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Does Digital Inclusive Finance Enhance the Creation of County Enterprises? Taking Henan Province as a Case Study

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Abstract: The broad inclusiveness of digital inclusive finance is essential for promoting coordinated regional development. This paper focuses on the impact of digital inclusive finance on creating county enterprises, discussing its heterogeneity in terms of region and type of entrepreneurship and revealing the mechanisms by which this set of impacts works. The methodology integrates the 2015–2020 Peking University Digital Inclusive Finance Index, business registration data from the industrial and commercial sectors and statistics from counties in Henan Province. The results show that digital inclusive finance can significantly promote the creation of county enterprises. All secondary dimension indices show positive effects; this result remains when replacing the core explanatory variables and lagged terms. Heterogeneity analysis finds no significant heterogeneity in the entrepreneurial effect of digital inclusive finance between urban and rural areas and types of entrepreneurship. The mechanism analysis finds that digital inclusive finance can promote the creation of county enterprises through two paths: improved financing and mobile payment. These findings reveal that we should use digital inclusive finance to improve the breadth and depth of financial services within the county and take advantage of its mobile payments to promote micro and small businesses.

Keywords: digital inclusive finance; micro and small enterprises; financing constraints; mobile payments; rural revitalization

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1. Introduction

Developing the county economy is a critical way to promote the realization of a new type of urbanization and the prosperity of rural industries; the prosperity of market players is a must for this. County enterprises are mainly small and micro enterprises which are an important support for expanding employment and improving people's livelihood. However, for a long time, information asymmetry caused by factors such as location, scale and system, as well as the shortcoming of financial factors and high transaction costs due to the lagging advancement of marketization in county economies, have together constrained the development of county enterprises [1,2]. To support the development of the real economy and promote the integration of urban and rural development, The 14th Five-Year Plan of the People's Republic of China proposes "to build the institutional mechanism for effective financial support to the real economy, enhance the level of financial technology and strengthen financial inclusion." This politic was fortified by the *No.1 central document* from 2020 to 2022 proposing the expanding of financial services in counties and rural areas. Hence, digital inclusive finance combines financial services' digital and inclusive characteristics, which can significantly alleviate financing constraints and reduce transaction costs [3,4]. Digital inclusive finance contains two basic aspects: the digital transformation of traditional financial institutions and the expansion of financial services by digital (internet) institutions. Inclusiveness is a distinctive feature in relation to traditional financial services. The financial business carried out by digital (internet) institutions using digital technology

is the main manifestation of digital inclusive finance [5]. Recently, it has been an important financial tool for China to achieve a change in the financial services field. Therefore, it is essential to clarify the relationship between the development of digital inclusive finance and prosperous market players to promote counties' economic development, with the effective connection of new urbanization and rural industrial prosperity.

Currently, the county is the basic unit for implementing national strategies and policies in China. Due to this, developing Medium, Small and Micro Enterprises (MSMEs) is essential in preserving employment and stabilizing people's livelihood. County enterprises are mainly small, medium and micro enterprises, compared with market players in the municipal area, not only in scale, technology and other aspects of their obvious heterogeneity, but also facing more severe financial constraints. Therefore, it is of great theoretical value and practical significance to explore the impact and mechanism of digital inclusive finance on enterprise creation at the county scale. Taking Henan Province as an example, this paper analyzes the impact of digital inclusive finance on the creation of county enterprises, uses a fixed-effects model to estimate the entrepreneurial effect of digital inclusive finance for empirical evidence, tests its heterogeneous impact in terms of region and type of entrepreneurship and explores the specific mechanism of action. Henan Province is a large province in terms of population (over 100 million people) and agriculture (urbanization rate of 56.45% in 2021), arguably characteristic of the development of most of China's less developed regions. So there is a greater need to develop the market economy and promote higher incomes and living standards for the population; traditional finance can hardly play a full role in this backward level of economic development, so digital inclusive finance is expected to play an important role in the region. Digital inclusion finance is an innovation and we track the latest developments as best we can. However, due to data availability limitations, we could only choose 2015–2020 as the period for our research. This article enriches empirical research in the digital economy, inclusive finance and enterprise development. It provides a reference for government departments to promote the development of micro and small enterprises for decision-making.

The remainder of the paper is organized as follows: after the introduction, the second part is the literature review; the third part is the theoretical model; the fourth deals with an econometric model construction and variable measurement; the fifth is the empirical analysis; and finally, the conclusions of the paper are addressed.

2. Literature Review

Many scientific research papers have widely and thoroughly discussed the factors influencing business creation, mainly from the point of view of individual characteristics, government behavior and entrepreneurial environment. Research on individual characteristics focuses on the analysis of personal and family characteristics of entrepreneurs, such as gender, age, level of human capital, level of social capital, work experience, degree of risk appetite, etc. [6,7]. In terms of government action, establishing development zones can influence the creation and growth of new enterprises through the "policy effect" and "agglomeration effect" [8]. In particular, the relationship between government subsidy practices and business development has been widely discussed [9,10]. In terms of entrepreneurial environment, the degree of marketization, infrastructure development, the level of network development and the social and cultural atmosphere have all been found to promote entrepreneurship [11–13]. Among these, the financial environment is an important part of the entrepreneurial environment and the availability of financing directly affects the development of entrepreneurial activities [14]; financial support has recently started to receive a lot of attention [15–18]. Several studies have concluded that financial supply can influence entrepreneurial behavior with a predominantly positive effect [14,19–21]. However, due to the widespread information asymmetry [22], formal finance's mechanical failure in entrepreneurial activities targeting long-tail regions and populations [23] has led to a series of explorations of banking relationships, informal social finance, etc. [24,25]. The digital inclusive finance developed by the internet, cloud computing, big data and

other technologies can effectively break the geographical distance limitation and reduce the degree of information asymmetry and is based on high expectations in cracking the "three rural areas", small and micro enterprises and other areas of investment and financing.

By addressing the financial exclusion of "long-tail" areas and populations [26], digital inclusive finance has significantly improved financial accessibility in rural areas, stimulating entrepreneurship among farmers and innovation among micro and small enterprises [27]; numerous empirical studies confirm the entrepreneurial effect of digital financial inclusion. At the individual level, Chen X and Yang J (2021) examined the impact of digital finance on the success rate of resident entrepreneurship and its mechanism of action based on data from the Digital Inclusive Finance Index of Peking University and the China Household Finance Survey. The study found that digital finance has a significant positive impact on the innovation success rate of residents and indirectly affects the entrepreneurial success rate by alleviating credit constraints [28]. Based on research data, He and Li (2019) found empirically that the effect of digital finance on non-farm entrepreneurship and subsistence entrepreneurship was highly significant and had a greater impact on those groups with lower human, physical and social capital. In contrast, banks' use of digital finance had no significant effect on farm entrepreneurship [29]. At the regional level. Xie et al. (2018) found that the development of digital finance significantly affects entrepreneurship. The breadth of digital finance coverage, usage depth and degree of digital support services significantly promote entrepreneurship. Meanwhile, in analyzing the mechanism of action, this paper finds that the development of digital finance has a stronger effect on encouraging entrepreneurship in provinces with lower urbanization rates and micro enterprises with less registered capital, which reflects the characteristics of digital finance inclusiveness [30]. Luo and Zhang (2021) used a fixed effects model based on panel data of local cities. They found that digital inclusive finance significantly affects residents' entrepreneurship and the promotion effect is more significant for entrepreneurial activities in areas with high levels of digital inclusive finance development [31]. At the same time, the relevant studies have the following shortcomings:

(1) The sample selection is not comprehensive enough. Individual studies contain both individual-oriented and enterprise-oriented aspects. The data used are mainly social survey data and listed enterprise data, which have variable suitability and problems of representativeness. For example, farmers' entrepreneurial behavior studies use provincial and municipal-level digital financial inclusion indices as the main explanatory variables [32]. Regional-level studies have primarily focused on provincial and municipal scales and evidence at the county level is still lacking. Scale effects are an essential concern in economic geography; provincial and municipal scale studies have all included municipal districts with more active industrial and commercial activities and thus may have obscured the specific entrepreneurial effects of digital inclusion finance on county areas with agricultural characteristics.

(2) Insufficient discussion on heterogeneity. The discussion of heterogeneity should start from the inclusiveness of digital inclusive finance regarding long-tail regions and populations. The existing studies mainly focus on heterogeneity at the provincial and municipal scales and discuss heterogeneity at a large regional scale, such as that of East, Central and West China, which cannot sufficiently reflect the current attention to the microscopic scale of urban-rural integration and development, i.e., the heterogeneity is not sufficient to discuss the situation of urban-rural areas. This idea of division idea is not to return to the discussion of the urban-rural binary structure but to respond to the new problem of the urban-rural digital divide [33]. Second, heterogeneity of entrepreneurial types and entrepreneurial activities cannot be portrayed simply by "whether", but should be further focused on the geography and type of entrepreneurial activities [29]. Obviously, the current research is still insufficient to address this issue.

(3) The mechanism of action is focused from a single perspective. Existing studies have mainly explored the mechanism of digital inclusive finance in promoting entrepreneurship from the perspective of financing constraints; this mechanism is gener-

ally revealed from the perspective of mutual "substitution" between digital inclusive finance and traditional financial services, with insufficient attention to the synergistic "complementary" effect of the two. Insufficient attention has been paid to this synergistic "complementary" effect [29]. Another feature of digital inclusive finance is the convenient and efficient mobile payment function. This feature has received relatively little attention in entrepreneurship-related studies [34,35], but has received extensive attention in the practical application of microenterprises (Data source: CBNData, https://www.cbndata.com/report/1198/detail?isReading=report&page=1; accessed on 30 August 2022). Digital financial inclusion as a new tool possesses diversity in its functions. Paying attention to its mobile payment function can help to fully perceive the mechanism of the entrepreneurial effect of digital inclusive finance.

Compared with the existing literature, the contributions of this paper are reflected in the following aspects: first, the entrepreneurial effects of digital inclusion finance are studied from the county's perspective. Existing literature has mainly studied the impact of digital inclusive finance on enterprise creation at the individual level. Some regional studies have focused on the provincial and municipal scales and have not studied the relationship between digital inclusive finance and enterprise creation at the county level. In this paper, we study the impact of digital inclusive finance on enterprise creation from the county scale to provide county-level experiences regarding the entrepreneurial effects of digital inclusive finance. Second, this paper analyzes the urban-rural regional and entrepreneurial type heterogeneity of the impact of digital inclusive finance on enterprise creation. Existing studies consider that the entrepreneurial effect of digital inclusive finance lies in its ability to alleviate the financing constraints of entrepreneurial behavior. The problem is mainly reflected in rural areas and micro and small enterprises, so the heterogeneity in urban and rural regions and entrepreneurial types of the entrepreneurial effect of digital inclusive finance must be considered. Previous studies have discussed heterogeneity in terms of East, Central and West and at the economic development level, but none have been carried out from the urban-rural perspective. The attention to the heterogeneity of entrepreneurship types is insufficient. This paper will discuss in depth the heterogeneity of digital financial inclusion entrepreneurship effects in urban and rural regions and entrepreneurship types.

3. Theoretical Analysis and Hypothesis

Entrepreneurial activity is the process of integrating various resources to create value, which inevitably requires financial support. The small number of financial institutions in counties, the uneven spatial distribution and the tendency towards "disappearing rural bank branches" [36], coupled with the slow marketization process and the lack of financial literacy of residents in counties [37,38], results in more severe financing constraints for entrepreneurial activities in counties compared to cities [39]. Traditional financial institutions are often reluctant to serve remote and poor populations [40] and have only a few branches in underdeveloped areas, which do not enjoy easy access to financial services such as lending and cash access. The lack of financial service support limits entrepreneurship [41]. Digital inclusive finance has both digital economy and inclusive financial characteristics, which can make up for the shortcomings of traditional finance and enable underdeveloped regions to enjoy convenient financial services, thus promoting entrepreneurial activities in underdeveloped areas. Accordingly, it is proposed that:

H1: *Digital financial inclusion has a positive impact on the creation of county businesses.*

Digital inclusive finance can significantly alleviate financing constraints. At the same time, physical exclusion, price exclusion and conditional exclusion are the leading causes of financial exclusion and financing constraints for long-tail regions and populations [42]. Location is a fundamental factor in physical exclusion, with traditional finance being extensively constrained from connecting with businesses in remote areas due to excessive geographic distances and aversion to risk, causing it to focus more on proximity to towns and cities [1,43]. Therefore, the creation of enterprises in rural areas may face more severe fi-

nancing constraints. Digital inclusive finance, relying on digital technology, may effectively break through the locational constraints and thus alleviate the above problems. In terms of price and conditionality exclusion, these lie in the size and institutional characteristics of the financing individuals themselves. This situation reveals that we must also pay attention to the heterogeneous impact of digital inclusive finance on different types of entrepreneurship [29].

On the one hand, the founders of MSMEs generally have limited capital size and have more urgent financing needs; on the other hand, MSMEs face more significant price discrimination. Due to the inclusive nature of digital inclusive finance, it is more able to serve the entrepreneurial needs of those micro and small enterprises. Therefore, micro and small enterprises, represented by individual entrepreneurs in the county, are more able to benefit from developing digital inclusive finance. Accordingly, it is proposed that.

H2.1: *Digital financial inclusion has a more significant impact on the creation of enterprises in rural areas.*

H2.2: *Digital financial inclusion has significantly contributed to creating individual business-type enterprises*.

One of the most important features of digital inclusive finance is its universality in promoting financing. From this perspective, existing studies show that the construction of China's financial system still needs to be improved. There are many structures for improving the coverage, depth of service and convenience of traditional financial services. Digital inclusive finance not only breaks through the limitations of geographical factors but also can accumulate credit information through big data to alleviate the problem of information asymmetry [29]. This characteristic can make up for the shortage of traditional financial services. That is, there is a "substitution" effect between them. At the same time, digital financial inclusion includes two characteristics: the financialization of digital technology and the digitalization of traditional finance. Its financing function cannot be performed without the support of traditional financial services [44,45]. The combination of digitalization and localized financial services will expand enterprises' existing financing channels and further promote county enterprises' financing, i.e., there is a "complementary" effect between the two models.

Another important feature of digital financial inclusion is a convenient, secure and efficient mobile payment function. Some studies have shown that convenient payments can significantly reduce operating costs and improve business performance [34,35]. The first is the ability to carry out cross-regional transactions and expand the market scope through the development of e-commerce; this feature is more able to benefit enterprises with relative advantages in good external support and industrial environment [46]. The second is the ability to reduce labor costs and security risks in transactions, thereby improving business performance; this feature is particularly significant for those engaged in self-employment [34]. For example, eliminating the risk of receiving counterfeit currency, eliminating the change-making process and reducing the phenomenon of bad debts on credit. Accordingly, it is proposed that.

H3: *Digital Inclusive Finance has facilitated the creation of county enterprises through improved financing and mobile payments*.

4. Method and Research

4.1. Data Description

The data used in this paper include: (1) The Peking University Digital Financial Inclusion Index of China published by the Institute of Digital Finance at Peking University is utilized to portray the changes in the degree of digital finance development in China. The index is comprehensive in terms of coverage breadth, usage depth and digitization level [5], which is the core explanatory variable of this paper. Coverage breadth, usage depth and digitization focus on revealing the degree of social coverage, specific use and convenience

of financial instruments, respectively, and have been widely used in research [32,45]. (2) The web-acquired data of nearly two million newly registered enterprises in each county of Henan Province during 2015–2020 includes indicators such as enterprise name, enterprise type, registered address, registration time, etc. The number of newly registered enterprises in each county can be summarized according to the above indicators for each calendar year. The registered address information and enterprise type information can be used to classify the newly registered enterprises in each county into enterprises in urban or rural and company-type or individual business-type enterprises, which are the main explanatory variables of this study. (3) Obtain data on other variables, such as GDP per capita, the loan balance of financial institutions, urbanization level, public finance expenditure, etc., from statistics such as the Henan Statistical Yearbook and China County Statistical Yearbook [6,7]. The level of urbanization has also been found to boost entrepreneurship significantly [47,48]. The government is not only the administrator of local affairs but also an important participant in economic development and its actions profoundly impact enterprises' development [9,49]. Traditional financial development is an essential part of the entrepreneurial environment and an important source of financing for entrepreneurial activity [14]. The above factors are used as a series of control variables in this paper; the descriptive statistics of each variable are shown in Table 1. The variables used are standardized and centred as necessary before entering the model.

Table 1. Descriptive statistics of the main variables.

Variables	Measurement Method	Symbols	Unit	Mean	Standard Deviation	References
Number of company-type enterprises	The number of new company registrations for the year	FIRM	-	1215.23	898.50	[28]
Number of individual business-type enterprises	The number of new registrations of individual businesses in the year	INDBUS	-	4920.04	2917.28	[28]
Composite index	Comprehensive index	INDEX	-	98.32	16.87	[3,47]
Coverage breadth	coverage breadth	COVER	-	89.08	11.86	[3,47]
Usage depth	usage depth	DEPTH	-	114.64	28.16	[3,47]
Digitization level	Digitization level	DIGIT	-	99.16	23.72	[3,47]
Level of urbanization	Urban population/total population	URBAN	%	43.39	9.33	[47,48]
Urban-rural income gap	Per capita disposable income of urban/rural residents	INGAP	-	2.03	0.32	[22,29]
Level of industrial development	Value added of the secondary industry	INDUS	Billion	138.67	103.16	[27,29]
Government spending intensity	General fiscal expenditure/GDP	FINE	%	0.16	0.06	[6,7]
Consumer market size	Total retail sales of consumer goods	CONSUM	Billion	105.11	59.97	[22]
Level of traditional financial development	Balance of loans of financial institutions at the end of the year	LOAN	Billion	122.53	84.41	[14]

4.2. Empirical Model

4.2.1. Baseline Regression Model

This paper explores the impact of digital financial inclusion on the creation of county enterprises and the study is carried out in Henan Province as an example. Henan Province is located in central China, with a mixture of various cultures and diverse topography; the differences among counties are challenging to portray fully by variable selection. At the same time, combined with the panel data characteristics of the data used, this paper selects a fixed-effects model for estimation. The base mode (1) is built as the following Equation:

$$Ent_{it} = \beta_0 + \beta_1 DIF_{it} + \sum_{i=n}^{N} \beta_i X_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

where Ent_{it} denotes the number of enterprises established in county i in year t, α denotes the individual effect, which is used to control for local unobservable factors that do not

change over time in each county but affect the creation of such enterprises, *DIF* represents the Digital Inclusive Finance Index, *X* represents a series of control variables, including variables such as urbanization level, urban–rural income gap, government spending intensity, value added of the secondary industry, year-end loan balances of financial institutions and total retail sales of consumer goods, β is the corresponding estimated coefficient and ε is the error term.

4.2.2. Robustness

This investigation examines whether the development of digital inclusive finance promotes the creation of county businesses. Identifying the impact of digital finance on entrepreneurship requires the addressing of two questions. The first is the issue of reverse causality, where entrepreneurial activity in a region may itself drive the local state of digital inclusive finance rather than just digital finance promoting entrepreneurship. The second is that, even if we control for the level of local economic development and the size of market consumption, other factors will lead to a change in the trend of corporate entrepreneurship that may not be related to the development of digital finance.

Hence, to ensure the robustness of the estimation, this study uses the inclusion of lagged terms of core explanatory variables and instrumental variables to address the endogeneity problem based on the construction of a fixed-effects model. First, the main explanatory variables are lagged by one period, i.e., to assess how the level of digital finance development in the previous year affects the creation of county enterprises in the current period, which can attenuate the reverse causality problem to a certain extent [30]. Second, drawing on existing studies [50], a construct Bartik instrumental variable is constructed. The rationale is to simulate the local estimated index for the current period by using macro-level development trends with the local base of the previous period.

$$DIF_{t,i,bartik} = DIF_{t-1,i} \times \frac{DIF_{t,I}}{DIF_{t-1,I}} \tag{2}$$

where $DIF_{t,i,bartik}$ is the *Barkik* instrumental variable for county i in year t and $DIF_{t,I}$ refer to the digital financial inclusion index of the previous level I in year t. In this paper, the provincial level is referred to. Since the provincial-level digital inclusion index contains information on the development of digital inclusion in each county and is not significantly affected by a particular county, its annual development changes are relatively exogenous to a specific county; even though shocks in each county other than digital inclusion may lead to biased estimates, the *Bartik* instrument variable is valid as long as a county is not important enough to affect the situation in the province [50]. Third, this paper regresses using a fixed individual effects model to further control for individual factors such as local innovation spirit and folk culture that may affect both digital finance development and entrepreneurial activity and do not change over time in the short run.

4.2.3. Heterogeneity

The heterogeneity of the impact of digital inclusive finance on the founding activities of county enterprises is an essential content explored in this research. According to the above analysis, the heterogeneity of entrepreneurial effects of digital inclusive finance can be developed from urban-rural regional heterogeneity and entrepreneurial type heterogeneity. The study can be explicitly classified by size and address. The heterogeneity of the different entrepreneurial types represented by these sizes contains two major elements: company-type enterprises and individual business-type enterprises, the latter more representative of the characteristics of micro and small enterprises. According to their registered address, regional types can be divided into urban and rural businesses. Again, the latest creation is more vulnerable to financing constraints. The heterogeneity of urban and rural areas and the heterogeneity of entrepreneurship types can also be combined and further divided into four different categories of entrepreneurial activities to test the heterogeneous impact of digital inclusion finance on the creation of enterprises of different sizes and in different regions.

4.2.4. Mechanism Testing

This paper focuses on two paths of digital inclusive finance: improving financing and mobile payment and promoting county enterprise creation. For the improvement of financing, the interaction term between the level of traditional financial development and digital financial inclusion is added to this model (1) to test the joint effect of the two on creating county enterprises, as shown in model (4). For the path of mobile payment, the three-level indicators under the usage depth of "payment business" (including the number of payments per capita; payment amount per capita; high frequency (active 50 times a year and above) and the ratio of active users to active users once a year and above) are separated from the usage depth of digital financial inclusion and the effect of the interaction term with the level of digitalization on business creation is examined. The impact of the interaction term on business creation is:

$$Ent_{it} = \beta_0 + \beta_1 DIF_{it} + \beta_2 LOAN_{it} + \beta_{23} DIF_{it} \times LOAN_{it} + \sum_{i=n}^{N-1} \beta_i X_{it} + \alpha_i + \varepsilon_{it} \quad (3)$$

$$Ent_{it} = \beta_0 + \beta_1 PAYMENT_{it} + \beta_2 DIGIT_{it} + \beta_{23} PAYMENT_{it} \times DIGIT_{it} + \sum_{i=n}^{N} \beta_i X_{it} + \alpha_i + \varepsilon_{it} \quad (4)$$

In model (3), LOAN refers to the level of traditional financial development and DIF*LOAN refers to the interaction term between the level of traditional financial development and various indices of digital financial inclusion. The existence and specific effects of improved financing paths are judged based on their coefficients. In model (4), PAYMENT refers to the level of payment business in digital inclusive finance. According to the coefficient of its interaction term with the digitization_level and significance, the existence of mobile payment channels and their specific effects are analyzed.

5. Results

5.1. Baseline Regression Results

The baseline estimation was first performed with a mixed OLS model. Considering time and individual differences, the model was also subjected to the Hausman test and the results showed a significant rejection of the original hypothesis that fixed effects should be selected for estimation. Adding time dummy variables for estimation using the LSDV model, it was found that the model AIC and BIC information values changed slightly (<5%) after adding time-fixed effects and the model goodness-of-fit R-squared decreased significantly and appeared negative. The estimation results also showed that the coefficients of time dummy variables varied positively and negatively and none of them met the minimum significance requirement at the 0.1 level. Hence, since 2015 China's economy has been growing and has entered a new trajectory. Simultaneously, the development of the market economy has also entered a stage of quality improvement and the creation of market subjects has been adversely affected by macroeconomic influence. Therefore, the analysis is mainly carried out with the fixed individual effect model results.

Columns (1) to (4) in Table 2 show the estimation results using the mixed OLS model; the coefficients of the composite index of digital financial inclusion and its secondary index are positive and significant at the 1% level. The coefficients of columns (5) to (8) are estimated after fixing individual effects. It can be seen that the coefficients of all core explanatory variables are positive and significant, at least at the 10% level. That is, digital inclusive finance significantly contributes to creating county enterprises. The characteristics of the digital economy enable county enterprises to be supported by digital elements and the aspects of inclusive finance enable county enterprises to receive more financial services. The universality and inclusiveness of digital inclusive finance positively impact the creation of enterprises in counties located in the long-tail region. The above results are broadly consistent with provincial and municipal studies [30,31].

From the control variables, the coefficients of traditional financial development level, urbanization level and social consumption level are significantly positive, indicating that the development of traditional finance is favorable to creating county enterprises. The supply of financial services, urbanization lifestyle and market size are all important factors influencing enterprise creation, which is more consistent with the findings of existing studies. The fiscal expenditure intensity and secondary industry size coefficients are positive but lack statistical significance. The coefficient of the urban-rural income gap is negative, or the urban-rural dual structure hinders the flow of production factors, is not conducive to the market economy's development and impacts entrepreneurial activities negatively.

Table 2. Benchmark regression results.

	Total Number of Enterprises in the County							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
INDEX	0.3606 *** (0.0460)				0.1998 *** (0.0602)			
COVER		0.1998 *** (0.0426)				0.0835 * (0.0444)		
DEPTH			0.4080 *** (0.0483)				0.2749 *** (0.0701)	
DIGIT				0.3251 *** (0.0433)				0.1753 *** (0.0596)
URBAN	−0.1451 (0.0965)	0.0777 (0.0939)	−0.1970 ** (0.0986)	−0.0959 (0.0950)	0.6620 *** (0.1994)	0.9475 *** (0.1712)	0.5127 ** (0.2114)	0.6872 *** (0.2040)
INGAP	−0.0419 (0.0903)	−0.0340 (0.0944)	−0.0531 (0.0904)	−0.0937 (0.0907)	−0.2449 (0.1785)	−0.2754 (0.1802)	−0.2273 (0.1779)	−0.3300 * (0.1772)
FINE	0.2440 *** (0.0754)	0.3680 *** (0.0749)	0.2090 *** (0.0757)	0.2440 *** (0.0760)	0.0905 (0.0892)	0.1533 * (0.0870)	0.0545 (0.0905)	0.0851 (0.0908)
INDUS	0.0876 (0.0999)	0.0729 (0.1035)	0.1362 (0.0994)	0.0768 (0.1004)	0.0470 (0.1288)	0.1105 (0.1277)	0.0312 (0.1283)	0.0267 (0.1316)
LOAN	0.6880 *** (0.0764)	0.7835 *** (0.0776)	0.6268 *** (0.0773)	0.6993 *** (0.0765)	0.5691 *** (0.0934)	0.5927 *** (0.0945)	0.5196 *** (0.0941)	0.5692 *** (0.0937)
CONSUME	0.7091 *** (0.0804)	0.7718 *** (0.0823)	0.6850 *** (0.0802)	0.7052 *** (0.0809)	0.6533 *** (0.0937)	0.6897 *** (0.0935)	0.6283 *** (0.0940)	0.6526 *** (0.0942)
Constant	−0.0000 (0.0850)	−0.0000 (0.0892)	−0.0000 (0.0856)	−0.0000 (0.0856)				
Individual fixed effects	NO	NO	NO	NO	YES	YES	YES	YES
Observations	624	624	624	624	624	624	624	624
Adjusted R2					0.4838	0.4764	0.4881	0.4815
F Statistic					99.1419 ***	96.6796 ***	100.5684 ***	98.3596 ***

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels.

5.2. Robustness Tests

In this research, to ensure the robustness of the baseline regression results, this paper performs robustness tests using the following methods.

(1) Instrumental variable method

Based on the existing research base [50], the Bartik instrumental variable, which is the product of the lagged first-order term of the independent variable and the overall rate of change of the variable, is constructed to replace the core explanatory variable. The estimated results after replacing the instrumental variables are shown in Table 3. It can be seen that the coefficients of the core explanatory variables are still significantly positive, except for the coverage breadth. Possible explanations are that the overall level of digital inclusion is higher and the growth rate slows down at the provincial level. In contrast, the opposite is accurate at the county level. The failure of the Bartik instrumental variable to accurately portray the breadth of digital inclusion coverage at the county level may have contributed to this change in results. Overall, however, the results of the benchmark regression can still be considered robust.

Table 3. Results of the robustness test.

	Bartik	LAG.1	LAG.2	LAG.3
INDEX	0.1193 ** (0.0585)	0.1690 *** (0.0645)	0.3232 *** (0.0690)	0.1947 ** (0.0887)
COVER	0.0337 (0.0452)	0.0036 (0.0463)	0.1547 *** (0.0486)	0.1252 ** (0.0541)
DEPTH	0.1833 *** (0.0635)	0.3192 *** (0.0749)	0.4007 *** (0.0852)	0.1446 (0.1253)
DIGIT	0.2168 *** (0.0632)	0.2366 *** (0.0656)	0.3548 *** (0.0742)	0.1787 * (0.1030)
n	624	520	416	312

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels.

(2) Add lagging terms

The core explanatory variables are estimated by replacing them with lagged one-, two- and three-period terms to see if there is an effect over a longer time. The results are shown in Table 3. It can be seen that the sign of the coefficients of the core explanatory variables with lagged one-period is always positive. Still, the coefficient of the coverage breadth is not significant. The coefficients of the core explanatory variables in the lagged two-period all have positive and statistically significant signs. The coefficients of the core explanatory variables with three lags are all positive in sign but slightly less significant and the coefficients of usage depth are not substantial. The above results suggest that digital financial inclusion development can facilitate the creation of businesses in the county over a longer, sustained period. From then on, this finding has important practical implications.

The results of the two methods tested above indicate that the baseline regression estimates are robust and reliable; i.e., digital inclusive finance development significantly contributes to creating county enterprises and Hypothesis 1 is confirmed.

5.3. Heterogeneity Test

To test whether the impact of digital inclusive finance on county business creation is related to the type of entrepreneurship. This study classifies businesses into company type and individual business type to estimate the heterogeneity of the impact of digital inclusion finance on county business creation in terms of the type of entrepreneurship. The estimated results are shown in Table 4. The coefficients of the core explanatory variables are all significantly positive. This result indicates no heterogeneity in the impact of digital financial inclusion on the establishment of county enterprises in terms of entrepreneurial type. It can significantly promote the establishment of firm-type and individual business enterprises. They also indicate that there is no heterogeneity in the impact of digital financial inclusion on the creation of county enterprises. Consequently, it can significantly promote the creation of company-type and individual business-type enterprises.

To test the heterogeneity of digital inclusive finance in promoting business creation in urban and rural areas, we categorize enterprises within the county as urban enterprises and enterprises in other areas as rural enterprises based on the registered address information of enterprises [51]. The grouping of enterprises in urban and rural areas was estimated and the results are shown in Table 4. It can be seen that the coefficients of the indicators of digital inclusive finance are still significant and they can promote entrepreneurship in both urban and rural areas.

Table 4. Test of the heterogeneity of entrepreneurial types and urban-rural regional.

	Number of Company-Type Enterprises	Number of Individual Business-Type Enterprises	Number of Enterprises in Urban Areas	Number of Enterprises in Rural Areas
INDEX	0.1587 *** (0.0248)	0.1958 *** (0.0356)	0.0945 ** (0.0422)	0.1220 *** (0.0467)
COVER	0.0650 *** (0.0230)	0.1415 *** (0.0336)	0.0641 ** (0.0303)	0.0594 * (0.0339)
DEPTH	0.2054 *** (0.0258)	0.1890 *** (0.0370)	0.0700 (0.0516)	0.1542 *** (0.0562)
DIGIT	0.1429 *** (0.0233)	0.1752 *** (0.0332)	0.0943 ** (0.0402)	0.1037 ** (0.0444)
n	624	624	624	624

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels.

Further, considering the above heterogeneity of enterprise types and the heterogeneity of urban and rural areas, the enterprise types in urban and rural areas were divided to investigate the impact of digital inclusive finance on creating different enterprise types in different areas. The results in Table 5 highlight that digital financial inclusion significantly affects all types of enterprises in urban areas. However, in rural areas, it only significantly promotes the creation of self-employed enterprises but does not positively affect the creation of company enterprises. This context may be due to the risk aversion of residents in rural areas, which choose a more survival-oriented entrepreneurship and stay away from opportunity-oriented entrepreneurship. Moreover, the increase in entrepreneurial behaviour in urban areas may lead to the further flow of production factors to urban areas and the lack of opportunity-oriented entrepreneurial resources in rural areas. This may also be because rural areas face more serious financial exclusion problems. Combining traditional finance and digital inclusive financial may alleviate the above issues. At the same time, the creation of individual business-type enterprises is less affected by the above problems due to their relatively small capital size.

The results in this section illustrate that there is no significant urban-rural regional or entrepreneurial-type heterogeneity in the entrepreneurial effects of digital inclusive finance. A consistent positive promotion effect is reflected across regions and entrepreneurship types. Hypotheses 2.1 and 2.2 were not confirmed.

Table 5. Joint tests of urban–rural regional heterogeneity and entrepreneurship type heterogeneity.

	Urban Areas		Rural Areas	
	Company-Type Enterprises (1)	Individual Business-Type Enterprises (2)	Company-Type Enterprises (3)	Individual Business-Type Enterprises (4)
INDEX	0.1140 *** (0.0311)	0.1390 *** (0.0507)	−0.0163 (0.0388)	0.1199 ** (0.0544)
COVER	0.0351 (0.0230)	0.0921 ** (0.0372)	−0.0383 (0.0284)	0.0644 (0.0399)
DEPTH	0.1746 *** (0.0361)	0.1157 * (0.0596)	0.0536 (0.0454)	0.1352 ** (0.0637)
DIGIT	0.1108 *** (0.0308)	0.1359 *** (0.0501)	−0.0362 (0.0383)	0.1081 ** (0.0538)
n	624	624	624	624

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels.

5.4. Mechanism Analysis

(1) Pathways to facilitate financing

Facilitating financing is one of the main functions of digital inclusive finance. Following Equation (3), the interaction term of digital inclusive finance and traditional finance development level is added to the model to estimate whether digital inclusive finance combines with traditional finance. Considering also urban–rural regional and entrepreneurship type heterogeneity, the sub-types of entrepreneurial behavior are estimated separately as dependent variables according to the above idea. The results are shown in Table 6.

Overall, the combined effect of digital financial inclusion and traditional financial development level exists, which can significantly promote the creation of county enterprises.

In classification, this combined effect mainly promotes the creation of company-type enterprises but does not significantly impact the creation of self-employed enterprises. The development of digital inclusive finance needs to rely on traditional financial services to a certain extent. Considering the lagging development of the market economy in county areas, the path dependence of residents in accessing financial services and the factors of digital and financial literacy, the combined effect of digital inclusive finance and traditional finance in promoting the creation of firm-type enterprises show a complementary effect. This result complements the debate in existing studies on the relationship between them [52].

Table 6. Pathway tests for improved financing.

(**a**)

	Total Number (1)	**Company-Type Enterprises (2)**	**Individual Business-Type Enterprises (3)**	**Enterprises in Urban Areas (4)**	**Enterprises in Rural Areas (5)**
INDEX*LOAN	1.5547 *** (0.4024)	1.8314 *** (0.2047)	−0.2767 (0.3390)	0.5080 * (0.2866)	0.0696 (0.3258)
COVER*LOAN	0.1448 (0.5314)	0.7087 ** (0.2832)	−0.5639 (0.4391)	0.2750 (0.3731)	−0.4890 (0.4216)
DEPTH*LOAN	1.0466 *** (0.2422)	1.2758 *** (0.1198)	−0.2292 (0.2059)	0.1547 (0.1748)	0.1157 (0.1974)
DIGIT*LOAN	0.8805 *** (0.2895)	1.0233 *** (0.1506)	−0.1429 (0.2423)	0.3506 * (0.2047)	0.0121 (0.2327)
n	516	516	516	516	516

(**b**)

	Company-Type Enterprises in Rural Areas (1)	**Individual Business-Type Enterprises in Rural Areas (2)**	**Company-Type Enterprises in Urban Areas (3)**	**Individual Business-Type Enterprises in Urban Areas (4)**
INDEX*LOAN	2.1138 *** (0.2462)	−0.5184 (0.3682)	1.0225 *** (0.2063)	0.2708 (0.3438)
COVER*LOAN	0.6938 ** (0.3384)	−0.8235 * (0.4764)	0.5531 ** (0.2748)	0.1548 (0.4451)
DEPTH*LOAN	1.5541 *** (0.1439)	−0.2892 (0.2234)	0.6087 *** (0.1240)	−0.0182 (0.2093)
DIGIT*LOAN	1.2267 *** (0.1798)	−0.3394 (0.2631)	0.5124 *** (0.1491)	0.2633 (0.2453)
n	624	624	624	624

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels.

(2) Mobile payment

The problem of financing constraints does not concern all types of entrepreneurial activity. Residents of less developed regions have a significant risk aversion [53]. Therefore, the entrepreneurial activities of this group are primarily survival-oriented. The main purpose of survival-oriented entrepreneurship is to improve survival conditions. As typical survival-oriented entrepreneurship, individual business-type is more sensitive to the increased digitalization of digital inclusive finance, convenient payment and reduced transaction costs brought about by it [34]. We also explore whether the mobile payment channel can explain the heterogeneity of urban and rural areas and types of entrepreneurship. Along the lines of the above, the specific impact of mobile payment is estimated using the individual business class versus the firm class and urban area businesses versus rural area businesses as explanatory variables, respectively, as shown in Table 7.

Overall, the coefficient of the payment business variable is significantly positive, as well as the coefficient of its interaction term with the dichotomous variable of digitalization. This situation indicates that digital financial inclusion significantly promotes the creation of county enterprises through the mobile payment channel. Categorically, this effect is mainly reflected in firm-based enterprise creation and urban area enterprise creation. At the same time, it also positively impacts self-employed and rural area enterprise creation but lacks strong support.

Table 7. Pathway tests of mobile payment channels.

(a)						
	Total (1)	**Total (2)**	**Individual Business-Type Enterprises (3)**	**Individual Business-Type Enterprises (4)**	**Company-Type Enterprises (5)**	**Company-Type Enterprises (6)**
PAYMENT	0.1547 *** (0.0510)	0.1990 *** (0.0516)	0.0571 (0.0425)	0.0657 (0.0436)	0.0976 *** (0.0272)	0.1333 *** (0.0271)
DIGIT	0.0870 * (0.0505)	0.2164 *** (0.0602)	0.0995 ** (0.0421)	0.1246 ** (0.0508)	−0.0125 (0.0270)	0.0918 *** (0.0316)
PAYMENT*DIGIT		0.1582 *** (0.0413)		0.0307 (0.0349)		0.1275 *** (0.0217)
n	624	624	624	624	624	624
(b)						
	Enterprises in Rural Areas (1)	**Enterprises in Rural Areas (2)**	**Enterprises in Urban Areas (3)**	**Enterprises in Urban Areas (4)**		
PAYMENT	0.0894 ** (0.0406)	0.1004 ** (0.0417)	−0.0045 (0.0362)	0.0143 (0.0370)		
DIGIT	0.0541 (0.0402)	0.0860 * (0.0486)	0.0934 *** (0.0358)	0.1482 *** (0.0431)		
PAYMENT*DIGIT		0.0390 (0.0334)		0.0670 ** (0.0296)		
n	624	624	624	624		

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels.

Further, as shown in Table 8, the effect of mobile payment on firm creation is found to be more robust, with no significant difference between urban and rural areas. However, the heterogeneity of entrepreneurship types is further revealed for firm creation in urban areas, i.e., the effect is significant only for firm creation in urban areas but not for self-employed firms. This context may be because the development of mobile payment expands the customer acquisition channel, which helps to improve the expected business performance of firms and thus promotes the creation of new firms.

Table 8. Joint tests of urban–rural regional heterogeneity and entrepreneurship type heterogeneity for pathway tests of mobile payment channels.

	Company-Type Enterprises in Rural Areas (1)	**Company-Type Enterprises in Rural Areas (2)**	**Individual Business-Type Enterprises in Rural Areas (3)**	**Individual Business-Type Enterprises in Rural Areas (4)**	**Company-Type Enterprises in Urban Areas (5)**	**Company-Type Enterprises in Urban Areas (6)**	**Individual Business-Type Enterprises in Urban Areas (7)**	**Individual Business-Type Enterprises in Urban Areas (8)**
PAYMENT	0.1040 *** (0.0325)	0.1293 *** (0.0330)	0.0908 ** (0.0460)	0.0966 ** (0.0473)	0.0660 ** (0.0265)	0.1063 *** (0.0260)	−0.0285 (0.0431)	−0.0193 (0.0443)
DIGIT	−0.0618 * (0.0322)	0.0120 (0.0385)	0.0772 * (0.0456)	0.0942 * (0.0551)	0.0534 ** (0.0262)	0.1710 *** (0.0303)	0.0906 ** (0.0427)	0.1175 ** (0.0516)
PAYMENT*DIGIT		0.0903 *** (0.0264)		0.0208 (0.0378)		0.1438 *** (0.0208)		0.0329 (0.0354)
n	624		624		624		624	

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels.

For self-employed business creation, the impact of payment business is significant in rural areas and digitalization is significant in urban areas. This issue may be because payment services are more likely to promote consumption within villages in rural areas, where business activities are more homogeneous. In contrast, commercial activities are more extensive and more diverse in urban areas and increased digitization helps to expand the scope of payments and the breadth of residents' consumption in urban areas.

The above results confirm that digital inclusion can facilitate the creation of county enterprises through the channel of mobile payments and is robustly reflected in the impact on the creation of firm-type enterprises. Regarding the creation of the self-employed type of business, this type of business in rural areas is mainly influenced by the level of payment

operations. In contrast, this type of business in urban areas is primarily influenced by the digitization_level.

Therefore, we found that the combining results from Section 5.4, Hypothesis 3 presented above, is confirmed. This conclusion sheds light that digital inclusive finance facilitates the creation of enterprises in the county through improved financing and mobile payments. Conversely, these results also prove that Hypotheses 2.1 and 2.2 are not supported.

6. Discussion and Conclusions

6.1. Discussion

The world is currently entering the era of the digital economy. The advantages of digital technology are breaking down traditional barriers and opening up more opportunities for developing long-tail regions and populations. This context brings new promise for reducing inequalities between regions and providing sufficient resources for the socioeconomic development of the whole population. China has made remarkable achievements in developing the digital economy, especially in digital finance.

This paper examines whether and how the development of digital inclusive finance can promote entrepreneurial behavior in less developed regions (within counties), starting from the perspective of financial services and selecting the typical Henan province as a case study. The results provide evidence of the entrepreneurial effects of digital inclusive finance at a smaller scale (within counties) [30,32]. The results of the heterogeneity analysis showed no significant heterogeneity in the entrepreneurial effect of digital inclusive finance between urban and rural areas and types of entrepreneurship. Except for company-type business creation in rural areas, a more consistent positive promotion effect is reflected across regions and entrepreneurship types. These results may be due to the more severe traditional financial constraints county areas face, particularly in rural areas. While digital technology can attenuate the impact of geographical factors, it cannot completely make solutions to resolve the institutional issues within the enterprise. This result complements the entrepreneurial effects of digital inclusive finance across geographies and types of entrepreneurship [29,32]. The mechanism analysis finds that digital inclusive finance can promote the creation of county enterprises through two paths: improved financing and mobile payment. When heterogeneity is considered, these mechanisms are more pronounced in the case of company-type enterprise creation. This finding complements related research on the specific role of mobile payments in promoting entrepreneurship [34]. The function of digital inclusive finance in improving access to finance is again confirmed. Beyond this, the results also reveal the specific role of mobile payments in promoting entrepreneurship in different regions and areas. Mobile payments can reduce operational costs, improve business performance and thus promote entrepreneurship [35] in Henan province.

6.2. Conclusions

This present investigation explored whether and how the development of digital inclusive finance can promote entrepreneurial behavior in less developed regions (at a county level) through Henan province as a case study area. In that setting, the results of our study highlight that digital inclusive finance can significantly encourage the creation of county enterprises. On the other hand, without finding heterogeneity between regions and entrepreneurship types, the specific role of 'mobile payments' as a mechanism of action is expanded. According to these results, the main contributions of this paper lie in the theoretical analysis of the entrepreneurial effect of digital inclusive finance and its heterogeneity within counties with empirical evidence using a large amount of data from multiple sources. As a result, these findings help us understand how digital financial tools can promote entrepreneurial behaviour in less developed regions in the context of the digital economy, which is vital for achieving coordinated regional development and revitalizing rural areas.

However, due to the current furtherance of the quality of economic development, this paper has not given enough attention to the industry structure and quality of enterprises, such as the size of enterprises and technological innovation, issues which future research should explore in depth. To better leverage the entrepreneurial effects of digital inclusive finance, we recommend promoting the integration of digital inclusive finance with traditional finance. In addition to this recommendation, it is necessary to enhance the accuracy and effectiveness of financial services, provide the required financial services to various companies and strengthen the level of financial services in the county. At the same time, the mobile payment function of digital inclusive finance should be brought into play to enhance its convenience and security advantages in order to reduce operating costs and improve business performance. Finally, traditional financial services should be expanded in rural areas and combined with digital inclusive finance to jointly promote the development of the market economy in rural areas and strengthen the financial services in the rural revitalization progress.

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