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# the Impacts of Rural Banks on Counties' Economic Growth: Evidence from China

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# Introduction

Grameen Bank was the first rural bank to provide credit services to farmers in Bangladesh. Its successful operation in the world has been recognized by developing countries, which have established their own rural banks. CBIRC issued a policy text at the end of 2006, which provided an institutional basis for the establishment of rural banks in China. In early 2007, rural banks were established in six provinces on a pilot basis and were implemented nationwide at the end of that year. In order to attract more private capital to participate in the establishment of rural banks, the former CBRC (now CBIRC) lowered the threshold and encouraged the establishment of rural banks in rural areas by lowering the registered capital and allowing social capital to participate. The number of rural banks in China has increased from 19 in 2007 to 1,621 in 2020, with an average annual growth of more than 100, and the number of counties covered has increased from 19 to 1,306 (as shown in Fig. 1).

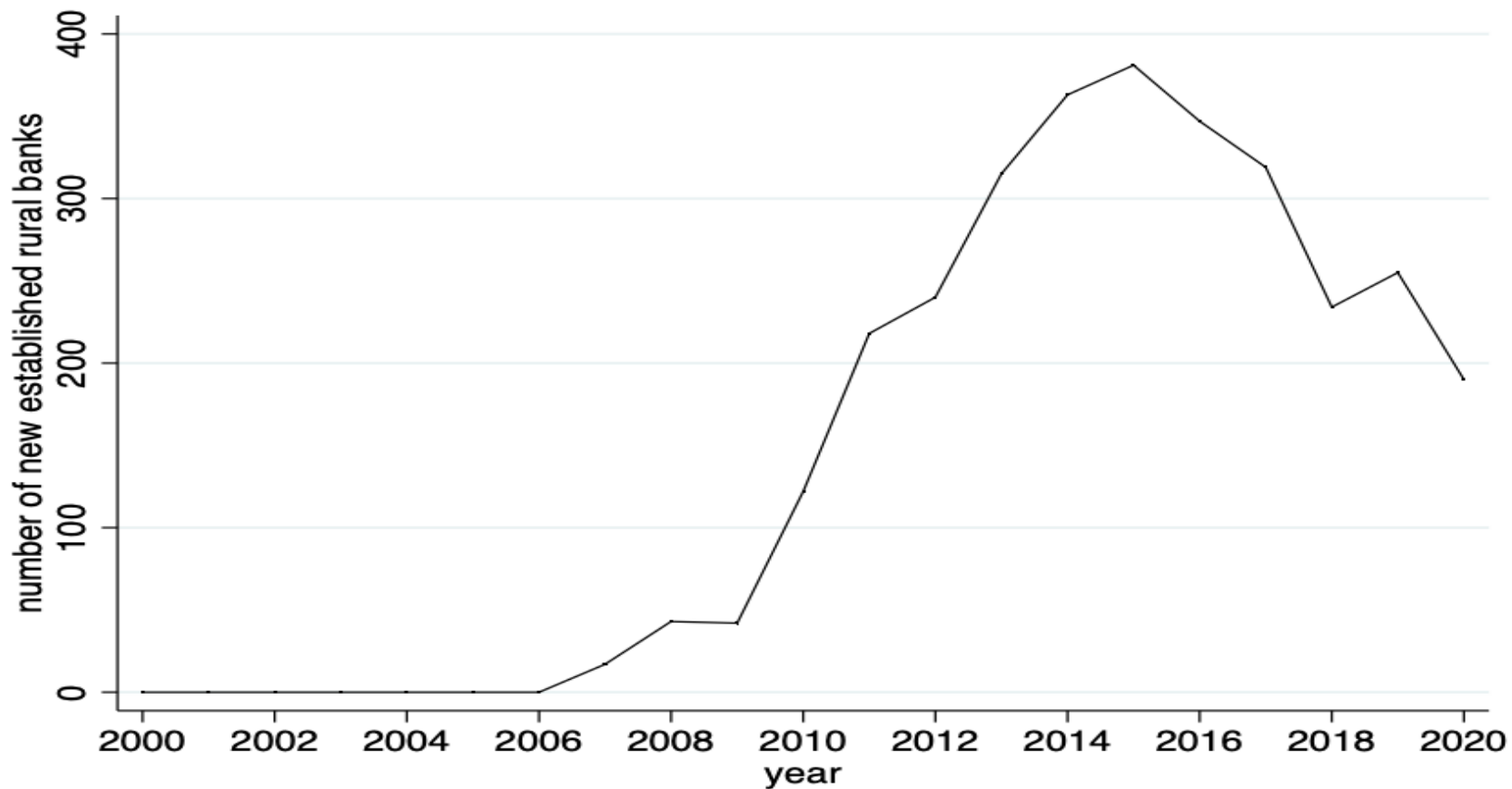


Fig. 1. Distribution of rural banks by year of establishment



# Theoretical analysis

Shaw (1973) and McKinnon (1973) found that financial development can promote economic growth and the lack of financial services is detrimental to regional economic growth (Leyshon and Thrift, 1995).

King and Levine (1993) found that bank expansion can significantly promote economic growth. While financial institutions promote economic growth, economic growth can also promote financial institutions (Greenwood and Jovanovic, 1990). This was subsequently supported by a dynamic panel model with data from 74 countries (Rioja et al., 2004). Abu-Bader et al. (2007) found a bidirectional causal relationship between financial development and economic growth in Egypt. Petach et al. (2021) found that the establishment of community banks had a direct impact on rural as well as micro-county development by promoting employment. Other studies by some scholars found an insignificant relationship between financial development and economic development (Alimi, 2015; Ganić et al., 2016).

# Research design

we construct the following time-varying difference-in-differences model to test the impact of the establishment of county financial institutions on economic growth in the central and western regions of China.

$$\text{Lncrgdp}_{it} = \alpha_0 + \alpha_1 \text{Post}_{it} + \alpha_2 X_{it} + \delta_i + \delta_t + \varepsilon_{it} \quad (1)$$



Table 1 Variable Definition

Lncrgdp	Logarithm of County Real GDP
Lnpcrgdp	Logarithm of real GDP per capita in the county
Treat	The dummy variable for the districts and counties implementing the policy of easing access to banking financial institutions in rural areas takes the value of 0 (control group) when the districts and counties do not have rural banks in the sample interval (2000-2020), and the value of 1 (treatment group) for the districts and counties that have rural banks in the sample interval.
Post	The dummy variable before and after the implementation of the policy of easing access to banking financial institutions in rural areas takes the value of 1 for that year and all subsequent years if a rural bank is established in county $i$ in year $t$ , Otherwise it is 0.
Industry	Value added of the secondary sector as a share of nominal GDP
Quality_L	Number of students enrolled in general secondary schools as a proportion of the total population at the end of the year
Saving_R	Share of resident savings deposit balance to nominal GDP
Communication	Number of fixed-line telephone subscribers as a proportion of total population at year-end
Fiscal	Ratio of local fiscal general budget expenditure to nominal GDP
Lnhealth	Logarithm of the ratio of the number of beds in hospitals and health centers to the total population at the end of the year
Ecoc	Ratio of value added of secondary and tertiary industries to land area
Serv	Ratio of value added of tertiary industries to nominal GDP





Table 2 Descriptive statistics

Variable	N	Mean	SD	p25	P50	p75	Min	Max
Lncrgdp	29127	12.687	1.158	11.908	12.775	13.534	9.789	15.691
Lnpcrgdp	29127	9.218	0.874	8.570	9.238	9.821	7.400	11.608
Treat	29127	0.641	0.480	0.000	1.000	1.000	0.000	1.000
Post	29127	0.236	0.425	0.000	0.000	0.000	0.000	1.000
Industry	29127	38.545	16.223	26.420	37.250	49.512	8.623	77.993
Quality_L	29127	5.355	1.686	4.194	5.272	6.392	1.679	10.083
Saving_R	29127	0.699	0.340	0.462	0.642	0.866	0.137	1.931
Communication	29127	11.050	8.211	5.445	9.049	14.195	1.202	52.484





# Empirical results

Table 3 Baseline regression results

	(1)	(2)	(3)	(4)	(5)
Post	0.028*** (0.005)	0.030*** (0.005)	0.023*** (0.004)	0.017*** (0.004)	0.019*** (0.004)
Quality_L		0.006*** (0.001)	0.011*** (0.001)	0.014*** (0.001)	0.013*** (0.001)
Industry			0.015*** (0.0002)	0.010*** (0.0002)	0.010*** (0.0002)
Saving_R				-0.682*** (0.011)	- 0.684*** (0.011)
Communication					0.003*** (0.0002)
_cons	12.682*** (0.002)	12.648** (0.008)	12.057** (0.011)	12.696*** (0.015)	12.673** (0.015)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
N	29127	29127	29127	29127	29127
Adj R <sup>2</sup>	0.959	0.959	0.967	0.979	0.979

Column (1) of Table 3 reports the regression results without control variables, and it denotes that the establishment of rural banks can promote economic growth and is significant at the 1% level. Columns (2) to (5) show the results of the regressions with the addition of control variables in turn. The promotion of economic growth by the establishment of rural banks (Post) remains significant, which indicates that the economic growth effect of the establishment of rural banks is robust to the consideration of omitted variables.

## Robustness test

A key hypothetical premise of the TDID model used in the baseline regression of this paper is the parallel trend hypothesis, i.e., there is no significant difference between the treatment and control groups in terms of county economic growth before policy implementation. To verify the reliability of the TDID model in identifying causality, referring to Jacobson et al. (1993) and Boler et al. (2015), we use an event study approach to examine the ex ante parallel trends as well as the dynamic effects of the policy. The regression equation is as follows.

$$\text{Lncrgdp}_{it} = \beta_0 + \sum_{e=-20}^{13} \beta_e \text{DID}_e + \beta_2 X_{it} + \delta_i + \delta_t + \varepsilon_{it} \quad (2)$$

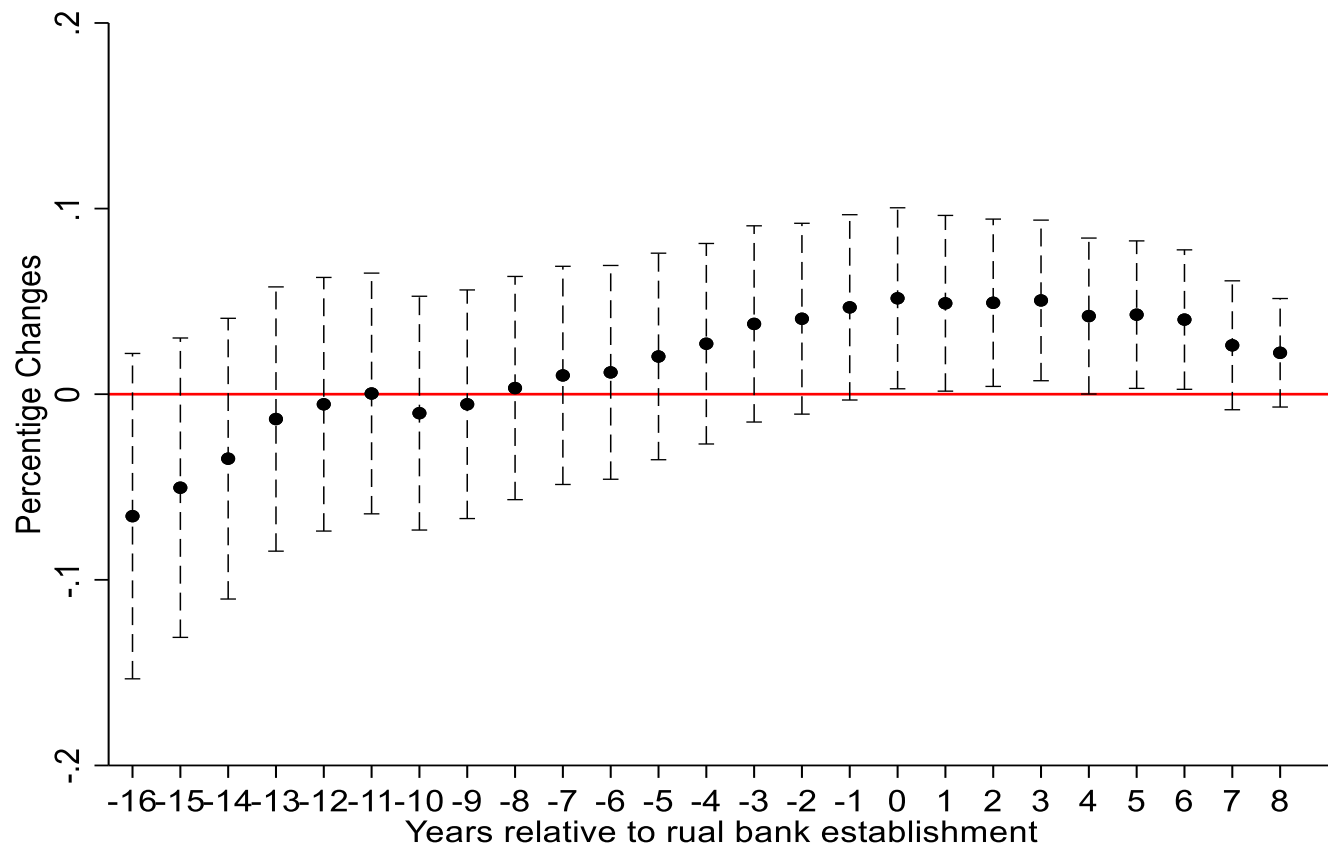


Fig. 2. Parallel trend test

As can be seen in Fig. 2, the estimated coefficients for each time are insignificant before the establishment of rural banks. In addition, the coefficient estimates are significantly different and heterogeneous after the establishment of rural banks. The results indicate that there is no significant difference between the treatment and control group counties before the implementation of the policy, and the study sample passed the parallel trend test.



Goodman-Bacon (2021) theoretically pointed out that when there is heterogeneity in treatment effects, differences in the effects produced by the same treatment for different individuals will lead to potential estimation bias in the two-way fixed-effects model. We refer to the interpolation estimator proposed by Borusyak et al. (2021) to retest the baseline regression results for parallel trends. Fig. 3 reports the parallel trend test based on the interpolation estimator. The estimation results indicate that the treatment and control groups share a common trend before the policy implementation

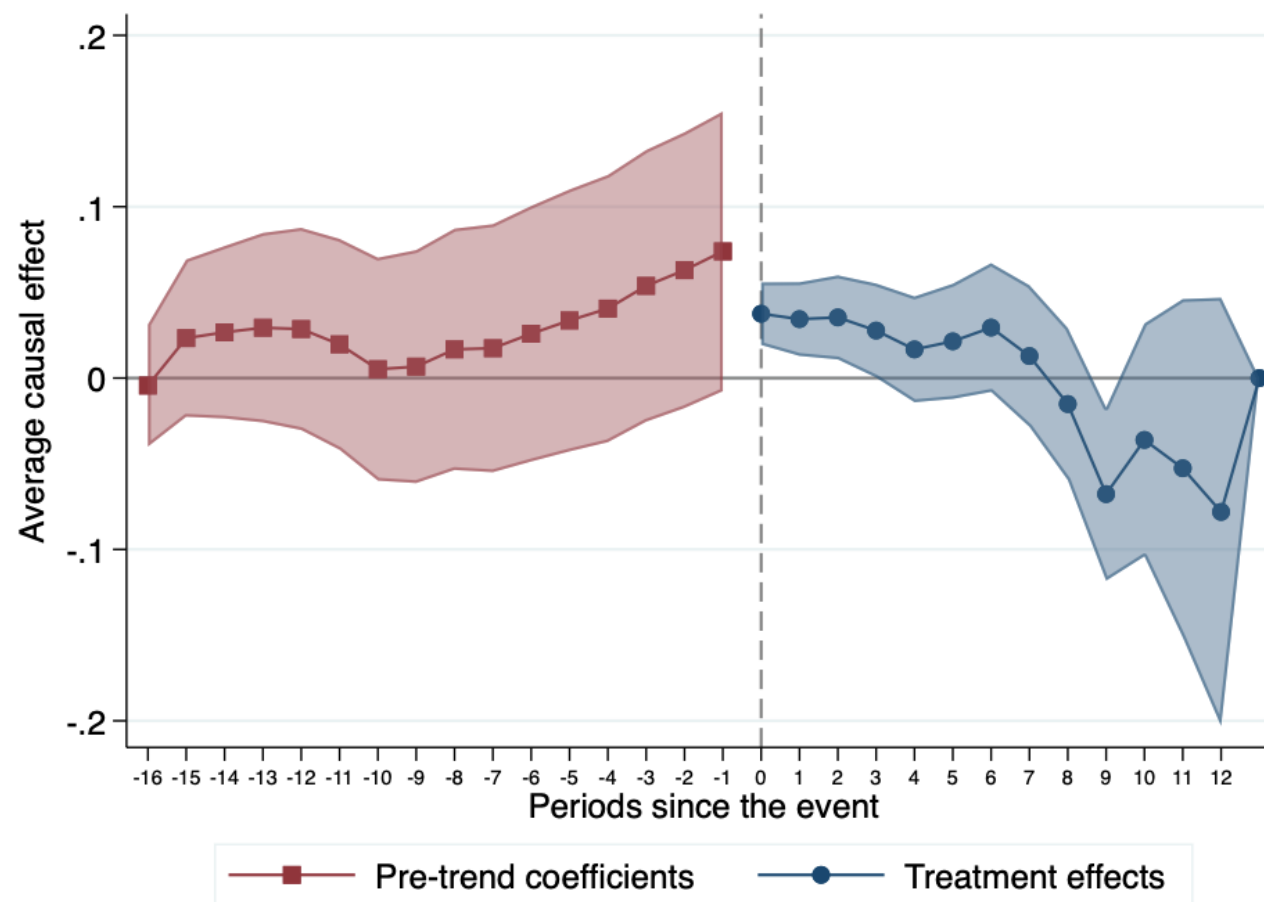


Fig. 3. parallel trend retest

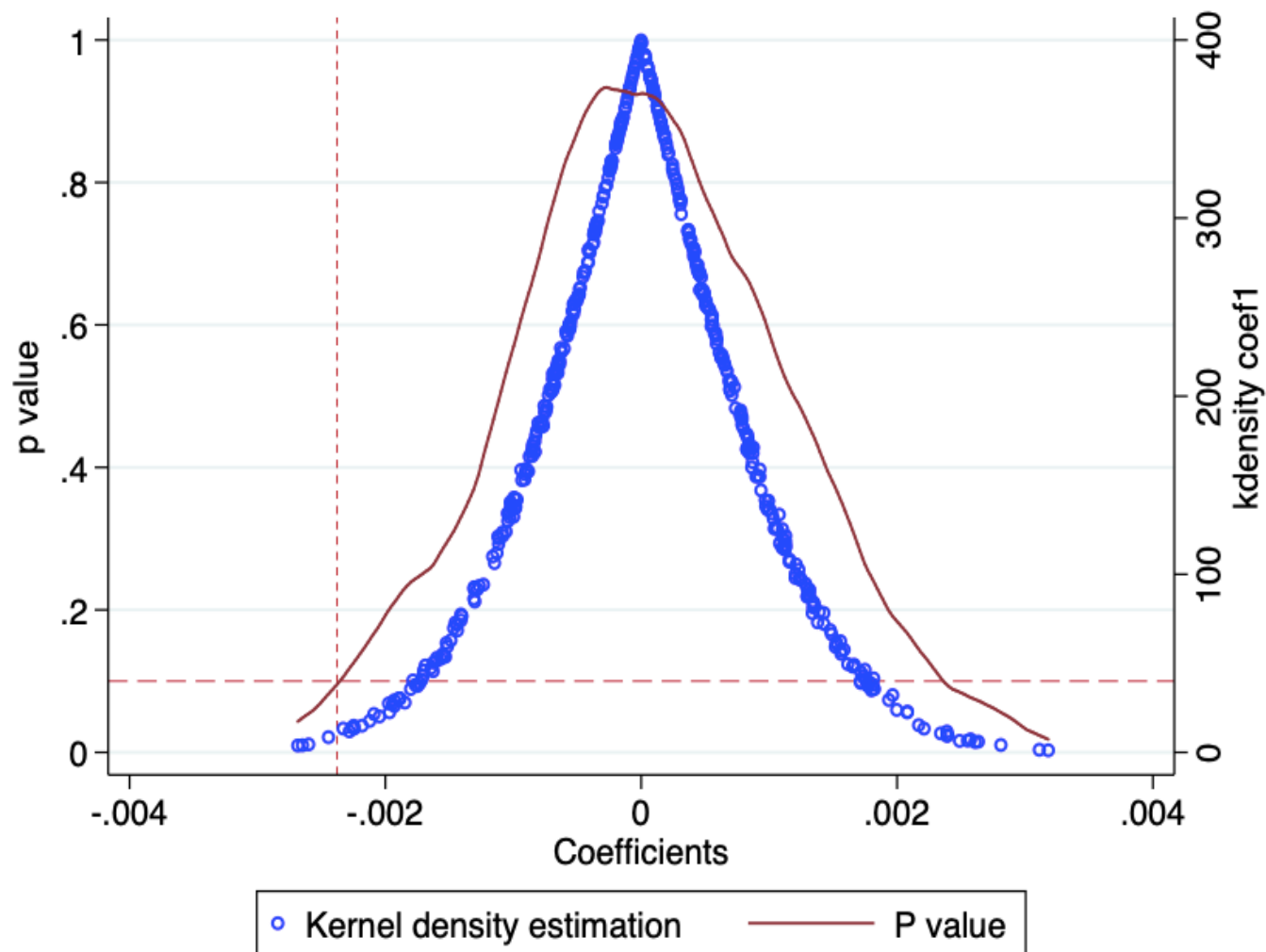


Fig. 4. Placebo test

To avoid baseline regression results being affected by unobservable omitted variables, according to Cai (2016), a placebo test was conducted by replacing the treatment group. It shows that the regression coefficients fall around the value of zero and obey a normal distribution, and the majority of the regression results are not significant. The coefficient estimates in the baseline regression were located in the high tails of the distribution of spurious regression coefficients, which were small probability events in the county placebo test. Accordingly, it can be excluded that the baseline estimation results are caused by unobservable factors.

Table 4 Other robustness test results

	(1)	(2)	(3)	(4)	(5)	(6)
	Lnpcrgdp	Lncrgdp	Lncrgdp	Lncrgdp	Lncrgdp	Lncrgdp
Post	0.014* (0.008)	0.024*** (0.009)	0.024*** (0.009)	0.023*** (0.009)	0.023** (0.009)	0.016*** (0.003)
Trend		0.107*** (0.001)	0.107*** (0.001)	0.107*** (0.001)	0.107*** (0.001)	
Latitude			-0.191* (0.100)	-0.402*** (0.099)	-0.275*** (0.095)	
Longitude				3.722*** (0.273)	3.758*** (0.250)	
Distance					-0.256*** (0.023)	
_cons	9.183*** (0.030)	11.447*** (0.037)	12.112*** (0.104)	-4.598*** (1.201)	-4.235*** (1.109)	13.096*** (0.023)
Controls	YES	YES	YES	YES	YES	YES
N	29127	29127	29127	29127	29127	19418
Adj R <sup>2</sup>	0.966	0.943	0.943	0.943	0.943	0.983

Column (1) shows the estimation result by replacing the economic growth variable with real GDP per capita, and the coefficient of Post is significant at the 10% level. The estimation results in columns (2) to (5) of Table 4 show the coefficient of Post are all significant after adding variables (time trend term, latitude, longitude, and distance to the city). Column (6) shows the estimation result by resetting the sample interval to 2007 to 2020 is significant at 1% level.

## Endogeneity test

If counties with better economic growth in the central and western regions of China choose to establish rural banks, then the results observed in the baseline regressions may not be the role of rural bank establishment, but only the results due to the self-selection behavior of the counties in the central and western regions of China. To alleviate this concern, we use the PSM-DID method to conduct robustness checks.

First, we perform logit estimation of the grouping variable *Treat* for the treatment and control groups with the control variables in model (1) and the population size and land area variables. Then, we use the above predicted values as the propensity scores for the establishment of rural banks. Finally, we perform 1:1 matching of the treatment and control groups according to the nearest neighbor principle based on the propensity score.

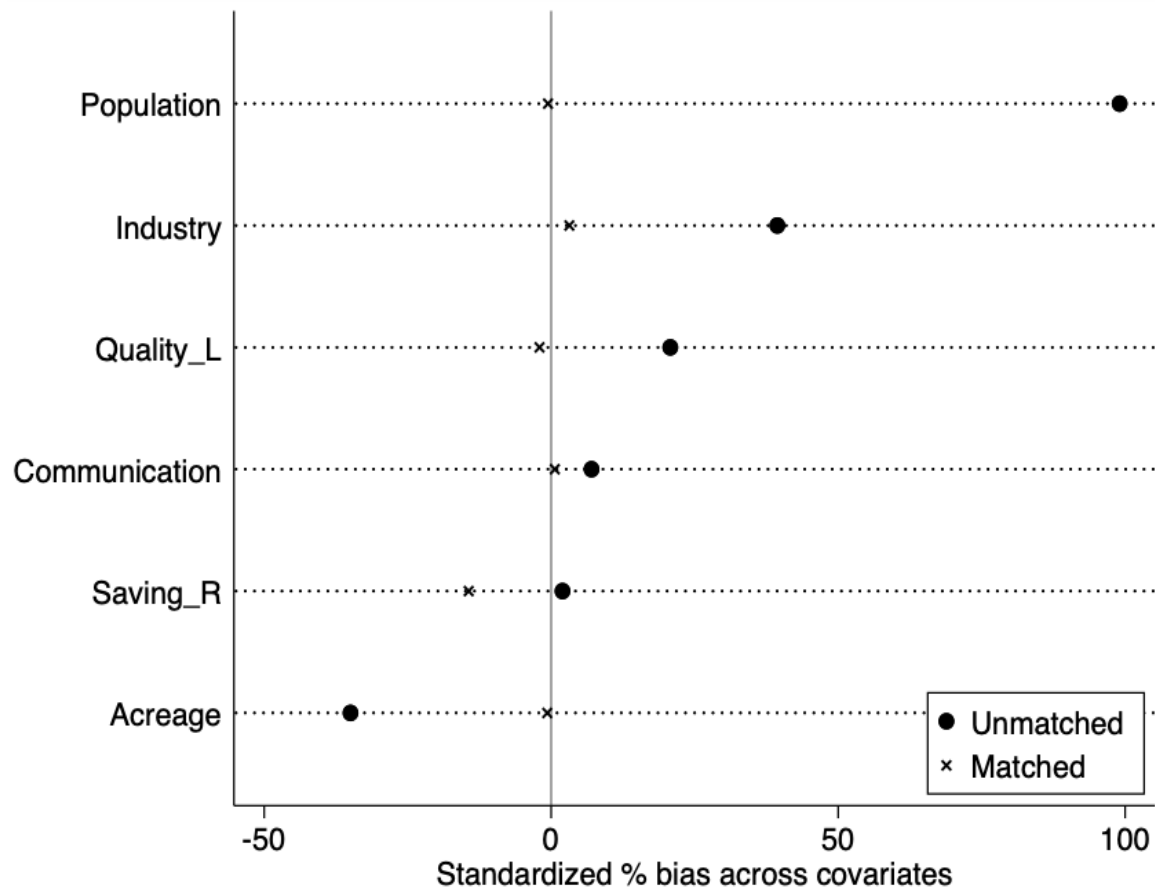


Fig. 5. Equilibrium test

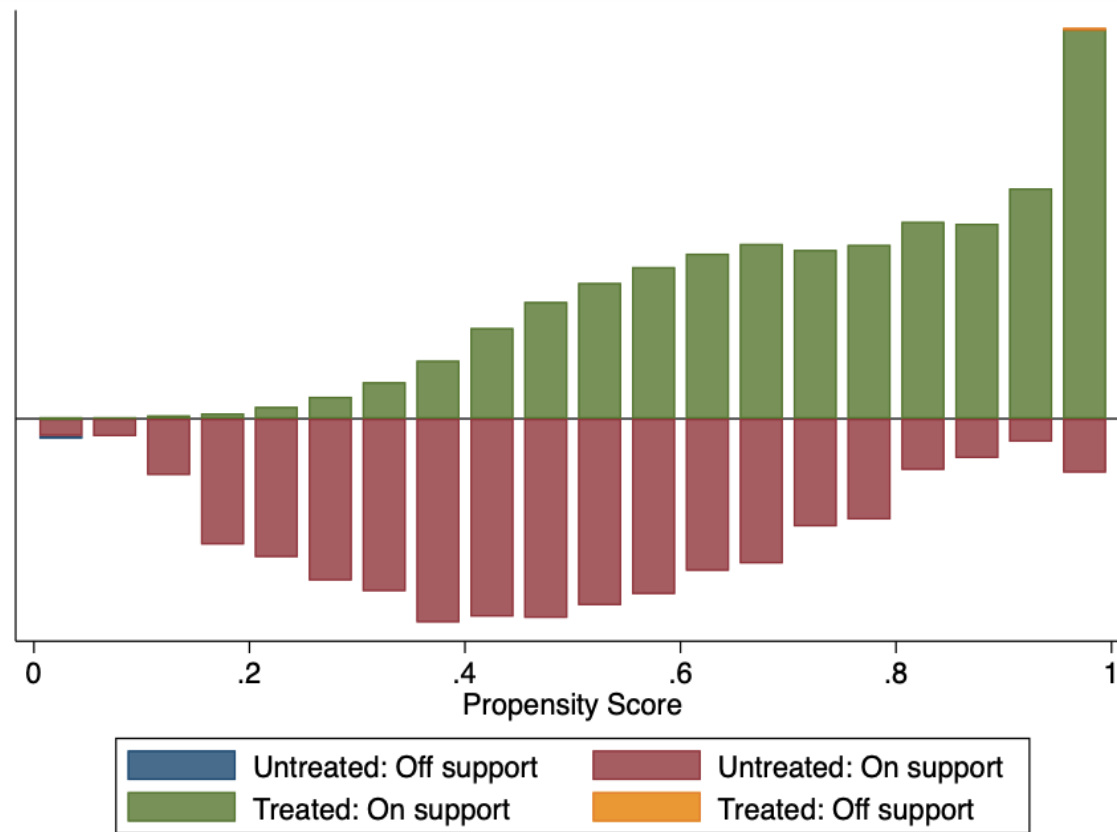


Fig. 6. Common support test





Fig. 5 reports the equilibrium test for the above propensity score matching. It shows that the standardized deviations of most variables are large before matching, while after matching the standardized deviations of all variables except for the resident savings rate are substantially smaller and all are less than 5%. This indicates that there is no longer a systematic difference between the treatment group and the control group, satisfying the requirements of a randomized experiment.

Fig. 6 reports the results of the common support test, which shows that the majority of the samples in the treatment group and the control group are within the common range of values, while the propensity score values for the samples that are not within the common range are more extreme and the samples satisfy the common support hypothesis.

Finally, the matched samples are subjected to DID test according to model (1). The results of this test are reported in columns (1) to (5) of Table 5. Column (1) shows the regression results of pooled OLS. Column (2) shows the results of two-way fixed effects regression. Column (3) shows the results of regression using samples with non-null weights. Column (4) shows the results of regression using samples that satisfy the common support assumption, and Column (5) shows the results of regression using frequency weighting. The regression coefficients for Post are all significantly positive at the 5% or 1% level. This indicates that these findings do not change after controlling for possible self-selection problems.

Table 5 Endogeneity test

	(1)	(2)	(3)	(4)	(5)
	Lncrgdp	Lncrgdp	Lncrgdp	Lncrgdp	Lncrgdp
Post	0.865*** (0.018)	0.019** (0.009)	0.035** (0.014)	0.020** (0.009)	0.036*** (0.005)
_cons	11.521*** (0.080)	11.567*** (0.031)	11.317*** (0.036)	6.976*** (0.031)	12.731*** (0.007)
Controls	YES	YES	YES	YES	YES
Year FE	NO	YES	YES	YES	YES
County FE	NO	YES	YES	YES	YES
N	29127	29127	10758	29114	42566
R <sup>2</sup>	0.507	0.943	0.941	0.943	0.979

Credit constraints can limit rural human capital enhancement (education level) and hinder farmers' health care level (Dong et al., 2012), while the establishment of rural banks can provide direct financial support to farmers' health insurance by providing a variety of credit financing (Mao et al., 2018) and promote county economic growth. Referring to Baron and Kenny (1986), we construct the following model.

$$M_{it} = \theta_0 + \theta_1 Post_{it} + \theta_2 X_{it} + \mu_i + \mu_t + \varepsilon_{it} \quad (3)$$

$$Lnrgdp_{it} = \omega_0 + \omega_1 Post_{it} + \omega_2 M_{it} + \omega_3 X_{it} + \mu_i + \mu_t + \varepsilon_{it} \quad (4)$$

Table 6 Mechanism test results

	(1)	(2)	(3)	(4)
	Lnhealth	Lncrgdp	Serv	Lncrgdp
Post	0.093*** (0.005)	0.011*** (0.004)	0.006*** (0.001)	0.014*** (0.004)
Lnhealth		0.091*** (0.004)		
Serv				0.933*** (0.020)
Sobel	0.009*** (0.001)		0.006*** (0.001)	
Intermediary effect ratio	0.443		0.287	
N	29127	29127	29127	29127
Adj R <sup>2</sup>	0.824	0.979	0.830	0.980

Columns (1) and (2) of Table 6 report the results with the level of health care coverage as the mediating variable. The estimated coefficient of Post in column (1) is significantly positive at the 1% level. The estimated coefficients of Post and Lnhealth in the regression in column (2) are also significantly positive at the 1% level. This indicates that the implementation of the access policy significantly improves the level of health care coverage in the county and that the level of health care coverage plays a partially mediating role in enhancing economic growth, and the Sobel test shows that the mediating effect is significantly positive at the 1% level and the ratio of the mediating effect is 44.3%.

Mattoo et al. (2001) confirms that the free entry of new firms is important for the development of the service industry, and the entry of new firms inevitably involves certain barriers to the necessary amount of capital (Ren et al., 2013), and the establishment of rural banks can reduce the external financing costs of firms, thus promoting the development of the service industry and contributing to economic growth. We use the level of service sector development as a mediating variable to test its role in the impact of rural bank establishment on county economic growth. Columns (3) and (4) of Table 6 report the regression results. The estimated coefficient of Post in column (3) is significantly positive at the 1% level. The estimated coefficients of Post and Sevr in column (4) are also significantly positive at the 1% level. This indicates that the implementation of access policy significantly improves the level of service industry development in the county, and the level of service industry development plays a partially mediating role in the enhancement of economic growth, and the Sobel test results show that the mediating effect is significantly positive at the 1% level and the ratio of mediating effect is 28.7%.

There is a typical administrative center bias in China's urban development, and a strong correlation between urban economic growth and administrative level (Wei, 2014). Jiang et al. (2018) point out that cities with high administrative levels have access to more economic resources, which in turn create a better development environment and form a positive feedback effect. Therefore, this article examines whether the establishment of rural banks has different effects on enhancing economic growth between counties belonging to provincial capital cities and non-capital cities. Columns (1) and (2) of Table 7 report the regression results of the above tests. It can be seen that the estimated coefficient of Post is significantly positive only in the sample of counties belonging to non-capital cities, but not in the sample of counties belonging to capital cities, and the Chow test is significant at the 1% level, indicating that there is a difference in the group coefficients between the two, i.e., **the establishment of rural banks in non-capital city counties has a greater effect on enhancing economic growth.**

Table 7 Heterogeneity test results

	(1)	(2)	(3)	(4)	(5)	(6)
	Provincial cities	Non-provincial cities	Central region	Western region	Low degree of fiscal intervention	High degree of fiscal intervention
Post	0.044 (0.030)	0.018* (0.009)	0.024** (0.011)	0.044*** (0.015)	0.017 (0.011)	0.022* (0.012)
_cons	12.274*** (0.121)	11.520*** (0.032)	12.018*** (0.043)	11.263*** (0.041)	11.822*** (0.044)	11.405*** (0.051)
Controls	YES	YES	YES	YES	YES	YES
Chow test	11.710***		18.450***		6.670***	
N	1869	27258	12558	16569	14579	14548
R <sup>2</sup>	0.935	0.944	0.954	0.938	0.936	0.956

China's economy is a typical large country economy, and there are large differences in factor endowments and industrial development levels in different regions, and factor endowments have significant effects on economic growth (Wang, W., and Wang, X., 2022), so it is necessary to test the economic growth effects of relaxed access policies in different regions. Columns (3) to (4) of Table 7 show that the relaxed market access policy is significant and has a positive estimated coefficient in the central and western regions in China.

McKinnon(1973) found that government policy interventions in the financial sector for developmental needs. For purposes such as correcting market failures (Besley, 1994) or covering deficits (Fry, 1995), the government intervenes in financial institutions. We examine the role of the degree of local government financial intervention in the impact of rural bank establishment on county economic growth. The results of these regressions are reported in columns (5) to (6) of Table 7. The coefficient of Post with low levels of fiscal intervention is not significant, while with high levels of fiscal intervention is significant at the 10% level. This effect is very closely related to the level of local financial support, i.e., increasing local financial support for the establishment of rural banks can significantly contribute to the economic growth of counties.



# Conclusions

First, the establishment of rural banks can promote county economic growth in central and western China, especially in counties with relatively weak financial supply. Therefore, it is recommended that local governments continue to promote the establishment of rural banks to increase coverage. It is recommended that local governments should expand the scale of rural bank operations at the right time, optimize the business structure and operation mode of banks, and further improve the level of financial services. Second, general branches of rural banks should be established in counties in the central and western regions where no rural banks have been set up to improve the breadth of financial services. At the same time, rural banks should also be established in rural areas to improve the financial accessibility in remote areas. During the construction process, attention should be paid to bank management, loan risk control, and financial product innovation to ensure the sustainable development of the bank.

Second, in counties with higher levels of fiscal intervention, the promoting effect of rural banks on economic growth is five times higher than in counties with lower levels of fiscal intervention. Therefore, we suggest that the local fiscal department should support the establishment of rural banks through fiscal subsidies and other means. However, our research also found that fiscal subsidies are not conducive to the long-term development of rural banks, and the promoting effect of tax incentives will gradually weaken over time. Therefore, we recommend that fiscal support should be provided in the early stage of the establishment of rural banks.

Third, the establishment of rural banks is an important mechanism to promote the economic growth of the county through improving health care services and increasing the level of service industry development. Therefore, we suggest that local governments focus on the level of health care and service industry development in their regions when considering the establishment of rural banks. In the process of establishing rural banks, attention should also be paid to the current situation and needs of the level of medical security and the level of development of the service industry in the region, which should be incorporated into the business scope of rural banks to better meet the needs of local residents and improve the level of medical security and the level of development of the service industry. Finally, in view of the differences and particularities of different regions, we suggest that local governments should consider the construction needs of rural banks in accordance with the actual situation of their regions and formulate specific implementation plans that meet the actual situation in order to achieve the purpose of promoting local economic growth.



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