# Whether Fixed Investment in Cities Can Still Boost Urban Economic Growth

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**Abstract:** This paper uses the panel data of Chinese cities from 1993 to 2017 to examine the impact of urban fixed asset investment on urban economic growth at different stages. The study found that from 1993 to 2017, China's urban fixed asset investment promoted economic growth, and the promotion effect was an “N” change. Further analysis shows that the higher the city's administrative level, the less obvious the role of fixed asset investment in promoting economic growth; Fixed asset investment in eastern and central cities has no significant driving effect on economic growth, while fixed asset investment in western cities has a strong economic growth effect. In addition, the stage of economic growth, national policy orientation, the size of urban capital stock, and the degree of industrialization all have an impact on the economic growth effect of fixed asset investment. Based on the conclusions of the study, this article puts forward policy recommendations to improve the efficiency of urban fixed asset investment.

## 1. Introduction

Classical economics believes that capital is an important driving force for economic growth, so the economic growth effect of investment has always been a focus of attention for economists. China, as a developing country with the fastest economic growth, is especially so. China's economic growth is based on the industrialization, urbanization, and marketization based on the continuous transfer of surplus labor. High investment as an inevitable result of this growth model has become the core driving force of economic development (Li Yang, Yin Jianfeng, 2005). Fixed asset investment as an important way of capital accumulation has a positive effect on China's regional economic growth (Zhang Xueliang, 2012). In fact, as early as 1992, research by American scholars De Long and Summers at the national level showed that there was a significant positive correlation between fixed asset investment and economic growth. It is worth noting, however, that the importance of urban economic growth has become increasingly apparent as China's economic growth has shifted from an industrial economy as the main driver to a common industrial economy and a common urban economy (i.e., “production-city integration”). (Wang Guogang, 2010). Especially in the case of diverse urban growth models, different growth stages, and various fixed asset investment scales, can urban investment effectively promote economic growth? As the margins of urban economies of scale decline, the labour force pool recedes year by year, and the birth rate declines and the ageing of the population worsens, the demographic dividend may soon disappear, and the problem of inadequate regional development imbalances is likely to intensify. In this regard, the report of the “19th National Congress” puts forward the strategic measure of “building the urban pattern of coordinated development of large, medium and small cities and small towns with the urban group as the main body”. Therefore, exploring the economic growth effect of investment at the urban level is not only a reflection on china's traditional urban economic growth model, but also a discussion of China's urban growth strategy in the future.

Foreign scholars' discussion on the relationship between fixed asset investment and economic growth, mainly include: The first is the negative impact of economic growth on fixed asset investment. For example, Vanhoudt (1994) thinks that rapid economic growth leads to rapid capital formation, and there is a reverse relationship between economic growth and fixed asset investment demand; As a result of the study of Podrecca and Carmec (2001), there is a two-way relationship

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between fixed asset investment and economic growth; The second is the positive impact of investment on economic growth. The findings of more studies support the view of De Long and Summers (1992) that investment has a significant one-way causal relationship between economic growth and that rapid economic growth is driven by high investment rates or high capital formation rates reflected in equipment investment. Third, on the basis of the De Long and Summers (1992) studies, the analysis of fixed assets in specific categories is carried out. For example, state-level research in the United States has shown that fixed asset investment in infrastructure can increase total output, stimulate private investment, and increase employment, thereby promoting economic growth (Garcia-mila et al, 1996). However, Rong et al (2016) found that with the growth of real estate fixed assets, it has promoted the rise of domestic house prices, which has led to a higher profit margin for real estate investment, enticing other non-real estate industries to turn to real estate investment, thereby inhibiting manufacturing innovation Power and hinder economic growth.

Many domestic scholars have explored the relationship between the two at the national level. The research of Pu Xiaosong and Chen Wei (2009) shows that there is a one-way causal relationship between the two, and fixed asset investment can effectively promote economic growth. Further, Liu Jinquan et al. (2002) studies that fixed asset investment has a one-way Granger influence on real GDP during the period of economic fluctuation. In the contraction phase of the economy, there is a two-way influence between the fluctuation component of fixed asset investment and real GDP. In addition to national-level research, domestic scholars also conduct empirical analysis at the provincial level, and the results show that fixed asset investment can promote economic growth (Wang Kaiqing, 2009; Xie Heng et al., 2013). Unlike the above point of view, many scholars have combined the development process of our country and questioned the promotion of fixed asset investment. Xu Xianchun et al. (2013) through the analysis of statistical indicators found that although the contribution rate of fixed asset investment to economic growth is on the rise, but with the expansion of the total scale of fixed asset investment, most industrial capacity has been saturated or surplus, structural imbalance has become a major obstacle to economic development of a major contradiction. In addition, although real estate investment in fixed assets can promote the rapid development of the national economy as a whole, as the proportion of real estate investment in fixed asset investment deviates from the optimal structure, it has a significant inhibitory effect on financial efficiency and is not conducive to economic growth (Peng Yu Super, 2018; Fan Desheng, etc., 2019).

It is not difficult to find from the above research that although the economic growth effect of fixed asset investment exists objectively, with the evolution of economic growth in stages, investment may hinder sustained economic growth. In addition, most of the existing literature from the national or state, provincial level experience analysis, but also lack of urban research literature, it is important to consider that the political system as an important factor affecting economic growth, in the administrative level and investment under the joint effect of investment may have differences in the impact of investment on economic growth (Li Weiru, 2014; River Boat, etc., 2018). Therefore, on the basis of the analysis of urban panel data, this paper further explores the heterogeneity of different cities at different administrative levels from the perspective of administrative level. In addition, imbalances in regional development may also widen differences in urban economic growth. Therefore, this paper also analyzes the heterogeneity of cities in the east, middle and west. By comparing the analysis of the results of the static regression model and the dynamic regression model, the static individual time double fixed effect model is finally used for econometric analysis. The heterogeneity of the effect of fixed asset investment on different periods and different types of cities is compared longitudinally, and whether the urban fixed asset investment is answered Can also promote the problem of urban economic growth. The article's text framework is as follows: The second part is the measurement analysis method, data source and processing process; the third part is the analysis of the measurement results, including the comparison of the results of different estimation methods, as well as the time-sharing and grouped estimates. Analysis of the main reasons for different regression results, and finally the main conclusions and attempts to give policy recommendations.

## 2. Models and Data

### 2.1 Econometric Model

First, based on Islam's (1995) macroeconomic growth model, a panel data model is constructed that includes the city's real GDP growth rate, real fixed asset inventory, real GDP lagging by one period, and other control variables. The basic measurement model is designed as follows:

$$growth_{it} = C + \alpha Uis_{it} + \beta X_{it} + t + i + \omega_{it} \quad (1)$$

Where *i* is the city, *t* is the year, *C* is the intercept term, t is used to control the time-fixed effect, i is the hard-to-observe city fixed effect, and $\omega_{it}$ is a random error term. $growth_{it}$ represents actual GDP as the explanatory variable for this article; $Uis_{it}$ represents the actual fixed asset stock and is the core explanatory variable of this article. $X_{it}$ includes 6 control variables: $\ln gdp_{i(t-1)}$ indicates the lagging real GDP logarithm, which is used to control the time path dependence of urban economic growth; $gh_{it}$ is the population growth rate to control the impact of the labor force; $fdi_{it}$ indicates the proportion of FDI, which is used to control the impact of the degree of urban economic openness; $inv_{it}$ represents the proportion of fixed assets investment of city *i* in year *t*, which is expressed by the proportion of fixed capital investment in GDP to control the influence of city on the investment strength of fixed assets; $urban_{it}$ is the urbanization rate, which is used to control the impact of the development process of urbanization; $Psi_{it}$ is the proportion of the secondary industry of *i* city in year *t*, which is used to control the impact of urban industrial structure.

### 2.2 Estimation Method

This paper starts from the static model and ignore the individual heterogeneity of samples before formal regression. First, this article estimates pool model, individual fixed effect model and individual random effect model. The Chow test (F test) and Hausman test were used for model setting. The original hypothesis of Chow test is pool model, and the alternative hypothesis is variable intercept model (including fixed and random). The test statistic of Chow test is 2.49, rejecting the original hypothesis at 1% significance level. Similarly, the original hypothesis of the Hausman test is the Random model, and its alternative hypothesis is the Fixed model. The test statistic is 403.92. The original hypothesis is rejected at a 1% confidence level. Therefore, the results of model setting tests indicate the need to establish individual fixed-effect models. In addition, according to the data results, the panel data model in this paper is 228 individuals and 25 periods. There is likely to be unobservable heterogeneity among individuals, which also supports the conclusion that the individual fixed effect model is more reasonable than the Pool model. Furthermore, since the period is as high as 25, this article introduces a time term through a dummy variable to determine the existence of the fixed effect of time. The results show that after the introduction of temporal dummy variables, there are more than 2 temporal dummy variables, so this paper considers that there is a time effect. Finally, in this paper, a dual-fixed-effects model of time cities is established. To avoid the problem of heteroscedasticity, the standard error of clustering at the individual level of cities is adopted. In order to examine the impact of past economic growth on the current period, this paper further constructs a dynamic panel model. Through the further analysis of the dynamic panel model, it is found that the results of one period lag of the explained variables are not significant, and the core explanatory variables in the results are basically consistent with the results of the static regression model. Therefore, the static double fixed effect model is selected for the final time division and group estimation.

### 2.3 Data Processing

The data used in this article covers the panel data of 228 prefecture-level cities and above in China from 1993 to 2017. The main indicators and data sources and processing are as follows:

(1) Stock of fixed assets. This article refers to the calculation method of Liu Changqing and other scholars in the article “Measurement of Capital Stocks in Chinese Prefectures and Above”, and calculates the fixed assets of each city from 1993 to 2017. Then use formula $K_t = K_{t-1}(1-\delta) + I'_t$

to get the actual fixed asset stock. Where $\delta$ is the average depreciation rate; $I'_t$ is the average fixed asset investment in the previous three years; $I'_t = (I_t + I_{t-1} + I_{t-2})/3$, $K_0$ is the initial fixed asset stock, , $K_0 = I_0 \frac{(1-\delta)}{(1+g)}$ ,of which $I_0$ is the new fixed asset investment extrapolated from the total fixed asset investment of the whole society, and g is the average annual growth rate of fixed asset investment. In order to alleviate the excessive standard deviation of the data, this article has reasonably scaled it, and the unit of the final fixed asset stock is 100 billion yuan.

(2) Urban GDP. From the statistical yearbooks of cities from 1993 to 2017, and using the base year of 1993 to deflate prices, the real GDP of each city from 1993 to 2017 was obtained.

(3) International Direct Investment (FDI). It mainly comes from EPS database, some of the missing years are supplemented by statistical yearbooks of each city, and a few of the missing years are filled with interpolation method.

(4) Other macroeconomic data mainly come from the China City Statistical Yearbook 1993 ~ 2017, the statistical yearbooks of various cities, the EPS database, and the China Statistical Yearbook 1993 ~ 2017.

## 3. Empirical Results and Analysis

### 3.1 Descriptive Statistics of the Data

The descriptive statistical results of the city panel data are reported in Table 1. Through descriptive statistical results, it can be found that from 1993 to 2017, the minimum value of real GDP growth in China's cities was -0.208, but the maximum value reached 0.452, the average value was 0.105, and the standard deviation was 0.09. It shows that from 1993 to 2017, China's actual economic growth rate fluctuated greatly and its economic growth was rapid. In addition, the minimum value of urban fixed asset stock is 0.004, the maximum value is 1.47, the average value is 0.051, and the standard deviation is 0.256. It can be found that there are large differences in fixed asset investment between cities.

Table 1 Descriptive Statistics

| Variable name | Obs | Mean | SD | Min | Median | Max |
|---|---|---|---|---|---|---|
| Real GDP growth | 5700 | 0.108 | 0.090 | -0.208 | 0.105 | 0.452 |
| Stock of fixed assets | 5700 | 0.155 | 0.256 | 0.004 | 0.051 | 1.470 |
| GDP lags by one period | 5700 | 14.824 | 1.214 | 11.997 | 14.798 | 18.104 |
| Population growth | 5700 | 0.023 | 0.077 | -0.107 | 0.007 | 0.541 |
| FDI Proportion | 5700 | 0.025 | 0.030 | 0.000 | 0.015 | 0.176 |
| Percentage of investment in fixed assets | 5700 | 0.459 | 0.265 | 0.076 | 0.409 | 1.000 |
| Urbanization rate | 5700 | 0.375 | 0.260 | 0.066 | 0.295 | 1.000 |
| Proportion of the secondary industry | 5700 | 0.480 | 0.104 | 0.216 | 0.481 | 0.791 |

### 3.2 Basic Estimation Results

First of all, according to the test results selected time city double fixed effect model, and estimate the impact of China's urban fixed asset investment on its economic growth from 1993 to 2017, the results of model (1) are reported in Table 2. Among them, [1] is the estimation result using ordinary standard error, and [2] is the estimation result using robust standard error. Considering the continuity and dynamics of economic growth, this paper further uses the dynamic SYS-GMM method to estimate the model (1). First, the one-step SYS-GMM method is used to obtain the regression results [3], and then the two-step SYS-GMM method is used to obtain Regression results [4]. In the dynamic regression model SYS-GMM method, AR(1) tests that the random error term of the reject equation does not have a first-order sequence-related hypothesis, but does not reject the hypothesis that there is no second-order sequence-related hypothesis. This shows that the random error term has a correlation in the lagging period, and there is no correlation in the lagging period, and the regression result of the dynamic regression model SYS-GMM method passes the Hansen test and has good robustness. However, the results of the lag terms of the explanatory variables in the dynamic regression model are not significant, and the symbols of the core explanatory variables in the

estimation results are consistent with the estimation results of the static regression model. Therefore, the final time period will be performed by the static time urban dual fixed effect model and group estimates.

Table 2 the Relationship Between China's Urban Fixed Asset Investment and economic growth: 1993 ~ 2017

| Explanatory variables | Static model | | Dynamic model | |
|---|---|---|---|---|
| | Common standard error | Robust standard error | One step SYS-GMM | Two step SYS-GMM |
| | [1] | [2] | [3] | [4] |
| GDP growth lag | | | -0.113<br>(-0.518) | 0.069<br>(0.369) |
| Stock of fixed assets | 0.029***<br>(4.109) | 0.029***<br>(2.958) | 0.073*<br>(1.765) | 0.098***<br>(2.692) |
| GDP lags by one period | -0.064***<br>(-17.391) | -0.064***<br>(-9.489) | 0.008<br>(0.652) | -0.001<br>(-0.111) |
| Population growth | 0.455***<br>(29.064) | 0.455***<br>(18.285) | 1.125***<br>(3.075) | 0.811***<br>(2.650) |
| FDI Proportion | -0.032<br>(-0.682) | -0.032<br>(-0.463) | -0.184<br>(-1.338) | -0.147<br>(-1.333) |
| Percentage of investment in fixed assets | 0.029***<br>(3.904) | 0.029***<br>(2.944) | 0.366***<br>(3.929) | 0.323***<br>(3.540) |
| Urbanization rate | -0.092***<br>(-12.220) | -0.092***<br>(-6.269) | -0.074<br>(-1.587) | -0.087*<br>(-1.829) |
| Proportion of the secondary industry | 0.222***<br>(12.828) | 0.222***<br>(7.091) | 0.131**<br>(2.553) | 0.113**<br>(2.155) |
| intercept | 0.926***<br>(17.970) | 0.926***<br>(9.924) | -0.065<br>(-0.433) | 0.058<br>(0.491) |
| Fixed time | Yes | Yes | Yes | Yes |
| City fixed | Yes | Yes | Yes | Yes |
| F value | 142.560*** | 147.390*** | -- | -- |
| R-Square | 0.448 | 0.448 | -- | -- |
| Wald test | -- | -- | 867.850*** | 858.700*** |
| AR (1) | -- | -- | -3.940*** | -3.270*** |
| AR (2) | -- | -- | -0.460 | 0.360 |
| Hansen | -- | -- | 19.640 | 20.040 |
| Number of samples | 5700 | 5700 | 5472 | 5472 |

Note: (1) *, **, *** indicate significant levels of 10%, 5%, and 1%, respectively;

(2) T statistics in brackets;

(3) The following table is the same.

The results in Table 2 indicate that China's urban fixed asset investment promoted economic growth from 1993 to 2017; Through the estimation results of static regression model and dynamic regression model, it is found that the growth rate of real GDP will increase by about 0.03 ~ 0.1 unit for each unit of growth of real fixed asset stock under the condition of other conditions unchanged. Investment in fixed assets, as an important part of national economic accounting, has a negligible driving effect on macroeconomics and microeconomics. For the macro economy, investment in fixed assets can generate demand and supply effects, thereby affecting the balance of the macro economy. On the one hand, investment in fixed assets means a new round of purchase of means of production and means of living, which can further expand the total demand of society and bring the demand effect of investment. On the other hand, the completed fixed assets will be put into production and operation, providing products and services to the society, thereby expanding the total social supply. Under the interaction of supply and demand, the macroeconomic aggregate tends to be balanced and the national economy achieves growth. For the micro-economy, investment in fixed assets directly affects industrial development. As an important means for the optimization and adjustment of China's industrial structure, fixed asset investment can not only effectively promote the rapid development of the industry, but also promote coordinated development among industries, effectively improve investment efficiency, and promote economic growth. The regression results of

other control variables also showed significant promoting effects.

(1) The GDP of each city in the last period has a negative effect on the economic growth of this period. It shows that the higher the level of economic development of a city in the previous year, the slower the economic growth of the city in that year, and there is a convergence feature of the overall economic growth. (2) The regression results show that the population growth rate is positively related to the economic growth rate, and the population growth rate can reflect the growth rate of the labor force. On the one hand, for cities, the spatial accumulation of labor forces and economies of scale are mutually causal, and the rapid growth of labor forces has effectively promoted this interaction. On the other hand, with the continuous deepening of China's labor market reform, the mobility and competitiveness of the labor market are also increasing, and the increased labor force improves the matching frequency of the labor market and realizes the continuous promotion of economic growth. (3) Urbanization rate is negatively correlated with economic growth. With the rapid improvement of urbanization level in China, most cities have reached a higher level of urbanization. According to previous studies, the negative effects of excessive urbanization will offset the economic effects of investment, thus hindering economic growth. (4) The increase in the proportion of the secondary industry is conducive to economic growth. The industrial division among regions leads to obvious differences in the proportion of the secondary industry in each city. Although the proportion of the tertiary industry in the first tier cities such as Beijing, Shanghai and Guangzhou is higher, the overall industrial development in China is still dominated and the development speed of the tertiary industry is relatively slow. In addition, the manufacturing industry in the secondary industry has made faster technological progress than the service industry. Therefore, it is easier to increase the economic growth rate of the region through the secondary industry. (5) The regression results of FDI proportion are not significant. This may be caused by the measurement error of FDI, which will not be discussed in depth here, because it does not affect the regression results of the core variables in this paper. In short, the basic regression results show that urban fixed asset investment has a significant promotion effect on its economic growth. However, this result can only show that in the long run, urban fixed asset investment can promote economic growth, while the different development stages of cities, the differences of policy orientation between cities, urbanization, degree of industrialization and geographical conditions and other factors may affect the regression results, resulting in the spatial heterogeneity of the impact of fixed asset investment on economic growth.

### 3.3 Estimated Results At Different Stages

First, this article integrates the process of China's economic growth, national policy orientation, and the division of China's industrialization stage by Zhao Changwen et al. (2015) to further classify the samples. China's accession to the WTO in 2001 and China's entry into a critical period of industrialization in 2012 have had a significant impact on China's economic growth. In addition, these two years are also a critical period for China's economic policy-oriented transformation. Therefore, this paper divides the data into three phases, which are 1993 ~ 2001, 2002 ~ 2012 and 2013 ~ 2017. In order to investigate the impact of urban fixed asset investment on economic growth in different stages, this paper estimates the three stages respectively, and the results are reported in Table 3. Among the three periods, fixed asset investment can promote economic growth, but the degree of promotion is different. The specific performance is as follows: (1) From 1993 to 2001, fixed asset investment had a positive impact on economic growth. The coefficient is 0.251, and it is significant at the level of 1%, indicating that for every unit increase in the actual fixed asset stock, the actual GDP growth rate will increase by 0.251 units. (2) The impact of fixed asset investment on GDP growth was significant from 2002 to 2012. However, at the 10% level, the coefficient and the significant level decrease, which indicates that the promotion of fixed asset investment on economic growth is weakening. (3) From 2013 to 2017, fixed asset investment was significant at the level of 1%, and its driving effect on economic growth was further improved, but the coefficient was still smaller than the first stage. At this stage, the regression coefficient of the two is 0.134. For each increase in the actual fixed asset stock, the actual GDP growth rate will increase by 0.134 units.

Comparing the results of the segment inspection, it can be found that from 1993 to 2017, there was a long-term promotion effect of fixed asset investment on economic growth, and the degree of contribution to economic growth approximated an “N” change. Fixed asset investment has the strongest effect on economic growth in the first stage. The promotion effect in the second stage reached the weakest. Starting from the third stage, the promotion effectiveness has picked up, but it still does not exceed the first stage. This may be the result of the post-2013 supply-side reforms delaying the diminishing marginal effect of fixed asset investment.

Table 3 Investment in Fixed Assets and Economic Growth: Comparison of Different Development Stages

| Explanatory variables | 1993-2001 | 2002-2012 | 2013-2017 |
|---|---|---|---|
| | [5] | [6] | [7] |
| Stock of fixed assets | 0.251*** (3.426) | 0.042* (1.677) | 0.134*** (4.842) |
| GDP lags by one period | -0.079*** (-7.242) | -0.172*** (-7.933) | -0.230*** (-6.769) |
| Population growth | 0.453*** (14.218) | 0.339*** (7.695) | 0.087 (1.150) |
| FDI Proportion | 0.190* (1.839) | -0.050 (-0.374) | 0.180 (0.538) |
| Percentage of investment in fixed assets | -0.041 (-1.448) | 0.008 (0.486) | 0.035 (0.998) |
| Urbanization rate | -0.122*** (-5.965) | -0.047 (-1.162) | -0.079 (-1.221) |
| Proportion of the secondary industry | 0.197*** (3.479) | 0.539*** (10.166) | 0.102* (1.708) |
| intercept | 1.163*** (7.462) | 2.355*** (7.726) | 3.612*** (6.891) |
| Fixed time | Yes | Yes | Yes |
| City fixed | Yes | Yes | Yes |
| F value | 147.190*** | 61.580*** | 18.350*** |
| R-Square | 0.493 | 0.327 | 0.186 |
| Number of samples | 2052 | 2508 | 1140 |

For a long time, China has promoted economic growth through “stable investment” and achieved remarkable results. As the core component of China's investment, fixed asset investment is not only the main channel of government direct investment, but also an important means of macro-control. Therefore, fixed asset investment is closely related to the process of economic growth and policy orientation. From 1993 to 2001, China's economic growth potential is huge. As the leading force of economic growth, investment can effectively and continuously promote China's economic growth. And during this period, China's level of fixed assets development was low, and investment space was large, so the investment efficiency of fixed assets was better. Since 2002, with China's accession to the WTO, China's opening-up has increased significantly, and the process of market-oriented reform has accelerated. With the reduction of tariff concessions and reduction of non-tariff barriers, domestic consumption demand has increased rapidly. Since China's entry into the WTO, China's traditional advantageous industries have been fully developed, such as household appliances and textile light industries, which have obvious benefits. They have quickly occupied the international market, effectively increased China's total exports, and won a large trade surplus. At this time, China's economy has developed to a certain degree. The “troika” can simultaneously promote economic growth, and the role of consumption and net exports has become increasingly significant, and the promotion effect of investment is relatively weak. Moreover, 2002-2017 is the middle and later stage of China's industrialization process, and the industry is gradually transforming into technology intensive and high value-added industries. The demand for entrepreneurial environment,

innovation factors and high-quality talents is higher in this period, and the ability of fixed asset investment to promote economic growth will decline. Therefore, with the acceleration of the economic growth process and the optimization and upgrading of the industrial structure, the average promotion effect of China's fixed asset investment on economic growth from 2002 to 2017 was not as good as before. Further analysis of the effect of fixed asset investment on economic growth since 2002 found that national policy orientation also has a negligible impact on the relationship between the two. This can be done from two important components of fixed asset investment-- Specific analysis of infrastructure investment and real estate investment, And explain the difference between the second and third phases of the role of fixed asset investment in promoting economic growth.

First, from the perspective of infrastructure construction. In 2002, the 16th National Congress of the Communist Party of China proposed “two unwavering”, including “it must be unwavering to encourage, support and guide the development of the non-public ownership economy.” The successful transformation and upgrading of the private economy has become an important part of China's market economy, making China's economic growth no longer mainly driven by government-led infrastructure construction projects. In this case, the contribution of fixed asset investment to economic growth has declined, and the driving effect on the economy is naturally not as good as before. With the strong support of the state, 2002 ~ 2012 has become the “golden decade” for the development of private economy, with the most rapid development trend. At this time, the gross national product created by the non-public ownership economy reached 60% of the gross domestic product in 2012. And the employees of private enterprises are more than 80% of the national total. The number of new posts has reached 90% of the country's total (Zhuang Congsheng, 2018). Therefore, in the period of 2002 ~ 2012, the promotion effect of fixed asset investment on economic growth is the lowest. It is worth noting that in 2008, the four trillion investment plan and active fiscal policy were implemented successively. China acquires key technologies from developed countries, the means of investing heavily in high-margin infrastructure will stimulate economic growth. However, due to the long payback period of infrastructure investment, the investment benefit is finally reflected in the period of 2012 ~ 2017, It shows that the promotion effect of fixed asset investment on economic growth in the third stage is higher than that in the second stage. Secondly, from the perspective of real estate investment, national policies also play a role. From 2002 to 2012, China's market economy was not perfect. The rapid development of the real estate industry and the rapid growth of housing prices have weakened the investment effect of fixed assets. The increase in real estate prices has made its profit margins much higher than in other traditional industries, Crowded out a lot of financial resources, Most of the credit funds go to the real estate sector. In this case, the cost of traditional fixed asset investment has risen significantly. Therefore, the increase in the cost of traditional fixed asset investment has generally weakened the investment effect of fixed assets, leading to the lowest contribution of fixed asset investment to economic growth between 2002 and 2012. With the introduction and implementation of “strengthening real estate credit management” and “stabilizing house prices” policies, and the continuous improvement of China's market economy, the weakening effect has gradually decreased. Real estate investment has also become the core component of China's fixed asset investment, which can effectively drive the economy increase. At this time, the promotion effect of fixed assets on economic growth has picked up. Therefore, the promotion effect of fixed asset investment on economic growth in the third stage is higher than that in the second stage.

By analyzing the results of the piecewise regression, it is found that the process of national economic growth and government policy orientation can affect the economic growth effect of urban fixed asset investment. It is worth noting that cities, as important economic units in China, have obvious heterogeneity in economic growth. China's economy grew rapidly from 1993 to 2017, and the differences between cities have gradually widened. The economic growth effect of fixed asset investment in cities with different administrative levels may be quite different. Therefore, it is necessary to further explore the impact of administrative levels.

### 3.4 Estimated Results At Different Administrative Levels

Fixed asset investment not only needs the support of government financial funds, but also needs the government's preferential policies for related industries. With different administrative levels, cities will enjoy different government support. The regression results by time period found that, China's overall policy orientation will have an impact on the economic growth effect of urban fixed asset investment. Then government support and preferential policies for different cities cannot be ignored. Therefore, in order to examine the impact of urban administrative hierarchy, This article further divides cities into two levels: Cities below the provincial capital and cities above the provincial capital, Classification and regression were performed, and the results are reported in Table 4. It can be seen that the impact of fixed asset investment on economic growth in cities below the provincial capital and cities above the provincial capital is significantly different. For cities below the provincial capital, the promotion effect of fixed asset investment on economic growth is more obvious, However, fixed asset investment in provincial capitals and above has no significant impact on economic growth.

Table 4 Investment in Fixed Assets and Economic Growth: Comparison of Different Cities

| Explanatory variables | Below provincial capital | Provincial capital and above |
|---|---|---|
| | [8] | [9] |
| Stock of fixed assets | 0.018* | 0.000 |
| | (1.782) | (-0.049) |
| GDP lags by one period | -0.071*** | -0.041*** |
| | (-17.599) | (-3.124) |
| Population growth | 0.451*** | 0.424*** |
| | (26.075) | (12.190) |
| FDI Proportion | -0.058 | 0.113 |
| | (-1.115) | (1.070) |
| Percentage of investment in fixed assets | 0.031*** | 0.049*** |
| | (3.821) | (2.688) |
| Urbanization rate | -0.107*** | -0.081*** |
| | (-13.204) | (-2.808) |
| Proportion of the secondary industry | 0.294*** | -0.121** |
| | (15.414) | (-2.573) |
| intercept | 0.981*** | 0.815*** |
| | (17.509) | (4.348) |
| Fixed time | Yes | Yes |
| City fixed | Yes | Yes |
| F test | 126.41*** | 22.440*** |
| R-Square | 0.455 | 0.520 |
| Number of samples | 4925 | 700 |

Cities with provincial capital and above include municipalities directly under the central government, sub-provincial cities, and provincial capital cities. Cities below the provincial capital are ordinary prefecture-level cities. Due to differences in growth goals and administrative powers between cities at different levels, There are also differences in the level of fixed asset inventory and investment intensity. In general, the investment intensity and stock of fixed assets in China are provincial capitals and above, which are better than those below provincial capitals. Investment in fixed assets requires the guidance and direct input of a large amount of financial funds, as well as policy support for related industries. Provincial capitals and above enjoy more direct preferential policies and fiscal investment. However, with the increasing investment in various regions in recent years, The level of fixed asset development in provincial capitals and above has become saturated. As a result, fixed asset investment can no longer be the dominant force for economic growth in such cities. For cities below the provincial capital, There is still much room for improvement in the level of development of fixed assets. Easier to stimulate economic growth in the region through direct

government investment and policy support, Therefore, the promotion effect of fixed asset investment in such cities is more obvious. Through the above analysis, we can find that, Administrative level is a factor that cannot be ignored in urban economic growth. Under the background of imbalanced development of China's economic regions, different distribution areas of cities may also be a source of differences in economic growth between them. Therefore, it is necessary to further analyze cities in different regions.

### 3.5 Regression Results in Different Regions (East, Mid, West)

According to the three regions, the city data is divided into east, middle and west. The regression results by region indicate, The impact of urban fixed asset investment on the economic growth rate in the eastern, central, and western regions between 1993 and 2017 was quite different. It can be seen that urban fixed asset investment in the eastern and central regions has no significant impact on economic growth; and for cities in the western region, at a significant level of 1%, fixed asset investment has a positive effect on economic growth, the regression coefficient is 0.085. For the western region, For every unit of increase in the stock of real fixed assets, Real GDP growth will increase by 0.085 units This shows that cities in the western region have better investment benefits and greater investment space.

Table 5 Investment in Fixed Assets and Economic Growth

| Explanatory variables | East | Central | Western |
|---|---|---|---|
| | [10] | [11] | [12] |
| Stock of fixed assets | 0.015<br>(1.155) | 0.023<br>(1.485) | 0.085***<br>(2.670) |
| GDP lags by one period | -0.053***<br>(-7.428) | -0.101***<br>(-7.575) | -0.054***<br>(-5.097) |
| Population growth | 0.443***<br>(10.025) | 0.406***<br>(8.432) | 0.560***<br>(15.029) |
| FDI Proportion | 0.024<br>(0.288) | 0.199<br>(1.157) | 0.291<br>(1.240) |
| Percentage of investment in fixed assets | 0.012<br>(0.948) | -0.032<br>(-1.241) | 0.014<br>(0.744) |
| Urbanization rate | -0.040***<br>(-2.811) | -0.175***<br>(-6.968) | -0.079***<br>(-4.016) |
| Proportion of the secondary industry | 0.154***<br>(2.961) | 0.319***<br>(5.792) | 0.275***<br>(6.250) |
| intercept | 0.820***<br>(7.870) | 1.435***<br>(7.842) | 0.712***<br>(4.861) |
| Fixed time | Yes | Yes | Yes |
| City fixed | Yes | Yes | Yes |
| F value | 146.800*** | 86.890*** | 26.780*** |
| R-Square | 0.451 | 0.484 | 0.530 |
| Number of samples | 2375 | 1625 | 800 |

Since the reform and opening up, the development of the eastern and central regions of China is more rapid, while the development of the western regions is relatively backward. The difference in industrial structure is the most negligible difference between eastern, central and western regions. This will further affect the relationship between China's urban fixed asset investment and economic growth. For the eastern and central regions, the degree of industrialization is higher, the leading industries in the economy have gradually transformed into high-tech, high-value-added manufacturing industries, which have higher requirements for innovation elements and the entrepreneurial environment. The driving effect of investment in fixed assets on the economy is no longer significant. The industrialization process in the western region followed in the eastern and central regions. Its fixed assets have greater investment space and will bring more obvious benefits.

## 4. Robustness Test

Combining the above regression results, this article finds that although China's urban fixed asset investment can promote economic growth in general, but for different types of cities, the effect of fixed asset investment on economic growth is different. It is worth noting that fixed assets in different cities not only have different effects on economic growth, but also have different depreciation rates. Generally speaking, Depreciation of fixed assets is closely related to the economic situation and technological level of a region. The faster the economic growth rate or technological change, the more frequently fixed assets will be replaced. Therefore, the fixed asset depreciation rate is not constant in space. To ensure the reliability of the estimation results, eliminate the possibility of deviation caused by "one size fits all" depreciation rate of fixed assets between provinces. This paper uses Jia Runsong et al. (2014) to estimate the fixed asset depreciation rate of each province, and calculates the fixed asset stock again. Specifically, replace $\delta$ in formula $K_t = K_{t-1}(1-\delta) + I'_t$ of the fixed asset inventory calculation formula in this article, which is the average fixed asset depreciation rate of each province, with the fixed asset depreciation rate of each province in which the city is located, and estimate the above regression again. Based on the regression results in Table 6, this paper finds that the recalculated effects of urban fixed asset stocks on economic growth still show a significant positive effect, indicating that the benchmark results in Table 2 are robust. At a significant level of 1%, urban fixed asset investment can effectively promote its economic growth, with a coefficient of 0.02. It shows that under other conditions unchanged, for every unit increase in the actual fixed asset stock, the actual GDP growth rate will increase by 0.02 units.

Table 6 Investment in Fixed Assets and Economic Growth: Robustness Test

| Explanatory variables | Common standard error | Robust standard error |
|---|---|---|
| | [13] | [14] |
| Stock of fixed assets | 0.020*** (3.694) | 0.020*** (2.632) |
| GDP lags by one period | -0.065*** (-17.549) | -0.065*** (-9.819) |
| Population growth | 0.449*** (28.903) | 0.449*** (18.298) |
| FDI Proportion | -0.029 (-0.612) | -0.029 (-0.412) |
| Percentage of investment in fixed assets | 0.033*** (4.345) | 0.033*** (3.285) |
| Urbanization rate | -0.097*** (-12.651) | -0.097*** (-6.475) |
| Proportion of the secondary industry | 0.233*** (13.245) | 0.233*** (7.362) |
| intercept | 0.941*** (18.077) | 0.941*** (10.252) |
| Fixed time | Yes | Yes |
| City fixed | Yes | Yes |
| F value | 141.800*** | 146.460*** |
| R-Square | 0.450 | 0.450 |
| Number of samples | 5625 | 5625 |

## 5. Conclusions and Policy Recommendations

For a long time, "stable investment" has been an important means for China to promote economic growth. Not only promoted the economic growth at the national level, but also played an important role in urban economic growth. As a core component of China's investment, fixed asset investment has become an important means of government macro-control. With the continuous development of

urban fixed asset levels, the acceleration of urbanization, and the growing differences between cities, this article explores the impact of Chinese urban fixed asset investment on economic growth. Taking 228 prefecture-level cities and above from 1993 to 2017 as a sample, Using the static time urban dual fixed effect model, the effect of different periods and types of urban fixed asset investment on economic growth is empirically tested. First, based on urban panel data from 1993 to 2017, this article finds that China's urban fixed assets can promote economic growth. Secondly, the results of further phased regression show that, from 1993 to 2017, the promotion effect of fixed asset investment on economic growth was similar to an “N” change, and the degree of promotion in different periods was affected by the process of China's economic growth and national policy orientation. In this context, this article analyzes the effect of urban fixed asset investment on economic growth at different administrative levels. It is found that the higher the administrative level, the lower the role of fixed asset investment in promoting economic growth. For cities in different regions, the effect of fixed asset investment on the economic growth of cities in the east and central regions is no longer obvious, but it still has a good role in promoting the economic development of cities in the west.

In short, the role of Chinese urban fixed asset investment in economic growth is mainly affected by the process of economic growth, national policy orientation, the level of fixed asset development, and the degree of industrialization. Investment in fixed assets requires not only a large amount of financial funds, but also policy support for related industries. Therefore, the efficiency of such projects should be given high attention. According to the research results in this article, the driving effect of urban fixed asset investment on economic growth in China in the early stage was more obvious, However, with the acceleration of China's economic growth process and the continuous improvement of fixed assets in various regions, in recent years, the effects of investment in fixed assets in China's cities on economic growth have not been as good as before. In order to further realize the positive impact of fixed asset investment on urban economic growth, improve its investment efficiency, and promote the scientific and effective growth of urban economy, this article proposes the following policy recommendations based on the results of the study: (1) Local governments should correctly understand the impact of economic growth, national policy orientation, the level of fixed asset development and the degree of industrialization, and choose an investment speed that is compatible with fixed asset investment. (2) For different types of cities, there should be differences in the direction of investment in fixed assets, to reverse the inertia of stimulating economic growth by continuously expanding investment, and to formulate investment policies consistent with the development of the city.

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