Supplementary Materials

1. Introduction

Chinese President Xi Jinping has repeatedly emphasized that Chinese-style modernization should also be a modernization in which human beings live in harmony with nature. On the basis of harmonious coexistence between human beings and nature, the government should support high-quality economic development through a high-quality ecological environment.

With the successful completion of the poverty eradication campaign, the construction of forest cities has become one of China's "biggest livelihood projects". It is particularly important to point out that the construction of forest cities has entered a new stage of development and has risen to the strategic level of national development. In order to meet the new era of our people from the pursuit of material culture to the pursuit of a better life, the government needs to focus on promoting the concept of people-centered development, and at the same time to force regions to carry out green development transformation. More importantly, the government should actively build an efficient, livable, and beautiful county spatial structure, and must follow the spatial pattern centered on forest city construction in the implementation process. Therefore, it is necessary to analyze the optimization strategy of the "three spaces (production, living and ecological) " in the process of forest city construction.

First, in the aspect of “town + ecology”, county governments should lead the green transformation of their economies through ecological industries. Governments at all levels should establish the strategic idea that mountains, water, forests, fields, lakes, and grasses are an organic community of life, make the development of forests the central task of forest city construction, integrate the forest system scientifically and rationally into urban space, and give full play to the special role of the forest system in maintaining the community of life of mountains, water, forests, fields, lakes and grasses. Under the strategic goal of putting ecology first and promoting green development, county governments should implement the development concept of "ecological industrialization and industrial ecology", take greening and intelligence as the direction, strengthen the level of ecological monitoring, forecasting and early warning, and promote the continuous development and growth of new high-end industries. The government should promote the reduction of pollutant emissions and the recycling of energy and resources, so as to create a green park with distinctive features, carbon reduction and emission reduction, and environmental protection and intensification. The Government should strengthen the rigidity of the implementation of the system, accelerate the improvement of the economic and social development appraisal and evaluation system, and reasonably determine the indicators reflecting the status of the construction of ecological civilization, so as to continuously realize the ecological and economic development of "green water and green mountains".

Second, in "ecology + agriculture", county governments should protect ecological resources to complement agricultural functions. County governments should select the direction of green industry development according to local conditions, develop green and organic agricultural products with local characteristics and comparative advantages, effectively extend and expand the industrial chain and profit sources, and spare no effort to promote the realization of the value of ecological agricultural products, and effectively transform ecological advantages into economic advantages, and form the ecological economic

value. The relevant departments should, in accordance with the construction idea of "short-term benefits, long-term forests and coordinated development", strengthen the protection and restoration of ecosystems, improve the quality and stability of ecosystems, and enhance the quality and effectiveness of ecological barriers. The government should enrich crop diversity and three-dimensional level, constantly improve the gold content value of a good ecological environment, and actively explore mechanisms and ways to transform ecological environmental advantages into ecological agricultural advantages.

Third, with regard to "agriculture + towns", county governments should strictly prohibit the destruction of arable land in order to enhance people's well-being. County governments should study the spatial characteristics of the development of various high-efficiency industries, and actively develop eco-industries for the benefit of the people by deeply integrating specialty leisure agriculture, tourism, and cultural and recreational industries. The government should expand the ecological service model and gradually form a new rural economic development model integrating leisure, entertainment, culture, tourism and health and wellness. The government should respect the laws of nature and economic development, consider, and promote urban greening and rural greening in an integrated manner, treat the forest system as an important infrastructure of the city, and strengthen the ecological public service function. The Government should gradually change the dualistic structure of urban and rural ecological construction, eliminate the gap between urban and rural human settlements, and take the lead in promoting the construction of forest cities in a comprehensive manner.

2. Literature Review and Theoretical Mechanisms

2.1. Policy Background

On the basis of the protection, construction and management of natural infrastructures, such as forests, trees and wetlands, the construction of forest cities are able to continuously expand the new space for green ecological development in the region, thus forming an economic and social development mode in which human beings and nature coexist harmoniously.

From an international perspective, the construction of forest cities originated in Western developed countries such as Europe and the United States, with a history of more than 50 years. In 1972, the United States promulgated the Urban Forestry Act in accordance with the laws of economics and nature. This law specifically organizes research on the economic and social benefits of urban forests, which is used to improve the urban living environment, and then builds a complete ecological network of urban forests and a synergistic system of industries. The Freiburg Forest Convention, adopted in 2001, was the first forest convention at the local level in Germany. In 2004, the Greater London Spatial Development Strategy issued by the Greater London Authority (GLA) incorporated green rings, green chains, and public spaces into overall environmental planning, thereby promoting the symbiosis between green space and urban development. In 2007, the Government of Tokyo, Japan, through the formulation of the Green Ten-Year Plan, vigorously promoted the "gap space" greening construction pattern, thereby realizing the scientific advancement of regional integration of ecology, production, and life. In 2013, the European Union comprehensively implemented a green infrastructure strategy, including forests, to further enhance the quality and capacity of sustainable urban development. In 2016, Malaysia implemented the Forest City Program. In the construction program, the

government established a "people-centered" infrastructure system, emphasizing complex ecological functions, and thus achieving the goal of rational coexistence among industries, cities, and people.

Domestically, the construction of forest cities in China started relatively late, with the concept not being introduced until the 1990s. However, as the world's most powerful developing country, China has made it clear that, in exploring the path of modernization towards harmonious coexistence between human beings and nature, it will never repeat the development model of Western industrial civilization, which pits human beings against nature, and it will never again follow the old path of pollution followed by governance, which is the path of Western modernization. Instead, China will follow a completely different path. This path is to treat human beings and nature as a community of life, and on the basis of respecting, adapting to and protecting nature, to satisfy the people's ever-increasing demand for a better life by creating more material and spiritual wealth. At the same time, China will also provide more high-quality ecological products to meet the people's growing demand for a beautiful ecological environment, so that the people can truly enjoy the fruits of ecological greening. In summary, this is China's unique modernization path of harmonious coexistence between human beings and nature.

In January 2016, Chinese President Xi Jinping made a clear request at a meeting of the Central Finance and Economic Leadership Group to focus on forest city construction, marking the rise of forest city construction as a national strategy. At present and in the coming period, green development remains a major strategy for China's development. By 2035, the construction of forest city clusters and forest cities will be fully advanced, and the value of ecological assets and services in forest cities will have been significantly increased, enabling the realization of the goal of sharing ecological welfare among all people. Data show that from 2012 to 2021, the green coverage rate of built-up areas in Chinese cities increased from 39.59 per cent to 42.42 per cent, and the per capita area of green space in parks increased from 12.26 square meters to 14.87 square meters. By 2023, China's forest coverage rate will reach 24.02%, and forest stock will reach 19.493 billion cubic meters, maintaining a "double growth" in forest area and stock for more than 30 consecutive years. Evidence predicts that by 2025 and 2030, the overall market size of forest carbon sink trading in China is expected to reach 10.6 billion yuan and 134.4 billion yuan.

2.2. Theoretical Analysis

For simplicity, the theoretical model assumes two sectors. The sectors are the development and construction sector (the sector that capitalizes on and develops and builds non-urban land to make it urban) and the urban land use sector (the forest sector).

Greenfield externalities are defined as the social benefits associated with undeveloped land. These benefits disappear as soon as the land is developed. These externalities may arise from undeveloped land, wetlands, or simply from being a non-urban sector. Urban undeveloped land may also have a high social value as a refuge for endangered species or more common flora and fauna.

If cities are allowed to develop and build in an unorganized manner, the market will attract too much land to the urban sector in both the short and long term. In response, governments can impose practical quantitative limits on the amount of land that can be developed. Policymakers do this by setting a development boundary to allow enough land for

the desired expansion, while also taking into account green space concerns. The boundary can prevent the city from exceeding land beyond the designated boundary from being used for urban development, or it can be a matter of protecting extensive green space corridors from development.

In the long run, urban land development boundaries do increase the economic rate of return to land size at the inner-city scale with the inclusion of the forest sector. As the market adjusts to long-term equilibrium, this in turn again increases the net rate of return to urban land in all states in the short run. In other words, the presence of the forest sector can contribute to an effective increase in the economic scale of the city over a longer period of time.

3. Research Design

3.1. Estimation Method

Before the panel regression model is used, the article performs a Hausman test. The results of the test indicate that two-way fixed effects should be used for empirical estimation.

```
             |
                         b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =     1905.37
              Prob>chi2 =      0.0000
              (V_b-V_B is not positive definite)


                         b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =     2166.13
              Prob>chi2 =      0.0000
              (V_b-V_B is not positive definite)
```

Figure S1. Hausmann test.

From the analysis of the attached Figure S1, the p-value is 0, indicating that the original hypothesis should be rejected and the alternative hypothesis accepted.

In other words, the article should use the fixed effects model instead of the random effects model.

Before the spatial econometric model is used, the article performs various tests. The results of the tests indicate that the spatial Durbin model should be used for empirical estimation.

The three most basic and common types of spatial econometric models are the spatial autoregressive model (SAR), the spatial error model (SEM), and the spatial Durbin model (SDM). Obviously, the correct setting and selection of the model becomes an important prerequisite for spatial econometric analysis.

First, the relationship between the variables should be clarified from the orientation of the problem. The spatial correlation between variables should be examined for the problem under study. Second, control variables are added reasonably. It is easy to omit important dependent

variables in modeling, for this reason, control variables with greater relevance and theoretical basis should be sought as much as possible. Third, there should be a balance between statistical significance and economic significance modeling.

When studying forest city construction and county economic growth, ignoring spatial factors can easily lead to bias in the empirical results.

The spatial Durbin model simultaneously considers the spatial correlation of the dependent variables and control variables, which can not only explain the spatial spillover effect and the impact of spatially lagged variables, but also effectively avoid the regression bias of ignoring spatial factors. Therefore, the article firstly considers the spatial Durbin model.

The article uses four statistics, LM-Error, LM-Lag, Robust LM-Error, and Robust LM-Lag, to test the error term of OLS. If the error term is spatially correlated with the dependent variable, the test results of LM-Lag and Robust LM-Lag are significant. The article should choose the spatial lag model. If the error term itself is spatially correlated, the test results of LM-Error and Robust LM-Error are significant. The article should use the spatial error model. Since all LM tests reject the original hypothesis, the spatial autoregressive model and the spatial error model may have the problem of omitted variable bias. Therefore, the article uses the spatial Durbin model and the spatial Durbin error model as the baseline spatial econometric model.

3.2. Sample Scope

A national forest city is a city that has formed a stable and healthy urban forest ecosystem, with forests and trees as the mainstay, within the administrative jurisdiction of the city, and has been approved by the State Forestry Administration in accordance with the relevant procedures after passing the evaluation according to the prescribed indicators.

The approval of national forest cities shall adhere to the principles of justice, openness, and fairness, and actively accept social supervision.

The State Forestry Administration that has the conditions for creation, should be included in the national forest city to create a city list, to be recorded. The State Forestry Administration after the record, in writing to the provincial, autonomous regions and municipalities directly under the Central People's Government forestry department.

For those that do not have the conditions for creation, the State Forestry Administration shall not record, and inform the forestry department of the people's government of the province, autonomous region, or municipality directly under the Central Government.

To apply for the title of national forest city, local governments shall submit the following materials:

(1) A letter of application for the title of national forest city.

(2) A report on the creation works of the applicant city.

(3) A report on the implementation of the applicant city's master plan for forest city construction.

(4) Self-examination report on the evaluation indicators of the national forest city of the applicant city.

(5) The assessment report of the competent forestry department of the people's government of the province, autonomous region, or municipality directly under the central government on the creation of the city.

(6) Other materials that the State Forestry Administration thinks should be submitted.

The comprehensive indicators for the selection of national forest cities are as follows:

(1) The concept of forest construction should be practical, combining nature and humanity, and intermingling history and culture with urban modernization. The urban forest should be reasonably laid out, functionally sound and beautifully landscaped.

(2) The area should be dominated by native tree species, and various types of forests and green spaces dominated by trees should be created through the rational allocation of plants such as trees, shrubs, vines, and grasses, so as to form an urban forest ecosystem dominated by near-natural forests.

(3) Build protective green spaces in accordance with the requirements of urban health, safety, disaster prevention and environmental protection. Green isolation forest belts are built around the city, between urban clusters, urban functional subdivisions, and transition areas. The selection and configuration of regional tree species are reasonable, and the effect of alleviating the urban heat island and turbidity effect is remarkable.

(4) The connectivity of urban water system networks such as rivers, streams and lakes is high, the forest vegetation of important urban water sources is well protected and functional, the role of water conservation has been effectively played, and the water quality has been improved in the past five years.

(5) Advocating greening construction to save water and energy and focusing on saving construction and management costs.

The other indicators selected for national forest cities are listed below:

(A) Coverage rate

1. The coverage rate of urban forests, the greening coverage rate of urban built-up areas (including the built-up areas of cities and counties under the jurisdiction of the city), and the coverage rate of forests in the suburbs of cities vary according to the conditions of the land.

2. Actively carry out three-dimensional greening of buildings, roofs, walls, and overpasses.

(B) Forest ecological network

1. The green belts of backbone rivers and roads connecting key ecological zones reach a certain width, and urban forest ecological corridors are built with continuity.

2. Emphasize natural ecological protection along rivers, streams, lakes, seas, and other water bodies. On the premise of not affecting flood safety, the use of near-natural waterfront greening mode, the formation of the city's unique scenery.

3. The greening of highways, railroads and other roads focuses on the combination and coordination with the surrounding natural and humanistic landscapes to form a network of green corridors.

(C) Forest health

1. Emphasize the protection of biodiversity. Nature reserves and important forest and wetland ecosystems are reasonably conserved.

2. Urban forests are constructed with a rich variety of tree species, forest plants are mainly native species, and plant growth and community development are normal.

3. Pay attention to the improvement and protection of the soil environment of green areas, urban green areas and various types of exposed land surface covering measures are in place, and the surface of green areas is not exposed to the soil.

4. Scientific planting and management of trees. Strict management of large tree transplantation, so that the whole plant transplantation.

(D) public recreation

1. There are many recreational green spaces in the built-up area, mainly parks and public green spaces.

2. There are forest parks and other kinds of ecotourism and leisure places in the suburbs of the city, which basically satisfy the daily leisure and recreation needs of the city's residents.

(E) Ecological culture

1. Ecological science propaganda facilities are perfect, and there are more than 2 educational bases or places for ecological science knowledge, such as forests or wetlands.

2. Seriously organize compulsory tree-planting activities for the whole nation and establish a registration card system for compulsory tree-planting.

3. Widely carry out various forms of social participation in greening activities, such as building, adopting, and managing urban green spaces, and establish various memorial forest bases.

4. Organize various kinds of ecological popularization activities every year.

5. The public awareness rate of the creation of the National Forest City reaches more than 90%.

6. Urban old and valuable trees protection and management of strict norms, measures in place.

(F) Rural greening

1. Ecological economy, ecological landscape, ecological gardens and other modes of countryside greening, countryside greening area has increased year by year in the past five years.

2. The healthy development of rural tourism in various forms such as suburban sightseeing, picking and leisure, as well as the development of special eco-industries such as forest seedlings and flowers.

Actual examples are shown below:

In the pilot forest city policy, neither Guilin (a city under the jurisdiction of the Guangxi Zhuang Autonomous Region in the western part of China) nor Shanghai (a municipality in the eastern part of China) has been selected. Guilin is a tourist city with picturesque mountains and water. Shanghai is the most economically developed city. The fact that these two places have not yet been selected is a good indication of the high standards required for a national forest city.

In 2021, the State Forestry and Grassland Administration (SFGA) carried out research and evaluation on the construction of national forest cities. By means of field inspection, random sampling, discussion and exchange, and checking accounts, the research and assessment team went deep into the pilot areas of forest cities to check the construction of urban and rural greening, corridor greening, rural road greening, protection of old and valuable trees, forest belt around the city, tree species diversity, ecological industry, forest villages, creation of forest families, ecological governance, and ecological science and technology bases, and other aspects of construction.

3.3. Variable Selection

Control variables: drawing on Yang and Xie, the article selects county-level control variables in terms of industrial structure, investment scale, fiscal expenditure, educational status, credit level and infrastructure.

The control variables were chosen for the article for two reasons:

First, after controlling the control variables, the empirical results of the article are more robust, the model fits better and the estimated coefficients are more reliable.

Control variables: industrial structure ($Industru$), proxied by the ratio of county secondary industry value added and county total GDP; Investment scale (*Invest*), measured by

the share of total county social fixed asset investment in county GDP; The size of financial autonomy (*Finauto*), which can be obtained by the ratio of the county's local financial general budget revenue to the county's local financial general budget expenditure; The level of credit (*Ocredit*), on the other hand, can be characterized by the ratio of the year-end balance of loans in local and foreign currencies of financial institutions in the county to the real GDP of the county; The quality of education (*Oedu*), which is obtained by using the ratio of the number of students enrolled in general elementary school and the number of students enrolled in general secondary schools in the county to the total population of the county; Infrastructure (*Infrast*), characterized by the ratio of the number of hospital and health center beds in the county to the total population of the county.

Different industrial sectors have different production characteristics. The transfer and mobility of production factors in different sectors will produce the effect of resource reallocation and industrial linkage, which is an important source of sustainable urban economic growth. In the process of construction of forest cities, the industrial structure ($Industru$) affects the quality of regional economic growth to a certain extent.

Investment scale (*Invest*) in fixed assets both facilitates the accumulation of physical capital and can have a significant impact on economic growth. A higher investment rate is conducive to achieving technological progress, significantly improving the efficiency of economic operations and optimizing the breadth and depth of the county's economic development.

Government fiscal spending can significantly improve the external conditions of public services and infrastructure, reduce transaction cost prices and accelerate regional economic growth. Financial autonomy (*Finauto*) in the forest city building process also indicates to some extent the degree of government intervention in the economy, which is used to characterize the relationship between the government and the market.

The increase in the level of credit (*Ocredit*) stimulates to a certain extent the expansion of the scale of green production in society as a whole, contributing to the high efficiency of the county's economic growth. The substantial increase in the level of financial credit can promote changes in the level of county economic output, optimize the allocation of resources and promote rapid economic growth.

In the age of the knowledge economy, the prevalence and quality of education in a region determines the development potential of the region's economy. In the age of the knowledge economy, the prevalence and quality of education in a region determines the development potential of the region's economy. As the functional scope of the county continues to expand, the quality of education (*Oedu*) can enhance the accumulation of knowledge and experience of workers, promote the improvement of labor productivity, and continue to promote the stable growth of the county's economy.

Strengthening infrastructure (*Infrast*) can promote sustainable economic growth in the county. From the supply-side perspective, social infrastructure not only directly increases the output and operational efficiency of relevant sectors, but also enhances the total factor productivity of industries. From the demand-side perspective, infrastructure construction can promote the increase of total social output and accelerate social and economic activities through the multiplier effect.

Second, the article conducts VIF test to ensure that the selected variables do not have multicollinearity. The results of the vif test are detailed in Table S1.

Table S1. VIF test results.

Variable	VIF	1/VIF
Finauto	1.51	0.664048
Industru	1.49	0.670797
Ocredit	1.27	0.787256
Infrast	1.18	0.847147
Invest	1.11	0.902018
Oedu	1.04	0.958342
Mean VIF	1.27	

Variance inflation factor (VIF) is a measure of the severity of complex (multiple) covariance in a multiple linear regression model. It represents the ratio of the variance of the estimated regression coefficients to the variance of the coefficients assuming no linear correlation between the independent variables.

Multicollinearity refers to the existence of a linear correlation between independent variables, i.e., one independent variable can be a linear combination of one or more other independent variables. If multicollinearity exists, the matrix is not invertible when calculating the partial regression coefficients of the independent variables. The variance inflation factor (VIF) is usually judged with 10 as the boundary. When VIF<10, there is no multicollinearity; When 10<=VIF<100, there is strong multicollinearity; When VIF>=100, severe multicollinearity exists.

A VIF test of the control variables reveals that the estimated coefficient of VIF is 1.27, which is well below the standard of 10.

This again justifies the article's choice of the above control variables.

3.4. Data Source

Table S2. Descriptive statistics of variables.

Variable	Mean	Sd	P50	Min	Max
Lngdp	13.737	1.133	13.781	8.924	17.571
Lnpergdp	10.103	0.801	10.104	7.604	13.046
Industru	0.422	0.158	0.424	0.013	0.985
Invest	0.940	0.665	0.802	0.000	14.861
Finauto	0.321	0.241	0.254	0.006	9.463
Ocredit	0.628	0.436	0.525	0.000	7.731
Oedu	0.731	0.295	0.696	0.005	14.968
Infrast	0.365	0.215	0.325	0.005	8.896

4. Empirical Results Analysis

4.1. Direct effect Estimation

Forests are the main and key resources of terrestrial ecosystems, but also an important ecological guarantee for green economic and social development. Therefore, the main

consideration of the article lies in the role of forest city construction in influencing the economic growth of the county.

In this section, the article analyzes the direct impact effect of the forest city policy on the economic growth of the pilot counties with the help of equation (1).

According to the analysis of the results in Table 2, it is obtained that the control variables have diversified influence effects on the county economic growth.

Based on equation (1), model (1) and model (3) in Table 2, we can get the following measurement equation:

$$Lngdp = 0.018Did + 13.734$$

$$Lnpergdp = 0.014Did + 10.1$$

With $Lngdp$ and $Lnpergdp$ as dependent variables, the estimated coefficients of the core explanatory variables on county economic growth are 0.018 and 0.014 respectively. The synthesis shows that the construction of forest cities can bring about a continuous increase in the total size of the county economy and improve the quality and stability of economic growth.

Based on equation (1), model (2) and model (4) in Table 2, we can get the following measurement equation:

$$Lngdp = 0.027Did + 1.062Industru - 0.095Invest + 0.118Finauto - 0.193Ocredit + 0.040Oedu + 0.037Infrast + 13.415$$

$$Lnpergdp = 0.026Did + 1.048Industru - 0.094Invest + 0.126Finauto - 0.191Ocredit + 0.149Oedu + 0.172Infrast + 9.653$$

With $Lngdp$ and $Lnpergdp$ as dependent variables, the estimated coefficients of industrial structure ($Industru$) on county economic growth are 1.062 and 1.048 respectively.

With $Lngdp$ and $Lnpergdp$ as dependent variables, the estimated coefficients of fiscal autonomy ($Finauto$) on county economic growth are 0.118 and 0.126 respectively.

The estimated coefficients of infrastructure ($Infrast$) on county economic growth are 0.037 and 0.172 using $Lngdp$ and $Lnpergdp$ as dependent variables.

The estimated coefficients of education quality ($Oedu$) on county economic growth are 0.040 and 0.149 using $Lngdp$ and $Lnpergdp$ as dependent variables respectively.

With $Lngdp$ and $Lnpergdp$ as dependent variables, the estimated coefficients of investment size on county economic growth are -0.095 and -0.094 respectively.

With $Lngdp$ and $Lnpergdp$ as dependent variables, the estimated coefficients of credit level on county economic growth are -0.193 and -0.191 respectively.

Industrial structure, financial autonomy, infrastructure, and education quality have a positive effect on county economic growth and can significantly increase the total economic size of the region.

The level of credit and the scale of investment negatively affect the quality of economic growth in the county. As the region's population increases rapidly, more land resources are

needed for industrial and commercial activities and infrastructure development. The increase in the total amount of credit in the county does not enhance the rise of efficient investment projects, but rather allows inefficient credit investments to continue to materialize. The county government should flow the foreign credit funds of the banking system to the real energy-saving and environmentally friendly green economy. In view of the existence of investment inefficiency in some areas, disorderly expansion of the construction of new towns and new districts, and over-investment in some industries and regions, the county governments should improve the mechanism of expanding the investment and provide better development conditions for the main business entities of the green industry.

4.2. Cost-Benefit Analysis

General Secretary Xi Jinping has repeatedly emphasized that land resources are needed for urban construction, industrial development, and ecological protection. Therefore, the Government must give serious consideration to planning according to priorities and strictly prohibit the occupation of arable land and afforestation and greening against the laws of nature.

The article's analysis of the benefits of forest city construction mainly includes the following aspects: firstly, economic scale benefits; secondly, sterilization and noise reduction benefits; thirdly, carbon sinks and oxygen production benefits. The article's analysis of the costs of constructing a forested city mainly includes: the costs of restoration and maintenance of forest greenery by the regional government.

First, the economic scale benefits of forests. It is calculated as [(GDP before pilot batch 1×2.74%×14 years×number of pilot counties in batch 1) + (GDP before pilot batch 2×2.74%×13 years×number of pilot counties in batch 2) + ... + (GDP before pilot batch 14×2.74%×1 year×number of pilot counties in batch 14)]/total number of pilot counties. After calculation, it is obtained that the construction of forest cities can bring about 2,990,896,661,000 yuan (approximately 421.501 million dollars) of economic scale benefits to the pilot counties on average.

Follow the formula below: [(Total GDP before pilot batch 1 × 2.74% × 14 years × number of 1st batch of pilot counties) + (Total GDP before pilot batch 2 × 2.74% × 13 years × number of 2nd batch of pilot counties) + ... + (Total GDP before pilot batch 14 × 2.74% × 1 year × number of 14th batch of pilot counties)]/total number of pilot counties.

Following the formula, the article calculates the size of the economic growth benefits of the pilot counties from 2007-2020 separately, based on the collection of the number of pilot counties in each year. 2.74% is the result obtained through Table 2 in the article.

Third, the carbon sink and oxygen production benefits of forests. A study by Peking University shows that for every cubic meter of storage volume grown in a forest, more than 1.8 t of carbon dioxide has to be absorbed and about 1.6 t of oxygen released on average. During the growing season, 1 hectare of broad-leaved forest can absorb 1 t of carbon dioxide and produce 730 kg of oxygen per day. If the forest conservation rate can be increased to 142% by 2050, the forest conservation emission reductions in 2050 will be reduced to 0.79 billion t. It is estimated that the carbon price will rise on schedule due to the potential contribution of forest conservation, jumping from less than $18 in 2015 to $51 in 2050. According to Zhang article [42], 1 hectare of forest can absorb 1,000 kilograms of carbon dioxide per day, the artificial

afforestation in the pilot counties can absorb about 134,800.34 tons of carbon dioxide every year.

Fourth, the cost of forest maintenance and restoration. It was obtained by crawling on the Chinese government procurement website (http://www.ccgp.gov.cn/) and then reading the data of the total winning amount of the county's winning contracts related to forest restoration, maintenance and greening for analysis. Among the selected words: forest, afforestation, camping, forestation, forestry, trees, seedlings, replanting, tree planting, plant protection, forest land, forest species, lawn, greening, nurturing, conservation, maintenance, degradation, gardening, landscape, greening, greening overlay, greening, protection forest, windbreak, public welfare forest, degraded forest, reserve forest, retired forest, retired pasture, retired grassland, pest, and disease control. In more detail, with the help of python tools, the authors read the data of the amount of money in the awarded contracts related to forest restoration, maintenance and greening in all the pilot counties on the China Government Procurement Network (http://www.ccgp.gov.cn/). Based on the data obtained, the authors add up the expenditure data generated by all pilot counties after the implementation of the policy. In this section, the authors did not use formulas for extrapolation.

The article manually collects and analyzes data on the total amount of winning bids in 973 pilot county contracts related to forest restoration, maintenance, and landscaping. Based on the complexity and large volume of data collected, we selected Dachang Hui Autonomous County (a county under the jurisdiction of Hebei Province in the eastern region of China), Shexian County (a county under the jurisdiction of Anhui Province in the central region of China), and Xishui County (a county under the jurisdiction of Guizhou Province in the western region of China) for analysis.

4.3. Spatial Spillover Effect Estimation

According to the results of the analysis in Tables S3 and S4, it can be seen that whether *Lngdp* or *Lnpergdp* is used as the dependent variable, the Moran index is positive, and both are significant at the 1% level. This indicates that there is a significant positive spatial correlation of economic growth between counties. In addition, the Moran index of county economic size from 2007 to 2020 all show a fluctuating upward trend. This indicates that the overall spatial correlation of economic scale between regions is increasing, and the impact of pilot county policy implementation on the economic growth of neighboring regions is also increasing.

According to the theory of new economic geography, there exists spatial correlation between anything, and the strength of this link shows a positive trend with the distance between regions. Since the research sample of the article is county-level administrative units, the spatial weight matrix based on geographical distance is selected for analysis. The Spatial Durbin Model (SDM) simultaneously takes into account the level of economic development between different regions and contains not only the spatial lagged variables of the dependent variables but also the spatial lagged variables of the dependent variables. After LM test, fixed effect test, Hauaman test, and LR test, it is found that the spatial Durbin model is the best model for empirical estimation study. The results of the spatial spillover effect of the pilot counties on the economic scale of the neighboring regions are obtained in the case of satisfying the requirements of the Moran index.

Table S3. Moran index – *Lngdp.*

Year	Variables	I	E(I)	sd(I)	z	*p*-Value
2007	lngdp	0.140	-0.001	0.001	97.130	0.000
2008	lngdp	0.141	-0.001	0.001	97.688	0.000
2009	lngdp	0.140	-0.001	0.001	96.655	0.000
2010	lngdp	0.140	-0.001	0.001	96.788	0.000
2011	lngdp	0.137	-0.001	0.001	94.888	0.000
2012	lngdp	0.133	-0.001	0.001	92.158	0.000
2013	lngdp	0.132	-0.001	0.001	91.183	0.000
2014	lngdp	0.131	-0.001	0.001	90.522	0.000
2015	lngdp	0.131	-0.001	0.001	90.825	0.000
2016	lngdp	0.132	-0.001	0.001	91.367	0.000
2017	lngdp	0.133	-0.001	0.001	92.218	0.000
2018	lngdp	0.133	-0.001	0.001	91.897	0.000
2019	lngdp	0.135	-0.001	0.001	93.061	0.000
2020	lngdp	0.134	-0.001	0.001	92.580	0.000

Table S4. Moran index – *Lnpergdp.*

Year	Variables	I	E(I)	sd(I)	z	*p*-Value
2007	lnpergdp	0.111	-0.001	0.001	76.907	0.000
2008	lnpergdp	0.113	-0.001	0.001	77.931	0.000
2009	lnpergdp	0.109	-0.001	0.001	75.640	0.000
2010	lnpergdp	0.111	-0.001	0.001	77.184	0.000
2011	lnpergdp	0.109	-0.001	0.001	75.165	0.000
2012	lnpergdp	0.104	-0.001	0.001	71.830	0.000
2013	lnpergdp	0.100	-0.001	0.001	69.543	0.000
2014	lnpergdp	0.094	-0.001	0.001	65.401	0.000
2015	lnpergdp	0.091	-0.001	0.001	63.120	0.000
2016	lnpergdp	0.081	-0.001	0.001	55.932	0.000
2017	lnpergdp	0.085	-0.001	0.001	58.962	0.000
2018	lnpergdp	0.083	-0.001	0.001	57.705	0.000
2019	lnpergdp	0.089	-0.001	0.001	61.579	0.000
2020	lnpergdp	0.088	-0.001	0.001	60.921	0.000

SDM with random-effects — Number of obs = 27832

Group variable: id — Number of groups = 1988
Time variable: year — Panel length = 14

R-sq: within = 0.4002
between = 0.3118
overall = 0.1572

Log-likelihood = 11062.9926

Spatial						
rho	.9780642	.0054195	180.47	0.000	.9674422	.9886862
Variance						
lgt_theta	−3.105403	.0173182	−179.31	0.000	−3.139346	−3.07146
sigma2_e	.016772	.0001476	113.60	0.000	.0164826	.0170614

Figure S2. Results of full-sample spatial econometric analysis with *Lngdp* as the dependent variable.

According to the results in Figure S2, the result of R-square is 0.4002 and the value of log-likelihood is large, so it can be shown that the model fit is high and credible.

The autocorrelation coefficient of the dependent variable is positive at the 1% significant level after controlling for control variables and two-way fixed effects. Meanwhile, the coefficient of the spatially weighted term W×Did of the core explanatory variables is significant at the 1% level, and the value is 0.978, indicating that the construction of forest cities has a significant spatial spillover effect on economic growth. Specifically, forest city construction has a positive spillover effect on economic growth, and forest city construction will increase the level of economic development in the neighboring areas of the pilot counties.

The regression coefficient of W×Did not directly reflect the degree of its impact, which still needs to be decomposed into direct effect, indirect effect, and total effect. The direct effect includes both the influence of the implementation of the forest city construction policy on the pilot counties, as well as the impact of the pilot counties on the neighboring non-pilot areas in turn on the pilot counties, i.e., the feedback effect. The indirect effect refers to the impact of the policy implementation on the economic growth of the neighboring non-pilot counties.

According to the results in Figure S2, the estimated coefficients of direct, indirect, and total effects are all negative and not statistically significant. The reason is that the implementation of forest city construction in the pilot counties may stimulate "free-riding" behavior in ecological governance, triggering the phenomenon of local-neighboring "competition at the bottom", which undermines the promotion of normalized synergies on a regional scale. This undermines neighboring counties' own efforts at economic growth.

As long as the project is conducive to local economic growth, it will try to catch it, with less consideration for the overall regional benefits of neighboring counties.

For the resources shared by the neighboring areas, the awareness of common construction and sharing is not strong, the ecological environment synergistic management mechanism is not perfect, and there is a phenomenon of competing for resources in the two neighboring areas, which can't well realize the complementary advantages and synergistic development. After the

implementation of the policy, the relevant county ecological governance results in unsustainable and rebound problems, resulting in ecological environmental governance "leakage effect", resulting in the construction of forest cities in the county within the urban agglomerations of the spatial spillover effect on economic growth is not significant, the effect of pollution control greatly reduced.

Therefore, on a larger regional scale, county governments should establish the principle of ecological co-management and ecological sharing, implement integrated joint prevention and comprehensive management implementation programs, enhance the gravitational pull of inter-governmental cooperation in cross-regional green management, establish a cross-regional ecological management rights and responsibilities list mechanism and legal system, promote the complementarity of factor resources and integration of production functions within the region, and realize the synergistic and integrated development of the county economy.

SDM with random-effects — Number of obs = 27832

Group variable: id — Number of groups = 1988
Time variable: year — Panel length = 14

R-sq: within = 0.4524
between = 0.4692
overall = 0.3114

Log-likelihood = 9806.7958

rho	.9710792	.0068987	140.76	0.000	.957558	.9846003
Variance						
lgt_theta	−2.411748	.0183794	−131.22	0.000	−2.447771	−2.375725
sigma2_e	.0201536	.0001777	113.44	0.000	.0198054	.0205018

Figure S3. Results of full-sample spatial econometric analysis with *Lnpergdp* as the dependent variable.

According to the results in Figure S3, the result of R-square is 0.4524 and the value of log-likelihood is large, so it can be shown that the model fit is high and credible.

The autocorrelation coefficient of the dependent variable is positive at the 1% significant level after controlling for control variables and two-way fixed effects. Meanwhile, the coefficient of the spatially weighted term W×Did of the core explanatory variables is significant at the 1% level, and the value is 0.971, indicating that the construction of forest cities has a significant spatial spillover effect on economic growth. Specifically, forest city construction has a positive spillover effect on economic growth, and forest city construction will increase the level of economic development in the neighboring areas of the pilot counties.

The regression coefficient of W×Did not directly reflect the degree of its impact, which still needs to be decomposed into direct effect, indirect effect, and total effect. The direct effect includes both the influence of the implementation of the forest city construction policy on the pilot counties, as well as the impact of the pilot counties on the neighboring non-pilot areas in turn on the pilot counties, i.e., the feedback effect. The indirect effect refers to the impact of the policy implementation on the economic growth of the neighboring non-pilot counties.

According to the empirical test results in Figure S3, the estimated coefficient of the direct effect is negative and not statistically significant. The estimated coefficients of the indirect and total effects, however, are significantly negative and pass the 5% confidence interval.

The reason is that after the construction of the forest city, the situation of neighboring county governments disregarding the principle of mutual benefit to realize the transfer of pollution still occurs from time to time, and the cooperation mechanism of cost sharing and benefit sharing has not been fully established, which in turn fails to form the industrial competitiveness and efficiency of the overall economy.

Therefore, prefecture-level city governments should fully consider the interests of the counties under their jurisdiction, collaborate to solve common problems faced in the process of economic development, and promote multi-field, multi-level, and multi-form cooperation among counties to enhance the level of integrated regional economic development. Neighboring county governments should coordinate the inter-governmental relations of all parties, gradually solve the externalities of cross-border ecological damage and the phenomenon of "free-riding" on environmental protection and improve the operational efficiency of coordinated ecological governance. The government should avoid the negative spillover effects of ecological damages that limit the regional synergistic governance model and should accelerate the formation of stakeholders' ecological protection value orientation, thus contributing to the sustainable economic and social development of the urban area.

4.4. Heterogeneity Analysis

4.4.1. Heterogeneity Analysis of Direct Effects

Due to the county in the geographic location, administrative level, social attributes and their own endowments and other aspects of the existence of different degrees of difference, so that the implementation of forest city construction policy on the pilot county economic growth will also have a difference in the impact of the role.

Therefore, in terms of geographic location, the pilot counties are divided into the eastern region, central region, western region, northern region and southern region samples.

In the administrative hierarchy is divided into three types of administrative units: county-level cities, counties and municipal districts.

In terms of social attributes, they are divided into old revolutionary counties and non-revolutionary counties, counties to the left of Hu Huanyong and counties to the right of Huanyong, and counties under the jurisdiction of old industrial cities.

In terms of its own endowment, it is divided into counties with large grain production and counties without large grain production, counties with high-speed rail and counties without high speed rail, and counties under the jurisdiction of resource-oriented cities.

Compared with the samples from the western and northern regions, the samples from the central-eastern and southern regions have generated greater economic growth after the construction of forest cities. The specific test results are shown in Table S5 models (1)-(10).

Table S5. Heterogeneity analysis of geographic location.

	(1) Lngdp	(2) Lnpergdp	(3) Lngdp	(4) Lnpergdp	(5) Lngdp	(6) Lnpergdp	(7) Lngdp	(8) Lnpergdp	(9) Lngdp	(10) Lnpergdp
	Eastern region	Eastern region	Central region	Central region	Western region	Western region	Southern region	Southern region	Northern region	Northern region
Did	0.024**	0.025**	0.043***	0.046***	0.013	0.010	0.009***	0.008*	0.018*	0.013
	(0.010)	(0.011)	(0.008)	(0.009)	(0.010)	(0.012)	(0.003)	(0.004)	(0.009)	(0.010)
_Cons	14.084***	10.071***	13.457***	9.397***	12.935***	9.373***	13.686***	9.812***	13.124***	9.450***
	(0.059)	(0.066)	(0.058)	(0.066)	(0.042)	(0.053)	(0.009)	(0.013)	(0.046)	(0.055)
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at the county level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	7518	7518	8442	8442	11872	11872	14518	14518	13314	13314
R2_a	0.992	0.982	0.991	0.977	0.993	0.981	0.996	0.986	0.992	0.979

The reason is that these regions are cultivating new momentum for green economic development, accurately implementing ecological greening space, actively establishing and improving effective mechanisms and paths for green governance and performance evaluation systems, and continuously expanding the new advantages of the green economy. Among them, the estimated coefficient of economic development generated by the implementation of forest city construction policy in the central region sample is the largest and passes the 1% statistical significance test. This indicates that the central region actively supports the development of leading enterprises, vigorously cultivates new management subjects, continuously improves the utilization rate and output rate of forest land, encourages technological innovation and the development of new industries, enhances the "face value" of green mountains and mountains, and realizes the value of "Golden Mountains and Silver Mountains".

Table S6. Heterogeneity analysis of administrative levels.

	(1) Lngdp	(2) Lnpergdp	(3) Lngdp	(4) Lnpergdp	(5) Lngdp	(6) Lnpergdp
	County	County	County municipality	County municipality	Municipal districts	Municipal districts
Did	0.025***	0.026***	0.037***	0.045***	0.015	0.007
	(0.006)	(0.007)	(0.010)	(0.011)	(0.022)	(0.023)
_Cons	13.060***	9.4171***	13.973***	9.690***	14.560***	10.491***
	(0.059)	(0.066)	(0.091)	(0.106)	(0.080)	(0.091)
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at the county level	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	19670	19670	5152	5152	3010	3010
R2_a	0.992	0.979	0.991	0.980	0.989	0.975

From the analysis in Table S6 model (1)-(6), it can be seen that the results of empirical estimation found that the sample of municipal districts did not show obvious economic upgrading effects after the implementation of the forest city construction policy. With the accelerated urbanization of population and further development of industrial construction, the

contradiction between the demand for development and construction by changing land use such as occupying cultivated land and crowding out forest land and the scarcity of land resources has existed for a long time in municipal districts, and the local ecosystems have been fragmented and siloed, resulting in the reduction of connectivity between internal and external ecosystems of the city.

In the future development, the municipal governments should continuously root the green concept, revitalize, and utilize the existing funds and resources by restructuring and optimizing and upgrading the traditional industries. The government should adhere to the innovation-driven development, explore the county's own endowment and comparative advantages, cultivate new suitable industrial growth points, and take the road of green economic development.

Table S7. Heterogeneity analysis of social attributes.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Lngdp	*Lnpergdp*	*Lngdp*	*Lnpergdp*	*Lngdp*	*Lnpergdp*	*Lngdp*	*Lnpergdp*	*Lngdp*	*Lnpergdp*
	Old revolutionary area	Old revolutionary area	Old non-revolutionary areas	Old non-revolutionary areas	Area to the left of the Hu Huanyong Line	Area to the left of the Hu Huanyong Line	Area to the right of the Hu Huanyong Line	Area to the right of the Hu Huanyong Line	Counties under old industrial cities	Counties under old industrial cities
Did	0.051***	0.049***	0.016***	0.015**	0.021***	0.021***	0.012	0.003	0.021**	0.024**
	(0.012)	(0.013)	(0.006)	(0.006)	(0.006)	(0.006)	(0.020)	(0.024)	(0.010)	(0.010)
_Cons	13.020***	9.374***	13.660***	9.764***	13.691***	9.719***	12.567***	9.489***	13.449***	9.525***
	(0.043)	(0.053)	(0.041)	(0.062)	(0.040)	(0.073)	(0.059)	(0.066)	(0.070)	(0.076)
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at the county level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	11146	11146	16686	16686	21630	21630	6202	6202	7420	7420
R2_a	0.993	0.981	0.993	0.982	0.993	0.982	0.992	0.981	0.988	0.977

From the analysis of Table S7 model (1)-(10), it can be obtained that after the construction of the forest city, the counties in the old revolutionary areas, the counties on the left side of Hu Huanyong and the counties under the jurisdiction of the old industrial cities are all able to produce positive economic growth effects.

Hu Huanyong left county government always practice the concept of ecological priority and green development, integrated implementation of agricultural and forestry land, construction land comprehensive remediation, enhance the connectivity and resilience of the blue-green network within and around the city, and then realize the majority of farmers to enrich and increase income.

The governments of counties under the jurisdiction of old industrial cities are eliminating backward production capacity with high consumption, high pollution, and low efficiency, accelerating the cultivation and development of new industries driven by kinetic energy, and creating natural forest landscapes and waterfront spaces on old industrial sites, thus forming a symbiotic and win-win ecological model of "leading enterprises + incubation".

For their part, the county governments of the old revolutionary areas are actively extending the supply chain of the ecological industry, promoting the implementation of new measures for transfer payments and ecological compensation, constructing new advantages in the branding of green agricultural products, broadening the scope of development of the green

economy, and increasing the green added value of the processing chain, thereby promoting the sustainable development of the economic, social and environmental environment in the ecological functional areas of the old revolutionary areas.

Table S8. Heterogeneity analysis of self-endowment.

	(1) Lngdp	(2) Lnpergdp	(3) Lngdp	(4) Lnpergdp	(5) Lngdp	(6) Lnpergdp	(7) Lngdp	(8) Lnpergdp	(9) Lngdp	(10) Lnpergdp
	Counties with high speed rail	Counties with high speed rail	No high-speed rail county	No high-speed rail county	Large grain-producing counties	Large grain-producing counties	Non-food-producing counties	Non-food-producing counties	Counties under the jurisdiction of resource-oriented cities	Counties under the jurisdiction of resource-oriented cities
Did	0.042***	0.034***	0.021***	0.023***	0.039**	0.032	0.024***	0.024***	0.021***	0.027***
	(0.011)	(0.012)	(0.006)	(0.007)	(0.017)	(0.020)	(0.006)	(0.007)	(0.008)	(0.008)
_Cons	14.105***	9.875***	13.227***	9.591***	13.843***	9.189***	13.366***	9.686***	13.285***	9.494***
	(0.072)	(0.110)	(0.036)	(0.085)	(0.113)	(0.117)	(0.032)	(0.067)	(0.040)	(0.049)
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at the county level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	6006	6006	21825	21825	2506	2506	25326	25326	11732	11732
R2_a	0.991	0.981	0.993	0.980	0.983	0.974	0.994	0.981	0.991	0.980

As analyzed in Table S8 model (1)-(10), compared with non-high-speed rail counties and food-producing counties, high-speed rail counties, counties under the jurisdiction of resource cities, and non-food-producing counties are able to generate more positive economic growth effects after the implementation of the policy.

It is worth noting that the economic growth effect of the policy in large food-producing counties is not statistically significant. The reason for this is that large grain-producing counties have actively promoted green, circular, and sustainable development, innovated land-use mechanisms, optimized the layout of agricultural development, improved the quality of arable land and soil, and in turn enhanced the output benefits and utilization efficiency of food crops per unit of sown area. By reasonably controlling the intensity of development, county-level governments in large grain-producing counties have accelerated the resourcing and recycling of agricultural waste, effectively curbed agricultural surface pollution, actively developed high-yield, high-quality, high-efficiency, and ecologically safe agriculture, and accelerated the construction of large-scale, standardized, low-carbon, and green agriculture, which has in turn continuously improved the comprehensive production capacity of grain. The Government has started by focusing on the quality of crops, building the bottom line of national food security, continuing to promote the construction of high-standard farmland, focusing on the scientific use of inputs in the production process, and thus enhancing the coordination of the development of the entire agricultural industry chain. The government has accelerated the construction of new pollution-free information science and technology production facilities and equipment, and empowered agricultural operations with the digital economy, thereby providing more green and high-quality agricultural products and ecological products, and significantly increasing the total factor productivity of agriculture.

4.4.2. Heterogeneity Analysis of Spatial Spillover Effects

Table S9. Tests of spatial spillover effects by subregion.

Variables	Eastern region	Eastern Region	Central region	Central region	Western region	Western region
	Lngdp	*Lnpergdp*	*Lngdp*	*Lnpergdp*	*Lngdp*	*Lnpergdp*
Spatial	2.145***	2.114***	0.954***	0.963***	2.448***	2.426***
	(0.013)	(0.019)	(0.012)	(0.010)	(0.017)	(0.018)
Sigma2_e	0.013***	0.013***	0.011***	0.011***	0.017***	0.018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LR_Direct	0.004	0.007	0.015**	0.009	0.024***	0.014*
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
LR_Indirect	-0.057**	-0.075**	8.353***	7.617***	0.284***	0.304***
	(0.029)	(0.030)	(2.746)	(2.676)	(0.030)	(0.035)
LR_Total	-0.053**	-0.068**	8.368***	7.626***	0.308***	0.318***
	(0.030)	(0.032)	(2.750)	(2.679)	(0.033)	(0.038)
Did	Yes	Yes	Yes	Yes	Yes	Yes
*W*Did*	Yes	Yes	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes	Yes	Yes
*W*Control*	Yes	Yes	Yes	Yes	Yes	Yes
N	7518	7518	8442	8442	11872	11872
R2_a	0.013	0.064	0.853	0.822	0.014	0.014

5. Robustness Test and Mechanism Test

5.1. Instrumental Variable Test

Instrumental variables method. When choices in a project are influenced not only by observable variables but also by unobservable factors, the conditional expectation independence (CMI) assumption no longer holds, which can bias the regression estimates. IV estimation is an instrument for endogeneity problems caused by selection based on unobservable variables. The instrumental variable must be uncorrelated with the random disturbances; Second, the instrumental variable is able to clean up the endogenous part, so that it remains correlated with the endogenous variable; Finally, the instrumental variable satisfies the exclusion constraint. The instrumental variable cuts off the channel of action that affects the explained variable through other control variables.

According to Table S10 model (1) to model (3), the results of the first stage of the regression show that the county's atmospheric water vapor pressure difference and average annual evapotranspiration are significantly negatively correlated with the construction of a forested city. The relationship basically has a significant negative impact result at 10% level. This finding also indirectly confirms the analysis of the reasons for selection above. In the second stage of the instrumental variable approach, the estimated coefficients obtained through statistical significance indicate that the correctness of the baseline regression results was verified again. With *Lngdp* as the dependent variable, the estimated coefficient of the forest city pilot policy on county economic growth is 1.15. With *Lnpergdp* as the dependent variable, the estimated

coefficient of the forest cities pilot policy on county economic growth is 1.12. The implementation of the forest city construction policy can contribute to the rapid growth of the county's economy.

According to the analysis of model (4)-model (5) in Table S10, it can be seen that there is no correlation between instrumental and control variables.

Table S10. Estimation of instrumental variables.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Did	*Lngdp*	*Lnpergdp*	Correlation test of variables		
Watersp	−0.005***			Variables	Variables	Correlation coefficient
	(0.001)					
Evapot	−0.019*			*Watersp*	*Lngdp*	0.180
	(0.011)					
Did		1.146***		*Watersp*	*Lnpergdp*	-0.009
		(0.206)				
Did			1.124***	*Evapot*	*Lngdp*	0.055
			(0.204)			
_Cons	0.250***	12.277***	8.595***	*Evapot*	*Lnpergdp*	-0.006
	(0.059)	(0.050)	(0.051)			
P-value	0.2005					
F-value	203.061					
Individual effect	Yes	Yes	Yes			
Year effect	Yes	Yes	Yes			
Control Variables	Yes	Yes	Yes			
N	27 832	27 832	27 832			
R^2	0.286	0.521	0.523			

Note: *, **, *** significant at 10%, 5% and 1% level, respectively. The following tables are the same as the notes to this table.

5.2. Robustness Test

5.2.1 Parallel Trend Test

As shown in the left panel of Figures S4 and S5, the test results of the event study method found that the upper and lower limits of the confidence interval of the estimated coefficients basically include 0 before the implementation of the policy. It indicates that the implementation of the forest city construction policy does not have systematic significant difference between the treatment group and the control group, nor has it shown a certain pattern. Therefore, the common trend assumption is satisfied. The left panels of Figures S4 and S5, on the other hand, show that forest city construction nevertheless has a significant positive effect on county economic growth after the policy implementation. Once again, this shows that there are no other random factors interfering with the previous conclusions, which in turn suggests that the county's role in influencing the economic growth effect on the treatment group's sample after the implementation of the policy is real and reliable.

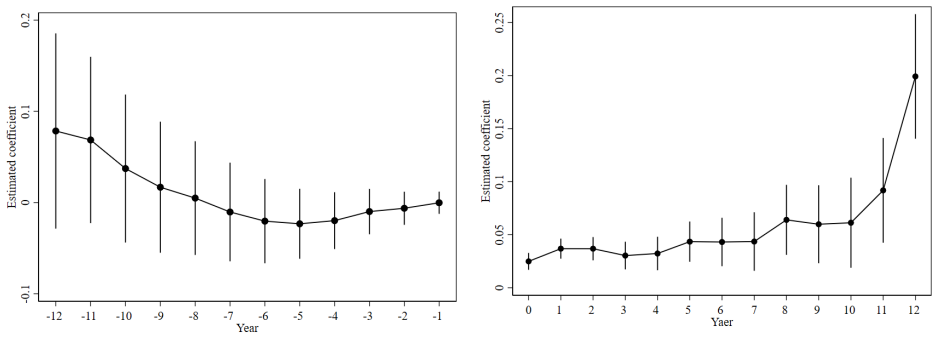

Figure S4. Parallel trend test with *Lngdp* as dependent variable.

Note: The left panel shows the year before the policy implementation and the right panel shows the year after the policy implementation. The "-1" in the horizontal axis of the left panel indicates the year before the policy was implemented, and the "1" in the horizontal axis of the right panel indicates the first year of the policy.

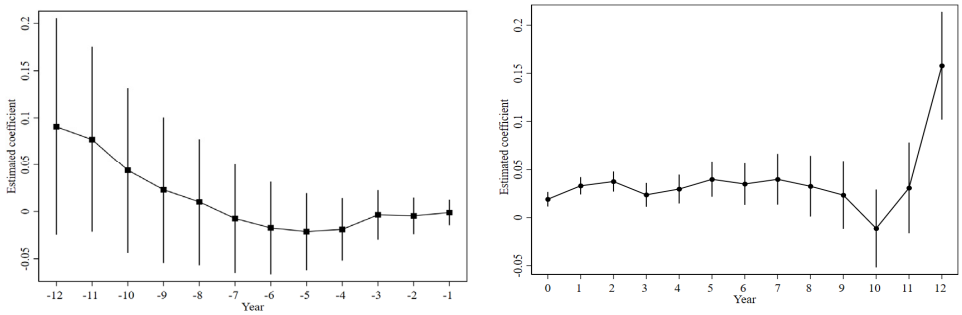

Figure S5. Parallel trend test with Lnpergdp as dependent variable.

Note: The left panel shows the year before the policy implementation and the right panel shows the year after the policy implementation. The "-1" in the horizontal axis of the left panel indicates the year before the policy was implemented, and the "1" in the horizontal axis of the right panel indicates the first year of the policy.

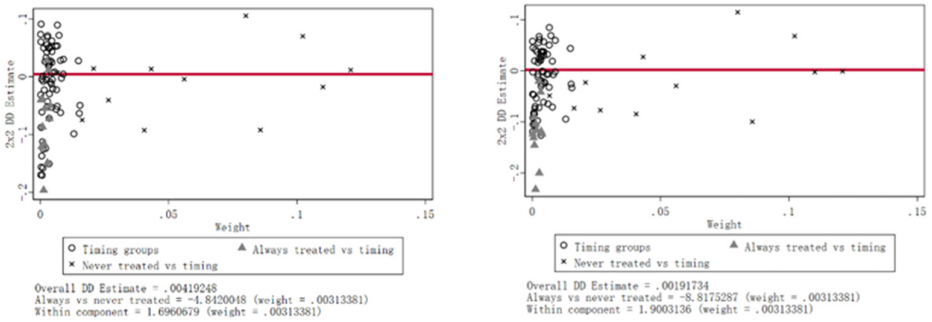

Figure S6. Graphical representation of the staggered-DID test.

The Staggered-DID model is a method to deal with the inconsistency of individuals in a treatment group in terms of the time they receive the treatment. According to Goodman-Bacon's DID decomposition theorem, all individuals can be divided into group $R+1$, where one group is untreated and the other group is not identical to each other at time point R treatment. In this way, a basic DID comparison can be formed. That is, a comparison between the treated group and the group that did not undergo the policy intervention. At the same time, another basic DID comparison can be formed between groups at different treatment time points. $R \times (R-1)$ basic DID comparisons can be formed between different groups in R. Typically, a later policy intervention is used as the control group and an earlier policy shock is used as the experimental group. The final estimate is a weighted average of $R \times R$ basic DID estimates.

The empirical analysis of the Staggered-DID model reveals that the implementation of the forest city building policy has a positive and positive effect on the economic scale and development level of the pilot counties. Once again, it shows that the conclusion of the economic growth effect generated by forest city construction in the county is robust and reliable. The test results are shown in Figure S6.

5.2.2 Transformed variables test

One is to lag all dependent variables by one period and then estimate them empirically. Please see model (1) in Table S11. The second is to change the assignment of the core variables and estimate them again. Please see model (2) in Table S11. The third is to regress per capita disposable income of urban residents as an dependent variable again. Please see model (3) in Table S11. Fourth, empirical regression is conducted again on the basis of using PSM-DID (Propensity Score Matching-Double Difference Model) to re-select the research sample. Please see model (3) in Table S12. To summarize, there is an obvious economic enhancement effect of forest city construction in the pilot counties.

Table S11. Tests for transformed variables.

	(1)Dependent variables lagged one period		**(2)Changing the assignment of core variables**		**(3)Changing the dependent variables**	
	Lngdp	*Lnpergdp*	*Lngdp*	*Lnpergdp*	*Chengzhen*	*Nongcun*
Did	0.016***	0.013**	0.031***	0.030***	0.049***	0.059***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.010)	(0.008)
_Cons	13.535***	9.839***	13.415***	9.653***	9.713***	8.057***
	(0.025)	(0.037)	(0.033)	(0.068)	(0.028)	(0.024)
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at the county level	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	25 844	25 844	27 832	27 832	27 832	27 832
R2_a	0.991	0.975	0.993	0.981	0.844	0.747

5.2.3 Benchmark Variable Test

First, the selection of the pilot sample may be affected by "old, small, border and poor" areas. Therefore, an interaction term between the baseline variable ((whether it is a county in the northern region, whether it is a county in the old revolutionary area, whether it is a large grain-producing county, whether it is an autonomous county (district) for ethnic minorities, whether it is a national-level poverty-stricken county, whether it is a county with a change in administrative division (samples in which the removal of counties to districts, counties to municipalities, and districts to cities occurred in the sample timeframe), whether it is a county at an inter-provincial (inter-municipal) border versus whether it is a county on the west side of the Hu Huanyong) and the time linear trend and the squared term with the time linear trend is added to the model. This again mitigates the estimation bias due to group selection in a certain sense. The test results are shown in Table S12 Model (1).

Second, a joint fixed effect of the time trend term with the city and county dummy variables is added to the model. In summary, it is found that the test results do not change the conclusions obtained in the previous section, and there is no doubt that the results are highly robust. The test results are shown in Table S12 Model (2).

Table S12. Benchmark variable test.

	(1) Benchmark variable test①		**(2) Benchmark variable test②**		**(3) PSM-DID test (kernel matching)**	
	Lngdp	*Lnpergdp*	*Lngdp*	*Lnpergdp*	*Lngdp*	*Lnpergdp*
Did	0.027***	0.026***	0.027***	0.026***	0.027***	0.027***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)
_Cons	13.415***	9.653***	13.415***	9.653***	13.393***	9.606***
	(0.034)	(0.071)	(0.033)	(0.069)	(0.031)	(0.063)
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at the county level	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	27 832	27 832	27 832	27 832	27 828	27 828
R2_a	0.993	0.979	0.993	0.981	0.993	0.981

5.2.4 Omitted Variable Test

In order to avoid the omitted variable error at the county level, the selection ratio indicator is constructed based on the idea of "inferring the selectivity of unobservable variables based on the selectivity of observable variables".

The first step is to regress the dependent variables on the core explanatory variables and control variables, and the regression coefficients are 0.027 and 0.026 respectively.

The second step is to regress the dependent variables on the control variables to obtain the fitted values and the variance of the residuals.

The third step is for the core explanatory variables to do regression on the fitted values in

the second step, obtaining estimated coefficients of 0.

The fourth step is the regression of the core explanatory variables on the control variables to obtain the variance of the residuals.056 and 0.067, respectively.

x_hat	27,832	13.7374	.2353196	11.71576	15.34687
w1	27,832	-1.01e-11	.0861823	-.9399281	1.365798
e	27,832	-1.01e-11	.0861823	-.9399281	1.365798
w2	27,832	-2.72e-12	.1756549	-.6143075	.683162
w1	27,832	2.13e-12	.1027836	-1.145939	1.295558
x_hat	27,832	10.10291	.2342783	8.073448	13.12851
w2	27,832	-2.72e-12	.1756305	-.6160191	.6865096
w3	27,832	-2.91e-12	.1754968	-.6274372	.6927185

Figure S7. Calculated data of omitted variables.

The values of selection ratio were calculated accordingly to get the values of 2.005 and 1.133 respectively. Both values are significantly greater than 1, indicating that there is no omitted variable bias in the article. See Figure S7 for specific test results.

5.3 Mechanism Test Analysis

Labor efficiency has increased significantly. The construction of forest cities is a powerful measure to alleviate the pressure on laborers and enhance their effectiveness. An empirical test using labor productivity in the tertiary industry ($Selabp$) and labor productivity in the secondary industry ($Telabp$) reveals that the construction of forest cities can significantly enhance the productivity of county laborers.

Rapid agglomeration of high-end elements. First, the high-end modern enterprises ($Hienind$) in the county include: information transmission software and information technology services, public administration social security and social organizations, health and social work, international organizations, residential services repair and other services, education, culture, sports and entertainment, water environment and public facilities management, scientific research and technology services, leasing and business services and finance. Secondly, the difference between the number of resident populations minus the number of household population in the county and the share of household population is defined as the county population inflow ($Labliuru$). Finally, the general public financial expenditure of county science and technology ($Kejiexp$) is used to measure the degree of government support for business agglomeration. The production, living and ecological spaces are naturally connected, and talents come to the county in droves, and enterprises gather and settle down. County governments actively support technological innovation in the fields of low-carbon energy saving, clean production, and waste utilization in order to promote the construction of forest cities. Following the implementation of the forest city policy, county governments have made great efforts to stimulate the green development drive of enterprises, which in turn has continued to promote the transformation of the industrial structure towards high-end, emerging, efficient, and high value-added. After the implementation of the policy, the relevant government has continued to rationalize the planning of industrial layout, encourage the development of green and low-carbon industrial projects, cultivate the main

body of emerging high-end industries, promote the development of low-carbon modern service industry, insist on curbing the blind development of "three-high" projects, guiding the production of green and low-carbon products, constructing green industrial supply chain, and upgrading the level of recycling of industrial parks and industrial clusters, thus realizing the continuous enhancement of the county economy. The level of recycling of industrial parks and industrial clusters has been improved, thus realizing the continuous enhancement of the county's economy.

Expanding market potential. This indicator uses the county market potential ($Markpot$) to measure. Firstly, the straight-line distance between any two counties is manually calculated by ArcMap software, secondly, the total retail sales of consumer goods of the county is divided by the straight line distance and summed up, and finally, the market potential of the county is summed up. The county government has fully implemented the requirements of the "forest manager system", enhanced the awareness of county residents of the protection of green vegetation and biodiversity, promoted ecological greening system restoration projects, ensured the contribution of regional natural ecological space, and upgraded the ecological quality and resilience of the county. The government has promoted the ecological function of industrial space, extending from "ecological protection" to "industrial prosperity", and driving more people to increase their income and become rich. On the basis of the optimization of land space pattern, the county has organized the revitalization of the use of vacant, abandoned and inefficiently utilized collective construction land, and actively created industrial clusters of bulk products. The government has opened all links in the industrial chain, vigorously developing efficient cash crops, realizing the conversion of forest resources from service flow to value flow, creating a new ecological and green value plateau, and giving play to the advantages of economic scale on a wider scale.

Table S13. Mechanism path analysis.

	(1)	(2)	(3)	(4)	(5)	(6)
	Selabp	*Telabp*	*Hienind*	*Labliuru*	*Kejiexp*	*Markpot*
Did	5.907*	1.174***	0.042***	0.274**	0.060**	0.027***
	(3.408)	(0.236)	(0.012)	(0.110)	(0.027)	(0.005)
_Cons	33.437***	18.520***	5.414***	11.291***	6.131***	4.231***
	(10.143)	(0.700)	(0.036)	(0.276)	(0.082)	(0.013)
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at the county level	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	16 700	16 700	27 818	27 832	9 917	27 832
R^2	0.338	0.606	0.936	0.602	0.823	0.990