The Impact of Economic Policy Uncertainty on Real Estate Development in China

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Abstract: This paper analyzes the impact of economic policy uncertainty on real estate development at the macro level in China. Using the Economic Policy Uncertainty (EPU) Index released by Baker et al. (2016), we find that EPU has a leading and negative effect on real estate development investment. And there is a positive relationship between EPU innovations and the growth rate of real estate development investment. Moreover, the restraining effect of EPU is more pronounced in the state-owned enterprises' investment and the part of construction and installation investment. Based on the empirical evidence, we suggest that government should pay attention to the negative impact of economic policy uncertainty and maintain consistency and stability of economic policies.

Key Words: Economic Policy Uncertainty, Real Estate Development, Real Option theory
JEL Classification: D81, R31, R38, G31

1. Introduction

This paper explores the relationship between economic policy uncertainty (EPU) and real estate development investment. In the past decades, real estate development investment has experienced explosive growth and constitutes a significant fraction of fixed asset investment. Figure 1 shows the series of real estate development investment and its contribution to China's GDP. From 2000 to 2018, real estate development investment has been growing more than 24 times, with an average annual growth rate of 19.6%. In 2018, real estate development investment amounted to 12 trillion RMB, which accounted for nearly 19% of fixed asset investment and 13.4% of GDP. Moreover, because of its high volatility, real estate development investment has an impact on the macro-economy that is much larger than its relative size (Davis & Van Nieuwerburgh, 2015). Zhang et al. (2012) find that a 1% increase in real estate development investment induces a 3.15% increase in China's GDP.

In addition to its significance to economic growth, the dynamics of real estate development investment has important implications for dealing with China's housing affordability problem. In the past decade, Chinese housing market has experienced fast price growth (Wu et al., 2014). And the growth and volatility of house prices are often ascribed to demand-side factors. But understanding housing supply is also critical in alleviating the problem of soaring housing prices. In fact, empirical investigations of housing supply have been lagging behind that on housing demand and there is much to learn about the supply side of the housing market. Real estate development investment generates a massive supply of new houses. The annual floor area of new

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starts increases from 283 million square meters in 2000 to 2.1 billion square meters in 2018. Understanding real estate development investment can help understand new housing supply and housing market.

Figure 1 Real estate development investment and its contribution to GDP
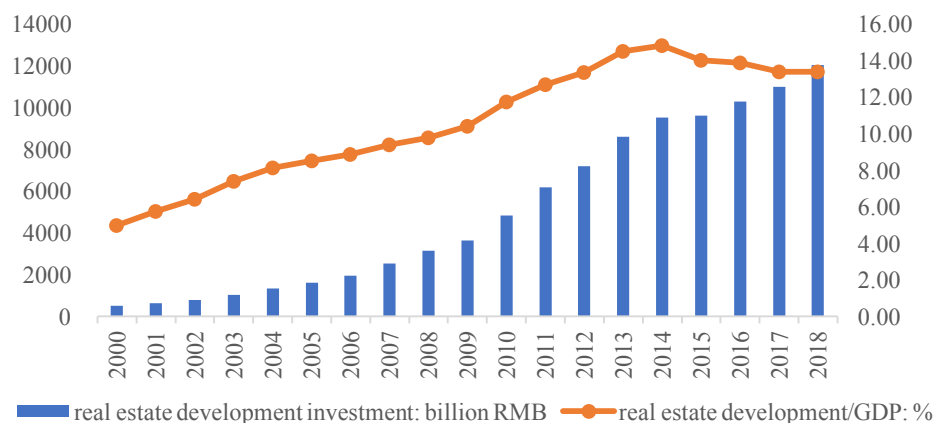
Note: data is from National Bureau of Statistics of China (NBSC).

There are numerous factors that might affect real estate development investment. One of the most important is policy change which will affect the environment in which real estate developers operate and hence their investment behavior. Policy uncertainty reflects the unexpected changes that might have a direct effect on firms' investment and production decisions. Besides, China's real estate market faces frequent intervention from government due to its critical importance for China's economic growth. Policy uncertainty might play a more important role in shaping real estate developers' behavior. Therefore, it is of great interest to examine the impact of policy uncertainty on China's real estate development investment.

Existing studies have provided empirical evidence that economic policy uncertainty can depress economic activities such as corporate investment, economic growth. It is important to examine if the impact of economic policy uncertainty results in similar or different effect on real estate development investment from other macroeconomic indicators. These results may provide policy implications for government on the real estate market.

Thus, this study tries to investigate the impact of economic policy uncertainty on new housing supply at the macro level in China. The impact of uncertainty on housing prices and housing market returns has been examined before, but there is little focus on housing supply. We choose real estate development investment as the key indicator of new housing supply and use the growth rate of real estate development investment as the main dependent variables. To measure economic policy uncertainty, we adopt the index developed by Baker et al. (2016) which has been tested to be a good proxy of economic policy uncertainty. Using nationwide data from 2004 to 2018, this paper finds that economic policy uncertainty has an important impact on real estate development investment in China. First, an increase in economic policy uncertainty can dampen real estate development investment which is consistent with prior evidence for general corporate investment. Second, there is a positive relationship between economic policy uncertainty variation, which means that an increase in economic policy variation can promote real estate development investment. Third,

economic policy uncertainty has a more significant effect on construction and installment investment and SOEs' investment. These results still hold when we apply a number of additional robustness checks. In particular, this paper uses provincial panel data and an alternative proxy for economic policy uncertainty. Until now, this paper is one of the first studies to investigate the relation between economic policy uncertainty and real estate development investment and these findings contribute to the literature and offer meaningful suggestions to policy making on real estate market.

The rest of the paper proceeds as following. The second section reviews the existing literature that is most related to this study and develops main hypotheses. The third section presents research methods and describes the sample and variables. The fourth section presents the empirical results and conducts robustness tests. The last section concludes the entire paper.

2. Literature Review and hypotheses development

Existing literature that is closely related to this paper can be divided into three parts. The first strand is the measurement of economic policy uncertainty. There are many methods to measure policy uncertainty such as measuring important meetings, official turnover, and variances of important macroeconomic indicators. One of the widely-used methods is an economic policy uncertainty index proposed by Baker et al. (2016). They construct economic policy uncertainty indices using contents in newspaper article for 23 countries, including all G10 economies. And for China they use information from the South China Morning Post, a Hong Kong-based English newspaper. This index provides a relatively objective estimation based on newspapers and utilizes high-frequency data. Nowadays, this economic policy uncertainty index has been proofed to be a good indicator of real economic policy uncertainty and has been widely used in many empirical studies. To conduct the robustness check, we also use an alternative measure of economic policy uncertainty which is developed by Huang and Luk (2018). This index is constructed using 10 mainland Chinese newspapers while Baker et al. (2016) uses only one newspaper in Hong Kong. This index is proved to be not sensitive to media censorship in China.

The second strand of literature is on the effect of economic policy uncertainty on the housing market. Existing studies mainly focus on the impact of policy uncertainty on housing market returns. Existing studies have studied German (Su et al., 2016), Japan (Anoruo, Akpom, & Nwoye, 2017), America (André, Bonga-Bonga, Gupta, & Muteba Mwamba, 2017) , other developed economies (Christou, Gupta, & Hassapis, 2017; El Montasser et al., 2016) and developing economies (Aye, 2018; W.L. Huang, Lin, & Ning, 2018). But the research on the relationship between economic policy uncertainty and housing market returns has been inconclusive. Most studies find that the EPU could help in predicting real housing returns. But Aye (2018) finds no evidence of economic policy uncertainty causing real housing returns except for Chile and China.

The third strand is on the effect of economic policy uncertainty on investment behavior. Economic policy uncertainty has a significant influence on corporate investment. Increased economic policy uncertainty may weigh on confidence and thus decrease investors' investment spending. There are many empirical studies using the economic policy uncertainty index developed by Baker et al. (2016) to examine the effect of economic policy uncertainty on corporate investment. Gulen and Ion (2016) finds that a strong negative relationship between firm-level capital investment and economic policy uncertainty, and policy uncertainty can depress corporate investment by

inducing precautionary delays due to investment irreversibility. There are similar results for Chinese corporate investment. Wang et al. (2014) examines how economic policy uncertainty influences corporate investment for Chinese listed companies and they find that when the degree of economic policy uncertainty increase, firms stand to lower their investment.

To summarize the above, despite previous literature demonstrating the impact of economic policy uncertainty on corporate investment and on housing markets returns, studies on the impact of economic policy uncertainty on real estate development investment and new housing supply are relatively scarce. However, it is worthwhile to explore the relationship between economic policy uncertainty and real estate development investment due to the importance of real estate development investment in promoting economic growth and stabilizing housing market. Prior empirical studies suggest that economic policy uncertainty is an important predictor for housing market and corporate investment.

Besides, real estate development investment requires a large capital funding but it faces many risks and uncertainties. Due to the irreversibility of real estate development, real options theory has strong advantages in describing behaviors in real estate market (Titman, 1985; Quigg, 1993). According to the real options theory, because of the irreversible nature of real estate development investment, an increase in uncertainty will lead the developers to wait for more information by delaying investment. In this way, an increase in EPU might delay real estate development. Based on the existing studies, we propose the first hypothesis.

Hypothesis I: Economic policy uncertainty has a leading and negative impact on real estate development investment.

Despite the level effect of economic policy uncertainty, there are studies focusing on the innovations of economic policy uncertainty index. Brogaard and Andrew (2015) employs both the level of economic policy uncertainty and the innovation of economic policy uncertainty to investigate the asset pricing implications of economic policy uncertainty. They find that an increase of 1 standard deviation in level of economic policy uncertainty is associated with a 6.1% annualized abnormal returns while innovations in economic policy uncertainty is associated with a significant negative risk premium. Besides, Huang et al. (2018) also uses both economic policy uncertainty and economic policy uncertainty innovation to examine the relationship between economic policy uncertainty and housing market at the macro level in China. And they find a negative relationship between economic policy uncertainty and national housing climate index (NHCI) while a positive relationship between economic policy uncertainty innovation and NHCI. Based on these prior studies, we propose the second hypothesis.

Hypothesis II: Economic policy uncertainty innovation has a leading and positive impact on real estate development investment.

3. Empirical approaches and data description

3.1 Research designs

To examine the first hypothesis that economic policy uncertainty has a negative and leading effect on real estate development investment, we propose the following regression:

$$gInv_t = \alpha_0 + \alpha_1 EPU_t + \alpha_2 EPU_{t-1} + \beta X_t + \sum_{i=2}^{12} \eta_i + \varepsilon_t \quad (1)$$

Here, gInv represents the growth rate of real estate development investment. EPU_t represents economic policy uncertainty for time t. EPU_{t-1} represents economic policy uncertainty for time t-1. X_t represents the control variables that include money supply indicator, long term loan interest rate and exchange rate, which are consistent with Zhang et al. (2012) and Huang et al. (2018). $\sum_{i=2}^{12} \eta_i$ represents the fixed month effect in order to control monthly effect. ε_t is the omitted error.

To examine the second hypothesis that economic policy uncertainty innovation has a leading and positive impact on real estate development investment, we add innovation of economic policy uncertainty into the regression equation shown in the following equation (2). Here $\triangle EPU_t$ represents innovations of economic policy uncertainty at time t and $\triangle EPU_{t-1}$ represents innovations of economic policy uncertainty at time t-1.

$$\text{gInv}_t = \alpha_0 + \alpha_1 EPU_t + \alpha_2 EPU_{t-1} + \alpha_3 \triangle EPU_t + \alpha_4 \triangle EPU_{t-1} + \beta X_t + \sum_{i=2}^{12} \eta_i + \varepsilon_t \quad （2）$$

3.2 Variables Definition

This paper use time-series data at the macro level to examine the impact of economic policy uncertainty on China's new housing investment. The year-on-year growth rate of real estate development investment is the main dependent variable in this study. And we have compiled most of the data from the CEIC database, and all the year-on-year growth rate data are calculated using cumulative monthly data. Besides, D_M2, an indicator of money supply, represents the growth rate of M2. LR is an indicator of 5-years and above loan rate and CBER represent the exchange rate for Renminbi(RMB) from China's central bank. The economic policy uncertainty index we use is mainly the EPU index constructed by Baker et al. (2016) and this index is acknowledged to be credible and has been widely used in the literature. To check the robustness of empirical result, we also use the China EPU index constructed by Huang & Luk (2018), which construct a new China EPU index using 10 mainland Chinese newspapers. Table 1 shows the definitions of the variables and data sources.

Table 1 Variables' definition and Data sources

Variables	Definition	Data sources
EPU	economic policy uncertainty index	Baker et al. (2016)
CNEPU	China economic policy uncertainty index	Huang & Luk (2018)
ginv	growth rate of real estate development investment	CEIC database
gsoeinv	SOEs' growth rate of real estate development investment	CEIC database
gnonsoeinv	non-SOEs' growth rate of real estate development investment	CEIC database
glandinv	growth rate of land purchase investment	CEIC database
gconinv	growth rate of Construction and installation investment	CEIC database
D_M2	growth rate of M2	CEIC database
LR	5-years and above loan rate	CEIC database
CBER	exchange rate from China's central bank	CEIC database
gsale	growth rate of commercial housing sale	CEIC database

3.3 Data Description

All the data are monthly data from January 2004 to December 2018. Table 2 describes the data. Panel A shows the mean, median, minimum, maximus, standard deviation, skewness and kurtosis of all the variables. From the table 2A we can see the average monthly year-on-year growth rate of real estate development investment is 16.8% during the sample period, which is a fairly high level. Besides, the growth rate of real estate development investment fluctuates from -5% to 34.8%, with standard deviation of 9.7%. Dividing real estate development investment into state-owned and non-state-owned parts, there are no obvious differences between these two parts. Similarly, there are little differences between land purchase investment and Construction and installment investment. And we will conduct further empirical analysis to discuss the heterogeneous impact of EPU on different part of real estate development investment.

Table 2A. Descriptive statistics

	N	Mean	Median	min	max	St.Dev	skewness	kurtosis
EPU	180	180.9	132.5	32.6	694.8	142.2	1.7	5.7
△EPU	180	4.7	5.8	-269.4	257.8	77.5	-.1	4.4
ginv	180	16.8	17.8	-5	34.8	9.7	-.1	2.1
gsoeinv	168	18.4	14.1	-40.8	92.6	23.1	1	5
gnonsoeinv	168	17.3	18	-5.7	35	10.3	-.2	2.2
glandinv	180	18.5	18.3	-86.9	92.3	25.9	-.5	5.8
gconinv	180	16.6	18.7	-7.9	37.6	10.9	-.4	2.3
D M2	180	16	16.5	4.9	30.6	5.3	.3	3.6
LR	180	6.1	6.1	4.9	7.8	.9	.1	2.3
CBER	180	6.9	6.8	6.1	8.3	.7	.8	2.2
gsale	180	21.3	20	-126.9	209	32.8	.8	10.2

Table 2B Correlations between main variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
EPU	1.00										
△EPU	0.38*	1.00									
ginv	-0.48*	-0.02	1.00								
gsoeinv	-0.18	0.08	0.52*	1.00							
gnonsoeinv	-0.46*	-0.01	0.93*	0.18	1.00						
glandinv	0.01	0.11	0.35*	0.26*	0.40*	1.00					
gconinv	-0.59*	-0.09	0.89*	0.46*	0.86*	-0.01	1.00				
D_M2	-0.55*	-0.09	0.49*	0.24*	0.42*	-0.09	0.59*	1.00			
LR	-0.50*	-0.04	0.57*	0.06	0.59*	0.02	0.66*	0.36*	1.00		
CBER	-0.31*	-0.02	0.41*	0.30*	0.35*	0.10	0.40*	0.29*	0.09	1.00	
lag_gsale	-0.22*	-0.05	0.26*	0.11	0.25*	-0.06	0.25*	0.45*	-0.12	0.36*	1.00

Note: * shows significance at the 1% level

Panel B shows the correlation matrix of the variables. It can be seen that the EPU and growth rate of real estate development investment are negatively correlated, which is significant at the 1% level. And it is interesting to note that there is significantly negative relationship between EPU and non-SOE real estate development investment while there is negative but not significant relationship between EPU and SOE real estate development investment. Similarly, EPU and construction and installment investment are negatively correlated at the 1% level, while there is no obvious

relationship between EPU and land purchase investment. These interesting evidences lay a solid foundation for the empirical analysis to explore the heterogeneity of EPU's influences.

Panel C presents the unit-root test for each variable. We use the ADF method to perform unit-root test and the test results show that D_M2, LR and CBER exhibit a unit-root. And thus, in the follow-up study we use the first-order differences which have been proved to be stationary.

Table 2C Unit-root test of main variables

Variables	ADF statistics	critical value （1%）	critical value （5%）	critical value （10%）
EPU	-2.769	-3.484	-2.885	-2.575
△EPU	-16.67	-3.484	-2.885	-2.575
ginv	-4.075	-3.484	-2.885	-2.575
gsoeinv	-7.030	-3.488	-2.886	-2.576
gnonsoeinv	-4.119	-3.488	-2.886	-2.576
glandinv	-8.928	-3.484	-2.885	-2.575
gconinv	-3.413	-3.484	-2.885	-2.575
D_M2	-1.705	-3.484	-2.885	-2.575
LR	-0.531	-3.484	-2.885	-2.575
CBER	-2.377	-3.484	-2.885	-2.575
gsale	-6.737	-3.484	-2.885	-2.575

Figure 2 shows time series of EPU and the growth rate of real estate development investment. During the sample period, we can see that EPU index rises sharply after the global financial crisis in 2008, the European debt crisis in 2012 and the year after 2016. During this full period, there is an overall negative relationship between EPU and the growth rate of real estate development investment, which is consistent with the result of correlation matrix in Table 2B. Besides, from these two time-series data, it can be predicted that EPU might have a leading effect on real estate development investment, especially in the year of 2008 and 2012. And this provides preliminary evidence for hypothesis that EPU has a leading and negative effect on China's real estate development investment.

Figure 2 Time series of EPU and growth rate of real estate development investment in China
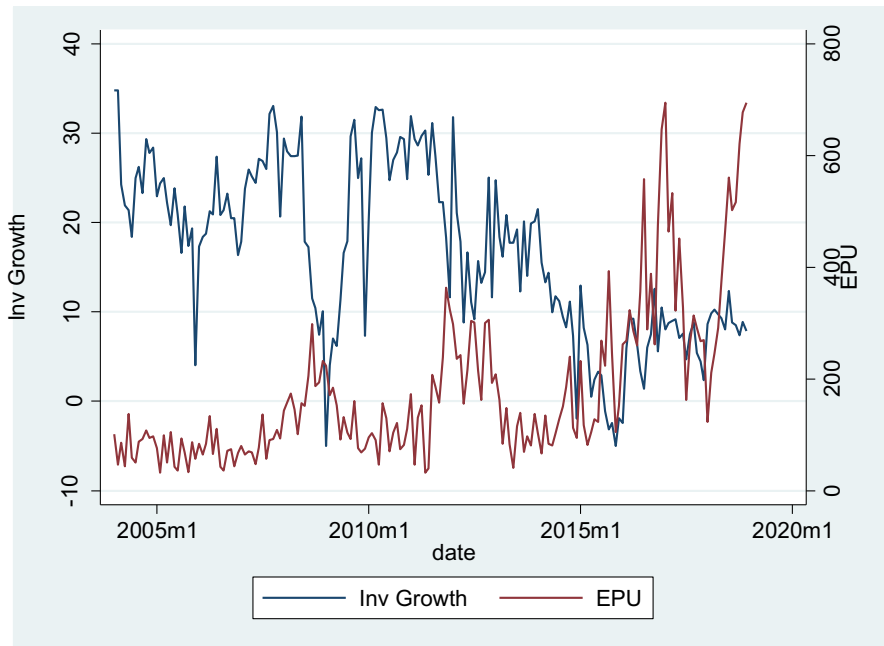
Note: Inv Growth refers to the growth rate of real estate development investment

4. Empirical Results

4.1 The impact of EPU on real estate development investment

Firstly, this study conducts an empirical analysis on the effect of EPU on real estate development investment in China according to the regression model (1). The regression results are in Table 3 and we can see there is a negative relationship between EPU and growth rate of real estate development investment. From the regression (1) and (2), the coefficients are -0.026 and -0.027 for time t and t-1, which are both significant at the 1% level, which means 1 unit increase in EPU will lead the growth rate of real estate development investment to decline by 0.026-0.027 percent. Put EPU and EPU(-1) together in the regression (3), we can see that both the coefficients of EPU and EPU(-1) are negative but the coefficient of EPU is insignificant even at the 10% level. This indicates that EPU(-1) has a larger and more significant effect on the growth rate of real estate development investment and thus EPU is a leading indicator of real estate development investment.

Table 3 The impact of EPU on real estate development investment

	(1)	(2)	(3)
EPU	-0.026***		-0.010
	(-6.279)		(-0.990)
EPU(-1)		-0.027***	-0.019**
		(-7.268)	(-2.064)
D.D_M2	-1.019	-0.928	-0.966
	(-1.645)	(-1.496)	(-1.563)
D.LR	19.404***	16.868***	17.658***
	(3.273)	(3.200)	(3.142)
D.CBER	-32.893**	-37.461***	-34.640**
	(-2.324)	(-2.824)	(-2.492)
lag_gsale	0.035*	0.040**	0.037*

	(1.677)	(1.979)	(1.735)
_cons	20.807***	20.500***	21.021***
	(6.738)	(6.760)	(6.750)
Obs.	179	179	179
R-squared	0.385	0.398	0.403
Month dummies	yes	yes	yes

Note. Significant level of 10%, 5%, 1% are marked by *, **, and ***, respectively. Numbers in italics are p-values.

Besides, this paper is also interested in the influence of an EPU variation on China's real estate development. Then we conduct empirical analysis based on the regression equation (2). The empirical results are listed in Table 4. Regression (1) employs the current period EPU and EPU variation; Regression (2) instead employs the lagged EPU and EPU variation; Regression (3) puts all the current and lagged EPU and EPU variation together. In all the regression results, the coefficients of △EPU (EPU innovation) and lagged △EPU are positive at the 5% level. The empirical results reveal that higher expected returns may motivate developers to continue investing facing greater variation of policy uncertainty, which is consistent with Wang et al. (2014). Besides, the coefficients of EPU and EPU(-1) are negative at the 1% level which is the same as Table 3. What's more, it can be concluded that both EPU and its innovation have a leading effect on the growth rate of real estate development investment.

Table 4 The impact of innovations of EPU on real estate development investment

	(1)	(2)	(3)
EPU	-0.030***		-0.052***
	(-7.510)		(-2.897)
EPU(-1)		-0.031***	0.018
		(-7.573)	(1.125)
△EPU	0.021**		0.044***
	(2.345)		(3.332)
△EPU(-1)		0.020**	0.019**
		(2.289)	(1.986)
D.D_M2	-0.973	-0.814	-0.866
	(-1.576)	(-1.301)	(-1.375)
D.LR	17.521***	17.029***	17.493***
	(3.153)	(2.941)	(2.904)
D.CBER	-33.539**	-37.698***	-33.288**
	(-2.459)	(-3.030)	(-2.553)
lag_gsale	0.036*	0.038*	0.035
	(1.720)	(1.885)	(1.651)
_cons	21.249***	20.941***	21.704***
	(6.873)	(6.626)	(6.699)
Obs.	179	179	179
R-squared	0.407	0.417	0.425
Month dummies	yes	yes	yes

Note. Significant level of 10%, 5%, 1% are marked by *, **, and ***, respectively. Numbers in italics are p-values.

4.2 Robustness test

4.2.1 Using provincial real estate development investment

The first robustness check is using the real estate development investment data from 31 provincial regions in place of national level data. The sample period is from 2004 to 2018 and the total number of observations is 5549. The result of panel data analysis is listed in Table 5. We can see that both the coefficients of EPU and EPU(-1) are significantly negative at the 1% level. And the coefficient of △EPU and △EPU(-1) are significantly positive at the 1% level. This further validates the conclusion that both EPU and EPU innovation have a significant leading effect on the real estate development investment.

Table 5 Using provincial growth rate of real estate development investment

	(1)	(2)	(3)	(4)	(5)
EPU	-0.024***		-0.007***	-0.028***	
	(-32.377)		(-4.841)	(-35.970)	
EPU(-1)		-0.028***	-0.022***		-0.031***
		(-35.581)	(-14.390)		(-38.484)
△EPU				0.022***	
				(14.390)	
△EPU(-1)					0.020***
					(13.246)
D.D_M2	-1.016***	-0.945***	-0.967***	-0.967***	-0.829***
	(-9.791)	(-9.259)	(-9.486)	(-9.486)	(-8.227)
D.LR	19.881***	17.342***	17.898***	17.898***	17.524***
	(23.170)	(20.461)	(20.968)	(20.968)	(20.998)
D.CBER	-34.907***	-37.338***	-35.713***	-35.713***	-37.559***
	(-16.382)	(-18.039)	(-17.065)	(-17.065)	(-18.430)
lag_gsale	0.029***	0.032***	0.030***	0.030***	0.030***
	(8.690)	(9.801)	(9.165)	(9.165)	(9.277)
_cons	20.544***	20.689***	20.987***	20.987***	21.135***
	(49.898)	(51.529)	(51.769)	(51.769)	(53.276)
Obs.	5549	5549	5549	5549	5549
R-squared	0.376	0.396	0.398	0.398	0.414
Month dummies	yes	yes	yes	yes	yes

Note. Significant level of 10%, 5%, 1% are marked by *, **, and ***, respectively. Numbers in italics are p-values.

4.2.2 Using Huang & Luk（2018）China EPU index

Secondly, we also use the China EPU index constructed by Huang & Luk (2018) To check the robustness of empirical result. The China EPU index is constructed a new China EPU index using 10 mainland Chinese newspapers[3]. The compilation strategy of the China EPU index follows that of Baker et al. (2016) and they also count the number of occurrences of articles discussing economic policy uncertainty.

Table 6 presents the result of using Huang & Luk China EPU index in place of Baker et al. (2016) EPU index. From the table, we can see that both the coefficients of EPU and EPU(-1) are significantly negative at the 1% level. And the coefficient of △EPU and △EPU(-1) are significantly positive at the 1% level. This further validates the above conclusion.

Table 6 Using Huang & Luk（2018）China EPU index

	(1)	(2)	(3)	(4)	(5)
CNEPU	-0.022***		0.020***	-0.034***	
	(-6.907)		(3.859)	(-10.034)	
CNEPU(-1)		-0.038***	-0.053***		-0.043***
		(-11.629)	(-10.005)		(-12.797)
ΔCNEPU				0.053***	
				(10.005)	
ΔCNEPU(-1)					0.024***
					(4.430)
D.D_M2	-0.958***	-1.011***	-1.012***	-1.012***	-0.989***
	(-8.814)	(-9.262)	(-9.223)	(-9.223)	(-9.018)
D.LR	18.947***	17.242***	17.030***	17.030***	16.956***
	(17.726)	(15.711)	(15.357)	(15.357)	(15.582)
D.CBER	-50.828***	-50.802***	-51.873***	-51.873***	-50.773***
	(-22.821)	(-22.968)	(-23.200)	(-23.200)	(-23.411)
lag_gsale	0.044***	0.039***	0.040***	0.040***	0.037***
	(14.294)	(13.559)	(13.570)	(13.570)	(12.534)
_cons	18.231***	20.124***	19.421***	19.421***	20.638***
	(29.348)	(32.879)	(31.397)	(31.397)	(34.580)
Obs.	6086	6086	6086	6086	6086
R-squared	0.262	0.273	0.274	0.274	0.275
Month dummies	yes	yes	yes	yes	yes

Note. Significant level of 10%, 5%, 1% are marked by *, **, and ***, respectively. Numbers in italics are p-values.

4.3 The impact of EPU on different parts of real estate development investment

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[3] The ten newspapers are: Beijing Youth Daily, Guangzhou Daily, Jiefang Daily, People's Daily Overseas Edition, Shanghai Morning Post, Southern Metropolis Daily, The Beijing News, Today Evening Post, Wen Hui Daily and Yangcheng Evening News.

4.3.1 Decompose real estate development investment into land purchase investment and construction and installment investment

Land purchase investment and construction and installment investment are two most important parts of real estate development investment. For example, in 2018 construction and install investment accounts for more than 60% of real estate development investment while land purchase investment accounts for nearly 30%. Land purchase investment is mainly influenced by land supply and land purchase intention, while construction and installation investment mainly reflects actual construction progress. In the housing construction cycle, construction and installation investment has a more direct effect on new housing supply in the short term. Therefore, discussing the heterogeneous impact of EPU on land purchase investment and construction and installment investment can further predict new housing supply.

Table 7 shows the empirical results. Regression (1) and (2) examines the impact of EPU on growth rate of land purchase investment. Regression (3) and (4) examines the impact of EPU on growth rate of construction and installment investment. As can be seen from Table 7, the coefficients of lagged EPU in equation (1) and (2) are insignificant from 0, while the coefficients of lagged EPU in equation (3) and (4) are significantly negative at the 1% level. This indicates that EPU has leading and negative effect on construction and installment investment while no significant effect on land purchase investment. As for ΔEPU(-1), its coefficient in equation (2) is positive but not significant while in equation (4) is significantly positive at the 10% level. This suggests that lagged EPU variation will increase the growth rate of construction and installment investment. Taken all those together, it can be concluded that EPU and EPU variation have significant effects on short-run new housing supply through construction and installment investment, which might lead to an increase in housing prices in the short run.

Table 7 Decomposing real estate development investment I

	(1)	(2)	(3)	(4)
	glandinv	glandinv	gconinv	gconinv
EPU(-1)	0.002	0.000	-0.039***	-0.042***
	(0.134)	(0.018)	(-7.814)	(-9.609)
ΔEPU(-1)		0.009		0.020*
		(0.232)		(1.841)
D.D_M2	-2.932	-2.879	-0.318	-0.201
	(-0.762)	(-0.734)	(-0.492)	(-0.329)
D.LR	29.862***	29.947***	12.582**	12.766*
	(3.302)	(3.323)	(2.346)	(1.921)
D.CBER	12.958	12.855	-46.728***	-46.951***
	(0.299)	(0.294)	(-3.568)	(-3.325)
lag_gsale	-0.113**	-0.114**	0.038*	0.036**
	(-2.206)	(-2.290)	(1.858)	(2.254)
_cons	12.435	12.643	24.224***	24.676***
	(0.455)	(0.470)	(9.535)	(7.846)
Obs.	179	179	179	179
R-squared	0.034	0.034	0.442	0.457
Month dummies	yes	yes	yes	yes

Note. Significant level of 10%, 5%, 1% are marked by *, **, and ***, respectively. Numbers in italics are p-values.

4.3.2 Decompose real estate development investment into SOEs and non-SOEs

SOEs and non-SOEs might react differently to changes in economic policy. The natural relations between SOEs and the government tends to make SOEs' behavior more pro-policy, namely, SOEs are more willing to invest in accordance with government policies. Besides, SOEs in China rely more heavily on bank lending and thus are more affected by economic policy uncertainty. What's more interesting, in China's real estate market there are only 5 SOEs in the top 30 real estate developers, which means housing supply market is in fierce competition. Decomposing real estate development investment into SOEs and non-SOEs can help to further investigate the heterogeneous effect of EPU.

Table 8 shows the empirical results. Regression (1) and (2) shows the effect of EPU on growth rate of SOEs' real estate development investment; regression (3) and (4) shows the effect of EPU on growth rate of non-SOEs' real estate development investment. For SOEs, the coefficient of lagged EPU ranges from -0.040 to -0.043, which is significant at the 1% level. For non-SOEs, the coefficient of lagged EPU ranges from -0.031 to -0.035, which is also significant at the 1% level. As for EPU variation, the coefficient for SOEs is positive but not insignificant while for non-SOEs is significantly positive at the 1% level. Comparing the coefficients of lagged EPU and EPU variation, we can see that real estate development investment by non-SOEs is less affected by economic policy uncertainty.

Table 8 Decomposing real estate development investment II

	(1)	(2)	(3)	(4)
	gsoeinv	gsoeinv	gnonsoeinv	gnonsoeinv
EPU(-1)	-0.040**	-0.043***	-0.031***	-0.035***
	(-2.578)	(-3.447)	(-5.435)	(-6.215)
ΔEPU(-1)		0.014		0.021**
		(0.791)		(2.167)
D.D_M2	-1.132	-1.054	-0.836	-0.719
	(-0.659)	(-0.707)	(-1.325)	(-1.190)
D.LR	29.298**	29.478**	12.884**	13.153**
	(2.033)	(2.155)	(2.432)	(2.147)
D.CBER	16.731	16.807	-70.033***	-69.918***
	(0.395)	(0.695)	(-4.503)	(-4.925)
lag_gsale	-0.005	-0.007	0.045**	0.042***
	(-0.096)	(-0.130)	(2.239)	(2.801)
_cons	23.035***	23.365***	22.046***	22.538***
	(3.297)	(5.756)	(8.588)	(6.452)
Obs.	167	167	167	167
R-squared	0.089	0.091	0.406	0.426
Month dummies	yes	yes	yes	yes

Note. Significant level of 10%, 5%, 1% are marked by *, **, and ***, respectively. Numbers in italics are p-values.

5. Conclusion

The previous literature has studies the relationship between EPU and corporate investment or housing market returns. Clearly, it is also important to examine the effect of EPU on real estate development investment which is "the engine of economic growth" in China. Hence, this paper focuses on the impact of EPU and EPU innovations on the real estate development investment. In addition, this paper also examines the heterogeneous effect of EPU on SOEs' and non-SOEs' real estate development investment and the heterogeneous effect of EPU on land purchase investment and construction and installment investment.

To conclude, there are several noteworthy findings. First, we find that EPU is an important indicator for China's real estate development investment. EPU has a leading and depressing effect on real estate development investment and 1 unit increase in EPU index leads to the growth rate of real estate development investment decreasing by about 0.026 percent. Second, there is a positive relationship between EPU innovations and the growth rate of real estate development investment. Moreover, the restraining effect of EPU is more pronounced in the state-owned enterprises' investment which means investments by non-state-owned developers are less affected by economic policy uncertainty. Finally, the part of construction and installation investment is more sensitive to economic policy uncertainty and this indicates that new housing supply in the short run might be affected to a greater extent.

Based on the above empirical evidences, we can see the economic policy uncertainty caused by frequent changes of economic policies might inhibit real estate development investment. The delay of real estate development investment will decrease new house supply in the short run, and this will cause an upward pressure on housing prices and this is not conducive to the steady development of real estate market. In the past decades, the direction of real estate regulation changed between looseness and tightness several times, which may offset the regulation effect of the policy to some extent. Therefore, we suggest that government should pay attention to the negative impact of economic policy uncertainty and maintain transparency, consistency and stability of economic policies.

References

［1］Davis, Morris A., and Stijn Van Nieuwerburgh. "Housing, finance, and the macroeconomy." *Handbook of regional and urban economics*. Vol. 5. Elsevier, 2015. 753-811.

［2］Zhang, Jie, Jianhua Wang, and Aiyong Zhu. "The relationship between real estate investment and economic growth in China: a threshold effect." *The Annals of regional science* 48.1 (2012): 123-134.

［3］Wu, Jing, Joseph Gyourko, and Yongheng Deng. "Evaluating the risk of Chinese housing markets: What we know and what we need to know." *China Economic Review* 39 (2016): 91-114.

［4］Baker, Scott R., Nicholas Bloom, and Steven J. Davis. "Measuring economic policy uncertainty." *The quarterly journal of economics* 131.4 (2016): 1593-1636.

［5］Huang, Wei-Ling, Wen-Yuan Lin, and Shao-Lin Ning. "The effect of economic policy uncertainty on China's housing market." The North American Journal of Economics and Finance (2018): 100850.

［6］Su, D., Li, X., Lobonţ, O. R., & Zhao, Y. (2016). Economic policy uncertainty and housing returns in Germany: Evidence from a bootstrap rolling window. Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu, 34(1), 43-61.

［7］Anoruo, Emmanuel, Uchenna Akpom, and Young Nwoye. "Dynamic Relationship between Economic Policy Uncertainty and Housing Market Returns in Japan." Journal of International Business and Economics 5.2 (2017): 28-37.

［8］André, Christophe, et al. "Economic policy uncertainty, US real housing returns and their volatility: A nonparametric approach." Journal of Real Estate Research 39.4 (2017): 493-513.

［9］Christou, Christina, Rangan Gupta, and Christis Hassapis. "Does economic policy uncertainty forecast real housing returns in a panel of OECD countries? A Bayesian approach." The Quarterly Review of Economics and Finance 65 (2017): 50-60.

［10］El-Montasser, Ghassen, et al. "Cross-country evidence on the causal relationship between policy uncertainty and housing prices." Journal of Housing Research 25.2 (2016): 195-211.

［11］Aye, Goodness C. "Causality between economic policy uncertainty and real housing returns in emerging economies: A cross-sample validation approach." Cogent Economics & Finance 6.1 (2018): 1473708.

［12］Huang, Wei-Ling, Wen-Yuan Lin, and Shao-Lin Ning. "The effect of economic policy uncertainty on China's housing market." The North American Journal of Economics and Finance (2018): 100850.

［13］Gulen, Huseyin, and Mihai Ion. "Policy uncertainty and corporate investment." The Review of Financial Studies 29.3 (2016): 523-564.

［14］Wang, Yizhong, Carl R. Chen, and Ying Sophie Huang. "Economic policy uncertainty and corporate investment: Evidence from China." Pacific-Basin Finance Journal 26 (2014): 227-243.

［15］Titman, S. (1985). Urban land prices under uncertainty. The American Economic Review, 75(3), 505–514.

［16］Quigg, L. (1993). Empirical testing of real option-pricing models. Journal of Finance, 48(2), 621–640.

［17］Brogaard, Jonathan, and Andrew Detzel. "The asset-pricing implications of government economic policy uncertainty." Management Science 61.1 (2015): 3-18.