

The Unintended Outcome Attainment of Urban Community Digital Infrastructure on Entrepreneurship in China

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Abstract

This paper utilizes data from “Survey on Rural Revitalization in Guangdong Province” and employs two classification methods, namely engineering type and service type, to cluster the data at the community level. Finally, a probit regression analysis is conducted to empirically analyze the relationship between residents’ entrepreneurial choices and digital infrastructure. The research findings are as follows: (1) Integrating digital technology into transportation, energy usage, water supply, and environmental protection in urban communities significantly cultivates entrepreneurial opportunities. (2) After considering covariates, all types of engineering digital infrastructure exhibit a significant and substantial increase in entrepreneurial activities. (3) Entrepreneurial returns on urban center digital infrastructure are higher than other areas, with proximity to city centers positively correlated with higher entrepreneurial returns. (4) The distance between entrepreneurship location and residential area amplifies the impact of residential digital infrastructure on entrepreneurial efforts. In conclusion, the externalities of innovation and entrepreneurship in urban community digital infrastructure are highly stable. Improvements in community digital infrastructure not only expand residents’ opportunities for entrepreneurship but also significantly enhance their likelihood of engaging in entrepreneurship. Community digital infrastructure enhances efficiency in information flow, resource allocation, and factor circulation which leads to optimistic expectations among residents regarding entrepreneurship. As a result, there is an increase in the proportion of residents engaged in entrepreneurship.

Keywords

Urban Community, Digital Infrastructure, Entrepreneurship

1. Introduction

Entrepreneurship is widely acknowledged as a pivotal driver for economic advancement (Chen & Zhou, 2023). Previous research has explored the determinants of innovative entrepreneurship from various perspectives, including the characteristics of the individual entrepreneur (Shane & Venkataraman, 2000), self-efficacy (Markman, Balkin, & Baron, 2002), the environment of innovative entrepreneurship and innovative policy (Block, Fisch, & Van Praag, 2017), university-industry collaboration (Eisingerich et al., 2012), financial resource (Haeussler et al., 2014; Block et al., 2014; Hsu & Ziedonis, 2013). The digital infrastructure has a positive impact on entrepreneurship (Schade & Schuhmacher, 2022). However, limited attention has been devoted to the impact of urban community's digital infrastructure on entrepreneurship. Several studies have tangentially explored the correlation between digital technology and entrepreneurship as a whole (Zhao, Zhang, & Liang, 2020; Mo & Li, 2022; Shen & Qian, 2022; Li, 2022; Tang, Wang, & Tian, 2022; Zhou & Fan, 2018). However, the article starts from the micro-decisions in the labor market and examines how urban community-level's digital infrastructure affects residents' entrepreneurial behavior, emphasizing its structural impact on the job market (Wan, 2021). This effectively explains why urban community digital infrastructure becomes a key variable for economic structural transformation and helps understand how it becomes the fundamental driving force for the economy's shift from investment-driven to innovation-driven.

Current research on entrepreneurship tends to focus on the enterprise or macro level, neglecting the role of individuals or families. Urban community's digital infrastructure can influence residents' entrepreneurial behavior, but there is still a lack of direct micro-level evidence for improvement in understanding the entrepreneurial externality of urban community's digital infrastructure. Firstly, existing literature primarily examines the impact of digital infrastructure on entrepreneurship at the national or city level, often overlooking the investment layout within cities. This, however, is a crucial direction for future investments, especially amidst declining economic growth.

Secondly, the current policies that support entrepreneurial activities are primarily concentrated on the enterprise side or the production end. However, this article demonstrates from the household perspective that policy support for residential services or digital infrastructure can also significantly influence the promotion of resident entrepreneurship. Consequently, it should be a focal point for future policy development.

Third, previous research on digital infrastructure primarily relies on aggregated data at the country or provincial level, with scant attention given to the perspectives of communities and households. Consequently, it overlooks the micro-level impacts and mechanisms resulting from urban community digital infrastructure. This article concentrates on two central themes: the construction of urban community digital infrastructure and its innovation transformation, connecting these to individual entrepreneurial decision-making at the micro level to analyze the

micro foundations.

Fourth, by utilizing data on the balance between employment and residence, along with objective evaluations of the community's digital infrastructure, it is possible to disentangle the existing endogeneity issues from various perspectives and gain a relatively clear understanding of the entrepreneurial impact of digital infrastructure.

Fifth, this article differentiates the innovative entrepreneurial driving role of digital-enabled enterprise production, digital-enabled residential services, and digital-enabled public services, and compares entrepreneurial returns across various regional locations. This can offer policy guidance for optimizing the types, targets, regional distribution, and investment focus of the community's digital infrastructure construction.

2. Literature Review

2.1. Digital Infrastructure and Entrepreneurship

The digital economy has given rise to new business models, such as the platform economy, outsourcing economy, gig economy, and sharing economy, which have promoted the development of new employment patterns and entrepreneurship models. The transformation brought by the digital economy has changed production methods and optimized industrial structures, leading to changes in the scale and structure of the job market. This has resulted in diversified employment modes, platform-based organizational models, and efficient information transmission in the labor market (Li, 2022), giving rise to a large number of new professions. These viewpoints are backed by (Mo & Li, 2022; Li, 2022; Tang, Wang, & Tian, 2022; He & Song, 2020). The assertions were further substantiated by (Schade & Schuhmacher, 2022) and (Soluk et al., 2021), who contend that digital infrastructure empowers the acquisition of pre-existing resources and markets, thereby fostering entrepreneurial endeavors of individuals.

2.2. Digital Infrastructure and Entrepreneurship Channels

The impact of digital infrastructure on employment has gained broader recognition; however, there is still a scarcity of studies examining its influence on innovative employment. The precise relationship between digital infrastructure and entrepreneurship remains unclear. According to the relevant literature on business venturing, an individual's inclination towards entrepreneurship is intricately linked to their personal attributes and the external environment in which they find themselves. The impact of digital infrastructure on entrepreneurship encompasses early-stage entrepreneurial intentions, mid-term entrepreneurial opportunities and processes, as well as late-stage entrepreneurial environment and support (Wan, 2021).

A well-developed digital infrastructure can transform the development of individuals' social networks and social capital, thereby affecting their entrepreneurial aspirations and motivations. For example, in countries with robust digital infra-

structure, social networks provide virtual avenues for building relationships, influencing career choices and entrepreneurial ambitions (Youssef et al., 2021). People develop social capital by using social media and virtual networks, which can offer invaluable support for various endeavors, aspirations, and career decisions (Wang & Li, 2020). The entrepreneurial chat forum acts as a catalyst for acquiring in-depth knowledge about entrepreneurial activities. This shift towards diverse resources is encouraging individuals' entrepreneurial ambitions (Youssef et al., 2021). Similarly, Dutot and Van Horne (2015) explored the crucial role of digital technology in shaping entrepreneurial intentions by conducting 10 semi-structured interviews with digital entrepreneurs in France and the United Arab Emirates (Dutot & Van Horne, 2015). The research findings indicate that the inclination towards entrepreneurship is shaped by agility, entrepreneurial acumen, and unique entrepreneurial traits. Likewise, the impact of experiential entrepreneurship education facilitated by technology on learners' entrepreneurial intentions and risk attitudes suggests that information and communication technology enhances the correlation between an entrepreneurial mindset and risk-taking behavior (Bandera, Collins, & Passerini, 2018). Primarily, the establishment of digital infrastructure fosters a supportive entrepreneurial environment and system, thereby reducing uncertainties in the entrepreneurial journey and consequently boosting individuals' inclination to start businesses (Levine & Rubinstein, 2016); Additionally, digital infrastructure enhances communication capabilities, facilitating the expansion of personal social networks or social capital and fostering an optimistic climate among entrepreneurs or investors. As a result, it is more likely to stimulate entrepreneurial behaviors (Blanchflower & Oswald, 1998).

The ability to uncover entrepreneurial opportunities signifies the initial step towards embarking on the entrepreneurial journey. The proposition by Shane and Venkataraman (2000) suggests the need for prior knowledge that can trigger entrepreneurial speculation (Shane & Venkataraman, 2000). Digital infrastructure, acting as an external enabler, enhances individuals' ability to access information (Shen & Qian, 2022) and acquire knowledge (Shane & Venkataraman, 2000). The emergence of digital construction introduces new information and knowledge, which can be disseminated to individuals and act as a catalyst for the creation of entrepreneurial opportunities. Wang et al. (2020) assert that the establishment of broadband infrastructure directly equips rural families with a wealth of information and knowledge, thereby empowering rural residents to discover lucrative entrepreneurial prospects. Furthermore, the implementation of broadband infrastructure presents rural residents with entrepreneurial opportunities and increases the chances for individuals to explore their potential in online retail (Wang & Li, 2020). Digital infrastructure, as an external enabler, not only expands an individual's social network but also fosters entrepreneurial opportunities. The advancement of digital infrastructure has not only made digital communication more accessible but also reduced the need for face-to-face interaction, adding a touch of sophistication to our daily

interactions. Thus, digital infrastructure expands an individual's social network by facilitating frequent communication with others. This facilitation of communication can effectively reduce information asymmetry, thereby promoting a surge in entrepreneurial activity and presenting a plethora of entrepreneurial opportunities.

Digital infrastructure aids enterprises in reducing operational expenses, enhancing the entrepreneurial ecosystem (Zahra, Liu, & Si, 2023), and increasing the likelihood of entrepreneurial success. This infrastructure, which includes cutting-edge technologies such as 4G/5G, satellite communication, and big data analytics, holds significant potential for providing unparalleled convenience to enterprises. It serves as a catalyst for fostering individual entrepreneurial behavior by substantially reducing operational costs and enhancing entrepreneurial returns. The improvement of the business environment can encourage individual entrepreneurial activities. To achieve success, entrepreneurs must rely on a variety of resources and harness the power of digital infrastructure. However, emerging economies often face institutional voids, including the lack of financial service institutions (such as banks, capital providers, insurance agencies), quality certification firms (comparable to ISO standards), institutional infrastructure facilitating data processing (including fiber optic networks), public economic development agencies, and employment agencies. Today, digital technologies offer a means to bridge these institutional voids with the support of informal institutions. Consequently, the digital infrastructure will have varying impacts on residents' entrepreneurial behavior, intentions, and success at different levels.

3. Research Methodology

3.1. Model

The Probit regression model is widely used in fields such as economics and sociology, often for regression analysis problems involving binary response variables. The relationship between entrepreneurship and digital infrastructure discussed in this paper fits these requirements and can employ the powerful tool of the Probit regression model. The Probit regression model set up in this paper is as follows:

$$P(Y = 1|X) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon) \quad (1)$$

In equation (1): Y represents entrepreneurship, $\Phi(\cdot)$ is the CDF of the standard normal distribution, $\beta_0, \beta_1, \dots, \beta_p$ are regression coefficients that reflect the linear impact of independent variables on the latent variable (Probit value); X_1, X_2, \dots, X_p are independent variables, representing digital-enabled transport (DET), digital-enabled energy utilization (DEEU), digital-enabled water supply (DEWS), digital-enabled environmental protection (DEEP), digital-enabled production services (DEPS), digital-enabled residential services (DERS), and digital-enabled public services (DEPS1), among others.

3.2. Data Source

The data presented in this article originates from the “Survey on Rural Revitalization in Guangdong Province”. The questionnaire was designed by esteemed economic experts from the province, and the survey was executed by the Rural Revitalization Research Center at Shaoguan University. The sample encompasses three groups: urban residents, rural inhabitants, and the floating population. Beyond examining individual and household matters, the survey also delves into village and rural community aspects. This article predominantly utilizes data from the year 2022.

3.3. Dependent Variable

This article distinguishes three different types of employment: the first is wage employment, which includes both long-term and short-term arrangements. Long-term wage employment refers to individuals working for others or entities (including collective farms and private farms) as permanent workers, as well as contract workers employed by private enterprises in towns; short-term wage employment encompasses temporary jobs, part-time positions, labor dispatches, and so forth.

Variables such as wages and income are defined at a per capita level within households and are adjusted to 2022 values based on the consumer price index published by the statistical bureau. Furthermore, individuals aged between 16-65 years old who have lost basic labor capacity or are unable to care for themselves are excluded from the sample.

3.4. Independent Variable

According to the personal code, this paper further aligns the relevant indicators of enterprises and the community, with a particular focus on enhancing digital infrastructure at both household and community levels. It includes indicators related to digital infrastructure for resident services and those related to corporate or community public services. The digital infrastructure of urban communities can be classified into two distinct categories: engineering and services. Among these, engineering primarily encompasses digital-enabled transportation (DET), digital-enabled energy utilization (DEEU), digital-enabled water supply (DEWS), and digital-enabled environmental protection (DEEP). Based on the nature of the services, they can be further categorized into digital-enabled production services (DEPS), digital-enabled residential services (DERS), and digital-enabled public services (DEPS1).

The installation of digital infrastructure at the community level was matched, and inquiries were made regarding the utilization of digital infrastructure at the household level. The presence of digital infrastructure in urban communities was coded as 1 for yes and 0 for no. The term “Comprehensive 1” denotes the state of having all four types of digital infrastructure-digital-enabled transportation, digital-enabled energy use, digital-enabled water supply, and digital-enabled environ-

mental protection—simultaneously; otherwise, it is considered as “0”. On the other hand, “Comprehensive 2” refers to the condition where production services, resident services, and public services coexist concurrently; otherwise, it is regarded as “0”. The primary urban areas, as well as the hybrid urban and rural regions, along with town centers and their corresponding combination areas within the city, can be further subdivided to discern disparities in the innovative entrepreneurial function of distinct locales and digital infrastructure.

3.5. Control Variable

Control variables include individual characteristics such as gender, age, education level, health status, and marital status. Family characteristics encompass the intricate tapestry of familial social networks, parents’ entrepreneurial lineage, the delicate balance between family income and consumption, the harmonious interplay between family property and consumption, as well as the significant burden of familial support pressure. The urban level includes the employment rate in urban areas, the number of employees in state-owned enterprises, the average profit margin of businesses, per capita salary, per capita GDP, and the size of the permanent population.

4. Digital Infrastructure of Urban Community and Entrepreneurship

4.1. Based Regression

Using two classification methods, namely engineering type and service nature, this article employs probit regression with digital infrastructure variables to analyze residents’ entrepreneurial choices and cluster them at the community level. The findings in **Table 1** confirm that the integration of digital technology into transportation, energy use, water supply, and environmental protection within urban communities significantly cultivates entrepreneurial opportunities. Moreover, we observe a remarkable and substantial surge in entrepreneurial activities across all engineering digital infrastructures after accounting for covariates.

The digital infrastructure of urban community is subdivided based on the diverse properties of services. The impact of enterprise digital service infrastructure support on entrepreneurship is significant, as demonstrated in **Table 1**. We have discovered a robust and noteworthy correlation between the availability of digital services in residential areas and innovative entrepreneurial activity within our model. The findings in **Table 1** also demonstrate a robust and statistically significant relationship between public service digital infrastructure and entrepreneurship, thereby providing strong support for our initial expectations. The combination of all the findings in **Table 1**, whether categorized by total items or sub-items, project type, or service nature, showcases the profound impact of community digital infrastructure on entrepreneurship. It remarkably enhances residents’ likelihood of engaging in entrepreneurial activities and maintains a consistently stable externality on entrepreneurship.

Table 1. Urban community digital infrastructure and innovative entrepreneurship.

| the dependent variable | the independent variable | | | | | | | | |
|------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | DET | DEE | DWS | DEEP | synthesize 1 | DEPS | DERS | DEPS1 | synthesize 2 |
| Entrepreneurship | 0.033*** (0.015) | 0.033*** (0.013) | 0.031*** (0.015) | 0.031*** (0.019) | 0.089*** (0.010) | 0.092*** (0.007) | 0.091*** (0.016) | 0.091*** (0.016) | 0.091*** (0.008) |
| Sample | 13019 | 13019 | 13019 | 13019 | 13019 | 13019 | 13019 | 13019 | 13019 |

Based on all the labor samples and using the probit method. Loss of individual variables resulted in a reduced sample size. The dependent variable is whether residents start to business. The independent variable is the digital infrastructure. Each coefficient represents a regression. To save space, the control variable results are not presented. The coefficients in the table are all marginal effects. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

4.2. Robustness Check

The present study delves into the profound impact of urban community's digital infrastructure on individual innovative entrepreneurship at the micro level within urban communities. The impact of individual entrepreneurial behavior on the overall supply level of digital infrastructure in urban communities is generally negligible. Moreover, there is no apparent issue of reverse causality. However, concerns still persist regarding families relocating to communities with superior digital infrastructure to foster innovative entrepreneurship. Referring to Wan Haiyuan's research, we have opted for the exogenous topographic slope as the instrumental variable for the digital infrastructure. The digital signal strength primarily diminishes due to topographic obstruction in the absence of significant external electromagnetic interference. The terrain slope, being an exogenous factor, does not readily exert a direct influence on the entrepreneurial decisions of residents. Therefore, this index satisfies the basic requirements of instrumental variables.

After conducting tests on the instrumental variables, it was discovered that the outcomes of Kleibergen-Paap rk LM and Kleibergen-Paap rk Wald F impeccably demonstrate the indispensability and soundness of the estimation results derived from instrumental variables. In **Table 2**, the regression coefficients all remain significantly positive after adding the instrumental variable method for the topographic slope, once again verifying the robust innovative entrepreneurship impact of urban community's digital infrastructure. The coefficients and standard errors estimated in line 1 of **Table 2** exhibit a significantly higher magnitude compared to the OLS method, while still indicating a significantly positive regression coefficient. This suggests that urban digital infrastructure indeed enhances the probability of residents engaging in entrepreneurship, with the significance results themselves demonstrating remarkable stability.

To mitigate the unobservable variables caused the coefficients to be overestimated. The estimation of the aforementioned tool variables serves as the foundation, upon which the in-laws' family background, per capita urban income, and urban industrial structure are incorporated as control variables to mitigate the influence of external factors. The estimation results of the instrumental variables,

based on the entire sample, are presented in line 2 of **Table 2**. After incorporating additional control variables, the standard error exhibited a slight increase; however, the regression coefficient's significance remained unchanged, and the innovative entrepreneurial impact of urban community's digital infrastructure persisted as significant.

The correlation between urban community's digital infrastructure and innovative entrepreneurship has been the focal point of our extensive investigation thus far. However, if the residents start a business successfully and thus buy a house in community with better digital infrastructure, there will also be a reverse relationship. Hence, we exclusively analyze the sample of commencing a business after the year of house purchase, thereby mitigating potential temporal repercussions. The driving effect of the digital infrastructure is estimated in the third line of **Table 2**, building upon the previous IV method. The regression results in the first line of **Table 2** remain consistent with the findings presented in the fourth line, indicating a lack of divergence. Moreover, there is no significant concern regarding endogeneity. The role of digital infrastructure in enhancing entrepreneurship is both substantial and resilient.

Table 2. Digital infrastructure and innovative entrepreneurship (Robust test).

| the dependent variable | Independent variable | | | | | | | | | |
|---|----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|
| | DET | DEE | DWS | DEEP | synthesize 1 | DEPS | DERS | DEPS1 | synthesize 2 | |
| IV + Full sample | 2.12*** (0.010) | 2.04*** (0.011) | 2.11*** (0.010) | 2.10*** (0.011) | 2.11*** (0.011) | 3.19*** (0.025) | 3.18*** (0.025) | 3.38*** (0.029) | 3.39*** (0.039) | |
| IV + Full sample + More control variables | 2.12*** (0.026) | 2.14*** (0.026) | 2.23*** (0.024) | 2.10*** (0.024) | 2.11*** (0.026) | 3.22*** (0.038) | 3.18*** (0.033) | 3.39*** (0.036) | 3.39*** (0.035) | |
| IV + Sub-sample + Start a business later than buy a house | 2.17*** (0.026) | 2.28*** (0.031) | 2.21*** (0.030) | 2.17*** (0.027) | 2.26*** (0.031) | 3.19*** (0.033) | 3.19*** (0.033) | 3.39*** (0.039) | 3.41*** (0.039) | |

Note: Using the IV probit method, the dependent variable is whether residents will start a business, and the independent variable is digital infrastructure. We used the terrain slope as the tool variable. Each coefficient in the table represents a regression equation. In order to save space, the results of control variables are not presented.

5. Urban Community Digital Infrastructure Layout and Innovative Entrepreneurship

The digital infrastructure of urban communities can generate externalities that foster entrepreneurship. The government should not only augment its investment in digital infrastructure, but also explore more efficacious forms of investment to optimize the arrangement and concentration of resources (Wan, 2021). Furthermore, we aim to examine the existence of a purported regional agglomeration effect in the realm of digital construction, as well as ascertain whether economically developed areas yield a higher return on investment and entrepreneurship in the digital domain. According to the geographical area, digital infrastructure was cat-

egorized into two distinct groups: the primary urban area (urban center or main urban area) and the secondary urban areas (combined areas of urban-rural, town and township, as well as other special regions), with integration of geographic location alongside infrastructure variables. The findings in Panel A of **Table 5** reveal a significantly positive correlation between digital infrastructure and entrepreneurship in non-main urban areas. The observation reveals that individuals exhibit a heightened propensity for entrepreneurial endeavors, particularly in urban centers boasting robust digital infrastructure. This affirms the presence of a resource agglomeration effect, whereby the entrepreneurial rate of return for digital infrastructure in the city center surpasses that of other regions, with proximity to the heart of the city correlating positively with greater returns on entrepreneurship.

Table 3. Regional differences in the driving role of urban Community’s digital infrastructure in innovative entrepreneurship.

| The dependent variables (Panel A) | The independent variables | | | | | | | | |
|--|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | DET | DEE | DWS | DEEP | synthesize 1 | DEPS | DERS | DEP | synthesize 2 |
| Digital Infrastructure (non-main area) | 0.041*** (0.013) | 0.046*** (0.012) | 0.041*** (0.018) | 0.061*** (0.011) | 0.093*** (0.012) | 0.082*** (0.008) | 0.071*** (0.011) | 0.073*** (0.011) | 0.081*** (0.010) |
| Main urban area × Digital Infrastructure | 0.051*** (0.020) | 0.050*** (0.018) | 0.052*** (0.020) | 0.052*** (0.020) | 0.541*** (0.023) | 0.059*** (0.023) | 0.061*** (0.025) | 0.061*** (0.024) | 0.061*** (0.022) |
| The dependent variables (Panel B) | DET | DEE | DWS | DEEP | synthesize 1 | DEPS | DERS | DEP | synthesize 2 |
| Community digital infrastructure (innovative entrepreneurship in city) | 0.051*** (0.017) | 0.056*** (0.015) | 0.059*** (0.019) | 0.057*** (0.017) | 0.12*** (0.021) | 0.060*** (0.018) | 0.068*** (0.016) | 0.067*** (0.013) | 0.10*** (0.013) |
| In Urban area innovative entrepreneurship × digital Infrastructure | 0.04 (0.008) | -0.02 (0.015) | -0.02 (0.016) | -0.02 (0.015) | 0.03 (0.007) | 0.03*** (0.014) | 0.01*** (0.014) | 0.01*** (0.014) | 0.03*** (0.014) |
| In street innovative entrepreneurship * digital infrastructure | 0.02 (0.008) | 0.05 (0.016) | 0.05 (0.016) | 0.06 (0.016) | 0.02 (0.007) | 0.001*** (0.014) | 0.05*** (0.014) | 0.05*** (0.014) | 0.02*** (0.014) |
| In community innovative entrepreneurship * digital infrastructure | 0.01 (0.008) | 0.04 (0.016) | 0.04 (0.016) | 0.05 (0.016) | 0.00 (0.007) | 0.02*** (0.014) | 0.06*** (0.014) | 0.06*** (0.014) | 0.02 (0.014) |

Note: Using the probit method, the dependent variable is the entrepreneurial decision; the explanatory variable is the infrastructure and its interaction term; and each column represents a regression equation. To save space, the results of control variables are not presented. The consumption return is shown in Panel A, and the first behavioral base group infrastructure is shown in Panel B; the other rows are compared with the base group coefficients. Cluster levels and significance levels are identical to those in **Table 1**.

The delicate equilibrium between the realm of work and the abode is an intricately intertwined concern closely associated with urban positioning. The discrepancy between place of residence and working location is particularly conspicuous (Wan, 2021). The question we seek to address is whether the presence of community digital infrastructure within residential areas exerts an influence on the en-

trepreneurial process, or if its impact extends beyond the confines of the community. The reality is that there exists a disparity between the location of employment and the place of abode. Does the digital infrastructure of one's place of residence also contribute to entrepreneurship beyond the confines of the local community? The questionnaire included a survey on the alignment of individual entrepreneurship and residence, which can be discerned based on their congruity. Compared with living in the community, entrepreneurship occurs in the community, in the street outside the community, in the urban area outside the street, and in the city outside the urban area (baseline group). The findings in Panel B of **Table 3** demonstrate that the proximity between the place of entrepreneurship and the place of residence amplifies the impact of promoting residential digital infrastructure on entrepreneurial endeavors. Conversely, the further the place of entrepreneurship is from the place of residence, the more diminished becomes the impact of residential digital infrastructure on promoting entrepreneurship. The aforementioned statement demonstrates the presence of a substantial level of community-level digital infrastructure, which not only facilitates convenience for residents but also fosters accessibility in terms of geographical proximity to entrepreneurial opportunities. Consequently, this effectively stimulates residents' entrepreneurial endeavors and further substantiates the pivotal role played by urban community digital development in promoting entrepreneurship.

6. How Urban Community Digital Infrastructure Affects the Individual's Innovative Entrepreneurship Decision

To comprehend the impact of digital infrastructure on entrepreneurial inclination, we delve deeper into the stimulation of inventive entrepreneurship by community-level digital infrastructure.

6.1. Digital Infrastructure Affects the Innovative Entrepreneurship Process of Individuals

The influence of digitization on intention can be contemplated from a dual perspective. First, the background of the potential entrepreneurial activity exerts a profound influence on the inclination towards embarking on an entrepreneurial journey. According to Mansfield's research, due to the presence of a substantial cohort of well-informed aspiring entrepreneurs yearning to penetrate the market, opportunities abound. Entering the entrepreneurial ranks is triggered by expected profit levels. Furthermore, the advancement of digital infrastructure is facilitating educational support for entrepreneurship, enabling individuals to cultivate their creativity, critical thinking, and other essential soft skills. The subsequent step involves defining an avant-garde entrepreneurial inclination as a binary variable (1 = yes, 0 = no). In the second row of **Table 6**, the findings reveal that a majority of digital infrastructures exert a significant influence on the intention to embark on entrepreneurship.

The widespread dissemination and application of digital technologies is giving

rise to new demands (services and products, particularly information products) and necessitating the emergence of fresh enterprises and innovative entrepreneurs, thereby expanding the scope of individual entrepreneurial opportunities. The greater the dynamism of the regional economy, the more abundant entrepreneurial opportunities arise. Hence, we consider the regional economic growth rate as a surrogate measure for entrepreneurial prospects. **Table 6**, line 2 reveals a significantly positive impact of entrepreneurship opportunities across all types of digital infrastructure, unequivocally demonstrating that the presence of digital infrastructure is inextricably linked to substantially heightened entrepreneurial prospects. Furthermore, the comprehensive institutional milieu must not be disregarded. The prospect of market entry may be impeded by extrinsic barriers, such as the initial investment and bureaucratic regulations, as well as intrinsic obstacles like research and development expenses and advertising costs. In the past, certain sectors such as tourism, transportation, retail and banking were believed to be safeguarded by relevant barriers to entry. However, in today's age of digital technology, new players are penetrating these industries with ease. The advent of virtualization is eradicating exorbitant costs and entry barriers, while simultaneously ushering in a plethora of novel opportunities for the next wave of visionary entrepreneurs. The entrepreneurial environment, therefore, can be classified as a binary variable (1 = yes, 0 = no).

To achieve success, entrepreneurs must rely on a diverse range of invaluable resources (e.g., financial services, reputable certification agencies, networking platforms), with particular emphasis on securing adequate funding. After individuals embark on entrepreneurial projects and develop entrepreneurial intentions, a plethora of market-oriented services can swiftly alleviate the constraints posed by limited capital. Here, the proportion of the total commercial loans in the total business loans is used as the agent variable of the entrepreneurial market. Line 4 in **Table 4** shows that the digital infrastructure significantly affects the level of the entrepreneurial market.

Table 4. How urban community digital infrastructure affects innovative entrepreneurship.

| The dependent variables | The independent variables | | | | | | | | |
|---|---------------------------|------------------|------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | DET | DEE | DWS | DEEP | synthesize 1 | DEPS | DERS | DEPS1 | synthesize 2 |
| Innovative entrepreneurship intention | 0.012 (0.009) | 0.014 (0.008) | 0.011 (0.007) | 0.010*** (0.008) | 0.011 (0.009) | 0.019*** (0.045) | 0.018*** (0.030) | 0.038*** (0.019) | 0.030*** (0.041) |
| Innovative entrepreneurship opportunity | 0.012 (0.00) | 0.01 (0.008) | 0.013 (0.007) | 0.010*** (0.004) | 0.011*** (0.006) | 0.022*** (0.018) | 0.018*** (0.013) | 0.019*** (0.018) | 0.022*** (0.015) |
| Innovative entrepreneurship environment | 0.07 (0.006) | 0.08 (0.007) | 0.08 (0.008) | 0.09 (0.007) | 0.07 (0.009) | 0.021*** (0.015) | 0.02*** (0.018) | 0.02*** (0.019) | 0.01*** (0.011) |
| Innovative entrepreneurship market | 0.06 (0.006) | 0.08 (0.007) | 0.08 (0.008) | 0.09 (0.007) | 0.07 (0.009) | 0.021*** (0.015) | 0.02*** (0.018) | 0.02*** (0.019) | 0.01*** (0.011) |

Note: Based on all the labor samples, the OLS method was used; each coefficient represents a regression equation where only the influence coefficient of urban digital infrastructure on the innovative entrepreneurship process is retained, and the table is the direct coefficient effect without control variable results.

6.2. Micro-Mechanism of Urban Digital Infrastructure Effect

In the following, we continued to explore why urban community digital infrastructure affects innovative entrepreneurship process. This article provides several possibilities. Firstly, the market information channel. Based on theoretical analysis, this article summarizes the role of reducing market information asymmetry and lowering market transaction costs as a market information channel. Therefore, if community digital infrastructure enables residents to obtain more market information, its results can be reflected in the following two aspects: (1) Rich market information is beneficial for start-up companies to accelerate market expansion, resulting in an increase in sales revenue. We assume that if community digital infrastructure can bring expected future growth in sales revenue, it is represented as 1; otherwise, it is represented as 0. The estimation results of **Table 5** (1) indicate that community digital infrastructure will significantly facilitate the anticipated scale expansion of start-up company sales. (2) It reduces the information asymmetry between enterprises and the market, manifested as a decrease in explicit costs such as sales expenses and management expenses. We assume that if community digital infrastructure lowers the expected explicit costs after starting a business, it is represented as 1; otherwise, it is represented as 0. The estimation results in column (2) demonstrate that community digital infrastructure significantly reduces the expected explicit costs. (3) Rich market information helps to enhance individuals' market perception. On one hand, abundant market information enables individuals to develop products that differentiate from existing enterprises. On the other hand, market demand is a crucial source of innovation for businesses, and the market information brought by community digital infrastructure facilitates better monitoring of market changes and identification of opportunities. Therefore, drawing on the approach used by Shen Kunrong et al. to examine "market opportunities" (Shen & Qian, 2022), we constructed an interaction term between digital infrastructure and expected sales revenue. The results in column 3 indicate that the coefficient of the interaction term is significantly positive, suggesting that digital infrastructure will promote individuals' confidence in future entrepreneurship and their confidence in future market demand. This is a figure. Schemes follow another format. If there are multiple panels, they should be listed as: (a) Description of what is contained in the first panel; (b) Description of what is contained in the second panel. Figures should be placed in the main text near to the first time they are cited.

Furthermore, according to the findings presented in **Table 6**, it can be observed that as industries become more capital-intensive and residents attain higher levels of education, the pathways through which community's digital infrastructure fosters entrepreneurship are enhanced by increased efficiency in information flow and heightened subjective expectations. The enhancement of the entrepreneurship externality in digital construction, in other words, its ability to drive the transformation and upgrading of the economic structure, necessitates a clear and adjusted investment direction for the future. The focus of investment should be

directed towards the digital transformation of urban communities in central areas, as well as capital-intensive industries such as energy, transportation, and environmental protection. Additionally, special attention should be given to guiding entrepreneurial policies for residents with higher levels of education.

Table 5. Urban community infrastructure affects the micro-characteristics of residents.

| the dependent variables | the independent variables | | | | | | | | | |
|-------------------------------------|---------------------------|-------------------|--------------------|--------------------|--------------------|-----------------|--------------------|--------------------|--------------------|--------------------|
| | DET | DEE | DWS | DEEP | PT | synthesize 1 | DEPS | DERS | DEPS1 | synthesize 2 |
| Abundant market information | 0.05 (0.017) | 0.05 (0.013) | 0.06*** (0.020) | 0.03 (0.015) | 0.05*** (0.013) | 0.04 (0.020) | 0.04*** (0.013) | 0.05*** (0.013) | 0.04*** (0.013) | 0.04*** (0.013) |
| Reduce market information asymmetry | 0.02** (0.016) | 0.02** (0.012) | 0.03*** (0.018) | 0.01*** (0.014) | 0.01*** (0.012) | 0.01 (0.018) | 0.02 (0.012) | 0.02 (0.012) | 0.02 (0.013) | 0.01 (0.012) |
| Enhancing market perception | 0.02** (0.016) | 0.02** (0.012) | 0.03*** (0.018) | 0.01*** (0.014) | 0.01*** (0.012) | 0.01 (0.018) | 0.02 (0.012) | 0.02 (0.012) | 0.02 (0.013) | 0.01 (0.012) |

Based on all the labor samples and using the probit method, the dependent variables are individual characteristics, and the independent variables are digital infrastructure. Cluster levels and significance levels are the same as those in **Table 1**.

Table 6. Micro-characteristics and entrepreneurship decisions of urban residents.

| the dependent variables | regression equations | | | | | | |
|---------------------------------------|----------------------|---------------------|--------------------|--------------------|--------------------|---------------------|---------------------|
| | No.1 | No.2 | No.3 | No.4 | No.5 | No.6 | No.7 |
| Abundant market information | 0.04*** (0.007) | | | 0.04*** (0.008) | 0.04*** (0.008) | | |
| Reduce market information asymmetry | | 0.04*** (0.0075) | | | | | |
| Enhancing market perception | | | 0.04*** (0.015) | | | 0.093*** (0.014) | 0.081*** (0.015) |
| X × High school degree | | | | 0.05*** (0.006) | | 0.05*** (0.008) | |
| X × College degree or above | | | | 0.14*** (0.008) | | 0.20*** (0.014) | |
| X × High-capital-intensive industries | | | | | 0.04** (0.008) | | 0.045*** (0.008) |

Note: Based on all labor force samples and using the probit method, the dependent variable is whether an individual starts a business. Each column represents a regression equation, and control variable results are not presented here for brevity. In models 4 and 5, X represents abundant market information, while in models 6 and 7, X corresponds to reduce market information asymmetry. The interaction term coefficients are relative to the baseline group of individuals with junior high school education or below and low capital intensity. According to [Wan Haiyuan \(2021\)](#), mining, manufacturing, power and gas production and supply, transportation and postal storage, information transmission and computer services, real estate, water conservancy, environment, and public facilities management are high-capital-intensive industries. The rest are low-capital-intensive industries. The cluster levels and significance levels are the same as those in **Table 1**.

7. Conclusion

This paper focuses on the two main themes of infrastructure and innovation transformation, establishing connections to the decision-making processes of micro-individuals. It highlights the positive externality that urban community's digital infrastructure has on innovative entrepreneurship, while emphasizing the pivotal role played by community's digital infrastructure in facilitating economies' transition from investment-driven models to innovation-driven models. This also gives rise to a pivotal directional assessment regarding the arrangement of community's digital infrastructure investment and the metamorphosis of the impetus behind economic growth.

Overall, the externalities of innovation and entrepreneurship in urban community digital infrastructure are very stable. The impact is particularly evident in central urban areas, capital-intensive industries, and residential services. The improvement of community digital infrastructure not only expands residents' entrepreneurial opportunities and willingness but also significantly increases their likelihood of participating in entrepreneurship. Objectively, community digital infrastructure enhances the efficiency of information, resources, and factors circulation, thereby greatly strengthening the microfoundation of macroeconomics. As a result, residents' optimistic expectations for entrepreneurship are raised, leading to an increase in the proportion of residents engaging in entrepreneurship.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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