# How Entrepreneurship Incentive Policies Affect Urban Innovation? A Study Based on National Entrepreneurial City Policy

# Yuwen WANG

School of Economics and Management, Northwest University, Xi'an, China; xbjgywyw@163.com

Abstract: Innovation is the only way to promote sustainable economic growth, and it is also an important way to solve China's regional development and transform the existing urban economic development model. This paper takes the construction of national entrepreneurial cities as a "quasi natural experiment" to study how the pilot policies aimed at encouraging entrepreneurship affect the level of urban innovation. The research finds that the construction of national entrepreneurial cities has significantly improved the level of urban innovation, which is robust. The mechanism shows that the construction of national entrepreneurial cities has effectively reduced the institutional transaction cost, increased the financial expenditure on science and technology, and improved the entrepreneurial activity, thus promoting the innovation level of pilot cities.

Keywords: national entrepreneurial city; urban innovation; institutional costs; entrepreneurship activities

## JEL Classification: C51; D78

## 1. Introduction

With the rapid development of science and technology in the 21st century and the deepening of economic globalization, scientific and technological innovation has become the key to the success of competition between countries. Since the reform and opening up, the Chinese government has attached great importance to the cause of scientific and technological innovation and has done a lot of work. Not only that, the central government has also listed building an innovative country and innovation driven development as a national strategy to promote scientific and technological innovation. In the process of implementing innovation to lead development, the Chinese government has carried out a number of policy pilot work, providing many guarantees from the administrative, legal, financial and basic technology supply aspects. According to statistics, during the "13th Five Year Plan" period, the number of invention patent applications in China ranked first in the world. By the end of 2019, the number of authorized and effective invention patents had reached 2.67 million, ranking second only to the United States, ranking second in the world and becoming a major innovation country.

The factors affecting innovation are complex. Since Schumpeter put forward the theory of "creative destruction", the relationship between entrepreneurial activities and innovation has attracted the attention of many scholars. In Schumpeter's view, entrepreneurial activities

give birth to entrepreneurs, and innovation is an attempt by entrepreneurs to make new combinations in order to bring excess profits in the process of entrepreneurship, so entrepreneurship is the key to innovation (Schumpeter, 1934). Not only that, existing studies believe that start-ups are not only participants in general innovation activities, but also the key source of disruptive innovation (Zhang & Ran, 2019). However, influenced by the social environment and space, entrepreneurial behavior is actually a "regional event" (Feldman, 2001). In order to promote the emergence of entrepreneurial activities, the Chinese government implemented the national pilot policy of entrepreneurial effect of the policy (Zeng & Wen, 2021). Due to the close relationship between innovation and innovation, the incentive for entrepreneurial activities in the implementation of the policy pilot will also be transmitted to innovation activities, but there is no clear answer to the impact of national entrepreneurial cities on the level of urban innovation, as well as the possible path of pilot policies on urban innovation.

# 2. Theoretical Background and Literature Review

## 2.1. Theoretical Background

Since the reform and opening up, China's economy has taken off at a high speed, precisely because a large number of entrepreneurial activities have sprung up, stimulating the vitality of the market economy (Zhou, 2013). It has been widely believed that entrepreneurship is an important way to promote the employment of residents and stimulate market vitality (Content et al., 2019). To this end, the Chinese government regards the promotion of entrepreneurship as an important part of its public policy and expects to build an ecosystem to support the creation of new enterprises (Bruton et al., 2018). The most famous one is the call for mass entrepreneurship and innovation. In addition, as early as 2009, the Chinese government launched a national entrepreneurial city pilot program to promote urban entrepreneurship, with a view to creating a good business environment to promote entrepreneurship, giving play to the employment multiplier effect of entrepreneurship, and thus promoting the transformation of economic structure.

# 2.2. Literature Review

Innovation is an activity with uncertain returns and accompanied by high risks (Oliver & Moore, 2008). For incumbent enterprises in the market, such enterprises can obtain normal profits in their business activities under the existing factor endowment. Therefore, they are conservative about innovation activities. For start-ups, only through innovation can they survive in the market and gain market share. As a result, startups tend to be more willing to engage in innovative activities. Not only that, unpredictable and disruptive innovations often occur in start-ups. Mature large companies are good at improving innovation, while disruptive innovation usually comes from newly established companies (Zhang & Ran, 2019). This is mainly because traditional large companies are usually vested interests of the status quo, and

disruptive innovation will destroy the status quo and endanger their vested interests. On the contrary, entrepreneurs take more risks, have more decision-making power, and ultimately can obtain greater returns. Disruptive innovation is unpredictable in nature, and it is impossible to preset an effective incentive system. The best incentive system is profit sharing. In fact, innovators become entrepreneurs.

The innovation activities of the micro market subject occur in a specific regional environment, which cannot be separated from the impact of the existing regional system, resource supply and a series of other aspects. As the main institution and resource supplier in the regional economic and social development (Yang & Zhao, 2020), the government has a profound impact on the regional innovation level. Due to the lack of formal systems, local governments have played a key role in resource allocation, profoundly affecting market structure and innovation activities. In regions with imperfect institutional environment, due to the great spillover effect of innovation and the inherent high-risk attribute of innovation activities, market economy is likely to provide insufficient innovation. At this time, the government's financial expenditure on science and technology is the key to restrict the micro innovation subject to obtain innovation input (Che et al., 2020). In addition, the weak protection of intellectual property rights has made the results produced by micro innovation subjects who spend a lot of money and energy can be captured by other market participants at a cost far lower than the innovation cost, which is a great blow to the innovation power of micro innovation subjects.

The government's public policies form an institutional framework, which in turn determines the costs and trade-offs of entrepreneurial activities (Minniti, 2010). Therefore, in any specific context, government public policies have a great impact on the occurrence of various types of entrepreneurial activities. In order to promote the emergence of entrepreneurial activities, local governments have implemented various entrepreneurial policies such as tax relief, entrepreneurial subsidies, and interest free loans to attract new companies. It is hoped that these start-ups can promote economic growth within their jurisdiction. As an entrepreneurial incentive policy of government departments, national entrepreneurial cities can stimulate entrepreneurs' entrepreneurial enthusiasm by creating a good external environment (Fritsch & Schilder, 2008). At the same time, the government's initiative to guide entrepreneurship can break the monopoly and information barriers in the free market to a certain extent, mobilize the enthusiasm of social entrepreneurship, and thus provide a foundation for innovation activities. In addition, the complicated administrative examination and approval procedures also create a broad space for the incumbent enterprises to safeguard their monopoly interests and engage in non-productive rent-seeking and corruption activities, increasing the cost of potential innovators. The national entrepreneurial cities take optimizing the efficiency of government services, vigorously promoting the reform of streamlining administration and delegating powers, and simplifying the administrative approval procedures as the pilot tasks, with the aim of reducing the market institutional transaction costs, improving the efficiency of resource allocation, and helping to promote innovation activities.

#### 3. Methodology

#### 3.1. Model Building

The construction of national entrepreneurial cities is a pilot policy implemented by the central government to stimulate entrepreneurial activities, which has a strong exogenous impact on innovation activities. This paper regards it as a "quasi natural experiment" and uses the double difference method (DID) to study the impact of national entrepreneurial city construction on urban innovation activities. The research sample selects 282 prefecture level cities from 2006 to 2019, including 77 national entrepreneurial cities.

This paper constructs the virtual variable *treated* and *time* of entrepreneurial cities. In order to solve the sample bias problem and endogenous problem, this paper adopts the method of combining the tendency matching score method with the double difference model (PSM-DID) in the robustness test, so as to obtain the policy processing effect. The model settings are as follows:

$$\text{Innovation}_{it} = \alpha_0 + \alpha_1 CY + \alpha_n X_{it} + \sigma + \varepsilon_{it} \tag{1}$$

In formula (1), subscript *i* represents city and *t* represents time. *Innovation*<sub>*it*</sub> is the explained variable of this paper, representing the entrepreneurial activities of city i in year t;  $CY = treated \times time$  is the core explanatory variable;  $X_{it}$  refers to a series of control variables that change over time and affect urban entrepreneurial activities;  $\sigma$  is urban fixed effect and time fixed effect;  $\varepsilon_{it}$  is the error perturbation term.  $\alpha_1$  is the core parameter of this paper, which represents the impact of entrepreneurial city construction on innovation activities. If entrepreneurial city construction can bring about the growth of urban innovation activities, then the  $\alpha_1$  should be significantly positive.

#### 3.2. Variable Definition and Data Source

Interpreted variable. Most of the existing literatures use the number of patent applications in the same year to measure innovation activities, but there are some defects in this way. This paper selects the urban innovation index released by Kou et al. to measure the comprehensive innovation level of cities at various levels. Since this index is only published to 2016, this paper obtains the urban innovation index after 2016 by interpolation fitting.

Explain variables. The explanatory variable of this paper is the virtual variable (*CY*) of entrepreneurial city construction. As of the end of 2019, there are 77 cities in China with entrepreneurial city construction. This paper constructs two dummy variables: ① policy shocks *treated*). If a prefecture level city becomes a pilot city for entrepreneurial city construction, the assigned value of *treated* is 1; otherwise, the assigned value of *treated* is 0; ② Policy time (*time*). If a city was approved as an entrepreneurial city construction pilot in 2009, the value assigned to it in the current year and later is 1, and the previous value assigned to it is 0, thus the explanatory variable  $CY = treated \times time_{\circ}$ 

Mediation variables. Based on the above mechanism analysis, this paper selects institutional transaction costs, government financial expenditure and entrepreneurial

activity as intermediary variables to test the impact of entrepreneurial city construction on urban entrepreneurial activities. Among them, (1) institutional transaction cost (*cost*), this paper uses the ratio of the sum of financial expenses, management expenses and sales expenses of listed companies in various cities to the total assets of listed companies in cities to measure institutional transaction costs. (2) Government financial science and technology support (kj), we use the proportion of government science and technology expenditure in public financial expenditure. (3) Entrepreneurial activity (*ea*), this paper measures the entrepreneurial activity based on the proportion of urban private and individual employees in the total resident population at the end of the year.

Control variables. Drawing on the research of existing scholars on innovation activities (Autio et al., 2014; Nicholas et al., 2019; Yan et al., 2021), this paper also adds a series of control variables to reduce endogenous problems caused by other factors not considered. The details of the control variables are as follows: the wage level of residents (*wage*) is measured by the average wage of urban employees; The degree of opening to the outside world (*f di*) is calculated by dividing the amount of foreign direct investment by GDP. Since the amount of foreign direct investment is US dollars, it is converted into RMB at the annual exchange rate published by the People's Bank of China; Infrastructure level (*inf*) is measured by the ratio of urban road area to area under jurisdiction; Industrial structure (*cyjg*) is measured by the ratio of urban tertiary industry output value to GDP.

Data source. The variables in this empirical study are all from the China Research Data Service Platform (CNRDS) database. For the missing data of some prefecture level cities in some years, the statistical yearbook of the province (district) where the city is located is used to supplement. Descriptive statistical results of each variable are shown in Table 1.

Variable	Ν	Mean Value	Std. Dev.	Min	Max
Innovation	3,934	9.934	41.344	0.000	1,037.31
CY	3,934	0.213	0.409	0.000	1.000
cost	3,934	0.065	0.061	0.000	0.495
kj	3,934	0.030	0.021	0.068	20.509
еа	3,934	0.124	1,478.687	0.005	3.092
wage	3,934	4.380	2.040	4.958	137.085
fdi	3,934	0.180	0.198	0.00	2.101
inf	3,934	0.275	0.504	0.024	7.527
cyjg	3,934	47.238	10.928	11.392	90.971

Table 1. Descriptive statistical analysis of variables

## 4. Results

#### 4.1. Basic Inspection

This paper uses OLS and heteroscedastic robust standard to get the estimation result of DID by mistake. The result is shown in column (1) (2) of Table 2, where column (1) is not added with control variable, and column (2) is added with control variable.

	Basic inspection		Robustness check				
Variable	(1)	(2)	(3)	(4)	(5)	(6)	
СҮ	23.074*** (3.02)	16.500*** (3.26)	4.237*** (3.10)	16.460*** (3.25)	7.988*** (3.98)	13.041*** (2.89)	
Cons	0.921 (0.53)	-19.186** (-1.98)	4.029*** (32.36)	-19.447** (-1.99)	8.606*** (-2.50)	-18.514** (-1.73)	
control variable	/	Yes	Yes	Yes	Yes	Yes	
Other policies	/	/	/	/	/	Yes	
City fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	
Time fixed effect	Yes	Yes	Yes	Yes Yes		Yes	
N	3,679	3,679	3,341	3,727 3,679		3,679	
R2	0.587	0.677	0.631	0.741	0.706	0.640	

Table 2. Impact of National Entrepreneurial City on urban innovation.

Note: \*, \*\*, \*\*\* are significant at the level of 10%, 5% and 1% respectively. In parentheses, there is the value of t.

It can be seen from Table 2 that the pilot policy can significantly improve the urban innovation index of 23.074 pilot cities without adding control variables. Considering that the average value of the innovation index of all cities in the study sample is only 9.934. Therefore, the construction of entrepreneurial cities can effectively promote the innovation activities of pilot cities. When control variables are added, the impact of pilot policies on innovation activities is reduced, but the relative value still reaches 16.5. Therefore, whether or not the control variables are included, the estimated value of the impact of entrepreneurial city construction on innovation activities is significantly positive, indicating that entrepreneurial city construction has significantly improved the level of urban innovation.

# 4.2. Robustness Check

(1) Replace the interpreted variable. Although the urban innovation index can comprehensively reflect the innovation level of a city, patent applications can more directly reflect innovation activities. This paper uses the number of patent applications in the year (1,000) as the proxy indicator of urban innovation level to re estimate the benchmark model. The results are shown in column (3) of Table 2. It can be seen that the impact of entrepreneurial city construction on proxy indicators of urban innovation activities is still significantly positive.

(2) PSM estimation. The whole research sample of this paper includes most prefecture level cities in China. Due to their own endowment, geographical location, history and culture and many other factors, the comprehensive development of these cities is quite different, and the innovation activities of different cities cannot meet the assumption of consistent time effect. In order to overcome the bias of estimation results caused by possible trend differences between pilot cities and non-pilot cities, this paper adopts the method of combining PSM-DID to solve the sample bias and endogenous problems and obtain the policy treatment effect. The results are shown in column (4) of Table 2. It is not difficult to find that the estimated coefficient of the impact of entrepreneurial city construction on urban innovation activities is positive at the significance level of 1%, which strengthens the conclusion of this paper.

(3) Exclude extreme value effects. In the benchmark regression, there may be interference of extreme values on the regression results. In order to avoid the interference of extreme values on the regression results, this paper shrinks the tail of all variables by 1%, and then regresses again. See column (5) in Table 2 for the regression results. It can be seen from the table that the tail shrinking treatment does not affect the result that the construction of entrepreneurial cities helps to enhance the level of urban innovation, which verifies the hypothesis of this paper.

(4) Control other policies. While building innovative cities, the central government has also implemented other policies to promote innovation, especially city-based pilot policies. Through collection and collation, it is found that national innovative cities have the most direct impact on the level of urban innovation. Therefore, this paper adds the policy impact dummy variable of this policy in the empirical study to control its impact on the level of urban innovative city pilots, the estimation coefficient is still significantly positive at the significance level of 1%, indicating that the innovation policy at the city level does not cause bias to the estimation results in this paper.

#### 4.3. Action Path Test

According to the above analysis, the construction of entrepreneurial cities may bring about the growth of urban innovation level through three ways: reducing institutional transaction costs, increasing financial expenditure on science and technology, and improving entrepreneurial activity. Therefore, this paper uses the intermediary effect model to empirically test the above mechanisms.

1. Institutional transaction cost (*cost*). Innovation is a highly complex process of resource allocation, and the existence of institutional transaction costs in the market makes the circulation of factor resources not smooth, which will reduce the willingness of entrepreneurs to engage in innovation. Moreover, the reduction of institutional transaction costs will effectively improve the operational efficiency of the market economy system and stimulate the rise of innovative activities. This paper uses the ratio of the sum of financial expenses, management expenses and sales expenses of listed companies in each city to the total assets of listed companies in cities to measure the institutional transaction costs. The regression results are shown in column (2) (3) of Table 3. It is obvious that the construction of entrepreneurial cities has reduced the institutional transaction costs of pilot cities at a significant level of 5%. It can be seen from column (3) that the impact of institutional transaction costs on urban innovation level is obviously negative. This shows that the construction of entrepreneurial cities can bring about the growth of urban innovation level by reducing institutional transaction costs.

2. Financial expenditure on science and technology (*kj*). The high risk and long cycle characteristics of innovation make it face strong financing constraints. The government expenditure on science and technology can not only directly provide innovation funds to improve the incidence of innovation, but also the government's support for enterprises' science and technology funds can bring demonstration effects and help enterprises with

subsequent financing. This paper uses the proportion of government science and technology expenditure in public financial expenditure to measure the intensity of financial science and technology expenditure. The regression results are shown in Column (4) (5) of Table 3. The result of column (5) shows that the pilot policy helps to improve the financial science and technology expenditure of government departments, and the financial science and technology expenditure is at a significant level of 5%, promoting the improvement of urban innovation level. Therefore, we can say that the construction of entrepreneurial cities has promoted the improvement of urban innovation level by increasing financial expenditure on science and technology.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
СҮ	16.500*** (3.26)	-0.012** (-2.66)	16.253*** (3.15)	3.164** (2.16)	15.665*** (3.32)	0.018** (2.07)	11.460** (2.94)
cost			-20.463* (-1.99)				
kj					0.272** (2.38)		
еа							2.059*** (3.98)
control variable	/	Yes	Yes	Yes	Yes	Yes	Yes
City fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,934	3,934	3,934	3,934	3,927	3,934	3,934
R2	0.677	0.694	0.677	0.580	0.685	0.816	0.760

Table 3. Function mechanism of National Entrepreneurial City on urban innovation

Note: \*, \*\*, \*\*\* are significant at the level of 10%, 5% and 1% respectively. In parentheses, there is the value of t.

## 5. Conclusions and Discussion

How to stimulate innovation is a fascinating issue. There have been studies discussing it from various angles such as intellectual property protection, government grants, fiscal decentralization and so on (Guo & Zhuang, 2017; Guo, 2018; Li et al., 2021). There are also many literatures concerned about the impact of the innovation incentive policies formulated by the government on innovation activities (Li & Yang, 2019; Zhou & Li, 2021), but few studies have considered the innovation effect of non-innovation incentive policies. This paper studies the impact of the pilot policies for the construction of entrepreneurial cities aimed at encouraging entrepreneurship on the level of urban innovation. The research results show that the construction of entrepreneurial cities can effectively improve the innovation level of pilot cities, and the conclusion is still valid after a variety of robustness tests. This shows that because innovation and entrepreneurship are closely related, the government's policies to promote regional entrepreneurial activities can also help promote local innovation activities. Secondly, the impact of the construction of entrepreneurial cities on the innovation level of pilot cities is mainly due to the fact that the pilot cities have effectively reduced the institutional transaction costs, increased the financial expenditure on science and technology,

and improved the entrepreneurial activity during the pilot period, thus promoting the improvement of the innovation level of pilot cities.

Of course, affected by the COVID-19, the author is unable to obtain the latest research data, so the research sample range needs to be updated. Innovation activities have a strong continuity. The level of urban innovation in the previous period will affect the level of urban innovation in the current period, which has not been considered in the research model of this paper. Last, this paper has not yet discussed whether the innovation effect of entrepreneurial city construction is regulated by other factors. China is in a critical period of economic transformation, and innovation driven development has become a national strategy. Therefore, there may be external factors regulating the impact of entrepreneurial city construction on the innovation level of pilot cities, which is also the next research direction of this article. Entrepreneurship is a key driving force for economic development and national growth, and innovation is the only way to ensure that a country can achieve sustainable long-term productivity growth. Studying whether the policies aimed at encouraging entrepreneurship contribute to innovation can help the government better clarify the formulation and implementation of policies, thus promoting the mutual promotion of entrepreneurship and innovation.

Acknowledgments: I would like to thank my senior brother Zheng Han for his guidance.

Conflict of interest: none.

#### References

- Autio, E., Kenney, M., Mustar, P., Siegel, D., & Wright, M. (2014). Entrepreneurial innovation: The importance of context. *Research Policy*, *43*(7), 1097–1108. https://doi.org/10.1016/j.respol.2014.01.015
- Bruton, G. D., Zahra, S. A., & Cai, L. (2018). Examining Entrepreneurship Through Indigenous Lenses. *Entrepreneurship Theory and Practice*, 42(3), 351–361. https://doi.org/10.1177/1042258717741129
- Che, D., Wu, C., Ren, X., & Wu, F. (2020). How does financial expenditure on science and technology affect enterprise technological innovation - Heterogeneity characteristics, macro and micro mechanisms and the cracking of government incentive structure. *China Soft Science*, *03*, 171–182.
- Guo, C, & Zhuang, Z. (2017). Intellectual property protection and independent innovation incentives in "South" countries. *Economic Research*, 47(09), 32–45.
- Guo, Y. (2018). The signaling mechanism of government innovation subsidies and enterprise innovation. *China Industrial Economy*, (09), 98–116.
- Feldman, M. P. (2001). The Entrepreneurial Event Revisited: Firm Formation in a Regional Context. *Industrial* and Corporate Change, 10(04), 861–891. https://doi.org/10.4337/9781848445079.00026
- Fritsch, M., & Schilder, D. (2008). Does Venture Capital Investment Really Require Spatial Proximity? An Empirical Investigation. *Environment and Planning A: Economy and Space*, *40*(9), 2114–2131. https://doi.org/10.1068/a39353
- Kou, Z., & Liu, X. (2017). *FIND report on city and industrial innovation in China (2017)*. Fudan Institute of Industrial Development, School of Economics, Fudan University, Shanghai, China.
- Li, Z., & Yang, S. (2019). Has the innovative city pilot improved the level of urban innovation? *China Political Economy*, *4*(1), 56–85. https://doi.org/10.1108/CPE-07-2021-0010
- Li, J., Xue, J., Feng, F., & Hua, P. (2021). Two-way FDI and China's regional innovation. *Economic and Management Research*, 42(09), 14–27.
- Minniti, M. (2010). The Role of Government Policy on Entrepreneurial Activity: Productive, Unproductive, or Destructive? *Entrepreneurship Theory and Practice*, *32*(5), 779–790. https://doi.org/10.1111/j.1540-6520.2008.00255.x
- Bloom, N., Van Reenen, J., & Williams, H. (2019). A Toolkit of Policies to Promote Innovation. *Journal of Economic Perspectives*, 33(3), 163–184. https://doi.org/10.1257/jep.33.3.163

Schumpeter, J. A. (1934). The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Harvard University Press.

- Hart, O., & Moore, J. (2008). Contracts as Reference Points. *The Quarterly Journal of Economics*, 123(1), 1–48. https://doi.org/10.1162/qjec.2008.123.1.1
- Yan, H., Sun, J., & Jiang, Z. (2021). Innovative Cities, Ownership Differences and Enterprise Innovation: From the Perspective of Target Assessment. *World Economy*, 44(11), 75–101. https://doi.org/10.19985/j.cnki.cassjwe.2021.11.005
- Yang, Z., & Zhao, H. (2020). Open Innovation of Chinese Enterprises: Institutional Environment, "Competition and Cooperation" Relationship and Innovation Performance. *Management World*, *36*(02), 139–160+224.
- Zeng, J., & Wen, Y. (2021). The impact of government entrepreneurship policies on urban entrepreneurship and its mechanism of action a quasi natural experiment based on national entrepreneurial cities. *Economic Management*, *43*(04), 55–70. https://doi.org/10.19616/j.cnki.bmj.2021.04.004
- Zhang, Y., & Ran, J. (2019). How do startups achieve disruptive innovation through dual capabilities a case study based on Youmi Technology. *China Soft Science*, 01, 117–135
- Zhou, W. (2013). Political connections and entrepreneurial investment: Evidence from China's transition economy. *Journal of Business Venturing*, *28*(2), 299–315. https://doi.org/10.1016/j.jbusvent.2012.05.004
- Zhou, Y., & Li, S. (2021). Can the innovative-city-pilot policy promote urban innovation? An empirical analysis from China. *Journal of Urban Affairs*, 1–19. https://doi.org/10.1080/07352166.2021.1969243