*Review of Finance*, 2022, 595–635
https://doi.org/10.1093/rof/rfab029
Advance Access Publication Date: 30 October 2021





# Do Place-Based Policies Promote Local Innovation and Entrepreneurship?*

**Xuan Tian[1] and Jiajie Xu[2]**

[1]PBC School of Finance, Tsinghua University, [2]Carroll School of Management, Boston College

## Abstract

This paper explores how a prominent place-based policy in China, the national high-tech zones, affects local innovation output and entrepreneurial activities. Making use of staggered establishments of national high-tech zones in various Chinese cities, we find that the establishment of national high-tech zones has positive effects on local innovation output and entrepreneurial activities. A number of additional tests suggest that the effects appear causal. Access to finance, reductions in administrative burdens, and talent cultivation are three plausible underlying economic channels. Our paper sheds new light on the evaluation of the effectiveness of China's place-based policies.

**JEL Classifications:** G24, G38, O38, L26

**Keywords:** Entrepreneurship, Innovation, National high-tech zones, Access to finance, Administrative burdens, Talent cultivation

Received December 24, 2020; accepted October 11, 2021 by Editor Zhiguo He.

## 1. Introduction

[illegible] (. ., S [illegible], 1957; [illegible], 1986; A [illegible], 1992). [illegible]

* We are grateful for helpful comments from Zhiguo He (the editor), three anonymous referees, Thomas Chemmanur, Lifeng Gu, Sabrina Howell, Vladimir Ivanov, Josh Lerner, Yifei Mao, Jay Ritter, Chaopeng Wu, Xintong Zhan, and conference participants at the 209 Western Finance Association meetings, the 2019 China International Conference in Finance, the 2019 China Finance Research Conference, and the 2019 Harvard-Tsinghua Private Capital Conference. We thank Xiaobo Zhang for providing access to the firm registration database. We also thank Lili Chen, Chaoya Feng, Lingyun Wei, Jinlin Li, Jun Xu, Yuan Zhang, and Zhao Zhang for their able research assistance. X.T. acknowledges financial support from the National Natural Science Foundation of China (Grant Nos. 71825002, 71790591, and 91746301) and Beijing Outstanding Young Scientist Program (BJJWZYJH 01201910003014). We remain responsible for all remaining errors and omissions.

1 See Decker *et al.* (2014), Da Rin, Hellmann, and Puri (2013), Chemmanur and Fulghieri (2014), and He and Tian (2018, 2020) for surveys of these two strands of literature.

2 A few recent examples of this literature include Audretsch, Link, and Scott (2002), Brander Du, and Hellmann (2015), Howell (2017), and Kong (2020).

3 Pirinsky and Wang (2006), Kedia and Rajgopal (2009), John, Knyazeva, and Knyazeva (2011), Tian (2011), Cai, Tian, and Xia (2016), and Bernile, Kumar, and Sulaeman (2015) show the effects of firms' locations on the comovement of stock returns, corporate stock option plans, dividend payout policy, VC stage financing, acquisition likelihood, and institutional investors' geographical bias.

4 One exception is Austin, Glaeser, and Summers (2018) who argue that place-based policies could insure residents against place-based economic shocks.

C a a9 a 9 a a B . 9 BB B a Ba
C a' -B 9 S 9B 2.
9 aBa B a 9 . B aB Ba 9aB a a B
aB B SBaB B 9B a B 9 (S ) C a a aB B9BaB
aBa aB B Ba C a' B aB aBa B SBaB
A B aB B a C 9 (SA C) C a a 9B - 9 a a9B B9
B C a C B SBaB B9a a k6. a aB aB Ba BaB
aBa aBB 9B . a 9 8,890 9B - a aB 473
9B a 30- a B 1985 a 2014.
A Ba a a a9 B aBa B 9 9 -B 9 Ba B B
Bk6 B a a B a ( S) B aB a 9B ' aB B B
a B a a9B B B 9B ' 9B 9 -.20 9B4B6a ( 920 B6371.805 9- B' .20 -5.6-B -B 3 )B(4
a B .314 1 a a Ba 1.31 Ba 56.31 a6 B 9.515 -5.

[illegible]

## 2. Institutional Background

[illegible]

[illegible]

5 See, for example, Neumark and Simpson (2015) for a comprehensive review on place-based policies in the USA and Europe. Existing studies pertaining to place-based policies in the USA mainly focus on Round I of the federal urban Empowerment Zone program and the California Enterprise Zone program. For example, Busso, Gregory, and Kline (2013) find that the Empowerment Zone designation substantially increases employment in zone neighborhoods and generates wage increases for local workers. Neumark and Kolko (2010) show that the California Enterprise Zone program has no significant effect on local employment.

6 Other contemporaneous place-based policies include the ETDZs with the aim of attracting foreign direct investment and boosting exports, the Bonded Zones with the aim of expediting import and export faster, and the Export Processing Zones for importing and processing raw materials from abroad without entering the territory of China (Alder, Shao, and Zilibotti, 2016).

7 State Administration of Taxation (2004) states that “the policies given to the province-level development zones should not be comparable to those given to the national ones.”

8 For national high-tech zones, the certification requires firms to have their main businesses involving high-tech industries, spend 3% or more of their revenue in R&D, and have 30% or more of employees with higher education backgrounds. Provincial high-tech zones, on the other hand, do not have any requirements on firms or they target certain industries based on local political or economic interests and are "a patchwork of different policies rather than a coherent policy instrument" (Alder, Shao, and Zilibotti, 2016). Note that the certification of firms and beneficial policies given to firms happen after a national high-tech zone is established and therefore has nothing to do with the concern that the approval of the central government could be related to a city's innovation capacity and industrial development.

9 On May 10 1988, the State Council of China initiated the "Interim Regulations of Beijing New Technology Industry Development Pilot Zone." The ZhongGuan Village (Beijing) became the first national high-tech zone initiated by the central government. For more details, see the Ministry of Science and Technology website: http://www.most.gov.cn/gxjscykfq/ldjh/.

10 On March 6 1991, the State Council approved twenty six national high-tech zones and issued the Notice on the National High-tech Zone and Related Policies with Three Annexes (Annex I, "Conditions and Measures for the Identification of High-tech Enterprises in National High-tech Zones," Annex II, "Interim Provisions on Certain Policies in National High-tech Zones," and Annex III, "Tax Policies for National High-tech Zones"). The full document (in Chinese) can be found from the website of the Ministry of Science and Technology: http://www.most.gov.cn/ztzl/jqzzcx/zzcxcxzzo/zzcxcxzz/zzcxgncxzz/200512/t20051230_27334.htm.

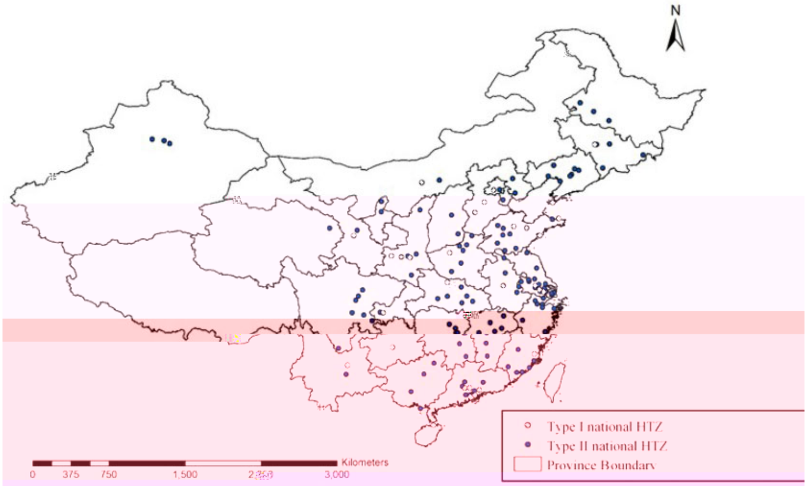


**Figure 1.** Geographical distribution of national high-tech zones. This figure exhibits the geographical distribution of national high-tech zones. Empty dots show the Type I national high-tech zones (i.e., zones initiated by the central government), while solid dots show the Type II national high-tech zones (i.e., those initially established by local governments and then certified by the MOST to be national-level zones).

[illegible] (… , 2019). [illegible] 1991 [illegible].[11] [illegible] 25 35% [illegible] (… , 2019). [illegible] 1/8 [illegible] 1/10 [illegible].[12] [illegible] (… et al., 2017). [illegible]

11 For example, if a firm is confirmed as a high-tech enterprise, its income tax is collected at a reduced rate of 15% since the date of confirmation. If the output value of export products of a certified high-tech enterprise in the high-tech zones accounts for more than 70% of the total output value in the same year, its income tax is collected at a reduced rate of 10%. A certified newly opened high-tech firm in the high-tech zones can be exempted from the income tax within 2 years after it is put into production.

12 According to the report given by the governor of the Minister of Science and Technology, Guanhua Xu, at the meeting of the national high-tech zone in August, 2005, the report (in Chinese) is available at http://www.most.gov.cn/ztzl/gjgxjskfq/gxhyfy/200508/t20050830_24388.htm.

[illegible] , [illegible] , [illegible].

[illegible] C [illegible] . [illegible] 2015, [illegible] 11.7% [illegible] D [illegible] C [illegible] 128 [illegible] 146 [illegible] 15% [illegible] D . [illegible] . [illegible] 2015, [illegible] 44.3% [illegible] C [illegible] &D [illegible] 19.8% [illegible] C [illegible] ( [illegible] ). [illegible] , [illegible] , [illegible] . C [illegible] , [illegible] 1,170 [illegible] , [illegible] , A [illegible] , [illegible] , [illegible] .

[illegible] C [illegible] , [illegible] D [illegible] . [illegible] D [illegible] , [illegible] , [illegible] . S [illegible] , (P_Apply). ... [14] ... (P_Grant). ... 1985 ... 2014 ... (2001), ... P_Cite.[15] ... SAC, ... 1985. ... F_Est) ... INNOV_PApply, INNOV_PGrant, INNOV_Cite, ENTREPRE_FEst, ...

14 There are three types of patents in China: IPs, utility model patents (UMPs), and design patents (DPs). The Chinese IPs are granted for a new technical solution relating to a product, a process, or an improvement, the Chinese UMPs are granted for new and practical technical solutions related to the shape and/or structure of a product, and the Chinese DPs are granted for new designs related to the shape, pattern or their combinations, or the combination of color, shape, and/or pattern that is aesthetically pleasing and industrially applicable. On the one hand, computation of both IPs and UMPs would have an overlap, as there is the parallel filing of a UMP and an IP, followed by the abandonment of the UMs once the IP is officially granted. On the other hand, only IPs requires “substantive examination,” indicating stricter grant standards and higher “inventivene

### 3.2.b. Defining national high-tech zones and other control variables

[illegible]

**Table I.** Summary statistics on national high-tech zones

This table presents variable definitions and descriptive statistics for the sample cities and national high-tech zones. Panel A lists national high-tech zones in the sample by the establishment year. Panel B reports national high-tech zones in the sample by geographical area. Panel C defines all variables used in our analyses. Panel D reports the descriptive statistics for the sample cities. The sample consists of 8,890 city-year observations for 473 cities over a 30-year period from 1985 to 2014. All variables are winsorized at the 1st and 99th percentiles.

a A: aB a -B 9 Ba a

| B a | . | 9 B | C . |
|---|---|---|---|
| 1988 | 15 | 11.03 | 11.03 |
| 1989 | 1 | 0.740 | 11.76 |
| 1990 | 6 | 4.410 | 16.18 |
| 1991 | 19 | 13.97 | 30.15 |
| 1992 | 50 | 36.76 | 66.91 |
| 1993 | 5 | 3.680 | 70.59 |
| 1994 | 3 | 2.210 | 72.79 |
| 1995 | 2 | 1.470 | 74.26 |
| 1996 | 1 | 0.740 | 75 |
| 1997 | 2 | 1.470 | 76.47 |
| 1999 | 4 | 2.940 | 79.41 |
| 2000 | 4 | 2.940 | 82.35 |
| 2001 | 8 | 5.880 | 88.24 |
| 2002 | 5 | 3.680 | 91.91 |
| 2003 | 5 | 3.680 | 95.59 |
| 2005 | 1 | 0.740 | 96.32 |
| 2006 | 2 | 1.470 | 97.79 |
| 2010 | 2 | 1.470 | 99.26 |
| 2012 | 1 | 0.740 | 100 |
| Ba | 136 | 100 | |

a B: aB a -B 9 Ba

| . | . | 9 B | C . |
|---|---|---|---|
| a B | 65 | 47.79 | 47.79 |
| l | 40 | 29.41 | 77.21 |
| B | 31 | 22.79 | 100 |
| Ba | 136 | 100 | |

a C: D B a a

| a a | D B |
|---|---|
| l a aB | |
| $INNOV\_PApply_{i,t+1}$ | aB a a B a 9B i' B Ba ł a 9aB a t+1 |
| $INNOV\_PGrant_{i,t+1}$ | aB a a B a 9B i' B Ba ł a a t+1 a a B a B |

(continued)

**Table I.** Continued

| [illegible] | [illegible] |
|---|---|
| $INNOV\_PCite_{i,t+1}$ | [illegible] $t+1$ |
| [illegible] | |
| $ENTREPRE\_FEst_{i,t+1}$ | [illegible] $t+1$ |
| [illegible] | |
| $PApply\_Growth_{i,-3\ to\ -1}$ | [illegible] 3- [illegible] |
| $PGrant\_Growth_{i,-3\ to\ -1}$ | [illegible] 3- [illegible] |
| $PCite\_Growth_{i,-3\ to\ -1}$ | [illegible] 3- [illegible] |
| [illegible] | |
| $FEst\_Growth_{i,-3\ to\ -1}$ | [illegible] 3- [illegible] |
| [illegible] | |
| $Population_{i,t}$ | [illegible] $t$ |
| $GDP_{i,t}$ | [illegible] $t$ |
| $GDP2\_\%_{i,t}$ | [illegible] % [illegible] $t$ |
| $GDP3\_\%_{i,t}$ | [illegible] % [illegible] $t$ |
| $AvgWage_{i,t}$ | [illegible] $t$ |
| $CPI_{i,t}$ | [illegible] $t$ |

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| P_Apply | 8,890 | 0.181 | 0.712 | 0.000 | 5.342 |
| P_Grant | 8,890 | 0.064 | 0.243 | 0.000 | 1.777 |
| P_Cite | 8,890 | 0.001 | 0.002 | 0.000 | 0.015 |
| F_Est | 8,045 | 3.632 | 5.976 | 0.049 | 37.729 |
| Population | 8,890 | 5.436 | 1.027 | −0.211 | 8.124 |
| GDP | 8,890 | 5.068 | 1.880 | −2.356 | 10.068 |
| GDP2_% | 8,890 | 46.417 | 12.330 | 0.400 | 93.407 |
| GDP3_% | 8,890 | 32.943 | 9.115 | 0.200 | 85.340 |
| AvgWage | 8,890 | 8.998 | 1.110 | 5.540 | 11.451 |
| CPI | 8,890 | 106.631 | 7.290 | 96.400 | 133.057 |

[illegible] 3,632 [illegible]

## 4. Baseline Results

[illegible]

a a a a a B aB B B 9B ’ -B 9 - BaB . a -
a9 , , B 9 9 a 9 .
a B B 9 9 , a D D a a9 B aB k6 Ba
Ba B aB a -B 9 a C 9B a .
D D a a9 a B a a Ba a B 9 9 9 a . B, B
D D a a9 a 9 Ba B 9 B B B aB B 9B
(B aB a aB aC19.2-B 94.5( )1.6( Ba2 6)-33 19.2B 9 B ( )-.9(B 4(S5)(5. -45 ,8(B aB 4(-3087a24)14

**Table II.** Baseline DiD specification

This table reports pooled OLS regression results of the following model:
$INNOV\_PApply\ (INNOV\_PGrant, INNOV\_PCite,\ ENTREPRE\_FEst)_{i,t+1} = \alpha + \beta HTZone_{i,t} + \gamma' CONTROLS_{i,t} + \delta YEAR_t + \theta CITY_i + \varepsilon_{i,t}$.

Variable definitions are provided in Table I Panel C. Year fixed effects, *YEAR*$_t$, and city fixed effects, *CITY*$_i$, are included in all regressions. Coefficient estimates are shown, and their standard errors are clustered by city and displayed in parentheses below. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) INNOV_ $PApply_{i,t+1}$ | (2) INNOV_ $PGrant_{i,t+1}$ | (3) INNOV_ $PCite_{i,t+1}$ | (4) ENTREPRE_ $FEst_{i,t+1}$ |
|---|---|---|---|---|
| HTZone | 0.369*** | 0.503*** | 0.175*** | 0.129** |
| | (0.082) | (0.089) | (0.032) | (0.058) |
| Population | −0.099 0.503 | 0.175***0.129*** | | |
| | 0.082) | | | |

(2), INNOV_PGrant. (3),
INNOV_PCite
HTZone (2) (3) 1%
50.3% 17.5%
(4),
ENTREPRE_FEst. HTZone (4)
5%
12.9%
1

## 5. Addressing Various Concerns

### 5.1 Did Approach with Propensity Score Matching

(1)
$t-1$, Population$_{-1}$, GDP$_{-1}$, AvgWage$_{-1}$, GDP2_%$_{-1}$, GDP3_%$_{-1}$,
CPI$_{-1}$.
3
PApply_Growth$_{i,-3 \text{ to } -1}$, PGrant_Growth$_{i,-3 \text{ to } -1}$,
PCite_Growth$_{i,-3 \text{ to } -1}$
3
FEst_Growth$_{i,-3 \text{ to } -1}$

(1)
$R^2$ 42% p- $\chi^2$ 0.001.

**Table III.** DiD tests with PSM

This table reports the diagnostics and results of the DiD tests on the effect of the establishment of national high-tech zones on local innovation and entrepreneurship. We match cities using a one-to-one nearest neighbor propensity matching, without replacement, on a set of observable city characteristics. Panel A reports parameter estimates from the probit model used in estimating the propensity scores for the treatment and control groups. The dependent variable in the probit model is the *HTZone* dummy. Column (1) contains the parameter estimates of the probit model estimated using the sample prior to matching. These estimates are then used to generate the propensity scores for matching treatment cities and control cities. Column (2) contains the parameter estimates of the probit model estimated using the subsample of matched treatment–control pairs after matching. Definitions of all other variables are listed in Panel C of Table I. The models in both columns of Panel A are estimated with province and year fixed effects. Coefficient estimates are reported and standard errors are displayed in parentheses below. Panel B reports the univariate comparisons between the treatment and control cities' characteristics and their corresponding *t*-statistics. Panel C provides the DiD test results. Standard errors are given in parentheses below the mean differences in innovation and entrepreneurial activities. The dependent variable is *P_Apply**, city *i*'s total number of patent applications in a given year, or *P_Grant**, city *i*'s total number of granted patents that are applied in a given year, or *P_Cite**, city *i*'s total number of patent adjusted citations generated by patent applied in a given year, or *F_Est**, city *i*'s total number of new firm registrations in thousands in a given year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| a A: - aB9 B 9 a B aB9 a B9 | | |
|---|---|---|
| | (1) | (2) |
| | - aB9 | B aB9 |
| PApply_Growth_ | | |

**Table III.** Continued

[illegible] A: [illegible]

| | (1) [illegible] | (2) [illegible] |
|---|---|---|
| [illegible] | | |
| [illegible] | | |
| [illegible] | 0.42 | 0.055 |

[illegible] B: [illegible]

| | [illegible] | C [illegible] | D [illegible] | t-[illegible] |
|---|---|---|---|---|
| GDP | 4.408 | 4.206 | 0.202 | 1.206 |
| Population | 5.549 | 5.472 | 0.077 | 0.659 |
| AvgWage | 48.053 | 48.233 | −0.180 | −0.100 |
| GDP2_% | 29.362 | 28.743 | 0.619 | 0.547 |
| GDP3_% | 8.169 | 8.096 | 0.073 | 0.689 |
| CPI | 105.039 | 104.896 | 0.143 | 0.175 |
| PApply_Growth | 10.519 | 8.074 | 2.444 | 0.709 |
| PGrant_Growth | 3.102 | 2.611 | 0.491 | 0.338 |
| PCite_Growth | −0.081 | 0.008 | −0.089 | −0.632 |
| FEst_Growth | −0.126 | 0.006 | −0.133 | −0.999 |

[illegible] C: [illegible]

| | [illegible] ([illegible]) | [illegible] ([illegible]) | [illegible] DD |
|---|---|---|---|

[illegible] 0.6, [illegible] 0.6 [illegible].[20] [illegible] 105 [illegible].

(2003),

$$P\_Apply(P\_Grant,\ P\_Cite,\ F\_Est)_{i,t} = \alpha + \sum_{t=-4}^{4} \beta_t Treat_i * Period_t + \sum_{t=-4}^{4} Period_t + \varepsilon_{i,t}, \qquad (2)$$

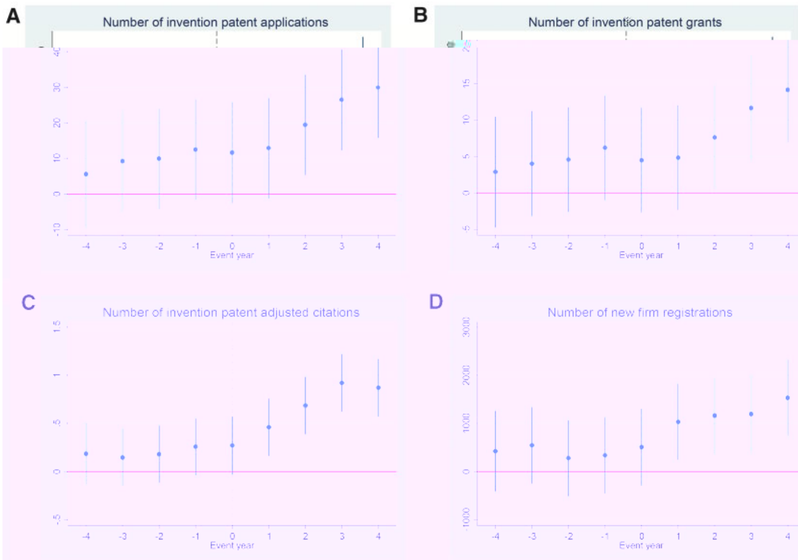


**Figure 3.** The dynamics of national high-tech zone establishments on local innovation and entrepreneurship. This figure plots the coefficient estimates of $\beta_t$ in the following model in a 9-year window centered on the establishment years:

$$\mathrm{P\_Apply}(\mathrm{P\_Grant},\ \mathrm{P\_Cite}, \mathrm{F\_Est})_{i,t} = \alpha + \sum_{t=-4}^{4} \beta_t \mathrm{Treat}_i {*} \mathrm{Period}_t + \sum_{t=-4}^{4} \mathrm{Period}_t + \varepsilon_{i,t}$$

where $Period_t$ is a set of dummy variables. $Period_{-4}$, $Period_{-3}$, $Period_{-2}$, and $Period_{-1}$ corresponds to 4, 3, 2, and 1 year, respectively, before the establishment of the national high-tech zones; $Period_0$ is the year when the national high-tech zones are established; $Period_1$, $Period_2$, $Period_3$, and $Period_4$ corresponds to 1, 2, 3, and 4 years, respectively, after the establishment of the national high-tech zones. The sample consists of 105 treatment cities and 105 unique control cities matched. Year 0 is defined as the event year when zones are established. We plot the coefficient estimates of $\beta_t$ when the dependent variable is the number of patent applications in Panel A, the number of patents applied and finally granted in Panel B, the number of adjusted citations of granted patents in Panel C, and the number of new firm registrations in Panel D. The center points show the point estimates of $\beta_t$ and the vertical lines denote the 95% confidence intervals of $\beta_t$ estimates. (A) Number of patent applications. (B) Number of patent grants. (C) Number of patent citations. (D) Number of new firm registrations.

3 B B 9 9 B B aB $\beta_t$ aB (2) a 9- a 9 -
B B Ba B a ( B a a 0). BB 9 9 B B aB
$\beta_t$ B B a a B aB Ba 9aB a A, B -
a B aB B a B, B aB B9BaB a C, a B
BaB a D. 3, B 9 B B B B B aB
$\beta_t$ a B B9a B B 95% 9 9 B a $\beta_t$ B aB . 3
B aBB 9 9 B B aB $\beta_t$ a B BaB B9a 9a B
B Ba B aB a -B 9 . aB B B aBB a
9a B 9 B B9 a a B Ba B -B 9
a 9 a k6 aB B a a B a B B D D a a . A B

[illegible]

## 5.2 Additional Identification Tests

[illegible] 2013; [illegible], 2016; [illegible] et al., 2017) [illegible]

[illegible] 1978 [illegible] 1995) [illegible]

[illegible] Enforced_HTZone$_{i,t}$, [illegible] 5.1 [illegible] Enforced_HTZone$_{i,t}$ [illegible]

**Table IV.** Excluding type II high-tech zones

This table shows the results for analyses that exclude type II high-tech zones. We only include treatment cities where the establishment of a national high-tech zone was initiated by the central government rather than the local government. The regression framework is the same as that in Equation (1), while the key variable is substituted with *Enforced_HTZone*. The variable *Enforced_HTZone* equals one when a zone has been initiated by the central government by year *t* in city *i*, and zero otherwise. Definitions of all other variables are listed in Table I Panel C. Coefficient estimates are shown below, and their standard errors are clustered by city and displayed in parentheses below. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) INNOV_PApply | (2) INNOV_PGrant | (3) INNOV_PCite | (4) ENTREPRE_FEst |
|---|---|---|---|---|
| Enforced_HTZone | 0.871*** | 1.039*** | 0.409** | 0.399** |
| | (0.297) | (0.310) | (0.179) | (0.178) |
| Population | 0.156 | 0.094 | 0.028 | 0.241** |
| | (0.130) | (0.126) | (0.030) | (0.111) |
| GDP | −0.023 | −0.051 | −0.001 | −0.025 |
| | (0.096) | (0.090) | (0.028) | (0.086) |
| GDP2_% | 0.020*** | 0.019** | 0.004* | 0.001 |
| | (0.008) | (0.008) | (0.002) | (0.008) |
| GDP3_% | 0.016 | 0.015 | 0.001 | 0.000 |
| | (0.013) | (0.012) | (0.003) | (0.009) |
| AvgWage | 0.265 | 0.338 | 0.073 | 0.213 |
| | (0.204) | (0.209) | (0.052) | (0.141) |
| CPI | −0.008 | −0.013 | −0.008 | 0.031*** |
| | (0.012) | (0.013) | (0.007) | (0.009) |
| Constant | −4.724** | −3.999 | −0.086 | −1.531 |
| | (2.261) | (2.477) | (0.917) | (1.536) |
| [illegible] | 3,382 | 3,382 | 3,382 | 3,303 |
| R-[illegible] | 0.870 | 0.840 | 0.679 | 0.807 |
| [illegible] | | | | |
| [illegible] | | | | |
| [illegible] | | | | |

[illegible]

**Table V.** Placebo tests using pseudo-event year

This table reports the results of identification tests using a pseudo-event year for the DiD analysis. We first obtain the distribution of the event years and then move back the event years 3 years before the real event year while keeping the same distribution. The key variable of the regressions is *HTZone_3y_Before*, a dummy equals one when a national high-tech zone is established by 3 years prior to the actual event year (year *t*–3) in city *i*. Definitions of all other variables are listed in Table I Panel C. Coefficient estimates are shown below, and their standard errors are clustered by city and displayed in parentheses below. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) INNOV_PApply | (2) INNOV_PGrant | (3) INNOV_PCite | (4) ENTREPRE_FEst |
|---|---|---|---|---|
| HTZone_3y_Before | 0.058 | 0.114 | 0.022 | 0.043 |
| | (0.068) | (0.070) | (0.021) | (0.063) |
| Population | −0.065 | −0.095 | −0.041* | 0.173*** |
| | (0.061) | (0.061) | (0.023) | (0.060) |
| GDP | 0.025 | 0.026 | 0.031* | −0.028 |
| | (0.039) | (0.039) | (0.017) | (0.063) |
| GDP2_% | −0.000 | −0.000 | −0.001 | −0.005 |
| | (0.004) | (0.004) | (0.002) | (0.005) |
| GDP3_% | −0.004 | −0.001 | −0.002 | −0.018* |
| | (0.005) | (0.005) | (0.002) | (0.011) |
| AvgWage | 0.230* | 0.233* | 0.152*** | 0.268** |
| | (0.130) | (0.126) | (0.040) | (0.122) |
| CPI | −0.008 | −0.005 | −0.006* | −0.001 |
| | (0.006) | (0.006) | (0.003) | (0.006) |
| Constant | −2.482* | −2.432* | −0.776 | 2.165* |
| | (1.401) | (1.299) | (0.521) | (1.267) |
| aB | 2,291 | 2,291 | 2,291 | 2,231 |
| R- a | 0.852 | 0.801 | 0.637 | 0.846 |
| C B | | | | |
| a | | | | |
| S l | | | | |

, HTZone_3y_Before$_{i,t}$, B aB a a aB a -B B - a t−3 B i a B , a BB B a . - B aB B B B aB HTZone_3y_Before$_{i,t}$ BB B a B B B aB a a -B B B B - B a B a aB B B a B a a B B . , B a B BB a a B aB B B B B aB a -B .

, B6 a B a B B a a B aB Ba B B . aB a B B B B aB B B B aB a -B - B a aB B Ba B a a B B , B B B a B aB B B . l B , a B BB a B a B B Ba B aB B B . aBB a D D B a a B aB Ba B B a a a a BB B a l. l a

**Table VI.** Placebo tests using randomly assigned treatment and control cities

This table reports the results of identification tests using randomly assigned treatment and control cities for the DiD analysis. We re-estimate the DiD estimators in Table III Panel C. Definitions of variables are listed in Table I Panel C. Standard errors are given in parentheses below the mean differences in innovation and entrepreneurial activities. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| P_Apply | 18.161 | 19.078 | −0.917 | −0.167 |
| | (4.165) | (3.591) | (5.499) | |
| P_Grant | 7.260 | 7.430 | −0.170 | −0.061 |
| | (2.197) | (1.737) | (2.801) | |
| P_Cite | 0.303 | 0.377 | −0.074 | −0.625 |
| | (0.094) | (0.072) | (0.118) | |
| F_Est | 1.269 | 1.133 | 0.136 | 0.452 |
| | (0.217) | (0.206) | (0.300) | |

[illegible]

[illegible]

[illegible]

**Table VII.** Excluding treatment cities with ETDZ established

This table reports the results of the tests excluding treatment cities where the ETDZs have been established prior to the establishment of the earliest national high-tech zones. $HTZone\_only_{i,t}$ is a dummy that equals one if a national high-tech zone is established by the end of year $t$ in city $i$ and no ETDZ has been established in that city by then, and zero otherwise. Definitions of variables are listed in Table I Panel C. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) INNOV_PApply | (2) INNOV_PGrant | (3) INNOV_PCite | (4) ENTREPRE_FEst |
|---|---|---|---|---|
| HTZone_only | 0.219* | 0.277** | 0.123** | 0.174* |
| | (0.125) | (0.132) | (0.049) | (0.099) |
| Population | 0.029 | −0.064 | −0.026 | 0.215** |
| | (0.097) | (0.093) | (0.027) | (0.090) |
| GDP | 0.056 | 0.055 | 0.040 | 0.046 |
| | (0.072) | (0.070) | (0.029) | (0.068) |
| GDP2_% | 0.013** | 0.010 | 0.001 | −0.002 |
| | (0.006) | (0.007) | (0.002) | (0.007) |
| GDP3_% | 0.018** | 0.016* | 0.001 | −0.003 |
| | (0.009) | (0.008) | (0.003) | (0.009) |
| AvgWage | 0.066 | 0.115 | 0.062 | 0.226 |
| | (0.183) | (0.166) | (0.046) | (0.141) |
| CPI | −0.022*** | −0.023*** | −0.010* | 0.025*** |
| | (0.008) | (0.008) | (0.005) | (0.007) |
| Constant | 0.452 | 0.192 | 0.198 | −0.606 |
| | (1.951) | (1.834) | (0.704) | (1.741) |
| [illegible] | 5,441 | 5,441 | 5,441 | 5,339 |

[illegible]

## 6. Plausible Underlying Channels

### 6.1 Access to Finance

(BS) 1998 2011. 5 (Income_Tax_Rate) (Sales_Tax & fee_Rate) 9- (1) 4 (2) (3) (4) Income_Tax_Rate 1.6% ( 1% ) Sales_Tax & fee_Rate 0.3% ( 1% )

### 6.1.b. Increase in early-stage venture capital investment

(2011) (2018, 2020). VC_Seed & A_AMNT VC_Seed & A_AMNT. 53.1%

**Table VIII.** Plausible channels: access to finance

This table reports the results for DiD tests on the average city tax rate, early-stage VC investment, and average premium of land transactions. *Income_Tax_Rate* equals the mean of the corporate income tax rate of firms in a city during the 9-year window period centered on the event year, which is computed by using the corporate income tax divided by the summation of its net income and the corporate income tax. *Sales_Tax&fee_Rate* equals the mean of firms' sales tax & fee divided by its sales revenue during the 9-year window period centered on the event year. The firm-level data is retrieved from annual surveys conducted by the NBS of China from 1998 to 2011. *VC_Seed&A_AMNT* is defined as the natural logarithm of one plus a city's total amount of VC investment in seed-stage and series-A stage start-ups. The data on VC investment are retrieved from CVSource, the largest dataset that covers Chinese VC activities. *Avg_Premium_Rate* equals the transaction price minus the land cost divided by the land cost. The land transaction records are obtained from the CSMAR, which covers the period from 1989 to 2014.

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| Income_Tax_Rate | −0.023 | −0.007 | −0.016 | −2.667 |
| | (0.004) | (0.004) | (0.006) | |
| Sales_Tax&fee_Rate | −0.003 | 0.000 | −0.003 | −3.000 |
| | (0.001) | (0.001) | (0.001) | |
| VC_Seed&A_AMNT | 0.646 | 0.115 | 0.531 | 1.924 |
| | (0.164) | (0.222) | (0.276) | |
| Avg_Premium_Rate | −0.017 | 0.001 | −0.018 | −1.617 |
| | (0.003) | (0.010) | (0.011) | |

[illegible]

### 6.1.c. Land price reduction

[illegible] (e.g., [illegible], 2012; [illegible], 2017; [illegible], 2021). [illegible] et al. (2015) [illegible] (CS[illegible]), [illegible] 1989. [illegible]

(Avg_Premium_Rate),

1.8%

3.3%.

## 6.2 Reductions in Administrative Burden

2015).

(2011)

(2011),

Gross_Adm_Exp

Net_Adm_Exp.

1998 2011.

(1) 4 4 (2) (3) (4)

Gross_Adm_Exp

1.8% 1%

Net_Adm_Exp

1.7% ( 1% )

**Table IX.** Plausible channels: reductions in administrative burden

This table reports the results for DiD tests on the average administrative expenses of firms in a city. The variable *Gross_Adm_Exp* expresses the average administrative expenses of firms divided by their sales in a city per year during the 9-year window period centered on the event year, while the variable *Net_Adm_Exp* expresses administrative expenses excluding administrative taxes of firms divided by their sales in a city per year during the 9-year window period centered on the event year. The data are collected from annual surveys conducted by the NBS of China from 1998 to 2011. Standard errors are given in parentheses below the mean differences in innovation and entrepreneurial activities.

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| Gross_Adm_Exp | −0.034 | −0.016 | −0.018 | −2.250 |
| | (0.006) | (0.006) | (0.008) | |
| Net_Adm_Exp | −0.033 | −0.016 | −0.017 | −2.125 |
| | (0.006) | (0.006) | (0.008) | |

[illegible]

## 6.3 Talent Cultivation and Introduction

[illegible] et al., 2016). [illegible] 2010; [illegible] 2010; [illegible] 2017). [illegible]

[illegible] 5% [illegible]

**Table X.** Plausible channels: talent cultivation

This table reports the results for DiD tests on the average number of a city's college students and a city's middle and high school students. The variable *College_Students* expresses the average number of a city's college students per year (in thousands) during the 9-year window period centered on the event year, while the variable *MidSchool_Students* expresses the number of a city's middle and high school students per year (in thousands) during the nine-year window period centered on the event year. The variable *Executives_Graduate* expresses the average number of a city's executives at listed companies with a graduate degree per year during the nine-year window period centered on the event year. The education data are collected from China City Statistics Yearbook, which covers the full sample period (from 1985 to 2014). The education information on the executives working for listed firms is collected from CSMAR, which covers the period from 1999 to 2014.

| | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|
| College_Students | 9.556 | 3.381 | 6.175 | 3.328 |
| | (0.877) | (1.635) | (1.855) | |
| MidSchool_Students | 52.208 | 27.888 | 24.320 | 1.519 |
| | (11.465) | (11.173) | (16.009) | |
| Executives_Graduate | 3.215 | 1.303 | 1.912 | 1.828 |
| | (0.867) | (0.585) | (1.046) | |

[illegible]

## 6.4 Channels and Explanatory Power

P

**Table XI.** Controlling for plausible underlying channels

This table reports the results for the DiD test after controlling for plausible underlying channels through which the establishment of national high-tech zones affects local innovation and entrepreneurship. *Treat* is a dummy that equals one for treatment cities and zero for control cities. *Post* is a dummy that equals one if a city-year observation is from the period after the establishment year and zero otherwise. Channel variables including *Income_Tax_Ratio*, *VC_seed&A_AMNT*, *Avg_Premium_Rate*, *Gross_Adm_Exp*, and *College_Student* are introduced in Tables VIII–X. Coefficient estimates are shown below, and their standard errors are clustered by city and displayed in parentheses below. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) P_Apply | (2) P_Apply | (3) P_Grant | (4) P_Grant | (5) P_Cite | (6) P_Cite | (7) F_Est | (8) F_Est |
|---|---|---|---|---|---|---|---|---|
| Treat_Post | 115.207*** | 21.354 | 44.731*** | 14.066 | 0.266** | 0.125 | 5.883*** | 2.326 |
| | (33.036) | (26.710) | (11.479) | (9.219) | (0.117) | (0.100) | (1.628) | (1.455) |
| Treat | −3.283 | 28.148 | −0.426 | 7.032 | 0.190* | 0.093 | −1.970 | −1.010 |
| | (32.312) | (26.125) | (11.227) | (9.017) | (0.115) | (0.098) | (1.592) | (1.423) |
| Post | 61.047** | 35.262* | 16.190* | 8.468 | −0.004 | −0.053 | −1.616 | −2.221** |
| | (25.228) | (20.253) | (8.766) | (6.990) | (0.090) | (0.076) | (1.243) | (1.103) |
| Income_Tax_Ratio | | −8.460*** | | −2.211*** | | 0.001 | | −0.127** |
| | | (0.953) | | (0.329) | | (0.004) | | (0.052) |
| VC_seed&A_AMNT | | 4.108*** | | 1.938*** | | 0.015*** | | 0.226*** |
| | | (0.364) | | (0.126) | | (0.001) | | (0.020) |
| Avg_Premium_Rate | | 2.608*** | | 1.010*** | | 0.014*** | | 0.097*** |
| | | (0.417) | | (0.144) | | (0.002) | | (0.023) |
| Gross_Adm_Exp | | −2.838*** | | −0.196 | | 0.030*** | | −0.085 |
| | | (0.963) | | (0.333) | | (0.004) | | (0.052) |
| College_Student | | 0.724*** | | 0.240*** | | 0.002*** | | 0.027*** |
| | | (0.026) | | (0.009) | | (0.000) | | (0.001) |
| Constant | 40.255 | 189.652*** | 17.745** | 48.782*** | 0.280*** | −0.028 | 5.362*** | 6.825*** |
| | (24.722) | (26.532) | (8.590) | (9.158) | (0.088) | (0.099) | (1.218) | (1.446) |
| [illegible] | 2,770 | 2,770 | 2,770 | 2,770 | 2,770 | 2,770 | 2,770 | 2,770 |
| [illegible] | 0.104 | 0.429 | 0.125 | 0.450 | 0.114 | 0.374 | 0.048 | 0.258 |

[illegible] 21.4, [illegible] 82% [illegible] (1). [illegible] 82% [illegible]

[illegible] (3) [illegible] (4), [illegible] P_Grant [illegible] $\beta_1$ [illegible] 1% [illegible] (3), [illegible] (4) [illegible] $\beta_1$ [illegible] 44.7 [illegible] (3) [illegible] 14.1 [illegible] (4), [illegible] 69% [illegible]

## 7. Spillover Effects

$$\text{INNOV\_PApply(INNOV\_PGrant, INNOV\_PCite, ENTREPRE\_FEst)}_{i,\,t+2} = \alpha + \beta \text{CloseHTZ}*\text{Post}_{i,t} + \gamma'\text{CONTROLS}_{i,t} + \delta \text{YEAR}_t + \theta \text{CITY}_i + \varepsilon_{i,t}, \quad (4)$$

24 The results are similar if we include the access to finance channel variables individually instead of all together.

(1) t+2 ( t+1)

(4), β

β.

(1) INNOV_PApply.

β 1%

INNOV_PGrant (2)

β

(3) (4) INNOV_PGrant F_Est,

β 10%

(3) (4).

## 8. Conclusion and Discussion

**Table XII.** Spillover effects of national high-tech zones

This table reports for the test examining the spillover effects of national high-tech zones on nearby cities by estimating the following model:

$$\mathrm{INNOV\_PApply(INNOV\_PGrant,\ INNOV\_PCite,\ ENTREPRE\_FEst)}_{i,\ t+2} = \alpha + \beta \mathrm{CloseHTZ} * \mathrm{Post}_{i,t} + \gamma' \mathrm{CONTROLS}_{i,t} + \delta \mathrm{YEAR}_t + \theta \mathrm{CITY}_i + \varepsilon_{i,t}.$$

*CloseHTZ* is the natural logarithm of the reciprocal of city *i*'s distance to the closest city with a national high-tech zone in the province. We only include cities that are within a 250-km radius of a city with a national high-tech zone. *Post* is a dummy variable that equals one if a city-year observa-

[illegible]

( et al., 2017). C

## Data Availability Statement

## Supplementary Material

S Review of Finance .

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