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An Investigation into Real Estate Investment and Economic Growth in China: A Dynamic Panel Data Approach

Yu Kong [1,*], John L. Glascock [2] and Ran Lu-Andrews [2]

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[1] School of Public Affairs, Chongqing University, No. 174 Shazhengjie, Shapingba District, Chongqing 400030, China
[2] Center for Real Estate and Urban Economic Studies, University of Connecticut, 2100 Hillside Rd, Storrs, CT 06269, USA; John.Glascock@business.Uconn.edu (J.L.G.); Ran.Lu-andrews@business.uconn.edu (R.L.-A.)
* Correspondence: kongyu@cqu.edu.cn; Tel.: +86-135-9435-1017; Fax: +86-23-6510-2591

Abstract: Using a dynamic panel data approach to analyze national-level and province-level data in China from 2000 to 2012, this paper studies how real estate investment affects Chinese economic growth. We find that real estate investment has significantly positive contemporaneous effects on economic growth on both national and regional levels. Surprisingly, we also find that real estate investment has negative lagged effects on economic growth. Such negative lagged effects differ among the three regions we investigated: the eastern region shows the most significant effects from real estate investment; while the middle region shows the least. Further examinations of the four types of real estate investment (*i.e.* housing investment, office building investment, investment for commercial and business purposes, and other investment) show that housing investment exhibits the most influence on the economy in China. Additionally, we find that the four types of real estate investment exhibit significantly negative lagged effects on Chinese economic growth and there are regional differences in the repressive effects of the four types of real estate investments on economic growth.

Keywords: real estate investment; economic growth; regional difference; dynamic panel data model

1. Introduction

In the mid and late 1990s, the Chinese government released a series of documents on deepening reforms of the housing system. The documentations specified policies and measures for the development of housing commercialization and construction. Since then, the Chinese real estate industry has progressed rapidly, and its contribution to the national economy has become increasingly important. According to the National Bureau of Statistics of China, investments in real estate development accounted for 4.58% of GDP in 1999 [1]. In 2012, this figure grew tremendously to 13.8% [2]. Meanwhile, the real estate industry took a dominant position in the new round of investment growth. Among the 19 industries included in the statistics, the real estate industry comes in second for its proportion of fixed asset investment, preceded only by the manufacturing industry [3].

As a result, the economic stimulating function of China's real estate investment has gained universal recognition. It is estimated that the contribution from real estate investment to the economic growth in China rose from 0.78% in 2000 to 1.86% in 2007 [4]. However, Chen [5] argues that it is misguided to think that real estate investment stimulates the economy. He suggests that real estate investment is not the reason but the result of economy and politics. Thus, how to view the relationship

between real estate investment and economic growth in China has garnered attention from both regulatory authorities and academic circles.

As we acknowledge that real estate investment is a crucial part of the economy, there has not been a consensus in the previous literature on the impacts of real estate investment on economic growth. Mainly, there are three schools of literature that address the relationship between real estate investment and economic growth in China. The first school focuses on the impact of real estate investment on economic growth. They suggest that real estate investment has a positive impact on economic growth. Liu [6] finds that real estate investment facilitates Chinese economic growth mainly in the short run; while the long-term equilibrium adjustment is not significant. Tang *et al.* [7] report that the fluctuation of real estate investment positively influences GDP growth and the stimulating function lasts in the long run.

The second school concentrates on the impact of economic growth on real estate investment. They suggest that economic growth leads to an increase in real estate investment. Shen and Liu [8] analyze time-series data on investment in real estate development and GDP in China for the period of 1986–2012. They find that GDP has a unidirectional impact on the investment in real estate development. Its tendency is decisive to the development of the real estate industry. Recently, Kuang [9] studies the interaction relationships among real estate investment, real estate credit and economic growth, using data on 35 large/medium-sized cities in China from 1996 to 2007. He shows that the influence of economic growth on real estate investment is greater than the influence of real estate investment on economic growth. This result is consistent with that of Shen and Liu [8].

The third school combines the views of the former two schools. It argues that real estate investment and economic growth mutually reinforce each other. For example, Liu *et al.* [10] find that the influence of housing investment on economic growth is stronger than that of non-housing investment in the short term. Housing investment influences economic growth in the long term; while economic growth has long-term influence on both housing investment and non-housing investment. Pi and Wu [11] suggest that there was a bilateral causal relationship between real estate development and economic growth from 1994 to 2002 in China.

Our research is motivated by the constant debates among these three schools in the literature. We focus on how real estate investment affects economic growth in China in both contemporaneous and lead-lag settings. Empirically, we use a dynamic panel data approach to test the relationship between real estate investment and economic growth with Chinese country-level and province-level data. Additionally, we also examine the regional differences of the effects from real estate investment to economic growth. Furthermore, to the best of our knowledge, our study is the first to investigate the relationships between different types (*i.e.* housing investment, office investment, investment for commercial and business purpose, and other investment) of real estate investment and economic growth. We expect that our research effort will provide further and more detailed evidence to the existing literature.

Using panel data on GDP per capita (a proxy for economic growth) and real estate investment from 2000 to 2012 in China, we find evidence to support the first school of literature that there is a significantly positive contemporaneous impact from real estate investment on economic growth. Also, we find remarkable differences in the three regions (*i.e.* eastern, middle, and western) of China. We show that, in the regions of eastern China and western China, the positive contemporaneous impact from real estate investment on economic growth remains significant; while, in middle China, the positive impact becomes insignificant. However, when we examine the lagged effect of real estate investment on economic growth, we find surprising results. Real estate investment from the prior year has a significantly negative impact on the economic growth in the subsequent year. Among all three regions, only eastern China exhibits significantly negative lagged effects from real estate investment and economic growth. The other two regions show negative effects, though insignificant.

By dissecting real estate investment types, we find that housing investment plays the most important role in economic growth. Both eastern China and Western China show significant

contemporaneous positive effects of housing investment on economic growth, but the effect is not significant in middle China. Real estate investment for commercial and business purposes also has a significant contemporaneous positive effect on economic growth for the whole country, and the eastern and western regions. There are significant negative lagged effects on economic growth from all four types of real estate investment (*i.e.* housing investment, office building investment, real estate investment for commercial and business purpose, and other investment) for the whole country. We also find there are regional differences in the repressive effects of the four types of real estate investments on economic growth. More specifically, both housing investment and real estate investment for commercial and business purposes have a significantly negative lagged impact on economic growth in eastern China, and only the results for real estate investment for commercial and business purposes showing lagged effects in western China remain consistent. However, results regarding the lagged effects of all four types of real estate investment are insignificant in middle China.

Our research contributes to the existing literature by providing new evidence to support the argument that real estate investment has an impact on economic growth. We find consistent results that there is a significantly positive contemporaneous effect of real estate investment on economic growth as found in previous research. Moreover, we find a significantly negative lagged effect of real estate investment on economic growth.

The paper is organized as follows. Section 2 provides a literature review. Section 3 outlines the empirical model, definitions of variables, data sources and the methodology. Section 4 reports and analyzes the empirical results. The conclusions are drawn in the final section.

2. Literature Review

There is a constant debate on the role of real estate investment in the economy in both developed and developing countries. Some economists think that real estate investment represses economic growth. The main opinion is that real estate investment, especially aimed at improving residential dwellings, can be regarded as a form of social welfare and security expenditure. When lacking in capital, such investments will be a burden for economic growth. In support of this view, Wells [12] points out that real estate investment is far less important than manufacturing because of its low rate of return. The investment should be minimized as much as possible, and improvements in housing should only be made once economic growth reaches a certain stage. Mills [13]came up with a similar conclusion. He uses 1929–1983 data to investigate the rate of return of American housing investment. He finds that the return from housing investment is about half of that of non-housing investment. Therefore, he thinks that current housing investment is excessive and will bring about improper capital allocation, withholding American economic growth.

However, since the 1970s, more researches have recognized the driving function of real estate investment in economic growth. Turin [14,15] analyzes 1955–1965 statistics of the major economic entities at that time, finding the construction industry (including infrastructure and real estate development) has made a contribution of 5%–8% to the GDP growth in developed countries, which is higher than the 3%–5% made in developing countries.

Green [16] utilizes 1959–1992 American quarterly data of housing investment, non-housing investment and GDP to conduct the Grange Causality Test. He shows that increasing housing investment has a unidirectional contribution to economic growth. Economic growth is not the reason for the increase in housing investment; while non-housing investment is not the reason for economic growth. However, economic growth is the reason for the increase in non-housing investment. Hereafter, Coulson and Kim [17] reach a similar conclusion. They use the multi-variable auto regression model to examine the influences of housing and non-housing investment on GDP based on American 1959–1997 quarterly data. They find that, compared to non-housing investment, housing investment has greater influence on GDP.

Recently, Dynan, Elemndorf and Sichel [18] find that the macro economy becomes less sensitive to investment following financial innovation and loose financial controls in America. Yet, housing

investment still has a relatively significant influence on GDP. Meanwhile, some studies emphasize the significant influence of real estate investment on economic growth, but not the unilateral function of real estate investment in economic growth. For example, Miles [19] applies the VAR model to study the long-term interaction between housing investment and the macro economy using U.S. data from 1959 to 2007. He finds that housing investment plays an essential role in the American business cycles.

Some researches involve inverse study and bilateral causal relationships. For instance, Kim [20] analyzes the 1970–2002 yearly proportion of real estate investment of GDP and tests for Granger Causality in South Korea. He finds that the proportion of real estate investment of GDP falls after the 1997 financial crisis, and GDP is the Grange cause for real estate investment, not vice versa. Wigren and Wilhemsson [21] find similar results when they study 1980–2004 panel data of the 14 countries in Western Europe. They show that housing investment and economic growth have a long-term bilateral causal relationship.

In recent years, studies on the relationship between real estate investment and economic growth of Chinese scholars have blossomed. Mainly, there are three different views. The first view insists that real estate investment unidirectionally influences economic growth (for example, see [6,7]). The second view suggests that economic growth unidirectionally influences real estate investment (for example, see [8,9]). The third view argues that there is a bilateral causal relationship between real estate investment and economic growth (for example, see [10,11]).

Lately, some Chinese studies have extended the examination to the regional level. Huang *et al.* [22] analyze province-level data for the period of 1997–2006. They find that real estate investment has some effect on economic growth but with regional differences. The contribution and influence in the eastern region are the greatest; while the western region shows the smallest contribution and influence, with the middle region lying in the middle. The stimulating effect of real estate investment on economic growth relies on the development of the regional economy. At the national level, as well as in eastern and western regions, economic growth can lead to a change in real estate investment. Yet, in the middle region, the effect of economic growth on real estate investment is not significant.

Lv [23] starts an empirical test of the influence of real estate investment on local economic growth by analyzing 1996–2009 data of the 10 provinces and municipalities in eastern China. The results demonstrate that real estate investment stimulates economic growth in eastern China with its investment and industrial radiation effects. However, such a growth effect is not quite obvious and is inferior to the effects of human capital formation, material capital investment and the development of international trade at the time.

Chen [24] stresses that the influence of real estate investment on economic growth depends on the scale of cities. She chooses indices of population, built-up area and economic scale which are closely related to city scale, and sorts 70 Chinese large-and-medium-sized cities into groups by scale using the cluster analysis method of the panel data with multiple indexes. Based on the data of 1998–2009 of China's 70 large and medium sized cities, she establishes a panel data model to analyze the relationship between real estate investment and economic growth. She finds that the stimulating function of real estate investment is weak in large cities, but strong in medium/small cities.

Upon reviewing the related literature, we do not see a consensus on the relationship between real estate investment and economic growth. Some disagreements may arise due to empirical issues, such as different data sets and different methodologies. Our research fits into the existing literature by taking into account the dynamic effect of real estate investment on both national and regional levels in terms of real estate investment scale and real estate investment structure. We hope that our effort can provide better understanding of the impact of real estate investment on economic growth.

3. Data and Methodology

3.1. The Basic Model

To examine the dynamic effect of real estate investment on economic growth in different regions, we take provinces, municipalities and autonomous regions of China as cross-section units and then sort all of them into three cross-sections: the eastern, middle and western regions. We shall use the 2000–2012 panel data to construct a dynamic panel data model to investigate the dynamic effect of real estate investment on economic growth in various regions in China. We establish the following quantitative analysis model in accordance with the existing research and practical situations of China:

$$\ln gdp_{i,t} = \alpha_0 + \alpha_1 \ln gdp_{i,t-1} + \alpha_2 \ln rei_{i,t} + \alpha_3 \ln rei_{i,t-1} + \alpha_4 X_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where $gdp_{i,t}$ is the economic growth of province i during year t; $rei_{i,t}$ is the real estate investment (According to the definition of investment in real estate development by statistical yearbook released by National Bureau of Statistics of the People's Republic of China, investment in real estate development refers to the investment by the real estate development companies, commercial buildings construction companies and other real estate development units of various types of ownership in the construction of house buildings, such as residential buildings, factory buildings, warehouses, hotels, guesthouses, holiday villages, office buildings, and the complementary service facilities and land development projects, such as roads, water supply, water drainage, power supply, heating, telecommunications, land leveling and other projects of infrastructure. It excludes the activities in simple land transactions.) of province i during year t; $X_{i,t}$ is a vector of control variables that are associated with economic growth, which are specified later. In the regression analysis, we use the natural logarithm of both economic growth and real estate investment. We use the lagged variables of economic growth and real estate investment to control for the influences stemming from the existing conditions of the economy.

In our study, we use the natural logarithm of GDP per capita as proxy for economic growth. We choose the logarithm of completed volume of real estate developing enterprises to reflect real estate investment as a result of the late initiation of the real estate industry and the fact that our real estate industry is far behind the balanced stocking and increment market conditions of developed countries. Control variables used in existing research mainly include: material capital investment, human capital investment and development of international trade. Meanwhile, studies in the late 1990s indicate that factors like infrastructure construction and expansion of urbanization can be important to the relationship between real estate investment and economic growth [25]. Therefore, in our analysis, control variables $X_{i,t}$ include macro control variables, infrastructure variables, and other control variables. Macro control variables include material capital, human capital, opening up and government behaviors. Infrastructure variables include length of railway and road. Other control variables primarily consider the degree of urbanization and financial development.

Table 1 shows the control variable notations and definitions.

Table 1. Control Variable Definitions.

Variable	Name	Definition
K	Physical capital	Capital stock/GDP
L	Human capital	Average years of education × quantity of labor force
Open	Open strategy	Total export-import volume/GDP
Govern	Government behaviors	Government expenditure/GDP
Rail	Rail mileage	Natural logarithm of the rail mileage
Road	Highway mileage	Natural logarithm of the highway mileage
Urban	Urbanization	non-agricultural population/total population
Findev	Financial development	Loan Balance of Financial Institutions/GDP

Further, we divide real estate investment into four categories according to the China Statistical Yearbook [2]. The four categories are housing investment, office building investment, real estate investment for commercial and business purposes and other investment. The categorization provides us with the opportunity to study the regional influences of real estate investment in various categories on economic growth within the real estate investment framework. Thus, we also apply Equation (1) to the four categories on both national and regional levels.

3.2. Data Source

We obtain relevant data from Database of China Statistical Yearbook, and China Statistical Yearbook for Regional Economy [2,26,27]. Primarily, we obtain data on economic growth and real estate investment of 30 provinces, municipalities and autonomous regions of China (We abandon the Tibetan statistics due to lack of materials) for the period of 2000–2012. The nominal variables are adjusted into actual values by the provincial Consumer Price Index of the corresponding year. The base period year of Consumer Price Index is 2000. Next, we calculate the natural logarithm of economic growth, real estate investment, real estate investment in all four categories, and the mileages of road and railway from control *i*.

Table 2 shows the summary statistics of the variables used in our analysis. The sample period is from 2000 to 2012. *gdp* is a proxy for economic growth. *rei* is real estate investment. *hi* is housing investment; *oi* is office building investment; *ci* is investment for commercial and business purpose; *qita* is other investment. K is the physical capital, calculated as capital stock/GDP. L is human capital, calculated as average years of education × quantity of labor force. Open is open strategy, which is Total export-import volume/GDP. Govern is a variable on government behavior, which is Government expenditure/GDP. Rail is the natural logarithm of rail mileage. Road is the natural logarithm of highway mileage. Urban is a proxy for urbanization, which is calculated as non-agricultural population /total population. Findev is a proxy for financial development, which is calculated as Loan Balance of Financial Institutions/GDP.

Table 2. Summary Statistics.

Variable	Observation	Mean	Std. Dev.	Min.	Max.
gdp	390	8.5229	1.0051	5.5797	10.7057
rei	390	5.9471	1.2897	3.3251	8.4402
hi	390	5.5702	1.3187	1.8956	8.0859
oi	390	2.5393	1.4363	−2.5215	5.7011
ci	390	3.8412	1.2602	0.0994	6.5905
qita	390	3.8677	1.3675	0.6048	6.8285
K	390	9.5218	0.8706	7.3586	11.4522
L	390	9.6005	0.8398	7.0935	11.0640
Open	390	0.3283	0.4125	0.0357	1.7214
Govern	390	0.1773	0.0789	0.0691	0.6121
Rail	390	7.6514	0.7475	5.2983	9.1590
Road	390	11.1465	0.8890	8.3663	12.5896
Urban	390	35.386	16.1877	14.46	89.76
Findev	390	1.0617	0.4953	0.0748	7.7283

3.3. Dynamic Panel Data Methodology

Real estate investment can stimulate economic growth, and economic growth in return improves real estate investment. This means that the two may have a bilateral causal relationship. Once there is an inverse causal relationship between economic growth and real estate investment, the endogeneity problem with empirical models is inevitable. Apart from that, the lagged dependent variables of this empirical model will lead to the interaction between explanatory variables and random disturbances

(meaning that explanatory variable is endogenous). The endogeneity problem of explanatory variables is always an important factor in the deviation of estimated empirical model parameters.

In order to mitigate the endogeneity problem with explanatory variables, Arellano and Bond [28] propose to use instrumental variables (IV) to deduce the generalized method of moments (GMM) of corresponding moment conditions, namely Difference GMM. The basic idea of the method is: eliminating the individual fixed effect by proceeding with first difference of regression equation in the first place. Then, the lagged variable will be regarded as the corresponding instrumental variable of endogenous variables in the difference equation. It is absolutely clear that the validity of this method depends on the reliability of the first differenced lagged variable as the instrumental variable.

However, Arellano and Bover [28] and Blundell and Bond [29] point out that using first differenced lagged variable to construct the instrumental variable often follows weakened instrumental variables, leading to serious deviation of limited samples. Based on that, they propose a systematic GMM estimation method of instrument variables constructed by difference and level variable information, simultaneously. This method introduces a level equation on the basis of the first difference equation to construct a double equation system. The introduction of the level equation not only effectively increases the instrumental variable of the difference equation, but also turns its lagged variable into an instrumental variable as the corresponding variables of the level equation. This method makes use of more sample information, which will be more efficient than Difference GMM in the common situations. Therefore, we will apply the systematic GMM estimation method for the dynamic panel data model.

Besides, the dynamic panel GMM estimation can be divided into one-step and two-step estimations in accordance with different choices of weight matrix. Bond *et al.* [30] suggest that, with limited samples, the standard error of two-step GMM estimation value will have a remarkable downward bias. Such bias will decrease after the adjustment of Windmeijer [31]. However, this adjustment will lead to unreliable approximate asymptotic distribution of two-step GMM estimation, and that is why we often use one-step GMM estimations in empirical applications. Therefore, we will utilize one-step system GMM and make the small samples' adjustment for estimations. However, the validity of parametric estimation depends on the instrumental variable selection. As one-step GMM cannot examine whether the disturbances are sequentially auto-correlated, this paper will use Sargan Test to verify the validity of instrumental variables.

4. Results

4.1. Unit Root Test

Before the empirical experiment, the first thing to do is to pre-analyze major variables to validate the stability of the variable sequence. To ensure the stability and reliability of the result, this paper applies several kinds of panel unit root test methods, mainly including LLC, IPS, ADF and PP test. The results are listed in Table 3.

This table shows the results of unit root test for stationality. gdp is a proxy for economic growth. *rei* is real estate investment. *hi* is housing investment; *oi* is office building investment; *ci* is investment for commercial and business purposes; *qita* is other investment. K is the physical capital, calculated as capital stock/GDP. L is human capital, calculated as average years of education × quantity of labor force. Open is open strategy, which is total export-import volume/GDP. Govern is a variable for government behavior, which is government expenditure/GDP. Rail is the natural logarithm of rail mileage. Road is the natural logarithm of highway mileage. Urban is a proxy for urbanization, which is calculated as non-agricultural population /total population. Findev is a proxy for financial development, which is calculated as Loan Balance of Financial Institutions/GDP.

Table 3. Panel Unit Root Test.

Variable	LLC	IPS	ADF	PP
gdp	−0.68762 (0.2458)	6.93613 (1.0000)	44.9471 (0.9261)	43.8830 (0.9413)
rei	−6.56346*** (0.0000)	1.96613 (0.9754)	67.1961 (0.2443)	151.072*** (0.0000)
hi	−5.30499*** (0.0000)	1.16024 (0.8770)	67.0494 (0.2482)	122.060*** (0.0000)
oi	0.57205 (0.7164)	5.28677 (1.0000)	33.0776 (0.9982)	24.6151 (1.0000)
ci	−1.50146* (0.0666)	4.62596 (1.0000)	25.5738 (1.0000)	65.8552 (0.2815)
qita	0.13893 (0.5552)	5.52261 (1.0000)	21.1741 (1.0000)	62.8335 (0.3762)
K	9.9407 (1.0000)	10.4485 (1.0000)	54.6956 (0.6693)	0.0218 (1.0000)
L	3.95765 (1.0000)	4.92667 (1.0000)	42.1124 (0.9615)	44.8214 (0.9280)
Open	−2.41072*** (0.0080)	0.05942 (0.5237)	54.4952 (0.6763)	50.4011 (0.8068)
Govern	−2.4808*** (0.0066)	1.3922 (0.9181)	47.9510 (0.8690)	47.5461 (0.8779)
Rail	3.34598 (0.9996)	4.49183 (1.0000)	39.1656 (0.9829)	108.694*** (0.0001)
Road	−4.25150*** (0.0000)	1.16636 (0.8783)	47.4364 (0.8803)	48.9685 (0.8448)
Urban	−9.19486*** (0.0000)	−0.89709 (0.1848)	57.9044 (0.5527)	30.6892 (0.9994)
Findev	−2.53451*** (0.0056)	−0.06692 (0.4733)	55.3023 (0.6478)	70.0195 (0.1766)
D *gdp*	−6.73224*** (0.0000)	−4.63100*** (0.0000)	115.061*** (0.0000)	147.255*** (0.0000)
D *rei*	−9.05362*** (0.0000)	−6.02378*** (0.0000)	140.478*** (0.0000)	146.092*** (0.0000)
D *hi*	−10.2700*** (0.0000)	−6.79295*** (0.0000)	150.753*** (0.0000)	176.585*** (0.0000)
D *oi*	−5.00025*** (0.0000)	−5.01101*** (0.0000)	126.545*** (0.0000)	282.395*** (0.0000)
D *ci*	−3.51171*** (0.0002)	−2.58356*** (0.0049)	87.9722** (0.0108)	174.719*** (0.0000)
D *qita*	−4.93456*** (0.0000)	−6.69375*** (0.0000)	150.386*** (0.0000)	366.318*** (0.0000)
DK	−7.48781*** (0.0000)	−2.79121*** (0.0026)	112.116*** (0.0001)	148.784*** (0.0000)
DL	−6.74720*** (0.0000)	−7.47492*** (0.0000)	160.530*** (0.0000)	131.687*** (0.0000)
DOpen	−13.4161*** (0.0000)	−8.93787*** (0.0000)	184.048*** (0.0000)	208.310*** (0.0000)
DGov	−16.2575*** (0.0000)	−8.8308*** (0.0000)	169.920*** (0.0000)	237.848*** (0.0000)
DLnrail	−4.02578*** (0.0000)	−6.60857*** (0.0000)	151.335*** (0.0000)	361.983*** (0.0000)
DLnroad	−19.4231*** (0.0000)	−12.0223*** (0.0000)	229.933*** (0.0000)	243.886*** (0.0000)
DUrban	−28.7362*** (0.0000)	−5.84651*** (0.0000)	110.933*** (0.0001)	198.762*** (0.0000)
DFindev	−12.6601*** (0.0000)	−9.42392*** (0.0000)	192.943*** (0.0000)	269.515*** (0.0000)

Note: *, **, *** respectively indicate significance at the 10%, 5% and 1% levels.

For every test result of the level value of time sequence variables, we cannot reject the null hypothesis of unit root. However, their first difference denies the existence of null hypothesis of unit root at the 1% level. Test results demonstrate that time sequence variables are part of an unstable I (1) process. Then, we can conduct the panel co-integration test and regression analysis of variables.

4.2. Main Results

4.2.1. Real Estate Investment on a National Level

We estimate Equation (1) using panel data of 30 Chinese provinces, municipalities and autonomous regions on a national level. Table 4 shows the results of the impacts of real estate investment on economic growth at both national and regional levels.

This table shows the regression results for the effects of real estate investment on the economic growth estimated from Equation (1). $gdp(1)$ is one-period-lagged value of GDP per capita. *rei* is real estate investment. $rei(1)$ is one-period-lagged value of real estate investment. K is the physical capital, calculated as capital stock/GDP. L is human capital, calculated as average years of education × quantity of labor force. Open is open strategy, which is total export-import volume/GDP. Govern is a variable on government behavior, which is government expenditure/GDP. Rail is the natural logarithm of rail mileage. Road is the natural logarithm of highway mileage. Urban is a proxy for urbanization, which is calculated as non-agricultural population/total population. Findev is a proxy for financial development, which is calculated as Loan Balance of Financial Institutions/GDP. The values in parentheses represent the z-statistic.

Table 4. The Effects of Real Estate Investment on Economic Growth.

Variable	Nation	Eastern Regions	Middle Regions	Western regions
$gdp(1)$	0.6583*** (8.44)	0.9919*** (14.03)	0.4805*** (2.94)	0.6165*** (8.01)
rei	0.2849*** (6.10)	0.2025*** (4.97)	0.0683 (0.48)	0.2049*** (6.27)
$rei(1)$	−0.1477*** (−2.96)	−0.1192*** (−3.08)	−0.0102 (−0.09)	−0.0420 (−1.23)
K	0.0741 (1.23)	−0.1375** (−2.13)	0.3830** (2.19)	0.1100** (2.22)
L	0.0350* (1.69)	0.0802*** (3.33)	0.0251 (0.88)	0.0682*** (3.53)
Open	0.1415* (1.73)	0.0916*** (2.80)	−0.0120 (−0.02)	0.0516 (0.42)
Govern	−0.4128 (−1.47)	−0.3844 (−0.92)	−2.2215** (−1.96)	−0.4385*** (−3.55)
Urban	0.0063* (1.85)	0.0030 (0.89)	−0.0034 (−0.37)	0.0042** (2.27)
Rail	0.1258*** (2.74)	0.0090 (0.25)	0.3141* (1.82)	0.0712* (1.68)
Road	0.0196 (1.35)	−0.0094 (−0.44)	0.1765** (2.09)	0.0197 (1.38)
Findev	−0.0300*** (−2.98)	0.0049 (0.33)	−0.0107 (−1.58)	−0.0890*** (−2.62)
Cons.	−0.2504 (−0.51)	0.3674 (0.81)	−3.8232* (−1.76)	−0.0875 (−0.23)
Wald chi2	90,442.04 (0.0000)	57,732.52 (0.0000)	15,674.29 (0.0000)	72,876.19 (0.0000)
Sargan test	44.17973 (0.1135)	46.49463 (0.3305)	22.58461 (0.1253)	50.10944 (0.2121)
Obs.	360	132	96	132

Note: *, **, *** respectively indicate significance at the 10%, 5%, and 1% levels.

Nationally, a 1% increase in GDP per capita from the previous year leads to an almost 0.66% increase in the GDP per capita in the current year. This indicates that the economic growth of the last term has an accumulating effect on current economic growth. We also find that a 1% increase of investment in real estate development leads to a 0.28% increase in the growth rate of GDP per capita, contemporaneously. This finding is consistent with the first school of literature that states real estate investment has a significantly positive effect on economic growth.

However, when we examine the lagged effect of real estate investment on economic growth, the results are surprising. We show that, at the national level, the influence of investment in real estate development has a significantly negative impact on economic growth in the subsequent year. Specifically, a 1% increase of investment in real estate development in year *t-1* results in a 0.15% decrease in GDP per capita in year *t*. This finding could indicate that real estate investment has some repression effects on economic growth in China. Our results are consistent with those of Wang and Cui [3]. They think the surplus increase of real estate investment will reduce the investment in entity economy and, thus, produces the crowding out effect. Using the Feder Model, they provide evidence that the crowding out effect of real estate investment has a negative impact on economic growth in China, and the effect is more serious in large and medium sized cities.

In addition, the results also present other interesting information on the control variables. Human capital and opening up have positive coefficients, and both of them pass the 10% significance test, indicating that human capital and opening up can remarkably improve economic growth of China. The railway mileage, which can be used for assessing the degree of infrastructure, has a positive regression coefficient and passes the 1% significance test, indicating the remarkable positive stimulating function of railway construction for economic growth. The influence of government expenditure on economic growth is negative. It even fails the 10% significance test, which indicates that government expenditure is not the reason for economic growth.

The coefficient of government fiscal expenditure/GDP, an index often used for measuring government expenditure, is a negative value. This is because that generally speaking, the influence of government expenditure on economic efficiency is mutual. If government expenditure is invested in public services including education and health and infrastructure construction, it promotes economic efficiency; if the expenditure is directed towards administration, it will result in the distortion of resource deployment and loss of efficiency.

The index for measuring financial development Findev has a negative regressive coefficient and passes the 1% level significance test, indicating financial development suppresses economic growth. This proves the idea of "destructive power of finance" referred to in existing literatures. On the theoretical front (see [32,33]), it is shown that the development of formal financial markets will fight for informal curb markets, thus reducing the volume of bank credits available for capital investment and hampering growth.

Among other control variables, urbanization level has a relatively small regressive coefficient but passes the significance test, showing a positive stimulating function for economic growth.

4.2.2. Real Estate Investment on a Regional Level

Huang *et al.* [22] suggest that real estate investment will result in economic growth whether at national or regional levels. Thus, we also test the effects of real estate investment on economic growth at a regional level in Table 4. We have divided provinces of China into three regions according to geography and their economic development level: eastern, middle and western. (Eastern region includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan, Middle region includes Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hunan and Hubei, Western region includes Inner Mongolia, Guangxi, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Sichuan and Chongqing (exclude Tibet because of data limit)). For each economic region, we use Equation (1) to analyze the relationship between investment in real estate development and economic growth.

First, economic growth in each region depends on early economic growth. From the influential coefficient of the last term of economic growth to the present economic growth, we can see that the elastic coefficient of the eastern region is 0.99, which is higher than the 0.48 of the middle region and the 0.61 of the western region. As the influence of last term economic growth on present economic development can be regarded as the result of inertia of economic growth, the eastern region then has the greatest economic growth inertia, western is low, and the middle is the least.

Second, even though the present investment in real estate development can help the present economic growth in every economic region, degrees of significance of the influence differ greatly. The present investment in real estate development in eastern and western regions both have a significant stimulating effect on economic growth, of which a 1% increase in current investment in real estate development will make the present economic growth in eastern and western regions increase about 0.2 percent, respectively; while the influence on economic growth has stimulating functions, in middle region provinces, it is weak.

Third, in all three regions, investment in real estate development shows negative influences on economic growth in the lagging phase. Among which, the eastern region has the most significant influence of investment in real estate development on economic growth in the lagging phase with an elastic coefficient of about 0.12. It also passes the 1% level significance test, indicating that every 1% increase in investment in real estate development in the lagging phase will lead to a 0.12% drop of economic growth. This figure is 0.1% higher than that of the middle region, and 0.08% higher than that of the western region. We argue that the crowding-out effect of investment in real estate development is relatively more significant in the developed cities in the Eastern region compared to western and middle regions. Meanwhile, the gap between the crowding-out effect of middle and western regions and the Eastern region reflects that the crowding out effect of real estate investment is still under control.

4.2.3. Real Estate Investment Structure on a National Level

We further our investigation by examining the real estate investment structure. We categorize real estate investment into four types: housing investment, office building investment, investment for commercial and business purposes, and other investment. We use Equation (1) for each type of real estate investment. Table 5 shows the regression results on a national level in China.

This table presents the regression results for the four types of real estate investment and their effects on economic growth at a national level. $gdp(1)$ is one-period-lagged value of GDP per capita. *rei* is real estate investment. $rei(1)$ is one-period-lagged value of real estate investment. *hi* is housing investment; *oi* is office building investment; *ci* is investment for commercial and business purpose; *qita* is other investment. K is the physical capital, calculated as capital stock/GDP. L is human capital, calculated as average years of education × quantity of labor force. Open is open strategy, which is total export-import volume/GDP. Govern is a variable for government behavior, which is government expenditure/GDP. Rail is the natural logarithm of rail mileage. Road is the natural logarithm of highway mileage. Urban is a proxy for urbanization, which is calculated as non-agricultural population/total population. Findev is a proxy for financial development, which is calculated as Loan Balance of Financial Institutions/GDP. The values in parentheses represent the z-statistic.

We can see a huge stimulating effect of housing investment, real estate investment for commercial and business purposes and other investments on present economic growth. The influence of housing investment is the greatest, with an elastic coefficient of about 0.2; the influence of real estate investment for commercial and business purposes is less, with its elastic coefficient of about 0.11; the influence of other investments is the least, with an elastic coefficient of 0.0971.

Furthermore, all four structure types of investment in real estate development have significantly negative lagged effects on economic growth nationally. Real estate investment for commercial and business purposes contributes the most to the slowing down of China's economic growth. Its elastic

coefficient is about 0.11, 0.07 and 0.05 higher than that of housing and office building investment and other investment, respectively.

Table 5. The Effects of Real Estate Investment Structure on Economic Growth on a National Level.

Variable	Housing Investment	Office Building Investment	Real Estate Investment for Commercial and Business Purpose	Other Investment
$gdp(1)$	0.6596*** (10.10)	0.6550*** (5.70)	0.7566*** (7.94)	0.6587*** (5.32)
rei	0.1995*** (6.81)	−0.0099 (−0.43)	0.1107** (2.35)	0.0971** (2.49)
$rei(1)$	−0.0722** (−2.06)	−0.0698** (−2.38)	−0.1067*** (−2.89)	−0.0508* (−1.69)
K	0.0992** (2.09)	0.4233*** (2.94)	0.1663 (1.60)	0.1561 (1.48)
L	0.0536*** (2.93)	0.0473 (1.57)	0.0561** (2.23)	0.0966*** (4.28)
Open	0.1445*** (3.17)	0.3881*** (3.08)	0.3038*** (2.57)	0.2717* (1.85)
Govern	−0.5119*** (−2.78)	−1.1210* (−1.87)	−0.8612* (−1.69)	−0.1414 (−0.22)
Urban	0.0039 (1.54)	0.0104* (1.73)	0.0087* (1.64)	0.0103* (1.65)
Rail	0.1543*** (4.10)	0.3031*** (3.93)	0.2125*** (2.91)	0.1324 (1.24)
Road	0.0031 (0.25)	0.0091 (0.43)	0.0422* (1.91)	0.0472 (1.53)
Findev	−0.0190** (−2.13)	−0.0203 (−1.04)	−0.0304* (−1.69)	−0.0406** (−2.01)
Cons.	−0.4977 (−1.22)	−3.9728*** (−4.81)	−2.3161*** (−3.16)	−1.5433* (−1.82)
Wald chi2	116,366.93 (0.0000)	41,418.60 (0.0000)	52,857.98 (0.0000)	50,450.41 (0.0000)
Sargan test	59.91145 (0.2394)	31.85921 (0.1621)	27.89424 (0.2645)	16.84062 (0.4652)
Obs.	360	360	360	360

Note: *, **, *** respectively indicate significance at the 10%, 5%, and 1% levels.

4.2.4. Real Estate Investment Structure on a Regional Level

Table 6 shows the results of the relationship between investment structure of real estate development and economic growth in the eastern region of China. It indicates that housing investment and real estate investment for commercial and business purposes in the eastern region have a remarkable stimulating effect on the economic growth in the ongoing period. The regression outcome suggests that the elastic coefficient of the influence of housing investment on economic growth is about 0.16 in the eastern region, 0.09 higher than that of business building constructions. On the contrary, office building investment and other investment in the ongoing period in the eastern region have a weak negative influence on present economic growth, but the effect is not significant.

This table presents the regression results for the four types of real estate investment and their effect on economic growth in the eastern region. $gdp(1)$ is one-period-lagged value of GDP per capita. *rei* is real estate investment. $rei(1)$ is one-period-lagged value of real estate investment. *hi* is

housing investment; *oi* is office building investment; *ci* is investment for commercial and business purposes; *qita* is other investment. K is the physical capital, calculated as capital stock/GDP. L is human capital, calculated as average years of education × quantity of labor force. Open is open strategy, which is total export-import volume/GDP. Govern is a variable for government behavior, which is government expenditure/GDP. Rail is the natural logarithm of rail mileage. Road is the natural logarithm of highway mileage. Urban is a proxy for urbanization, which is calculated as non-agricultural population/total population. Findev is a proxy for financial development, which is calculated as Loan Balance of Financial Institutions/GDP. The values in parentheses represent the z-statistic.

Table 6. The Effects of Real Estate Investment Structure on Economic Growth in Eastern Region.

Variable	Housing Investment	Office Building Investment	Real Estate Investment for Commercial and Business Purpose	Other Investment
$gdp(1)$	0.9921*** (13.26)	1.0217*** (6.94)	1.0311*** (13.39)	0.7850*** (3.31)
rei	0.1629*** (4.43)	−0.0134 (−0.69)	0.0914*** (3.75)	−0.0114 (−0.28)
$rei(1)$	−0.0910*** (−2.81)	−0.0345 (−1.48)	−0.0756*** (−2.67)	−0.0440 (−1.04)
K	−0.1261* (−1.88)	0.0284 (0.21)	−0.1280 (−1.64)	0.1296 (0.58)
L	0.0681*** (2.61)	0.0792** (2.04)	0.0810*** (3.10)	0.0738 (1.43)
Open	0.0753** (2.11)	0.2048*** (3.96)	0.1117*** (3.18)	0.1343** (2.01)
Govern	−0.4988 (−1.12)	0.1059 (0.16)	−0.1275 (−0.28)	0.0706 (0.09)
Urban	0.0016 (0.46)	0.0037 (0.55)	0.0002 (0.06)	0.0107 (1.37)
Rail	0.0260 (0.69)	0.0357 (0.49)	0.0558 (1.49)	0.0828 (0.66)
Road	−0.0111 (−0.50)	−0.0148 (−0.40)	−0.0095 (−0.39)	0.0387 (0.36)
Findev	0.0179 (1.14)	0.0316 (1.49)	0.0031 (−0.18)	0.0250 (0.96)
Cons.	0.3168 (0.66)	−1.0927 (−1.52)	−0.1022 (−0.19)	−1.3841 (−1.57)
Wald chi2	51,131.38 (0.0000)	34,235.25 (0.0000)	47,162.21 (0.0000)	25,915.14 (0.0000)
Sargan test	43.6562 (0.4434)	33.44854 (0.1202)	43.60392 (0.4456)	22.29347 (0.1340)
Obs.	132	132	132	132

Note: *, **, *** respectively indicate significance at the 10%, 5%, and 1% levels.

Similarly to national-level results, the four types of real estate investment structures have negative lagged effects on economic growth in the eastern region. Among which, the negative impacts of housing investment and real estate investment for commercial and business purposes are relatively significant in the lagging phase in the eastern region, with an elastic coefficient of 0.09 and 0.08, respectively. They all pass the 1% level significance test, indicating that every 1% increase of housing

and business building construction investment will lead to a 0.09 and 0.08% decrease in economic growth in the lagging phase in eastern region.

Table 7 shows the results for the relationship between investment structure in real estate development and economic growth in the middle region of China. The results indicate that the differences in influence of the four investment structure types on local economic growth in the overall period are significant in the middle region. To be specific, unlike the stimulating effect of present housing and other investment on economic growth, the present office and business building investment negatively influence economic growth. Among them, the negative influences of present office building investment on present economic growth are relatively significant with its regressive coefficient passing at least the 10% level significance test. Besides, in the lagging phase, the four types of investment structure in the middle region have no remarkable influence on regional economic growth.

Table 7. The Effect of Real Estate Investment Structure on Economic Growth in the Middle Region.

Variable	Housing Investment	Office Building Investment	Real Estate Investment for Commercial and Business Purpose	Other Investment
$gdp(1)$	0.4631*** (3.96)	0.9102*** (10.37)	0.5915*** (3.72)	0.7079*** (3.86)
rei	0.0984 (1.01)	−0.0450* (−1.92)	−0.0764 (−1.19)	0.0384 (0.65)
$rei(1)$	0.0160 (0.23)	0.0321 (1.46)	0.0335 (0.44)	−0.0657 (−1.25)
K	0.3294** (2.50)	0.2104** (2.18)	0.4674*** (3.06)	0.3276** (2.12)
L	0.0236 (0.93)	0.0447** (2.16)	0.0319 (1.30)	0.0495* (1.93)
Open	0.1504 (0.33)	0.0360 (0.10)	−0.1005 (−0.21)	−0.0562 (−0.12)
Govern	−1.7954* (−1.82)	−0.6422*** (−2.85)	−2.5225** (−2.01)	−2.2783** (−2.14)
Urban	−0.0011 (−0.13)	0.0117* (1.72)	0.0079 (0.76)	0.0033 (0.33)
Rail	0.2432* (1.85)	0.1946* (1.71)	0.3045* (1.94)	0.2443 (1.59)
Road	0.0883 (1.10)	0.0398 (1.30)	0.1551*** (2.91)	0.1422*** (3.21)
Findev	−0.0112* (−1.88)	−0.0148*** (−2.63)	−0.0164** (−2.28)	0.0122* (−1.78)
Cons.	−1.9913 (−1.25)	−3.5106*** (−3.60)	−5.0997*** (−3.53)	−4.2814*** (−3.22)
Wald chi2	21,975.95 (0.0000)	22,444.45 (0.0000)	15,255.17 (0.0000)	17,366.23 (0.0000)
Sargan test	10.07215 (0.4342)	3.546555 (0.9655)	17.96777 (0.3909)	20.37017 (0.2557)
Obs.	96	96	96	96

Note: *, **, *** respectively indicate significance at the 10%, 5%, and 1% levels.

This table presents the regression results for the four types of real estate investment on economic growth in middle region. $gdp(1)$ is one-period-lagged value of GDP per capita. *rei* is real estate investment. $rei(1)$ is one-period-lagged value of real estate investment. *hi* is housing investment; *oi* is office building investment; *ci* is investment for commercial and business purposes; *qita* is other investment. K is the physical capital, calculated as capital stock/GDP. L is human capital, calculated as

average years of education × quantity of labor force. Open is open strategy, which is total export-import volume/GDP. Govern is a variable for government behavior, which is government expenditure/GDP. Rail is the natural logarithm of rail mileage. Road is the natural logarithm of highway mileage. Urban is a proxy for urbanization, which is calculated as non-agricultural population/total population. Findev is a proxy for financial development, which is calculated as Loan Balance of Financial Institutions/GDP. The values in parentheses represent the z-statistic.

Table 8 presents the results for the relationship between investment in real estate development and economic growth in the western region of China. The regression results reveal two essential phenomena. One is that in the ongoing period housing and business building construction investment in the western region play the same role as that in eastern region in contributing to local economic growth. The elastic coefficients of the influence of housing and business building construction investment on economic growth are about 0.25 and 0.11 in the western region respectively, and they both pass the 1% and 5% level significance tests. It is not hard to find that the stimulating effect of housing and business building construction investment in the western region on local economic growth in the ongoing period is far more important than that in the eastern region.

Table 8. The Effect of Real Estate Investment Structure on Economic Growth in the Western Region.

Variable	Housing Investment	Office Building Investment	Real Estate Investment for Commercial and Business Purpose	Other Investment
$gdp(1)$	0.3803*** (3.79)	0.7091*** (6.83)	0.7648*** (7.84)	0.7126*** (6.85)
rei	0.2462*** (6.43)	0.0312 (1.08)	0.1071** (2.48)	−0.0122 (−0.42)
$rei(1)$	−0.0022 (−0.06)	−0.0221 (−1.00)	−0.0941*** (−3.11)	0.0154 (0.57)
K	0.2146*** (3.20)	0.2523** (2.23)	0.1804* (1.90)	0.2578** (2.35)
L	0.0402 (1.57)	0.0648* (1.85)	0.0581* (1.81)	0.0729** (2.26)
Open	−0.1773 (−1.08)	0.2044 (0.80)	−0.0071 (−0.03)	0.3470* (1.69)
Govern	−0.3502** (−2.29)	−0.9167*** (−3.41)	−0.9838*** (−4.41)	−0.9263 (−3.06)
Urban	0.0049** (2.13)	0.0011 (0.29)	0.0056 (1.55)	0.0005 (0.09)
Rail	0.0544 (0.94)	0.2212*** (2.92)	0.1551 (1.63)	0.2433*** (3.22)
Road	−0.0019 (−0.11)	0.0730*** (2.62)	0.0741** (1.96)	0.0708** (2.54)
Findev	−0.0947** (−2.32)	−0.0634 (−1.13)	−0.0513 (−0.89)	−0.0355 (−0.62)
Cons.	1.1045* (1.90)	−2.7966*** (−4.15)	−2.1618*** (−2.98)	−3.1027*** (−4.69)
Wald chi2	47,719.20 (0.0000)	30,364.56 (0.0000)	30,964.40 (0.0000)	32,109.63 (0.0000)
Sargan test	41.16506 (0.5511)	40.05006 (0. 2110)	34.08819 (0.1635)	43.51215 (0.4087)
Obs.	132	132	132	132

Note: *, **, *** respectively indicate significance at the 10%, 5%, and 1% levels.

This table presents the regression results for the four types of real estate investment and their effect on economic growth in the western region. $gdp(1)$ is one-period-lagged value of GDP per capita. *rei* is real estate investment. $rei(1)$ is one-period-lagged value of real estate investment. *hi* is housing investment; *oi* is office building investment; *ci* is investment for commercial and business purpose; *qita* is other investment. K is the physical capital, calculated as capital stock/GDP. L is human capital, calculated as average years of education × quantity of labor force. Open is open strategy, which is total export-import volume/GDP. Govern is a variable for government behavior, which is government expenditure/GDP. Rail is the natural logarithm of rail mileage. Road is the natural logarithm of highway mileage. Urban is a proxy for urbanization, which is calculated as non-agricultural population/total population. Findev is a proxy for financial development, which is calculated as Loan Balance of Financial Institutions/GDP. The values in parentheses represent the z-statistic.

The other is that, apart from the stimulation effect of other investments on economic growth in the western region, the remaining three real estate investments have negative lagged effects on economic growth in the western region. Although the impact of housing and office building investment on economic growth is relatively weak in the western region (the elastic coefficients are 0.0022 and 0.221, respectively) and the influence is not obvious, the negative influence of business building construction investment has a significant influence on economic growth in the western region with an elastic coefficient of approximately 0.09. It also passes the 1% level significance test, indicating the excessive investments in buildings for business and commercial use are associated with remarkably repressed economic growth in the western region.

5. Conclusions

In this research, we utilize the dynamic panel data model to explore the relationship between real estate investment and economic growth in China. We include economic and financial variables for 30 provinces, municipalities and autonomous regions of China for the period 2000–2012. The main findings indicate that, on the national level and in eastern and western regions, the investment in real estate development has a significantly positive contemporaneous impact on economic growth. This implies that real estate investment could stimulate economic growth as shown in the first school of literature. However, we also show that investment in real estate development has a significantly negative lagged impact on economic growth at both national and regional levels. Such negative influences present a significant repression effect on economic growth, especially at the national level and in the eastern region.

One of our biggest contributions of this research is that we also investigate the effects of different types of real estate investment on economic growth. We document that, no matter at the national or regional level, housing investment always had the greatest impact on economic growth in the sample period. The contemporaneous stimulating effect of housing investment on economic growth is statistically significantly positive on a national level and in eastern and western China. This shows the unique influence of housing investment on investment in real estate development in China.

Consistent with the findings for overall real estate investment, we show that all four types of investment in real estate development exhibit significantly negative lagged effects on Chinese economic growth. These findings imply that an over-heating in the real estate industry may hinder the development of economy in China. Additionally, we find that there are regional differences in the repressive effects of the four types of real estate investments on economic growth. In the eastern region, both housing investment and real estate investment for commercial and business purposes have significantly negative lagged influences on economic growth. In the western region, only real estate investment for commercial and business purposes shows great negative lagged influences on regional economic growth. In the middle region, there are no significant lagged effects of these four types of real estate investment on regional economic growth.

Our empirical findings provide us with the following two insights: First, real estate investments do have positive contemporaneous impacts on economic growth nationally and regionally in China. However, the present accumulation of investment in real estate development will become a burden for the economic growth of China and of each region in the future. The development of the economy has slowed down. Therefore, the central government should persist in developing real estate adjustment and control policies and focus on the problems of investment scale and structure in real estate, and further invest in real estate to boost the economy as well as to ensure a positive interaction between real estate investment and economic growth.

Second, the influences of real estate investment on economic growth show regional disparity. Therefore, the government should fully consider such regional disparity when implementing adjustment and control policies in the real estate industry. We should avoid implementing policies with uniformity but apply adjustment and control policies according to regional features. To be specific, we should prudently control the scale and structure of real estate investment in eastern and western regions. As for the middle region, we should explore the stimulating effect of real estate investment on economic growth as much as possible.

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