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Impact of Rural Housing Reform on Economic Growth and Quality of Life in China: An Analysis from 1998 To 2022

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ABSTRACT: The landscape of rural housing and infrastructure has aided vast changes within the past 25 years in China, through the implementation of various policies and measures by the Chinese government. This paper analyzes the specific economic influences of rural housing reform measures that contribute to regional GDP growth from 1998 to 2022. To analyze the data, the paper mainly utilizes the multiple regression model, through which the driving effect of such reforms is disclosed vis-à-vis policies of housing, infrastructure investment, and health care to rural GDP. The disclosed data have proved that these reforms not only propelled economic development but also increased the quality of life for rural residents and balanced the growth of regional economies. The rural revitalization strategy of China is economically proven, and it becomes a reference for related future policymaking.

KEYWORDS: Rural housing reform, GDP growth, infrastructure investment, healthcare expenditure, rural revitalization, economic development, China, regional economic growth, quality of life, policy analysis.

I. INTRODUCTION

Over the past 25 years, policies have led to dramatic changes in rural China, especially in housing and infrastructure. The Chinese government has made a number of policy breakthroughs in rural people's livelihood and rural economic development. In 2018, the Chinese government issued the landmark Rural Revitalization Strategy (2018-2022), which marks a renewed commitment to integrated rural reform and demonstrates China's determination to promote sustainable development in rural areas. The purpose of this paper is to study the specific impact of these rural housing reform measures on the economy, and to reveal the specific potential of this policy for rural economic recovery and long-term development through a detailed analysis of how housing reform contributes to regional GDP.

This paper aims to identify the effect driven by the reforms in the housing system, infrastructure investment, and health care expenditure on rural GDP growth through the use of multiple regression models on data for the years 1998 to 2022. They contain not only positive direct economic impacts through the reforms but also other effects that might serve in an indirect manner to improve the quality of the residents' lives in rural areas or enhance regional balanced economic development. The findings have important implications for understanding the influence of the rural revitalization strategy on China's economics and would be useful in the preparation of future policy statements.

II. LITERATURE REVIEW

China's rural housing reform policy has had a broad and far-reaching impact on the economy over the past decades. These policies not only directly promote the economic development of rural areas, but also indirectly improve the quality of life of rural residents, and further promote the social stability and prosperity of rural areas. Housing reform policies, especially measures such as renting housing on collective construction land, have directly increased farmers' property income. Especially in the western and southern regions, through these policies, farmers can make more effective use of land resources and maximize economic benefits (Yao et al., 2022). These increases in income not only improve the living conditions of farmers, but also enhance their consumption power, further stimulating local economic development.

The housing reform had a marked impact on the labor market. External investments improve farmers' economic conditions, creating job opportunities (Huang et al., 2013). Although this may lead to a reduction in labor supply in the short run, in the long run, such policies promote the flexibility and diversity of the labor market, creating conditions for the migration of rural labor to cities.

With the advancement of housing reform, the utilization efficiency of rural homestead has been significantly improved. Rational planning and effective utilization of collective construction land have led to more efficient allocation of rural land resources (Long, 2020). This not only helps relieve the pressure of arable land reduction, but also promotes the adjustment and optimization of rural

economic structure. Housing reform was accompanied by substantial investment in infrastructure and public services. The improvement of transportation, education, medical care and other infrastructure in rural areas not only improves the quality of life of rural residents, but also attracts more technical talents and capital inflow, which further promotes the development of local economy (Zvyagintseva & Zvyagintsev, 2022). These infrastructure improvements provide a strong guarantee for the long-term sustainable development of the rural economy.

Housing reform has promoted social stability while improving the quality of life of rural residents. Improved housing conditions have enhanced farmers' sense of belonging and well-being and reduced the incidence of social conflicts and clashes. By upgrading housing conditions, the government not only improves the material life of farmers, but also enhances their social status and self-esteem, which further promotes the harmony and stability of rural society (Hoggart, 2021).

Studies have shown that housing programs, both developed and under developed, have different impacts on rural areas. Developed housing programs tend to have more significant impacts on indicators such as education, health, market, social and economic (Socio Economic Effects of Developed and Under Developing Mega Housing Projects on Rural Area: a Case Study of Rawalpindi and Islamabad, 2022). Improving housing conditions in rural areas can improve the quality of life, attract skilled people and create a positive image of these areas, ultimately contributing to economic growth (Hoggart, 2021). In addition, the state of social infrastructure in rural areas directly affects economic productivity by improving living conditions, worker quality, and overall labor productivity (Zvyagintseva & Zvyagintsev, 2022). Therefore, investing in rural housing and infrastructure is essential to promote the development and sustainability of rural economies.

III. METHODOLOGY

(i) Variable selection and modeling

1. Variable selection

In this paper, a sample of annual data for a total of 25 years from 1998-2022 is selected to study the factors influencing the national rural GDP, and the data are obtained from the National Bureau of Statistics (NBS) and iFind databases.

Table 1 List of variable definitions

Type of variable	Variable Name	Variable Symbol
Dependent Variable	Total Rural GDP of the Country	GDP
	Total Number of Residential Reforms in the Country	REFORM
	Total Number of Residential Reforms in the Country	INFRA
Independent Variables	Total Number of Residential Reforms in the Country	EMPLOY
	Expenditure on Rural Medical Infras	HEALTH
	Agricultural Investment in the Country	AGRI

2、. Model Specification

To study the factors influencing the total rural GDP of the country, the following multiple regression model is constructed:

$GDP_t = \alpha_0 + \beta_1 Reform_t + \beta_2 Infra_t + 3Employ_t + \beta_4 Health_t + \beta_5 Agri_t + \varepsilon_t$

Where, GDP_t represents the total rural GDP of the country, β_i is the constant term (intercept), X_i are the coefficients of the independent variables（i=1，2，3，4，5）,and ε_t is the error term.

3. Time Series Analysis

From the data, it can be observed that the total rural GDP of the country, the total number of residential reforms in the country, the total investment in rural infrastructure in the country, the rural employment rate in the country, the expenditure on rural medical infrastructure in the country, and the agricultural investment in the country all show a positive linear growth trend. Moreover, from the linear analysis in EViews, it is evident through line chart analysis that there is a linear relationship between all the independent variables and the dependent variable.

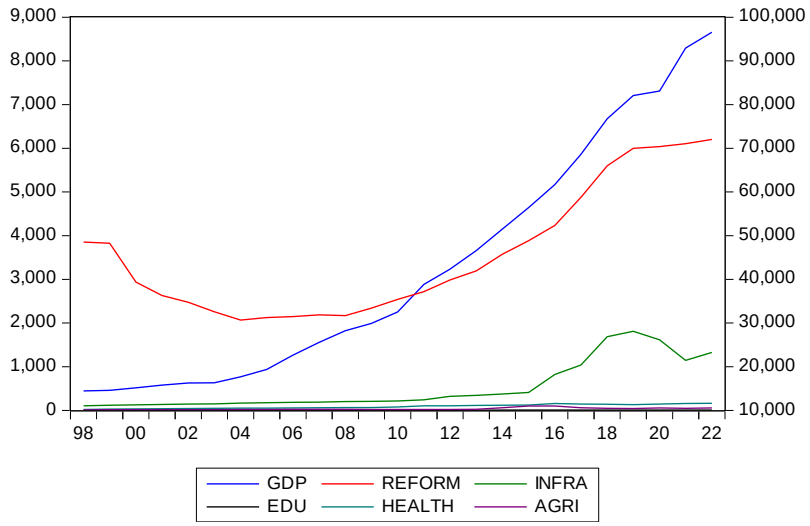

Figure 1: Time Series Plot of Variables

4. Descriptive statistics

Descriptive statistics were analyzed for the national total rural GDP, national overall housing reform households, national total rural infrastructure investment, national rural employment, national rural health care construction expenditures, and national agricultural investment data, with the following results:

Table 2. Results of descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.
GDP	42,637.36	32,527.07	96,562.22	14,472.00	27,310.01
REFORM	3,558.31	2,985.60	6,203.77	2,065.90	1,444.81
INFRA	529.79	213.51	1,810.66	102.69	558.23
EMPLOY	4.75	4.07	8.46	2.78	1.93
HEALTH	89.22	78.32	162.36	22.06	47.00
AGRI	34.72	22.64	100.64	11.87	25.00

The explanatory variable GDP has a mean of 42,637.36, a median of 32,527.07, a maximum of 96,562.22, a minimum of 14,472.00, and a standard deviation of 27,310.01, which suggests that there is a large variation in the data for this variable, mainly because the total rural GDP of the country is increasing from year to year.

5、Multiple covariance test

Simple correlation coefficients were analyzed for data on the number of households in the country's overall housing reform, total national investment in rural infrastructure, national rural employment, national rural health care construction expenditures, and national agricultural investment, with the following results:

Table 3. Multiple covariance test

	REFORM	INFRA	EMPLOY	HEALTH	AGRI
REFORM	1.000	0.908	0.998	0.763	0.558
INFRA	0.908	1.000	0.892	0.795	0.526
EMPLOY	0.998	0.892	1.000	0.727	0.525
HEALTH	0.763	0.795	0.727	1.000	0.765
AGRI	0.558	0.526	0.525	0.765	1.000

From the above table, we can see that the simple correlation coefficient of some variables between the number of households in the national overall housing reform, the total investment in the national rural infrastructure, the national rural employment rate, the national rural health care construction expenditure, and the national agricultural investment data is greater than 0.8, and according to the rule of thumb to judge, the model has multicollinearity. At this point we can use VIF as a further test index. the larger the VIF, the more serious the influence of the explanatory variables by the variable, there is a larger problem of multicollinearity. According to the formula of VIF, we can get:

Table 4. VIF test values

Variable	Coefficient Variance	VIF Value Without Intercept	VIF Value With Intercept
C	17534740	24.55262	NA
REFORM	614.8325	12625.63	1725.222
INFRA	24.16306	19.61786	10.12146
EMPLOY	2.86E+08	10488.98	1437.664
HEALTH	3358.279	47.40289	9.973856
AGRI	3501.395	8.850947	2.941062

From the above results, it can be seen that the VIF values of some independent variables are greater than 10, which further confirms the existence of multicollinearity. Due to the presence of multicollinearity, logarithmic transformation of the variables and the use of stepwise regression can be employed to obtain an appropriate model.

6. Regression Results of the Model

Based on the stepwise regression method, independent variables are introduced step by step to construct the regression model and perform model estimation. The decision on whether the newly introduced variable can be replaced by a linear combination of other variables rather than being an independent variable is made according to the change in goodness of fit. If the change in goodness of fit is significant, it indicates that the newly introduced variable is an independent explanatory variable; if the change in goodness of fit is not significant, it indicates that the newly introduced variable is not an independent explanatory variable and can be replaced by a linear combination of other variables, showing the existence of collinearity among variables. The regression estimation results using the EViews software are as follows:

$$GDP_t = -11379.87 + 5.117694\text{Reform}_t + 9.023896\text{Ln}Infra_t + 347.7609Health_t$$

（-3.106018） （3.548564） （2.271275） （11.35097）

n=26，R^2=0.979062，$\overline{R}^2$=0.976071，F=327.3166

The numbers in parentheses below the sample regression function above are the t-statistics of the parameter estimates, and n is the sample size.

Table 5. Final regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11379.87	3663.813	-3.106018	0.0053
REFORM	5.117694	1.442187	3.548564	0.0019
INFRA	9.023896	3.973052	2.271275	0.0338
HEALTH	347.7609	30.63711	11.35097	0.0000
R-squared	0.979062			
Adjusted R-squared	0.976071	The model's goodness of fit is satisfactory.		
F-statistic	327.3166			
Prob(F-statistic)	0.000000			

Economic Significance Test and Model Fit

From the regression results in the table, it can be observed that the coefficient of the explanatory variable REFORM is 5.117694, the coefficient of the explanatory variable INFRA is 9.023896, and the coefficient of the explanatory variable HEALTH is 347.7609. All coefficients are positive and have passed the economic significance test.

The model's goodness of fit is 0.979062, which is close to 1, indicating that the model fits well. Approximately 97.9062% of the variation in the dependent variable GDP is explained by the changes in the variables REFORM, INFRA, and HEALTH.

F-Statistic Test and T-Statistic Test

From the table, it can be seen that the F-statistic of the regression model is 327.3166, which is greater than the 5% critical value $F_\alpha(3,23)$=3.03（α=0.05）. This indicates that the F-test value of the model is significant at the 5% level, and the model passes the joint significance test, meaning that the linear relationship between the explanatory variables REFORM, INFRA, HEALTH and the dependent variable is significant.

From Table 7, the T-statistics for the explanatory variables REFORM, INFRA, and HEALTH are 3.548564, 2.271275, and 11.35097 respectively, which are greater than the 5% critical value $t_{\alpha/2}(22)$=2.074（α=0.05）. This indicates that the explanatory variables are significant at the 5% level, rejecting the null hypothesis, and the coefficients of the explanatory variables REFORM, INFRA, and HEALTH are significantly positive.

7. Model Autocorrelation Test Results

The autocorrelation of the random error term can take various forms, with the most common type being first-order autocorrelation, where the random error term is correlated only with its previous value. The Breusch-Godfrey autocorrelation LM test results are as follows:

Table 6. Autocorrelation test results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.319894	Prob. F(3,18)	0.1097
Obs*R-squared	6.970923	Prob. Chi-Square(3)	0.0728

The original hypothesis that there is no autocorrelation in the model is not rejected at the 5% level of significance.

8. Model Heteroscedasticity Test Results

To ensure that the regression parameter estimates have good statistical properties, an important assumption of the classical linear regression model is homoscedasticity, meaning that the random error terms in the population regression function have the same variance. If this assumption is not met, the linear regression model is said to exhibit heteroscedasticity. The heteroscedasticity test of the regression model was conducted using the White test, and the results are as follows:

Table7. Heteroscedasticity Test Results

Heteroskedasticity Test: White			
F-statistic	9.437034	Prob. F(9,15)	0.0001
Obs*R-squared	21.24750	Prob. Chi-Square(9)	0.0116
Scaled explained SS	23.85895	Prob. Chi-Square(9)	0.0045

The hypothesis testing process is as follows:

H0: The random errors in the regression equation satisfy homoscedasticity.

H1: The random errors in the regression equation exhibit heteroscedasticity.

From the heteroscedasticity test results, it can be seen that the F-value for the White heteroscedasticity test is 9.437034, and the Chi-squared （n）test value is 21.24750, with a corresponding p-value of 0.0116. At the 1% significance level, we do not reject the null hypothesis, indicating that the model does not exhibit White heteroscedasticity.

IV. RESULT AND DISCUSSION

This paper delves into the impact of housing reform on rural GDP by analyzing national rural data from 1998 to 2022. The research findings indicate that the increase in the number of residential reforms and the total investment in rural infrastructure in China has significantly promoted the growth of rural GDP.

First of all, the increase in the number of households in China's housing reform has helped more rural residents improve their living conditions and quality of life. A better living environment not only enhances residents' happiness, but also enhances their sense of belonging to the community. At the same time, the increasing demand for residential construction has stimulated the development of construction, building materials and other related industries, and promoted the rapid expansion of these industries.

The overall investment in rural infrastructure increased, which provided the backing of funds and gradually improved the countryside residential environment, as well as infrastructure regarding roads, electricity, and communications, to achieve efficiency in production and transportation in the countryside. The improvement of infrastructure has lowered the logistic cost in the countryside and sped up the flow and circulation of the agriculture and other goods, which has been supported solidly in the rural economy development. These measures of investment and reform are not only to create a great number of employment opportunities and raise the income level of rural labor force but further boost the general growth of rural economy. Infrastructure and residential environment improvement has greatly improved the quality of life for rural residents and enhanced economic vitality, which in return forms a virtuous circle.

But still, apart from the economic positive benefits that are brought by the policy, it is still necessary to pay attention to the regional difference in the implementation of the policy. The impact in different regions is different, especially in the more economically backward regions. These areas should be given more targeted support measures so as to guarantee all regions equitably share in the benefits accruing from economic growth occasioned by the reform, particularly for those and factors ensuring that the rural economy is sustained in growth over the long term. The government should establish a long-term mechanism to ensure the reform measures can work in the long run and be able to periodically evaluate the effect of the policy to make timely adjustments and optimization. This not only can cement the achieved economic achievements but also can meet some of the challenges that might present themselves at the economic front in the future, providing a solid guarantee for the rural economy to be sustainable.

By constantly improving and optimizing the rural reform policies, especially adjusting them to the specific needs of different regions, the effectiveness and coverage of the policies can be further improved, so as to achieve more balanced and sustainable rural economic growth.

CONCLUSIONS

The present study critically analyzes the economic influence of rural housing reforms in China between 1998 and 2022. It is apparent, from the study that the rural housing revolution and the heavy investments in infrastructure and health facilities therein have indeed contributed to rural GDP growth. In fact, the results of this study suggest that a better life and infrastructure in the rural areas have an increase in property incomes and, therefore, the use of land is more effective. Better life conditions and better infrastructure in the countryside increase the economic vigor of the entire countryside and, at the same time, elevate the quality of life for the rural residents; the result is enhancing property incomes for farmers, better utilization of land resources, and more efficient allocation of rural lands and hence promoting long-term sound development. The checking of regional disparities is the other aspect that these policies, identified in this study, will come to be identified with. These policies are not felt as strongly across each region, especially those that are economically backward. Thus, future policies should be region-specific if the principles of these regions are equal sharing of economic growth. Also, policy continuity and stability in economic terms are very important tools. A long-term mechanism establishing the regular evaluation and adjustment of the policy in place would consolidate existing achievements and focus on challenges faced in the future. In summary, rural housing reform and infrastructure investments have marked a turning point in the economic picture and better living standards of rural China. These policies shall increasingly be improved and modified to regional needs, thus the government, more balanced and sustainable economic growth, and the rural communities will enjoy long-term prosperity.

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