# Study on the Influence Degree of Domestic Counties' Integration into Metropolitan Area under "Internal Circulation"

## -- A Case Study of Counties in Hefei Metropolitan Area

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## Abstract

**With the development of national strategy in the new era, President Xi put forward the strategy of dual cycle development at home and abroad, which has had a lot of impact on the development of many cities in China. In particular, the strategy of "internal circulation" has affected the development of metropolitan areas. At the same time, all counties have also ushered in a new trend of development. Based on the four aspects of the county-level GDP, industrial output value, geographical location and household disposable income in the early stage of the development of Hefei metropolitan area in Anhui Province in 2016, this paper uses econometric methods such as multiple linear regression to analyze the influencing factors affecting whether the adjacent counties can be included in the metropolitan area. For counties close to urban areas, many new plans will affect their development. Geographical location, culture, history and policy development are the main influencing factors of county development. This paper mainly focuses on the change and development of Feidong and Feixi counties in Hefei metropolitan area. Based on the model, the geographical location, culture, history and policy.**

## Keywords

**County Development; Internal Circulation; Metropolitan Area; Geographical Location and Measurement Model.**

## 1. Introduction

Metropolitan area is an advanced form of the evolution of urban regional spatial form, and it is also a spatial phenomenon that occurs when the regionalization of large cities develops to a certain stage in the process of urbanization [5]. With the advancement of economic globalization and the establishment of information society, metropolitan area has become a type of spatial combination of urban groups with universal significance all over the world. It is also a basic unit for a country and region to participate in global competition [4].

The strategic positioning of Hefei metropolitan area is to build a metropolitan area with Hefei as the center, an important growth pole of Anhui economy and an important influence in the country. Advocate innovation, pay attention to coordination, advocate green, plant thick and open, and promote sharing. Focus on new display, integrated circuit, software, quantum communication, cloud computing, big data, electronic special equipment, digital audio and video, etc., to build a world-class electronic information industry cluster and an innovative metropolitan area with great influence in China [8]. Therefore, the establishment of metropolitan area can be developed, which is conducive to the complementary advantages of urban areas, but the research on the development of counties is not comprehensive. In particular, the influence of geographical factors seems to be the highest.

The county is the bridge between cities and towns and the promoter of urbanization. After the county is incorporated into the metropolitan area, it can share resources among cities. Under the promotion of the policies of industrial division, complementary advantages, economic growth, increased consumption capacity and internal circulation, the county can sell its products in the Metropolitan area and develop in a virtuous circle of economy. Whether the county can be incorporated into the metropolitan area is an important obstacle restricting the county's sharing of resources. The study of the factors affecting the county's integration into the metropolitan area is of great significance to the county's development.

It is not difficult to guess by observing the distribution of Hefei metropolitan area. The key factor for the inclusion of counties in the metropolitan area is geographical location. The counties closer to the development center are highly likely to be included in the metropolitan area. Thus,This paper takes the geographical location factor as the explanatory variable, plus three control variables of GDP, disposable income and gross industrial product of each county to analyze the influencing factors.

## 2. Literature Review and Review

The existing research on the spatial evolution and spatial structure of metropolitan area mainly has two dimensions: the spatial pattern of physical region and the relationship of urban functional network. The former regards the physical region of the metropolitan area as a whole "surface", and reveals the spatial pattern characteristics of the metropolitan area by analyzing the geographical distribution of the material spatial elements of the metropolitan area. The latter regards the cities and towns in the metropolitan area as "nodes" and analyzes the spatial structure characteristics of the metropolitan area from the dimension of functional network relationship based on socio-economic statistics or stream spatial data.

From the perspective of "entity regional space", geographical proximity plays a leading role in regional spatial connection [7]. Because the high concentration of population, economy and other factors is the basic spatial characteristics of cities and towns in metropolitan area, existing studies analyze the spatial structure characteristics of cities and towns in metropolitan area, such as centrality, core hinterland relationship and so on, through the attribute indicators such as urban population, land scale and economy, based on the classical central place theory and core edge theory.

Yao Shimou and Nian Fuhua systematically studied the pattern and main characteristics of China's urban agglomeration, and proposed that networking is an ideal model for the development of urban agglomeration [10]; Gu Chaolin and Pang Haifeng analyzed the spatial structure and connection state between cities in China based on gravity model [11]; Niu Xinyi and others analyzed the spatial structure characteristics of Shanghai metropolitan area from the perspective of functional connection through the commuting connection between cities [12]; Luo Chengshu and Cheng Yushen defined the spatial scope of Hangzhou metropolitan area by using the universal gravitation model and field strength model, which are the core area, tight layer, semi tight layer and loose layer [13]; Chen Xiaohua and others analyzed the spatial pattern of metropolitan area development on the basis of urban flow, and concluded that the main development prospect of metropolitan area is based on the regional development center and affected by administrative planning [2]. Most scholars' research on the metropolitan area is mostly based on the analysis of the spatial pattern, the relationship between the region and the development center, the development prospect and the development future. There is little research on the counties within the metropolitan area. How to be included in the metropolitan area, what elements should be basically met in order to be included in the metropolitan area, share the development resources in the metropolitan area, and then develop their own economy.

This paper mainly studies the county integration conditions, factors and influence intensity in the metropolitan area. Provide a demonstrable road for the development of the county. Select the economic evidence of Feidong and Feixi counties in Hefei metropolitan area after integration, and speculate the integration factors and influence according to policy research.

## 3.　Model Setting

### 3.1.　Data Management

#### 3.1.1.　Data Sources

**Table 1.** Statistical data of counties and cities in Anhui Province in 2016 city

| city | Is it included in the metropolitan area | GDP | Disposable income of residents (10000 yuan) | Gross industrial product (10000 yuan) | Distance from provincial capital (km) |
|---|---|---|---|---|---|
| Changfeng | 1 | 400.06 | 16149 | 745.52 | 73.8 |
| Feidong | 1 | 528.69 | 17813 | 1049.07 | 23.7 |
| Feixi | 1 | 605.02 | 18143 | 1287.66 | 14.5 |
| Lujiang | 1 | 245.32 | 15769 | 229.77 | 14.5 |
| Suixi | 0 | 253.23 | 10600 | 566.22 | 238.9 |
| Woyang | 0 | 247.44 | 9899 | 226.03 | 208.3 |
| Mengcheng | 0 | 240.29 | 10849 | 201.01 | 172.1 |
| Lixin | 0 | 192.75 | 9799 | 143.09 | 174.1 |
| Dangshan | 0 | 175.01 | 10128 | 315.85 | 300.4 |
| Xiao | 0 | 242.57 | 9856 | 345.57 | 270 |
| Lingbi | 0 | 186.87 | 9968 | 293.68 | 204.9 |
| Si | 0 | 171.33 | 9497 | 168.41 | 197 |
| Huaiyuan | 1 | 262.45 | 12732 | 590.6 | 124.6 |
| Wuhe | 1 | 180.41 | 12660 | 309.75 | 156.1 |
| Guzhen | 1 | 190.2 | 12802 | 486.31 | 163.3 |
| Linquan | 0 | 171.4 | 9344 | 155.52 | 224.9 |
| Taihe | 0 | 211.73 | 10028 | 471.36 | 192.5 |
| Funan | 0 | 145.6 | 9328 | 200.51 | 181.2 |
| Yingshang | 0 | 226.72 | 9826 | 294.21 | 128.7 |
| Fengtai | 1 | 231.1 | 12185 | 14.28 | 105.7 |
| Shou | 1 | 142.45 | 9236 | 106.49 | 88.2 |
| Laian | 1 | 141.12 | 10810 | 55.69 | 110.1 |
| Quanjiao | 1 | 128.07 | 11207 | 36 | 101.8 |
| Dingyuan | 1 | 166.38 | 10220 | 34.65 | 90.1 |
| Fengyang | 1 | 167.94 | 9617 | 51.01 | 120.8 |
| Huoqiu | 1 | 215.15 | 9327 | 201.74 | 102.4 |
| Shucheng | 1 | 172.62 | 10019 | 254.49 | 36.1 |
| Jinzhai | 1 | 96.95 | 9269 | 60.92 | 110.1 |
| Huoshan | 1 | 156.47 | 11175 | 361.16 | 84.9 |
| Dangtu | 1 | 297.26 | 20029 | 760.01 | 126.9 |
| Hanshan | 1 | 136.57 | 15607 | 311.99 | 82.2 |
| He | 1 | 149.68 | 15658 | 360.26 | 107.9 |
| Wuhu | 1 | 214.54 | 18947 | 636.45 | 125.3 |
| Fanchang | 1 | 247.1 | 18805 | 740.48 | 128.4 |
| Nanling | 1 | 205.54 | 18751 | 364.13 | 132 |
| wuwei | 1 | 371.29 | 15340 | 757.33 | 91.8 |
| Langxi | 0 | 119.75 | 13070 | 261.68 | 202.2 |
| Guangde | 0 | 202.84 | 15145 | 441.11 | 233.5 |

| Jing | 0 | 89.88 | 11989 | 144.4 | 177.4 |
| Jixi | 0 | 60.83 | 11051 | 64.56 | 247.2 |
| Jingde | 0 | 35.75 | 10732 | 30.1 | 225.1 |
| Zongyang | 0 | 205.4 | 10190 | 391.56 | 123.9 |
| Dongzhi | 0 | 143.04 | 12432 | 211.28 | 190.1 |
| Shitai | 0 | 23.83 | 8759 | 14.33 | 181 |
| Qingyang | 0 | 87.07 | 13056 | 174.9 | 152.1 |
| Huaining | 0 | 194.3 | 12345 | 454.17 | 127.5 |
| Qianshan | 0 | 137.1 | 9874 | 232.03 | 143 |
| Taihu | 0 | 106.31 | 9521 | 211.08 | 170.1 |
| Susong | 0 | 165.16 | 9615 | 278.23 | 213.4 |
| Wangjiang | 0 | 108.36 | 9711 | 214.86 | 194.9 |
| Yuexi | 0 | 82.62 | 9598 | 178.38 | 133.5 |
| Xi | 0 | 143.01 | 12790 | 199.63 | 254.3 |
| Xiuning | 0 | 78.5 | 12707 | 84.18 | 254.5 |
| Yi | 0 | 28.43 | 12912 | 26.48 | 226.7 |
| Qimen | 0 | 58.34 | 12706 | 53.64 | 234.2 |

The data in this paper are mainly from the statistical yearbook of Anhui Province in 2016, including the statistical data of total industrial output value of 55 cities and counties such as Changfeng County, Feidong County and Feixi County, the GDP in the economic statistical analysis of cities and counties and the disposable income of residents in the living conditions of urban and rural residents in cities and counties, as well as the linear measurement geographic data of distance in Baidu map.

### 3.1.2. Data Setting

This paper mainly studies whether the county can be included in the development of metropolitan area. Therefore, in order to facilitate the model, this paper sets a dummy variable [1]. If it has been included in Hefei metropolitan area, it will be set as number 1, and if it cannot be included, it will be set as number 0 Make model estimation and assumptions.

The explanatory variable Y is a dummy variable, and whether it can be included in the metropolitan area. The explanatory variables are the GDP value of each county in 2016, the gross industrial product, the disposable income of residents and the distance from the provincial capital X1, X2, X3 and X4. The main explanatory variables are geographical location and the rest are control variables.

**Table 2.** Variant description table

| Variable properties | concrete content | Letter setting |
|---|---|---|
| *Explained variable* | Whether to be included in metropolitan circles | **Y** |
| *Explanatory variable* | Distance from the provincial capital | **$X_4$** |
| *control variable* | GDP, industrial GDP and residents, disposable income | **$X_1, X_2, X_3$** |

### 3.1.3. Model Setting

By making graphical regression decisions on explanatory variable X4 and the explanatory variable y, as shown in the following figure, it can be found that: when y is 1, the values of X4 are more than 120. Knowing the content of each explanatory variable, it can be found that y is 1 that is incorporated into the Metropolitan, 0 that is a failure to be incorporated into the metropolitan, and thus, it can be obtained that the more proximal the prefecture is to be

incorporated into the metropolitan, the less likely the more distant the prefecture is to be incorporated into the metropolitan. It could be judged that there was a correlation between the two.
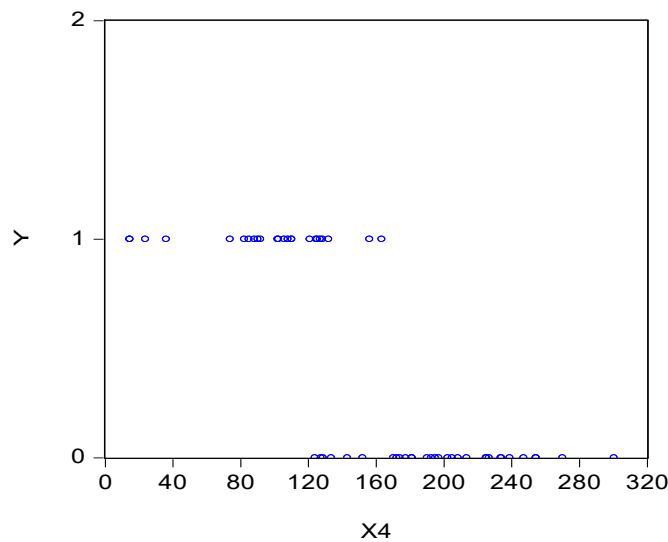


**Figure 1.** Correlation plot

Through the above related analysis, we first do the related regression analysis between the explanatory variables and the explanatory variables.

Let the model be:

$$I = \beta 0 + \beta 1 * X4$$

Model checking was performed using the logistics model:

**Table 3.** Graph of results from model fitting of geographic factors

|  | B | Standard error | Wald | freedom | Significanc | Exp(B) |
|---|---|---|---|---|---|---|
| Distance (km) from the provincial capital | -.076 | .023 | 10.972 | 1 | .001 | .927 |
| constant | 10.568 | 3.135 | 11.363 | 1 | .001 | 38858.315 |
|  |  |  |  |  |  |  |

Available

$$I = 10.568 + 0.076 * X4$$

**Table 4.** Model test

| step | log likelihood | Cox Snell r square | Negorkor r.f |
|---|---|---|---|
| 1 | 24.355a | .604 | .810 |

After a fit test we can see from the data above that with R ^ 2 = 0.604, the model fits better, with a t-statistic probability of 0.0001, at a 90% significance level, indicating a significant effect of location.

Thus we can judge that: far and close proximity to Hefei is an important factor that influences whether or not the urbanicity can be incorporated, basically plays a determining role.

Next, we put the three control variables into model setting sequentially for testing, setting the model as logistic regression model, ε For the random perturbation term, β Correlation coefficient for each dependent variable, the larger the absolute value of the correlation coefficient, the higher the impact of the inclusion metropolitan area.

$$Y = \beta_0 + I + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \varepsilon$$

After performing model regression:

**Table 5.** Regression effect table of equation variables

|  | B | Standard error | Wald | freedom | Significance | Exp(B) |
|---|---|---|---|---|---|---|
| Distance from provincial capital (km) | -.093 | .036 | 6.624 | 1 | .010 | .912 |
| GDP | .021 | .019 | 1.248 | 1 | .264 | 1.022 |
| Disposable income of residents (10000 yuan) | .001 | .001 | 3.126 | 1 | .077 | 1.001 |
| Gross industrial product (10000 yuan) | -.010 | .008 | 1.599 | 1 | .206 | .990 |
| constant | -3.976 | 7.244 | .301 | 1 | .583 | .019 |

According to the analysis of the observation table, the distance from the provincial capital is the most influential factor, and the correlation coefficient is close to 1, which has a great correlation. It is inversely proportional to whether it can be included in the metropolitan area. The farther away from the central city, the less likely it is to be included in the metropolitan area. On the contrary, the closer it is to the central city, the more likely it is to be included in the metropolitan area. The second major factor is the level of GDP development of the county itself. The higher the GDP level of the county itself, the greater the possibility of being included in the metropolitan area, and the higher the contribution level to the economic development in the metropolitan area.

Economic test of the model:

**Table 6.** Model fitting effect

|  |  | R^2 | LR | T | T-P |
|---|---|---|---|---|---|
| **EXPLANATORY VARIABLE** | X4 | 0.683793 |  |  |  |
| **CONTROL VARIABLE** | X1 | 0.705811 | 53.18484 | 1.211797 | 0.2256 |
| **CONTROL VARIABLE** | X2 | 0.775539 | 58.43910 | 1.521343 | 0.1282 |
| **CONTROL VARIABLE** | X3 | 0.801061 |  |  | 0.2040 |

By analyzing the above table and only observing the column R ^ 2, we can find that after the control variables are gradually incorporated into the model, the higher the fitting degree of the model will be for each additional control variable. After all variables are incorporated into the

model setting and fitted, the following numerical analysis is obtained. It can be found that the fitting degree is the highest after all control variables are incorporated into the model setting, It is concluded that explanatory variables and control variables have an impact on whether the county can be included in Hefei metropolitan area.

After model setting:

List the influence factors separately:

**Table 7.** Coefficient analysis table

| coefficient | variable | | | | | Influence direction |
|---|---|---|---|---|---|---|
| C(2) | X1 | 0.012020 | 0.010829 | 1.110067 | 0.2670 | Positive direction |
| C(3) | X2 | 0.000815 | 0.000462 | 1.765592 | 0.0775 | Positive direction |
| C(4) | X3 | -0.005666 | 0.004460 | -1.270259 | 0.2040 | opposite direction |
| C(5) | X4 | -0.053560 | 0.019673 | -2.722572 | 0.0065 | opposite direction |

From the positive and negative analysis coefficients in the above table, it can be concluded that the higher the GDP of each county, the greater the possibility of being included in Hefei metropolitan area, and the two have a positive impact; Similarly, the disposable income of residents and whether the county can be included in the metropolitan area also have a positive impact, while the two variables of industrial added value and distance have the opposite impact on the inclusion of Hefei metropolitan area. The farther away from Hefei, the more difficult it is to be included in Hefei metropolitan area, but the total industrial output value has the opposite impact. The reason for this situation is unclear, but some ideas can also be guessed. With the rapid development of the tertiary industry, the impact of industry is getting lower and lower. The influencing factors included in Hefei metropolitan area may have a higher correlation with the development of service industry in each county [3].

## 3.2. Development Results --Feixi and Feidong are the Main Examples

Feixi County has a total area of 1961 square kilometers and a permanent resident population of 746000. In 2016, the GDP of Feixi County reached 60.5 billion yuan, ranking first among the 61 counties (cities) in Anhui Province. It is the largest economic County in Anhui and the only county or city in Anhui that has been listed among the top 100 counties in China for eight consecutive years.

Feidong County has a total area of 2181 square kilometers and a permanent resident population of 863000. In 2016, the GDP of Feidong County reached 52.87 billion yuan, ranking second among 61 counties (cities) in Anhui Province. It is the second largest economic County in Anhui. At the same time, it has been ranked among the "top 100 counties of national scientific development" for five consecutive years.

In 2019, the GDP of Feidong County was 65.568 billion yuan, ranking first. The permanent resident population is 905000, and the per capita GDP of Feidong County is 63657 7 yuan; The per capita disposable income of the whole people is 32275 yuan, including 40854 yuan in urban areas and 25516 yuan in rural areas; The fiscal revenue was 7.198 billion yuan, including 4.58 billion yuan in local fiscal revenue and 3.43 billion yuan in tax revenue;

In 2019, the GDP of Feixi County was 80.386 billion yuan, ranking second. The permanent resident population is 790100, and the per capita GDP of Feixi County is 11013.8 billion yuan. The per capita disposable income of the whole people is 33671 yuan, including 43209 yuan in

urban areas and 26062 yuan in rural areas. The fiscal revenue is 8.222 billion yuan, including 5.07 billion yuan of local fiscal revenue and 3.84 billion yuan of tax revenue.

From the above data, it can be concluded that the county is very conducive to economic development after being included in the metropolitan area. Comparing the GDP in 2019 and 2016, it can be found that the GDP has nearly doubled in three years, which is almost the development result of eight years from 2000 to 2008. It can be imagined that the inclusion of the metropolitan area has a great beneficial impact on the development of the county.

## 4. Conclusion

Through the analysis of the above data and the logical combing of the whole article, we can draw the following conclusions, hoping to enlighten the current county economic development in China:

one Geographical location is the decisive factor for whether it can be included in the metropolitan area. At present, China's development strategy is to continue to develop in the East, rise in the middle and develop the West. Relatively speaking, the country's resources are inclined to the East and West. The middle is weak, which is not conducive to economic progress. However, there are many economic centers in the central region, such as Nanjing, Wuhan and Changsha, which are among the top cities in China, The development of the surrounding counties can rely on these economic centers to share resources and industrial division to promote economic development. However, in order to achieve rapid economic development, each county should choose a development center close to itself and highly affected by the central economy. Distance has always been a decisive factor in whether it can be included in the metropolitan area.

two County GDP development is also one of the key factors. If the county's own economic development level can not keep up, do not look for a development center with a large gap, otherwise it will not keep up with the economic development speed of the development center. At the same time, its own economic level is low and its industrial integration with the center is low, which can not reach the industrial adaptation of the two, which will continue to widen the economic gap.

three The impact of industrial output value is relatively small. At present, the service industry plays a major role in the industrial structure of developed countries. Later, if the county wants to be included in the development of similar metropolitan areas, it should focus on developing its own service industry and increase the proportion of service industry.

four The consumption level of residents also plays a major role. The level of disposable income of residents in an area affects the local consumption level. Only the local consumption level continues to improve and occupies a favorable position in demand sales. The consumption level in the county is high. After being incorporated into the development of metropolitan area, the consumption of high-quality goods will have a more market to promote the economic development of the county and meet the demand.

Therefore, if all counties want to be included in the metropolitan area, especially the counties in Anhui, these four factors can be used as a reference. At the same time, I hope this article can bring us some thoughts and benefits.

## Acknowledgments

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