

Article

The Impact of Economic Policy Uncertainty on Investment in Real Estate Corporations Based on Sustainable Development: The Mediating Role of House Prices

Yuanyuan Qu ^{1,2,*} and Aza Azlina Md Kassim ¹

¹ Post Graduate Centre, Management and Science University, Shah Alam 40100, Malaysia; aza_azlina@msu.edu.my

² School of Architectural Engineering, Zhengzhou Shengda University, Zhengzhou 450000, China

* Correspondence: 012021021071@gsm.msu.edu.my

Abstract: Since the COVID-19 outbreak, the global economy has undergone profound changes, and China's real estate market has experienced dramatic turbulence. In order to stabilise the national economy during the epidemic, China's macro-controls on the real estate industry have become more frequent. These regulatory policies have kept the uncertainty in China's economic policies at a high level for almost two years. Therefore, in order to further regulate the real estate market and thus establish a sustainable macro-control mechanism, the purpose of this study is to provide the necessary practical research and policy basis for the real estate market by exploring how economic policy uncertainty and house prices affect the level of corporate investment in real estate development. Based on the theory of real options, financial friction theory and real estate characteristics theory, this paper studies the relationship between economic policy uncertainty and the investment level of real estate developers and further explores the mediating role of house prices. This paper selects the panel data of Shanghai and Shenzhen A-share real estate listed companies in the CSMR database from the first quarter of 2012 to the fourth quarter of 2022 and uses the fixed-effects regression method to identify the following conclusions. Firstly, stronger economic policy uncertainty promotes the investment level of real estate corporations; secondly, the fluctuation of house prices plays a mediating role in the positive effect of economic policy uncertainty on the investment of real estate corporations.

Keywords: economic policy uncertainty; real estate investment; house prices



Citation: Qu, Y.; Md Kassim, A.A. The Impact of Economic Policy Uncertainty on Investment in Real Estate Corporations Based on Sustainable Development: The Mediating Role of House Prices. *Sustainability* **2023**, *15*, 15318. <https://doi.org/10.3390/su152115318>

Academic Editors: Pierfrancesco De Paola and Maria Rosa Trovato

Received: 12 September 2023

Revised: 15 October 2023

Accepted: 25 October 2023

Published: 26 October 2023



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1. Introduction

In recent years, the world economic landscape has changed dramatically under the impact of the COVID-19 epidemic. The level of real estate investment in China also changed after the epidemic was gradually brought under control. In 2022, China's GDP was about CNY 121 trillion, an increase of 3.0% year-on-year, and the tertiary industry investment increased by 2.3% year-on-year, but the annual investment in real estate development was CNY 13.28 trillion, a decrease of 10.0% compared with the previous year [1]. The stability of real estate investment is crucial to the sustained growth of China's economy. Since the 2020 epidemic, the Chinese government has frequently and intensively introduced a variety of real estate control policies. The real estate market presents a large uncertainty, and the policy end of the uncertainty in the real estate business is not to be ignored. Economic policy uncertainty means that enterprises cannot predict in advance the timing, direction and content of an economic policy adjustment, which brings about the uncertainty risk faced by enterprises when making investment decisions. This is not only reflected in the original impact of economic policy but also reflected in the real estate enterprise investment behaviour by changing expectations [2]. Theoretically, there are two main possible mechanisms for the impact of economic policy uncertainty on the investment behaviour of real estate enterprises: one is that economic policy uncertainty will inhibit the

investment behaviour of real estate enterprises, and the frequent introduction of policies pushes up the waiting expectations of real estate enterprises for the uncertainty in the future development of the real estate industry [3]. When faced with higher economic policy uncertainty, real estate firms generally consider reducing the number of land acquisitions, developing new buildings and other real economy investment activities or high turnover to avoid risks. The second is that rising economic policy uncertainty promotes the investment behaviour of real estate firms. During periods of high uncertainty, real estate firms will increase the amount of land reserves in anticipation of higher marginal profits on future capital. At the same time, real estate firms will also choose to increase their investment to expand their future market share, driven by the wave of mergers and acquisitions in the real estate industry [4]. Since China's reform of the monetised housing allocation system in 1998, investment in real estate development has entered a continuous growth path, with the proportion of national real estate development investment in fixed asset investment rising from 23.40% in 2008 to 26.62% in 2013, before declining slightly after 2014 [5]. During this period, real estate investment played a great role in improving the living conditions of urban residents and promoting the urbanisation process in China. However, excessive real estate investment not only crowds out the financing channels of the real economic sector but also faces a higher degree of uncertainty due to fluctuations in real estate control policies of governments at all levels and their own investment behaviour [6]. In 2017, the Chinese government put forward the basic position that "houses are used for living, not for speculation", and in July 2019, China's central government once again reiterated that it would not use real estate as a short-term means of stimulating the economy, implying that real estate companies will face a relatively tight macro-policy environment [7]. In addition, as real estate is a typical regional product, the investment of real estate corporations is also affected by city-level policies and other economic and social uncertainties [8]. In this background, studying the investment behaviour of real estate development corporations in the face of economic policy uncertainty is of great theoretical and practical significance for promoting the sustained and healthy development of China's real estate market and constructing a long-term mechanism for real estate market regulation and control.

This paper is organised as follows: Section 2 presents the research hypotheses based on a literature review. Section 3 explains the model design and presents the data sources. Section 4 analyses the empirical results. Finally, Section 5 presents conclusions and policy recommendations.

2. Literature Review and Hypotheses

2.1. Measurement of Uncertainty

On the issue of how to measure the strength of economic policy uncertainty faced by enterprises, in the early days, scholars mainly used two indicators as proxies, namely, the volatility of macroeconomic indicators such as GDP and the volatility of enterprise business performance [9]. However, although these two approaches can represent economic policy uncertainty to a certain extent, the fluctuation in a certain macro indicator alone is more one-sided, and it is difficult to strip the impact of changes in the enterprise's own business conditions by choosing the volatility of enterprise performance, so some scholars use the local government change as a proxy for economic policy uncertainty [10]. Also, some scholars set the change in local officials as a dummy variable for the dependent variable of uncertainty research using regression [11]. However, the officials of each local government have incentives to expand local investment to highlight their own performance during their term in office and, at the same time, the change in local government is often separated by a long period of time. Thus, it is difficult to measure the short-term fluctuation in economic policy uncertainty using this method, and the indicator is also difficult to quantify [12]. In order to solve the problems of the above measurement methods, more scholars in recent years have adopted the economic policy uncertainty index compiled by Baker or Huang to directly quantify economic policy uncertainty [13]. Compared with the index of dummy variables, this index has the advantages of continuous and better measurement, for example,

the change in officials often occurs in a longer cycle, while the index of economic policy uncertainty can be updated on a daily basis to be more visualised. The two economic policy uncertainty indices currently used most often by academics are the China economic policy uncertainty Index, compiled by American scholars such as Baker (2016) [12], and an index by Hong Kong scholars Huang & Luk (2019) [14]. These two indices can be understood as a kind of news index, and the principle of their compilation is basically the same, which is derived by counting the frequency of search keywords (e.g., economy, uncertainty, policy) related to economic policy uncertainty in mainstream newspapers or the number of times related articles appear each month, and then standardising the results of the counting and conducting robustness tests. The stronger the economic policy uncertainty, the higher the frequency of the corresponding articles and the larger the index. The difference between these two indices in terms of compilation is the choice of newspapers: while Baker et al. [12] mainly refer to the South China Morning Post in Hong Kong, Huang et al. constructed a Chinese policy uncertainty index using 10 mainland Chinese newspapers for the period of January 2000 to October 2018, with several robustness checks, and developed daily and monthly uncertainty indices for several policy categories (fiscal, monetary, etc.) [8].

Since the global financial crisis in 2008, China's economic policy uncertainty index has risen significantly, as shown in Figure 1. Also, a sharp increase in China's economic policy uncertainty index has occurred since 2018, indicating that the Chinese government has made continuous macro policy adjustments in response to the US–China trade war. At the end of 2019, the outbreak of the COVID-19 epidemic caused China's economic uncertainty, which is under double pressure at home and abroad, to reach its peak [15].

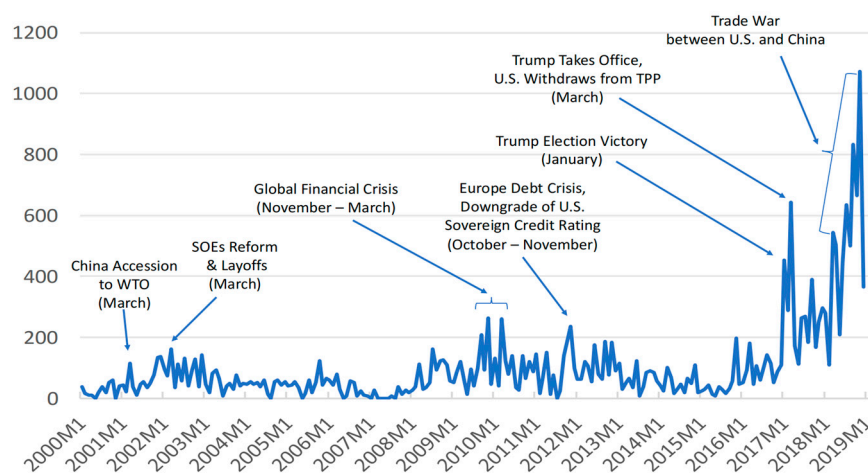


Figure 1. China trade policy uncertainty index, January 2000 to December 2019.

2.2. Economic Policy Uncertainty and Corporate Investment

In fact, there has been relatively fruitful academic research on the impact of economic policy uncertainty on firms' investments. Within this field of research, there are generally two views. One believes that stronger economic policy uncertainty will inhibit corporate investment, and the other believes that stronger economic policy uncertainty will promote corporate investment behaviour [16]. Most of the scholars who believe that corporate investment is inhibited used the real options theory as their primary theoretical foundation. In their view, a corporate investment opportunity can be regarded as an option held by the enterprise, and the enterprise needs to evaluate the value of exercising the option in the present and in the future and choose the time to execute. If a corporation chooses to exercise an option in the present, it gives up a better investment opportunity that may exist in the future. At this point, the enterprise's decision-making in the current period has incurred a certain opportunity cost. Therefore, in an environment of greater uncertainty, the problems faced by firms such as information asymmetry are further accentuated, and consequently, the risk and opportunity costs are further increased, and firms will be more

inclined to exercise options in the future [9]. In addition, a part of the scholars who support this view try to verify the view from other angles. For example, Rao et al. (2017) examined the impact of corporate management, shareholders and creditors on corporate investment and argued that when economic policy uncertainty becomes stronger, it is more difficult for corporate management to judge the trend in the adjustment of the future economic policy due to insufficient information and other reasons. They also argued that corporate investors are unable to judge the security and growth of an enterprise in the future, so they will be cautious in dealing with investment behaviour [17]. Furthermore, some scholars are interested in more rigorously verifying the inhibition of corporate investment by stronger economic policy uncertainty from the perspective of asset reversibility. For example, Liu et al. (2019) argue that the higher the asset reversibility, the relatively easier it is to liquidate, and the inhibition of corporate investment by economic policy uncertainty will thus be weakened [18].

On the contrary, another thought argues that stronger economic policy uncertainty promotes corporate investment, with some scholars pointing out that corporate investment does not decrease when uncertainty about the price of firms' future output and wage rates rises [19]. In the past two years, more and more scholars have gradually supported this view, and these scholars have analysed the channels through which commercial banks' risk-taking affects corporate investment, arguing that when economic policy uncertainty becomes stronger, commercial banks will expand their on-balance sheet business, i.e., increase the size of their loans, so as to stimulate corporate investment, as they have the responsibility of safeguarding the stability of the economy [20].

2.3. Economic Policy Uncertainty and the Investment of Real Estate Corporations

Since the real estate industry is significantly different from other industries, academics also focus on studying real estate firms. There are also two opposing views on economic policy uncertainty and real estate corporate investment. One believes that stronger economic policy uncertainty will promote real estate corporate investment, while the other believes that it will inhibit investment.

First, scholars who believe that stronger economic policy uncertainty will promote corporate investment in real estate mainly focus on the characteristics of real estate and the theory of financial friction [21]. Analysing the characteristics of real estate, scholars believe that real estate has the property of value preservation and high collateral value, so real estate enterprises are subject to relatively low financial friction. Specifically, in a period of high economic policy uncertainty, real estate as collateral can reduce the degree of information asymmetry between real estate enterprises and financial institutions, so real estate enterprises are more likely to obtain bank loans than other enterprises [22]. In addition, some scholars have suggested that the real estate industry is a pillar industry in China, which has a great impact on national economic growth and local financial income, and the stability of real estate is directly related to the stability of the macroeconomy [23]. The regulation of real estate by local governments has become an important instrument to stabilise local economic development, and this situation is more obvious in the period of economic policy uncertainty. So, when economic uncertainty is strong, the government tends to be more inclined to stabilise the real estate market for the sake of stabilising the real estate market, which is also more conducive to real estate corporate investment [24].

However, another school of thought suggests that greater economic policy uncertainty will dampen real estate corporate investment. The theoretical foundation of this school of thought is also largely based on the real options theory [25]. They argue that when economic policy uncertainty increases, it is more difficult for real estate firms to judge the future. As a result, the vast majority of real estate firms resort to the strategy of holding more cash to cope with external risks that may occur in the future [26]. On the other hand, under the effect of real options, real estate companies have higher "waiting returns", and corporate investment decision-makers generally believe that future investment projects are less risky, so they actively reduce current investment expenditures and prefer more liquid assets in

the selection of assets [27]. Meanwhile, some scholars have summarised the real value of real estate investment projects under the real option effect as the sum of the project's net present value, the intrinsic value of the option and the time value of the option [28]. When economic policy uncertainty becomes stronger, real estate corporate investment will increase the time value of assets such as development land in order to increase the real value of the project in the future, so it will inhibit their current investment [29].

2.4. Economic Policy Uncertainty and House Prices

In the research on the relationship between economic policy uncertainty and house prices, most of the research lineage is to first observe that economic policies have impacts on the real estate market, and then the impacts at the market level are reflected in house price fluctuations [19]. For example, using China's macro data, it was found that a positive macroeconomic trend will make house prices fluctuate in an upward trend, while economic policy uncertainty will exacerbate such fluctuations [30]. Among the results of direct research on economic policy uncertainty and house prices, one study found a significant causal relationship by examining the relationship between policy uncertainty and house prices in seven developed countries, including Canada and the United States [31]. They concluded that a house is the largest single asset of the household and precautionary saving of the household increases when uncertainty rises. Households' delayed home buying behaviour leads to a reduction in demand in the housing market and, consequently, a fall in house prices, and ultimately, such uncertainty exacerbates the volatility in house prices [32].

On the contrary, Chinese scholars, based on the rational expectations theory, argue that when economic uncertainty becomes stronger, the risk appetite of market agents decreases and thus suppresses house price volatility [33]. In addition, some scholars have further investigated regional heterogeneity by examining the relationship between uncertainty and house prices using Chinese provincial panel data and found that positive shocks to economic policy uncertainty have different effects on house price movements in different regions. Specifically, a positive shock to economic policy uncertainty causes house prices to rise in the eastern region, fall in the north-eastern region, and maintain volatility in the central and western regions [34]. Some scholars conducted an ADRL cointegration test on the relationship between house prices, residential investment, and economic policy uncertainty and found that stronger economic policy uncertainty has a negative impact on real estate investment in the short term and a positive impact on real estate investment in the long term [35]. Another study further distinguished between new and second-hand house prices based on panel data from the Yangtze River Economic Belt and found that the causal relationship between economic policy uncertainty and new house prices is more significant than that of second-hand houses [36]. Finally, when house prices are affected by economic policy uncertainty, it will further affect market demand, and the impact of market demand is then transmitted to real estate development investment, which means that house prices may also be a mediating variable of uncertainty affecting real estate development investment.

2.5. Research Hypotheses

The existing literature in the field of economic policy uncertainty and real estate has achieved some results, and these studies have analysed the heterogeneity in different macroeconomic cycles, regions, nature of firms, financing constraints, etc. However, the existing literature also leaves some gaps for further research.

There is some segmentation when introducing economic policy uncertainty into China's real estate sector, with studies focusing either on real estate corporate investment, the real estate market or house prices. However, the real estate market, firms and asset prices are inherently interrelated, and there are fewer studies in the literature that combine all three. Therefore, this paper aims to link the three aspects of economic policy uncertainty, real estate firms and house prices to study the impact of house prices on corpo-

rate investment in real estate under economic policy uncertainty, enriching the research results in this field, which is significantly different from that of the existing literature.

In terms of the selection of variables, the existing literature diverges in measuring real estate corporate investment expenditures. Some studies use the share of the increase in fixed assets, some use the share of capital expenditure and some distinguish between financial and real investment [18,22,24,29]. Real estate corporate investment is mainly divided into two parts: one part is the acquisition of state-owned land use rights, which is included in intangible assets, and the other part also includes the acquisition of investment property and some fixed assets. Therefore, this paper selects the proportion of cash paid for the acquisition and construction of fixed assets, intangible assets and other long-term assets in financial statements to measure the proportion of total assets, which is also different from the existing literature.

In summary, this paper will answer the following questions: how does economic policy uncertainty affect the scale of corporate investment in real estate, either by promoting or inhibiting it? What are the differences in the impacts on real estate firms of different sizes? How do changes in house prices affect investment by property developers under conditions of greater economic policy uncertainty?

Based on the above discussion, the research hypotheses of this study are as follows:

H1. *Greater economic policy uncertainty will encourage real estate corporate investment.*

H2. *House price volatility has mediating effects on economic policy uncertainty and real estate corporate investment.*

3. Materials and Methods

3.1. Data Sources and Processing

In this paper, we use Chinese A-share-listed real estate companies as our sample, and the sample period is from Q1 2012 to Q4 2022. Among the A-share listed real estate companies, we excluded ST companies and those with shelling during the sample period, as well as those with negative net assets, negative revenue from main business and missing data, for a total sample size of 554 corporations. All macro data and financial data of the listed companies are from the CSMAR and Wind database and the National Bureau of Statistics of China [37]. In order to exclude the influence of extreme values and outliers on the results of this study, we apply the Winsor shrinkage treatment to the continuous variables at the enterprise level.

3.2. Variables

3.2.1. Independent Variable

In this paper, we use the China Economic Policy Uncertainty Index (EPU) compiled by Baker [12]. The index is based on the daily news content of the South China Morning Post (SCMP) in Hong Kong and is compiled by screening and extracting articles containing at least one of the keywords “China & Economy & Uncertainty”, as well as related policy terms including “Currency & Central Bank & Government & Finance”, and then dividing the number of articles meeting the above screening criteria by the total number of articles in each month and standardising the index [8]. The Baker Economic Policy Uncertainty Index is widely used. Since the original data for the index is monthly, this paper converts the monthly data into quarterly data according to the methodology of Gulen [9]. The conversion formula is:

$$EPU_t = (\frac{1}{2} EPU_m + \frac{1}{3} EPU_{m-1} + \frac{1}{6} EPU_{m-2}) / 100$$

Subscripts t for quarterly, m for monthly.

3.2.2. Dependent Variable

The dependent variable in this study is real estate corporate investment. Referring to other scholars' approaches [38], the level of real estate corporate investment (Inv) is defined as follows.

The level of corporate investment = Cash paid for fixed assets, intangible assets and other long-term assets/Total assets for the period.

3.2.3. Mediating Variable

Regarding the selection of house price indicators for the mediating variable, we referred to other scholars' research on the relationship between monetary policy and house price volatility, which found that the price index synthesised from house prices in 70 large- and medium-sized cities can better fit the price volatility in the national real estate market [39]. Therefore, the selection of house price indicators for the model in this paper is used as a reference, and the month-on-month data of the price index of newly built residential houses synthesised using the house prices of 70 large- and medium-sized cities is used as a proxy for house prices in the period of 2012M1–2022M12 [40]. (Note: the price index of newly built residential houses synthesised using the house prices of 70 large- and medium-sized cities was obtained from the Wind database).

3.2.4. Control Variables

The setting of control variables at the corporation level mainly takes into account the nature of the corporation, operating conditions, debt level, profitability, solvency and other factors, so the indicators of company size, company age, the asset–liability ratio, net cash flow, the net profit margin of total assets, total asset turnover, Tobin's q-value, and the proportion of shares held by the first largest shareholder are selected [41]. Specific variable definitions as well as measurements are shown in Table 1 below.

Table 1. Definition and measurement of key variables.

Variables	Definition	Measurement
INDEPENDENT VARIABLE		
EPU	Economic policy uncertainty	Measured using the Baker index and quarterised
DEPENDENT VARIABLE		
INV	Real estate corporate investment	The level of corporate investment = Cash paid for fixed assets, intangible assets and other long-term assets/Total assets for the period
MEDIATING VARIABLE		
HP	Housing price	Average housing price index (HPI)
CONTROL VARIABLES		
SIZE	Company size	The natural logarithm of a company's total assets
LEV	Asset–liability ratio	Total liabilities of the enterprise/total assets at the end of the period
CASHFLOW	Cash flow ratio	Net cash flow/total assets at the beginning of the period
AGE	Company age	Take the natural logarithm after adding 1 to the year the company was established
ROA	Rate of return on total assets	Ratio of total net profit of the enterprise to the average total assets of the enterprise
TOBIN-Q	Tobin's Q value	(Market Value of Equity + Market Value of Net Debt)/Total Assets
ATO	Total assets turnover	Net sales revenue of enterprises/average total assets
TOP1	Shareholding ratio of the largest shareholder	The shareholding ratio of a company's largest shareholder at the end of the year; if it is less than 20%, it is assigned a value of 0

3.3. Empirical Models

In order to test research hypothesis H1 (the impact of economic policy uncertainty on corporate investment), this paper constructs Model (1) as follows:

$$INV_{i,t} = \beta_0 + \beta_1 EPU_{i,t-1} + \delta_i X_{i,t} + Quarter_{i,t} + Firm_{i,t} + \varepsilon_i \quad (1)$$

In this model, $Firm_{i,t}$ is the unobservable fixed effect controlling for listed real estate firms, $Quarter_{i,t}$ is a quarterly dummy variable and the rest of the control variables are denoted by $X_{i,t}$.

Research hypothesis H2 is that house price volatility has a mediating effect in the process of economic policy uncertainty affecting corporate investment in real estate. In order to test this hypothesis, it is necessary to apply the test method of the mediation effect model [42]. The testing process is as follows: first, test whether the effect of economic policy uncertainty on corporate investment in Model (1) is significant, and second, test whether the effect of economic policy uncertainty on house price volatility is significant (see Model (2)). If β_1 in Model (2) is significant, there is a partial mediation effect of house price volatility, which needs to be further combined with theoretical arguments to complete the mechanism analysis of the mediation effect [43]. Model (2) is constructed as follows:

$$HP_{i,t} = \beta_0 + \beta_1 EPU_{i,t-1} + \delta_i X_{i,t} + Quarter_{i,t} + Firm_{i,t} + \varepsilon_i \quad (2)$$

4. Results

4.1. Descriptive Statistics

Table 2 shows the descriptive statistics of the main variables. The level of investment (INV) has a mean of -3.774 and a standard deviation of 1.467 , indicating that the level of investment varies greatly across individuals and economic cycles. The standard deviation of economic policy uncertainty (EPU) is 0.679 , suggesting that economic policy uncertainty is more volatile during the sample period. The small standard deviation of house prices (HP) suggests that house prices have not been very volatile over the sample period.

Table 2. Descriptive statistics for the main variables in the results and analysis.

VarName	Obs	Mean	SD	Min	Median	Max
INV	554	−3.774	1.467	−7.403	−3.728	−0.981
EPU	554	5.772	0.679	4.660	5.853	6.660
Size	554	23.235	1.486	19.918	23.111	26.452
Lev	554	0.634	0.188	0.135	0.657	0.917
Cashflow	554	0.009	0.107	−0.414	0.010	0.310
Age	554	2.572	0.649	1.099	2.833	3.332
ROA	554	0.033	0.049	−0.229	0.036	0.148
Tobin-Q	554	0.870	0.940	0.000	0.555	4.952
ATO	554	0.339	0.223	0.057	0.284	1.648
Top1	554	0.350	0.160	0.081	0.345	0.758
HP	554	8.971	0.192	8.664	8.974	9.224

4.2. Regression Results

In order to avoid covariance in the data, a test for multicollinearity is needed, which is generally used to detect the presence or absence of multicollinearity using the variance inflation factor (VIF). The VIF is the ratio of the variance when there is multicollinearity among the explanatory variables to that when there is no multicollinearity [44]. The inverse of tolerance, the larger the VIF, the more serious the covariance. The empirical judgement method shows that when $0 < VIF < 10$, there is no multicollinearity; when $10 \leq VIF < 100$, there is strong multicollinearity and when $VIF \geq 100$, there is severe multicollinearity [45]. Table 3 shows the multicollinearity test results of Model (1). It can be seen that the VIF value of each variable is less than 10; thus, overall, the indicators selected in this paper do not have covariance.

Table 3. Variance inflation factor.

	VIF	1/VIF
Size	2.439	0.41
Lev	2.314	0.432
Tobin-Q	1.892	0.529
Age	1.507	0.664
ATO	1.497	0.668
ROA	1.215	0.823
Top1	1.188	0.841
EPU	1.169	0.856
Cashflow	1.059	0.945
MeanVIF	1.587	

For the panel data, the most important thing is to judge what model is suitable for its analysis. General panel data may be analysed with mixed effects models, fixed effects models and random effects models [46]. The Hausman test can be used to determine the choice of a random effect model or fixed effect model, and the F-test can determine the choice of a fixed effect model or mixed effect model [47]. In this paper, the Hausman test and F-test are mainly used to determine which model is suitable for the analysis of the data, and the test results are as Table 4 below.

Table 4. Hausman test and F-test.

Hausman Test			F-Test		
chi2 statistic	p-value	result	chi2 statistic	p-value	result
20.88	0.013	reject	23.13	0.000	reject

From the above table, it can be seen that the Hausman test as well as the F-test results statistic significantly rejects the original hypothesis, and the fixed effect model should be chosen.

Combining the results of the previous Hausman test and F-test and excluding the endogeneity problem caused by the individual effect and time effect, this paper finally uses a fixed effect model for regression analysis. In addition, in order to enhance the reliability of the results, a stepwise regression is used to verify the hypotheses [48]. The regression results in Table 5 show that the independent variable economic policy uncertainty (EPU) is significantly and positively correlated with the dependent variable real estate corporate investment level (INV) at the 1% significance level with a coefficient of 0.299. This means that for each unit increase in EPU, the average increase in INV, other things being equal, is 0.299 units [49]. This result validated research hypothesis H1. Furthermore, in terms of control variables, Tobin-Q is positive, indicating that enterprises are sensitive to investment opportunities. The ROA is significantly negative, indicating that the more internal cash flow, the more conservative corporate investment, probably because corporate investment relies more on external financing. Lev is also significantly negative, indicating that corporations with less debt invest more. Moreover, cashflow is significantly positive, indicating that firms holding more cash tend to invest more. However, the size of real estate firms presents negative coefficients, suggesting that large firms instead adopt a conservative strategy for corporate investment when the external environment is unstable. Finally, the coefficients of ATO and TOP1 are significantly positive, indicating that corporate investment in real estate is procyclical, which means that firms significantly increase their investment in times of asset growth as well as good corporate growth.

Table 5. Robust t-statistics in parentheses.

Variables	(1) Invest	(2) Invest	(3) Invest	(4) Invest	(5) Invest	(6) Invest	(7) Invest	(8) Invest	(9) Invest
EPU	0.015 (0.28)	0.299 *** (5.17)	0.217 *** (3.56)	0.205 *** (3.36)	0.161 ** (2.22)	0.163 ** (2.28)	0.181 ** (2.52)	0.181 ** (2.51)	0.183 ** (2.45)
Size		−0.501 *** (−7.12)	−0.358 *** (−4.34)	−0.356 *** (−4.33)	−0.381 *** (−4.51)	−0.325 *** (−3.66)	−0.303 *** (−3.34)	−0.296 *** (−3.22)	−0.296 *** (−3.20)
Lev			−1.290 *** (−3.58)	−1.271 *** (−3.53)	−1.251 *** (−3.50)	−1.644 *** (−4.04)	−1.498 *** (−3.76)	−1.507 *** (−3.79)	−1.524 *** (−3.77)
Cashflow				0.376 (1.23)	0.399 (1.29)	0.368 (1.21)	0.344 (1.13)	0.338 (1.11)	0.342 (1.13)
Age					0.234 (1.30)	0.003 (0.02)	−0.014 (−0.07)	−0.004 (−0.02)	0.008 (0.04)
ROA						−2.718 *** (−3.59)	−2.746 *** (−3.63)	−2.870 *** (−3.69)	−2.890 *** (−3.68)
Tobin-Q							0.091 * (1.78)	0.091 * (1.78)	0.093 * (1.76)
ATO								0.154 (0.73)	0.160 (0.74)
Top1									0.138 (0.26)
Constant	−3.860 *** (−12.13)	6.148 *** (4.14)	4.100 *** (2.59)	4.124 *** (2.62)	4.346 *** (2.75)	3.962 ** (2.51)	3.218 * (1.91)	2.996 * (1.71)	2.908 (1.60)
Observations	549	549	549	549	549	549	549	549	549
R-squared	0.798	0.826	0.832	0.833	0.833	0.838	0.839	0.839	0.839
Company	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively; values in parentheses are standard deviations.

In addition, the R-squared of the equation is above 0.8, which indicates a good model fit with strong explanatory power [50].

Combining the results of Tables 5 and 6, it can be found that the coefficients of EPU and HP are significant, indicating that economic policy uncertainty promotes the level of real estate corporate investment by increasing the volatility in house prices, and that house price volatility plays a partly mediating role in the process of promoting corporate investment by economic policy uncertainty. Therefore, hypothesis 2 is validated.

Table 6. Mediation effect test.

Variables	(1) HP(House_Price)	(2) HP(House_Price)
EPU	0.241 *** (59.44)	0.127 *** (20.33)
Size		0.060 *** (6.97)
Lev		−0.170 *** (−3.76)
Cashflow		0.016 (0.52)
Age		0.305 *** (13.51)
ROA		−0.182 ** (−2.05)
Tobin-Q		−0.000 (−0.02)
ATO		0.044 (1.64)
Top1		−0.100 ** (−2.13)
Constant	7.583 *** (322.46)	6.198 *** (38.02)
Observations	549	549
R-squared	0.796	0.902
Company	YES	YES

Notes: **, *** indicate significance at the 5% and 1% levels, respectively; values in parentheses are standard deviations.

4.3. Robustness Test

Considering that the sample time period selected for this paper includes years 2020 and beyond, the global outbreak of COVID-19 in 2020, being a public health emergency, caused a strictly exogenous external shock to firms' operations [51]. Failure to consider this exogenous factor may lead to the endogeneity problem of omitted variables [52]. Therefore, this paper conducted the regression again after excluding the special samples from 2020 and beyond. The results shown in Table 7 illustrate that the coefficient of the EPU pair with INV remains significant after excluding the effect of the COVID-19 epidemic, indicating that the results of the positive relationship between economic policy uncertainty and the level of real estate corporate investment are robust.

Table 7. Robustness test 1.

Variables	Exclusion of COVID-19 Effects Invest
EPU	0.248 *** (2.96)
Size	−0.249 ** (−2.30)
Lev	−1.435 *** (−3.36)
Cashflow	0.170 (0.52)
Age	−0.294 (−1.18)
ROA	−2.254 ** (−2.24)
Tobin-Q	0.056 (0.94)
ATO	0.438 * (1.75)
Top1	0.253 (0.45)
Constant	2.081 (0.98)
Observations	417
R-squared	0.855
company	YES

Notes: *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively; values in parentheses are standard deviations.

Meanwhile, in order to avoid the problem of endogeneity due to bidirectional causality as well as to explore the possible time lag in the effect of the independent variables on the dependent variable, this paper treated the independent variables with first- and second-order lags. The results of the regression are shown in Table 8, where the EPU is still significantly and positively correlated with the INV at a significance level of at least 5%.

Table 8. Robustness test 2.

Variables	First-Order Lag Invest	Second-Order Lag Invest
L.EPU	0.226 *** (2.73)	
L2.EPU		0.174 ** (2.29)

Table 8. Cont.

Variables	First-Order Lag Invest	Second-Order Lag Invest
Size	−0.377 *** (−3.64)	−0.451 *** (−3.70)
Lev	−1.627 *** (−3.56)	−1.220 ** (−2.31)
Cashflow	0.638 * (1.77)	0.213 (0.61)
Age	−0.035 (−0.13)	0.163 (0.44)
ROA	−2.130 *** (−2.60)	−1.405 (−1.57)
Tobin-Q	0.063 (0.97)	0.040 (0.59)
ATO	−0.188 (−0.70)	−0.204 (−0.92)
Top1	0.238 (0.39)	−0.480 (−0.86)
Constant	4.836 ** (2.32)	6.417 *** (2.70)
Observations	455	379
R-squared	0.853	0.873
Company	YES	YES

Notes: *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively; values in parentheses are standard deviations.

5. Discussion

Taking the fluctuation in house prices as a mediator, this paper uses a method of combining theoretical and empirical research to study the impact mechanism of real estate policy uncertainty on the level of corporate investment in real estate. From the level of theoretical analysis, this paper, starting from the real estate industry, elucidates the path of the impact of real estate policy uncertainty on corporate investment in real estate by constructing a capital market incomplete real options model based on the perspective of financing costs [34]. From the level of empirical analysis, this paper used the mediation effect method, with house price volatility as the mediating variable of the model, real estate policy uncertainty as the independent variable and the level of real estate corporate investment as the dependent variable. The results found that economic policy uncertainty is significant at the 1% level for both house price volatility and corporate investment in real estate, indicating that real estate policy uncertainty has a positive impact on the level of corporate investment in real estate by increasing house price volatility.

The reasons for analysing the above results lie in the following aspects:

Firstly, since 2008, China's urbanisation process has accelerated, the real estate market has shown rapid development and national residential prices have begun to rise in general, especially in some large- and medium-sized cities where house prices have risen sharply [53]. As a result, real estate assets have become the highest quality collateral in the field of indirect financing [54]. However, economic policy uncertainty will affect the residents' expectations of the real estate market, which will break the balance of supply and demand in the real estate market, resulting in abnormal fluctuations in housing prices and affecting the collateral value of real estate assets [55]. On the one hand, the volatility in housing prices will make most households take a wait-and-see attitude towards the real estate market, which will lead to less-than-expected real estate sales and a tightening of the real estate capital chain. Specifically, highly leveraged real estate enterprises will face serious liquidity pressure and even have difficulty in repaying commercial bank loans. On the other hand, if house prices fall sharply, the "financial accelerator" effect of policy uncertainty may aggravate the scale of non-performing loans of commercial banks. Thus, economic policy uncertainty will exacerbate property price volatility. In addition, the shock

of house price volatility will be amplified between the credit market and the real estate market, and this amplification effect will cause the real estate market to form a self-reinforcing procyclical volatility [56].

Secondly, economic policy uncertainty will lead to changes in the financial environment faced by real estate firms, thus affecting the behaviour of market players [57]. For commercial banks, economic policy uncertainty will affect commercial bank liquidity creation. Taking the monetary policy operation of the European Central Bank during the European debt crisis as an example, scholars generally believe that its policy intention is to stimulate capital flow to the real economy and boost economic growth [58]. When house prices are in the rising stage, on the credit supply side, commercial banks have a stronger willingness to grant real estate mortgage loans and will even relax credit conditions and increase mortgage rates to promote the acceleration of loan investment and the flow of credit resources to the real estate industry through the expansion of the interbank business, which will accelerate the financialisation of real estate [59]. Also, on the credit demand side, there has always been a tendency for residents to buy up but not down in the acquisition of assets, and the demand for financing home purchases is also relatively strong [60]. Therefore, for corporate investment in real estate, a high degree of economic policy uncertainty may exacerbate the investment behaviour of real estate firms. Specifically, real estate corporations may seize future market share in advance by increasing land reserves and expanding investment in an easy monetary environment [61]. Meanwhile, real estate firms with poorer financial conditions tend to have greater incentives to chase uncertain future excess returns in times of economic downturn.

6. Conclusions

This paper combines economic policy uncertainty, property developer investment and house prices in a study based on panel data of Chinese Shanghai and Shenzhen A-share-listed real estate companies from the first quarter of 2012 to the fourth quarter of 2022. The empirical regression results show that economic policy uncertainty enhances the investment behaviour of real estate corporations and that the sense of volatility in house prices plays a mediating role in the positive relationship as economic policy uncertainty rises. This facilitating effect may originate from three aspects, such as the active change in real estate firms' expectations after the rise in economic policy uncertainty, the change in the financing environment of real estate firms and the change in residents' housing investment expectations. The results of the empirical evidence also explain the core hypothesis of this paper better. Further research also finds that the investment behaviour of real estate enterprises exhibits significantly differentiated characteristics, taking into account different enterprise sizes, corporate financial operating conditions and future development.

In terms of policy insights, the government's adjustment to the layout of economic development with the introduction of economic policies is an important means of constructing a long-term stabilisation mechanism for the real estate market in China, which can be focused on the following three aspects:

First, real estate corporate investment expectations should be guided by sustained and stable housing market policies. In the process of the new normal economy, stabilising corporate investment sentiment is an important goal to be achieved in the stage of high-quality development of China's economy. Under the economic development requirements of "stable growth, stable employment and stable expectations" put forward by the Chinese government, stabilising expectations has become an important prerequisite for stable growth [62]. It is not only necessary to ensure the stable advancement of the consumption upgrading process, but also to accurately grasp the strength of the real estate market regulation, focus on stabilising the investment expectations of real estate corporations and ensure the stable and orderly supply of the real estate market. When formulating real estate market policies, the central and local governments should not only create a fair and transparent investment environment but also focus on maintaining consistency and coherence in real estate market policies. The government needs to avoid making

frequent changes to its policies, increase reform efforts, boost the confidence of real estate companies in the market and ultimately guide real estate companies to form reasonable investment expectations.

Second, reasonable monetary and fiscal policies should be used to guide the reasonable flow of capital. In the economic downward pressure, non-real estate enterprises, in order to reduce business risks, will increase the proportion of financial assets. These investment behaviours will ultimately be reflected in frequent changes in housing prices and the real economy investment efficiency decline.

Third, exploring the implementation of “one city, one policy” will be conducive to an improvement in the investment efficiency of real estate enterprises. In April 2019, China’s National Development and Reform Commission issued the “Key Tasks for the Construction of New-type Townships”, which calls for the further liberalisation of the restrictions on the settlement policy in various types of cities [63]. It can be foreseen that the logic of future urban development lies in placing more emphasis on conforming to the law of urban development, which requires that real estate policy issuers need to take into account local geographic conditions, labour mobility, urban spatial carrying capacity and other factors and give full consideration to the regional differences among cities.

Compared with the existing research, the innovation of this paper has two main aspects. First, most of the existing research is centred on the analysis of a single aspect of economic policy uncertainty, such as the impact of monetary policy uncertainty on real estate corporate investment, and less consideration of the comprehensive role of multiple external factors faced by real estate corporate investment. In this paper, we selected the comprehensive index system constructed by Baker (2016) [12] to take into account the uncertainty in China’s macroeconomic policy in a comprehensive way, analyse the integrated impact of rising economic policy uncertainty on real estate corporate investment and combine it with the fundamental characteristics of real estate enterprises. We use control variables to reveal the mechanism of corporate investment in real estate enterprises and the logic chain behind it in a more comprehensive way. Second, the existing studies were all conducted before the COVID-19 epidemic. In the face of the changes in China’s economic development in the post-epidemic era, when China’s real estate industry was re-faced with a cyclical loose monetary environment in the context of revitalisation of the economy and stimulation of consumption, the present study complements the findings of the positive stimulating effect of economic policy uncertainty on corporate investment in real estate in this new period.

The shortcomings of this paper are as follows. Firstly, there is no distinction between the impact of the economic cycle and the heterogeneity in cities. More research can be conducted in subsequent studies from the perspective of economic cycles and urban heterogeneity. Secondly, the measurement of the level of real estate corporate investment as the dependent variable can still be optimised, and it is best to supplement with the use of the quarterly total land purchase, which is the closest value to the actual amount of investment by developers. Furthermore, on the selection of house price data, it is hoped that a more reasonable calculation method for the house price index can be explored. Finally, the investment of property developers often also exists in favour of the selection of a few key cities. Therefore, it is hoped that subsequent research can add the decision of choosing key cities in China to the model innovation on the basis of the theory.

Author Contributions: Conceptualisation, Y.Q.; methodology, Y.Q.; software, Y.Q.; validation, Y.Q.; formal analysis, Y.Q.; resources, Y.Q.; data curation, Y.Q.; writing—original draft preparation, Y.Q.; writing—review and editing, Y.Q. and A.A.M.K.; supervision, A.A.M.K.; project administration, A.A.M.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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