the difference-in-differences method to prove that the establishment of mass entrepreneurship and innovation demonstration bases is conducive to the improvement of regional technology investment performance. Based on the regression results

Table 5. Heterogeneity analysis

VARIABLES	(1)	(2)	(3)	(4)
	East	Central	Northeast	West
	gtech	gtech	gtech	gtech
did	0.011** (0.004)	0.006* (0.003)	-0.002 (0.010)	0.014* (0.007)
Constant	-0.216 (0.538)	-0.403 (0.205)	-0.536 (0.296)	0.110 (0.088)
Control variable	YES	YES	YES	YES
Observations	120	132	66	262
Region FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Adjustment r^2	0.972	0.758	0.661	0.594

of this paper, to promote the economic development of each region, the government should continue to implement policies to encourage innovation and entrepreneurship and improve the performance of technology investment. Under the combined effect of promoting innovation and entrepreneurship and improving market structure, it will promote local economic development. This paper puts forward the following policy suggestions.

In terms of policy support, The government should improve the financing platform services for entrepreneurship and innovation enterprises, improve relevant financial policies, and facilitate start-ups and technology-based enterprises to issue bonds for financing; The government should lower the threshold for market access and encourage more technology companies and start-ups with development potential to go public for financing;. The administration should provide targeted financial products and services for strategic industries and major entrepreneurship and innovation development projects. The government should strengthen streamlining administration, delegating power, delegating regulation and strengthening market oversight, establish a fair and sound market environment, unleash the vitality of entrepreneurship and innovation in the region. In terms of scientific research and innovation, The administration should implement policies to encourage scientific research and innovation, support the development of universities and research institutes, encourage the establishment of cooperative research and development platforms for science and technology enterprises, build and improve technology transfer centers for entrepreneurship and innovation and related service platforms, and improve the efficiency of the conversion of basic research results. The government should improve protection of intellectual property rights.

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