



Investment inefficiency in the hospitality industry: The role of economic policy uncertainty

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ABSTRACT

Corporate investment inefficiency in the hospitality industry is an understudied topic. In this paper, we examine the effect of Economic Policy Uncertainty (EPU) on the investment inefficiency of a sample of 213 hospitality firms in the U.S. for the period 2010–2019. The results reveal that a rise in economic policy uncertainty leads to an increase in firm-level investment inefficiency in the hospitality industry. The underinvestment and the overinvestment problems are exacerbated by uncertainty. The results are robust for different variables specification and econometric techniques. Policy implications are also provided.

1. Introduction

Investment decisions are inherent to any business activity (Irawan & Okimoto, 2021). As part of the strategic dimension, they contribute to value creation and increase the company's performance in the long term. Investment is especially relevant considering that it derives from a business' growth opportunities. When investing, companies expect to get more revenues and make higher returns, which ultimately will make them more attractive to investors. Additionally, more incomes mean that a company will easily meet its financial obligations.

Investment is particularly relevant for firms operating in capital-intensive industries. That is the case for firms in the hospitality industry, which need regular investment to finance capacity expansion, growth, and renovation (Akron et al., 2020; Jiang & Dalbor, 2017). Traditional neo-classical economics suggests that companies should undertake all positive net present value (NPV) projects to maximize their value and avoid those that show a negative net present value (Modigliani & Miller, 1958). Thus, companies should invest in those projects that equal the marginal benefit and the marginal cost (Abel, 1983; Hayashi, 1982). However, business practice reveals that, on some occasions, companies do not follow this rationale and make investment decisions that deviate from their optimal level.

Inefficient investment behavior can weaken a firm's demand meeting, lose its market share, reduce performance, and dissatisfy

customers. Therefore, it is essential to understand whether capital is allocated to the best investment projects (Zhang et al., 2016). Traditional finance literature offers two complementary explanations for understanding corporate investment inefficiency. On the one hand, the agency theory (Jensen, 1986) suggests that managers in firms with free cash flows can engage in non-value-creating investments to benefit them but not necessarily the shareholders, creating an overinvestment issue. A similar explanation can be found considering the different attitudes towards risk between managers and shareholders (Díez-Esteban et al., 2013). On the other hand, investment inefficiency may also arise due to information asymmetries in financially constrained firms, which may create an edge between the cost of external and internal capital (Myers & Majluf, 1984). Specifically, financially constrained firms will not be able to undertake value-creating projects when they do not have sufficient internal reserves and, hence, provoke underinvestment problems.

The under/overinvestment issues are especially relevant when uncertainty arises (Samet & Jarboui, 2017). Uncertainty can cause firms to make inefficient investment decisions and may further endanger the sustainable development of firms (Hou et al., 2021) since managers may be more willing to expropriate shareholders' value (overinvestment) or be more reluctant to invest because of the information asymmetries in financially constrained firms (underinvestment).

In this study, we aim to explore the role of Economic Policy Uncertainty (EPU) on the investment inefficiency of U.S. hospitality

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companies. EPU Index, developed by Baker et al. (2016), reflects the frequency of articles containing economy, policy, and terms in leading newspapers and captures policy uncertainty from various aspects based on news, tax policies, fiscal policies, and monetary policies. Literature devotes a substantial effort to exploring the firm-specific and market-specific determinants of firm investment inefficiency or under- and over-investment (Benlemlih & Bitar, 2018; Samet & Jarbouli, 2017). However, there is no study yet focusing on the hospitality and tourism industry. Considering that those firms have a unique nature and differ from other industries in many aspects (Akron et al., 2020; Singal, 2015), it is worth exploring the investment inefficiency in this sector separately. The hospitality industry is regarded among the most competitive industries. Moreover, there are high exit barriers with high capital investment requirements. Akron et al. (2020) show that the capital expenditures of the industry is higher than the market average in the U.S. In this study, we explore the role of Economic Policy Uncertainty on the investment inefficiency of hospitality companies in the U.S. While Hou et al. (2021) and Im et al. (2021) provide some evidence on this topic for Chinese firms, to our knowledge, we are the first exploring this research question in hospitality industry in the U.S. We also use two alternative scenarios: underinvestment (the negative deviations from the optimal investment) and over-investment (the positive deviations from the optimal investment). By using data of 213 listed hospitality companies in the U.S. for the period 2010–2019, our results suggest that in periods of high economic policy uncertainty, hospitality firms are more inefficient when investing. Specifically, it is shown that the underinvestment and the overinvestment problems are exacerbated by the increase in uncertainty. The obtained results are consistent for alternative measure of EPU and econometric techniques.

The paper is structured as follows. Section 2 presents a brief literature review and develops the study's hypothesis. In section 3, we explain the data and methodology. Section 4 presents and discusses the findings. The last section concludes the paper and explains the policy implications.

2. Literature review and hypothesis development

2.1. Investment in the hospitality industry

While the finance literature extensively analyzes the determinants of firm investment, there is scarce research on the investment decisions of hospitality companies (Jang & Park, 2011). Dalbor and Jiang (2013) explore the determinants of capital expenditures of 78 U.S. restaurant firms from 2002 to 2012. It is found that growth opportunities, size, cash flow, and profitability are positively related to firm investment. The crisis period has a negative impact on firm investment, implying that during an economic downturn, firms tend to invest less. Jiang and Dalbor (2017) document similar findings to those of Dalbor and Jiang (2013). More specifically, by using data of the quick-service restaurant industry in the U.S. for the period of 2006–2016, they show that profitability and cash flow have a positive effect on firm investment; however, no statistically significant relationship is found for growth opportunities. Economic crisis lowers the firm level investment and quick-service restaurants that are franchising have also a tendency to have less capital expenditures.

Moon and Sharma (2014) analyze the factors affecting the firm investment in the lodging and restaurant industries in the U.S. They document that there are some differences across the industries. There is a positive effect of liquidity on investment in both industries. In the case of restaurants, ROA is positively related to corporate investment, while no statistically significant impact is found for lodging firms. Size and debt show a negative association with investment in the restaurant industry. While debt has a negative impact on the investment of firms in the lodging industry, size has no statistically significant impact.

The study by Kim and Jang (2018) focuses on the role of ownership structure on firm investment in the hotel industry. It is found that

institutional ownership is positively related to investment. However, for managerial ownership, the relationship is inverted U-shaped, meaning that firm-level investment tends to rise until managerial ownership reaches a certain threshold. If managerial ownership passes that threshold level, investment decreases in the hotel industry.

Choi, Lee, Choi, and Sun (2018) explore the role of internal cash flow sensitivity on the investment of the U.S. restaurant firms for the period of 2000–2014. It is found that internal cash flow positively affects firm investment, while Tobin's *q* has no statistically significant effect on investment decisions. Moreover, restaurants tend to benefit from franchising as a growth strategy. More recently, Akron et al. (2020) analyze how Economic Policy Uncertainty influences the investment decisions of the U.S. hospitality firms for the period 2001–2018. Their results show that EPU has a negative relationship with firm investment. Using panel quantile estimations, they demonstrate that this effect is observed only for companies in the lower quantile of investment ratios.

2.2. Investment inefficiency

While the literature exploring the determinants of hospitality firms' investment behavior is emerging, little is known about investment inefficiency in the hospitality industry yet. The studies by Dogru (2017, 2016) are among the first to examine the theory of over and underinvestment in the hospitality industry but focusing on the M&A process.

In a perfect financial market, firm-level investment should be determined by the investment opportunities (Modigliani & Miller, 1958). Firms are expected to undertake all positive net present value projects regardless of their financial situation, as they are expected to access finance for all those positive NPV projects. In this regard, firms should avoid negative NPV projects. This implies that firms will continue to invest until marginal benefit equals to marginal costs of projects (Hayashi, 1982) in order to maximize firm value. However, several empirical studies document that firms can deviate from this assumption due to market frictions, namely agency problems and information asymmetry (Benlemlih & Bitar, 2018; Dogru, 2017; Hubbard, 1998; Stein, 2003). This deviation from the optimal investment level or, in other saying investment inefficiency problem can be either in overinvestment or underinvestment form (Chen et al., 2014).

The agency theory (Jensen, 1986) postulates that when managers behave in a self-interested approach by investing in unprofitable projects to expropriate some firms' resources, then the overinvestment issue appears (Benlemlih & Bitar, 2018; Samet & Jarbouli, 2017). As the amount of free cash flows increases, the different attitudes towards risk of managers will make them to undertake excessively risky projects and damage the shareholders' rights by investing in non-value-creating projects.

On the contrary, the underinvestment scenario happens when managers reject positive NPV projects due to financial constraints (Benlemlih & Bitar, 2018). According to Myers and Majluf (1984), market information asymmetries can make the external cost of financing so high that, although companies may have value-creating projects in their portfolio, they will not have the opportunity to follow them.

2.3. Investment inefficiency and economic policy uncertainty

One of the relevant sources of information asymmetry is related to uncertainty (Samet & Jarbouli, 2017), especially the economic policy uncertainty, since it directly impacts a company's financing decision. Thus, our research is focused on studying the role played by EPU in the investment inefficiency of the hospitality industry. Economic Policy Uncertainty is developed by Baker et al. (2016) and has been accepted and widely used as an uncertainty proxy in tourism and hospitality literature. For example, the role of EPU on domestic tourism (Nguyen et al., 2020), outbound tourism (Demir & Gözgor, 2018), business tourism (Tsui et al., 2018), and international tourist arrivals (Tiwaree et al., 2019; Wu & Wu, 2020). There are also studies using firm-level

data from the hospitality industry. The effect of EPU on stock returns (Demir & Ersan, 2018), firm investment (Akron et al., 2020), firm performance (García-Gómez et al., 2021), and hotel operating performance (Madanoglu & Ozdemir, 2019) are examined. All those studies document that EPU has a detrimental effect on tourism development both in the macro and micro-level.

EPU index reflects the frequency of terms associated with economy, policy and uncertainty that appear in the newspapers. Thus, the index measures the uncertainty about policy makers' economic decisions and actions. Since the 2007/2008 global financial crisis, governments develop and implement several economic policies to mitigate the negative effects of this crisis on economies (Wang et al., 2014). The U.S. has experienced several jumps in Economic Policy Uncertainty in the last two decades (Baker et al., 2016). Frequent modifications to economic policies such as fiscal, trade, monetary and other regulatory policies substantially affect the firm level financial decisions and behaviors, including investment, capital structure, and cash holdings (Gulen & Ion, 2016; Hou et al., 2021; Demir & Ersan, 2017; Zhang et al., 2015). This triggers to the interest of academicians to explore the impact of EPU on various firm-level financial decisions. We join this stream of research focusing on the influence of EPU on the firm investment inefficiency for hospitality companies in the U.S.

EPU affects the business environment and the expected future cash flow from projects. In periods of high uncertainty, firms may cancel or postpone their investment projects to less uncertain periods. It is well documented that there is a negative impact of EPU on firm-level investment in different country settings (Gulen & Ion, 2016; Wu et al., 2020; Ilyas et al., 2021). However, to what extent EPU is related to the inefficiency in the hospitality industry remains unanswered.

Hou et al. (2021) consider the impact of EPU on the investment efficiency of Chinese firms from the year 2007–2018. They document that uncertainty negatively affects inefficient investment. They argue that due to the rising external financing costs and tightening external financial capital conditions in periods of higher economic policy uncertainty, firms tend to do their best to enhance their investment efficiency. This will be considered as a signal to investors in terms of their good performance and reducing firm risk. However, this argument may not be suitable for explaining the situation in the hospitality industry in the U.S., where the interest rates stay at relatively stable lower rates due to the monetary easing after the subprime mortgage crisis. Furthermore, it should be noted that the hospitality industry presents high investment irreversibility (Akron et al., 2020) and competitive structure (Singal, 2015). Therefore, in such a market structure, the option value of waiting is highly costly. Firms can continue their investment to benefit from growth opportunities and gain the first-mover advantage (Hou et al., 2021) even during uncertainty. Chevalier-Roignant et al. (2011) also argue that overinvesting can be favorable during increased uncertainty and, hence, firms may consider the rising in uncertainty as an opportunity rather than a risk (Irawan & Okimoto, 2021). Based on this, we expect that an increase in uncertainty will make companies less efficient in terms of investment decisions; in other saying, EPU will increase investment inefficiency. Accordingly, we develop the following hypothesis.

H1. Economic policy uncertainty increases the investment inefficiency of hospitality firms.

We now disentangle investment inefficiency as overinvestment (positive residuals) and underinvestment (negative residuals). The hospitality industry is highly competitive, and there is investment irreversibility due to the nature of the investments. Moreover, there is a rising demand for both domestic and international tourism. In such an industry structure, during uncertainty, waiting or delaying investments can be costly, and even overinvesting can be beneficial as uncertainty can be considered an opportunity. Additionally, according to the agency theory, it is more likely that the opportunistic behavior of managers is exacerbated during uncertainty periods when information asymmetries

increase (Díez-Esteban et al., 2013). Based on these arguments, we expect an increase in uncertainty to exacerbate overinvestment.

H2. Economic policy uncertainty is positively related to overinvestment.

Another aspect of the investment inefficiency is the underinvestment scenario. Im et al. (2021), for Chinese companies over the period of 1999–2019, analyze if EPU magnifies the peer effects for underinvesting and overinvesting firms. A higher EPU makes underinvestment problems last longer. Rising economic policy uncertainty can also exacerbate the underinvestment of hospitality firms. Akron et al. (2020) show that the negative impact of EPU is observed only for hospitality companies in the lower quantile of investment ratios. Firms tend to invest less than they should during higher uncertainty. Firms can postpone or cancel their investment projects and forgo profitable opportunities. This might result in a loss of market share and competitive advantage and less satisfied consumers.

H3. An increase in EPU will worsen the underinvestment.

3. Data and empirical design

3.1. Sample selection

The initial sample of our research comprised a total of 313 hospitality firms operating in the United States. However, after excluding companies with no sufficient data for at least three consecutive years, which allows obtaining a balanced panel data set (e.g. Baltagi & Baltagi, 2008), the final sample is made up of 213 firms. The timeline period goes from 2010 to 2019. All publicly traded hospitality firms in the U.S. have been retrieved from Eikon Refinitive™ dataset. The sample includes firms operating in the traditional hospitality industries, namely hotels and resorts, airline, leisure and recreation, and tourist services (Chen, 2012; Chen et al., 2010). Each company has been classified following the TRBC (Thomson Reuters Business Classification) code. The preliminary dataset was cleaned afterward, first by including only those companies that offered that for at least three subsequent years (Demir et al., 2019) and, second, by winsorizing all variables at the 1st and 99th percentiles to eliminate the effect of data errors and outliers.¹ After this process, the final sample includes a total of 1773 observations. Table 1 presents the number of companies in the sample.

3.2. Definition of variables

3.2.1. Investment inefficiency

Investment efficiency refers to a company's capacity to undertake all projects that show a positive net present value (Gomariz & Ballesta, 2014). Previous literature has not found an appropriate direct measure for a firm's investment efficiency yet. However, some papers provide

Table 1
Sample composition by sub-industry.

	Airline services	Hotels and resorts	Leisure and recreation	Tourist services	Total
Nº Companies	15	36	88	74	213
Observations	132	258	748	635	1773

Source: Thomson Eikon database.

¹ We have made an additional analysis winsorizing the variables at the 5th and 95th percentiles. The obtained results in the latter multivariate analyses are analogous to those shown in the study, and we do not include them for space reasons but they are available upon request.

some models to calculate the optimal level of investment (for example, Biddle et al., 2009 or Chen et al., 2014) and, hence, proxy investment inefficiency through the error term of the optimal investment model. Accordingly, we follow Choi, Lee, Choi, and Sun (2018) model and calculate the yearly normal investment level as a function of growth opportunities in the current year (measured by sales growth) as:

$$INVESTMENT_{i,t} = \beta_0 + \beta_1 Sales\ growth_{i,t-1} + \varepsilon_{i,t} \quad (\text{eq. 1})$$

where $INVESTMENT_{i,t}$ is the total investment of firm i in year t , calculated as the ratio of net increases in tangible and intangible assets to lagged total assets; $Sales\ growth_{i,t-1}$ is the rate of change in sales of firm i from $t-2$ to year t .

Investment inefficiency, i.e., the deviation from the expected investment level, is registered in the regression model residuals ($\varepsilon_{i,t}$). Companies that are overinvesting (investing more than expected) register positive residuals, whereas the underinvestment scenario (companies that invest below their expected level according to sales growth) is represented by negative residuals. At first, the main proxy for firm investment inefficiency is the absolute value of the residuals is used as (INEFF). Thus, a high value of the dependent variable reflects a high level of investment inefficiency.

3.2.2. Economic policy uncertainty

We use the Economic Policy Uncertainty index developed by Baker et al. (2016). The index is updated monthly, and the sample is based on yearly firm-level data. We convert the monthly data to yearly by getting the average of the monthly EPU data within a year. We then calculate the natural logarithm of the yearly values (LNEPU) in line with the literature (Demir & Ersan, 2017; Akron et al., 2020). As a further robustness test, we calculate the variables (LNDEPU_{t-1}) as the natural logarithm of the EPU value in the previous year and (EPU) as the absolute value of the average of the monthly EPU data within a year.

3.2.3. Company-level variables

A relevant determinant of the investment decision in the hospitality industry is a company's profitability (Lee & Kim, 2009; Lee, 2008; Kim, 2008). Thus, we include the ratio of net income to total assets (ROA). From an agency theory perspective, managers in more profitable firms are more likely to incur inefficient investments, looking to satisfy their self-interest (Naeem & Li, 2019).

Another traditional variable that affects a firm's investment decision is firm size. Although larger firms invest proportionally less than smaller ones (Lee et al., 2014; Lee & Kim, 2009), it is expected that when companies grow, they are less inefficient. Thus, we include a firms' company size proxied through the natural logarithm of total assets (SIZE).

A firm's leverage is also an essential variable in explaining corporate investment (Vo, 2019; Mykhayliv & Zauner, 2017), especially in the hospitality industry, which is among the most indebted.² The role of debt regarding investment inefficiency can have a double explanation. On the one hand, highly indebted firms will be less prone to invest due to the liquidity effect (Aivazian et al., 2005). On the other hand, according to the agency theory, shareholders can use debt to reduce a company's free cash flows to avoid the possibility of opportunistic behavior by managers. Consequently, we expect that firm's leverage is positively related to investment inefficiency. Accordingly, the ratio of total liabilities to total assets (LEV) is included in the model. In a later analysis, we also test whether it exists a non-linear relationship between leverage and investment inefficiency, introducing the square value of the LEV variable.

² For example, Andrew et al. (2006) document a leverage ratio between 49% and 65% for hotels and 44–54% for restaurants whereas Tsai and Gu (2007) report a leverage ratio of 53% for casino firms.

Investment opportunities are proxied with the market-to-book assets ratio (MB). A firm is expected to invest more if it has high growth opportunities (Kogan & Papanikolaou, 2014; Morgado & Pindado, 2003). The ratio is widely accepted in the finance literature (e.g., Adam & Goyal, 2008)³ as well as the hospitality one (e.g., Akron et al., 2020; Chen et al., 2012; Chen & Lin, 2015; Kim & Gu, 2009; Kizildag, 2015) as the best proxy for measuring a company's investment opportunities. Although it is expected that firms with growth opportunities invest more (Kogan & Papanikolaou, 2014), the effect on investment inefficiency remains unclear (Keramidou et al., 2013).

Lastly, we also include the cash ratio (CASH) calculated by dividing the sum of cash and cash equivalents by net assets (total assets minus cash and cash equivalents) (Demir et al., 2019; Jiang et al., 2022). It is expected that firms holding more cash can cause a deviation from efficient investment behavior and exacerbate the opportunistic behavior of managers (Shin et al., 2020).

3.3. Model specification

Following prior related studies in this field (Benlemlih & Bitar, 2018; Samet & Jarbouli, 2017), the following model is proposed to test the relationship between EPU and investment efficiency:

$$INEFF_{i,t} = \beta_0 + \beta_1 LNEPU_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 LEV_{i,t-1} + \beta_5 MB_{i,t-1} + \beta_6 CASH_{i,t-1} + SUBINDUSTRY + YEAR + \varepsilon_{i,t} \quad (\text{eq. 2})$$

where, i denotes each company, t indexes time, and $\varepsilon_{i,t}$ represents the stochastic error. The β_0 are firm fixed effects. We also include subindustry (SUBINDUSTRY) and year dummies (YEAR) in the estimation model. We utilize the one-year lagged values of the independent variables since some investment decisions are taken in advance (Akron et al., 2020). Thus, current investment decisions are conditioned by the past company or macroeconomic circumstances.

The general inefficiency analysis is also tested, considering the underinvestment and overinvestment scenarios. The dependent variable in the underinvestment scenario (UNDER) is built with the negative residuals of eq. (1), i.e., the negative deviation from the expected investment. Accordingly, high values of the UNDER variable (close to zero) indicate less underinvestment and, hence, less inefficiency. The dependent variable in the overinvestment scenario (OVER) is built with the positive residuals of eq. (1), i.e. the positive deviation from the expected investment. The rationale in this case is that high values of the OVER variable mean a higher overinvestment problem and, hence, higher inefficiency.

Therefore, to test our set of hypotheses, we formulate the following equations:

$$UNDER_{i,t} = \beta_0 + \beta_1 LNEPU_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 LEV_{i,t-1} + \beta_5 MB_{i,t-1} + \beta_6 CASH_{i,t-1} + SUBINDUSTRY + YEAR + \varepsilon_{i,t} \quad (\text{eq. 3})$$

$$OVER_{i,t} = \beta_0 + \beta_1 LNEPU_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 SIZE_{i,t-1} + \beta_4 LEV_{i,t-1} + \beta_5 MB_{i,t-1} + \beta_6 CASH_{i,t-1} + SUBINDUSTRY + YEAR + \varepsilon_{i,t} \quad (\text{eq. 4})$$

3.4. Empirical method

We first estimate the models by a pooled Ordinary Least Square (OLS) estimation technique. However, although consistent, OLS estimations may not be efficient due to serial autocorrelation and

³ Adam and Goyal (2008) provide a good discussion on the performance of several proxy variables for growth opportunities.

heteroskedastic in panel data estimations. Thus, fixed-random effects (FE-RE) estimations are also performed, a methodology that is more suitable for panel data estimation due to the unobserved individual effects (Moudud-Ul-Huq, 2021). The Hausman test is performed to determine among Fixed and Random effects estimations (Ampenberger et al., 2013).

4. Empirical results

Table 2 reports the relevant descriptive statistics of the variables. Although the independent variables in eqs. (2)–(4) are lagged 1 period, the descriptive statistics values are calculated using the whole sample period, which is independent from time. Investment inefficiency (INEFF) has a mean value of 0.1686, ranging from 0.0001 to 2.1087. Considering the underinvestment (UNDER) and the overinvestment (OVER) variables, we show that the mean inefficiency is -0.0878 and 0.0807 , respectively.

The Pearson pair-wise correlation coefficients are reported in Table 3. LNEPU is positively correlated with INEFF and OVER, whereas the correlation becomes negative for the case of UNDER. The control variables present a consistent correlation with investment inefficiency; besides that, there are no multicollinearity issues.

A pooled OLS regression is firstly performed to test the relationship between investment inefficiency (for global inefficiency (INEFF), underinvestment (UNDER) and overinvestment (OVER)) and EPU and the results are reported in Table 4. Columns 1, 3 and 5 are calculated only with the relevant independent variable (LNEPU). To avoid any heteroskedasticity issues, we include the command *robust* in all regressions.⁴ Additionally, all the models are valid since the *p-values* of the F-test are below 1%. Lastly, multicollinearity is not a problem as the variance inflation factor (VIF) values are below 4 (Hair et al., 2006).

The results reveal that EPU is positively related to investment inefficiency (INEFF), thus, confirming our first hypothesis. Specifically, when $LNEPU_{t-1}$ increases in 10%, we expect the firm's investment inefficiency level to increase by an estimated 0.153% (column 2). This finding contradicts the findings of Hou et al. (2021), who focus on the Chinese-listed firms operating in the energy and power industry. We show that the impact of EPU on investment inefficiency cannot be homogenous across industries. As argued by Singal (2015), the unique nature of the hospitality industry, such as high competition, low barriers for entry, high barriers for exit, ease of switching for consumers, high capital intensity and investment irreversibility can be among the reasons for such a different corporate action. Moreover, financial conditions in China and the U.S. during uncertain periods can have different effects on firm investment decisions.

Table 2
Descriptive statistics.

Variable	Mean	Std. Dev	Median	Minimum	Maximum
<i>Investment efficiency</i>					
INEFF	0.1686	0.2801	0.1745	0.0001	2.1087
UNDER	-0.0878	0.0950	-0.0841	-0.7034	0.0000
OVER	0.0807	0.2892	0.0901	0.0000	2.1087
<i>Economic Policy Uncertainty</i>					
LNEPU	4.8323	0.2113	4.7524	4.4665	5.1489
<i>Control variables</i>					
ROA	0.0912	0.2428	0.0714	-1.8300	0.4900
SIZE	2.0102	2.4123	2.0956	1.2899	24.4960
LEV	0.4366	0.4596	0.3061	0.0000	3.0544
MB	2.3060	7.6530	2.657	-31.6600	49.8900
CASH	0.0948	0.1033	0.1532	0.0001	0.5768

⁴ The command *robust* calculates a robust variance estimator based on a *varlist* of equation-level scores and covariance matrix.

In the underinvestment scenario, the coefficient of LNEPU is negative. It should be noted that UNDER variable is built up using the negative value of the residuals in eq. (1) (ε_{it}). Accordingly, it means that an increase in the uncertainty level is worsening the underinvestment issue. In another saying, uncertainty exacerbates the investment inefficiency with regard to underinvestment. Our estimations reveal that an increase by 10% in LNEPU worsens the underinvestment level by 0.055% (column 4), confirming our third hypothesis. When uncertainty arises, companies that are underinvesting are more prone to postpone or even cancel their investment projects and forgo profitable opportunities (Akron et al., 2020). In the overinvestment situation, we find a similar effect, considering that an increase by 10% in LNEPU worsens the overinvestment level by 0.208% (column 6), confirming our second hypothesis. The irreversibility of most hospitality firms' investments makes it difficult to delay or even undo them when uncertainty arises. Overall, uncertainty increases investment inefficiency of hospitality firms, which is different from the results by Akron et al. (2022), who find a positive effect of uncertainty in reducing investment inefficiency. These results contribute to the strand of the literature recognizing the specifics of the hospitality companies (Singal, 2015).

Our results suggest that the hospitality industry is among the firsts to be affected by uncertainty, as it is easy for customers to delay or even withdraw their consumption choices (Madanoglu & Ozdemir, 2019). If such is the case, hospitality firms will have to redo their investment decisions and, hence, may incur inefficiency. Additionally, in periods of high uncertainty, hospitality firms may totally cancel or even postpone value-creating investments in their portfolio to less uncertain periods. This is known as the underinvestment issue.

On the other hand, hospitality firms may be facing investment inefficiency on the overinvestment side. In a period of low-interest rates, managers can take advantage of the lower financial constraints and, hence, undertake investment decisions above their optimal level to benefit from growth opportunities and obtain a comparative advantage (Chevalier-Roignant et al., 2011; Hou et al., 2021). In this sense, from an agency perspective, uncertainty can be seen by managers as an opportunity to expropriate shareholders' value (Irawan & Okimoto, 2021).

Regarding the control variables, the effect of firms' financial performance (ROA) is only relevant to the underinvestment problem, mitigating it. When a company is more profitable, it does not have financial constraints and, hence, can better manage the investment opportunities. The obtained results for company size (SIZE) are consistent with the idea that larger firms invest proportionally less than smaller ones (Lee et al., 2014; Lee & Kim, 2009). Thus, we show that, in absolute values, larger companies are less inefficient. Similarly, larger firms will not be prone to continue investing in the overinvestment scenario. However, larger firms that are underinvesting will have more difficulties in reducing investment inefficiency. Leverage (LEV) is only relevant in the underinvestment situation, meaning that highly indebted companies will have more financing costs and, hence, intensify the underinvestment issue. Growth opportunities (MB) are not relevant for investment inefficiency, whereas liquidity (CASH) helps to increase inefficiency for both underinvestment and overinvestment (this result is in accordance with the agency theory in terms of the managers' opportunistic behavior).⁵

Being a company's capital structure one of the relevant dimensions in explaining its investment decisions (Myers & Majluf, 1984), the inconclusive obtained results (namely, LEV variable is only significant for the underinvestment scenario in Table 4) makes it relevant to analyze the hypothetical quadratic relationship with investment

⁵ Additionally, we have tested our models considering the current values of all the dependent variables. The positive relationship between EPU and investment inefficiency (INEFF) is persistent. Also, similar results are found for the case of underinvestment (a negative relationship) and overinvestment (a positive relationship). These results are available upon request.

Table 3
Correlation matrix.

Variable	INEFF	UNDER	OVER	LNEPU	ROA	SIZE	LEV	MB
UNDER	0.0726***							
OVER	0.9448***	−0.2583***						
LNEPU	0.0470**	−0.0317*	0.0351*					
ROA	0.0581**	0.0557**	0.0380	−0.0015				
SIZE	−0.1391***	−0.2406***	−0.0556**	−0.0066	−0.0589**			
LEV	0.0333	0.1185***	−0.0067	−0.0304	0.0039	−0.0754***		
MB	0.0103	0.0260	0.0015	0.0366	0.0875***	−0.0339	0.0583**	
CASH	0.0601**	−0.0841***	0.0858***	0.0119	0.0624***	−0.2295***	−0.0711***	0.0315

Note: ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

Table 4
Pooled OLS regression estimations.

	INEFF		UNDER		OVER	
	(1)	(2)	(3)	(4)	(5)	(6)
LNEPU _{t-1}	1.4326*** (0.5152)	1.5288*** (0.5084)	−0.5968*** (0.1305)	−0.5519*** (0.1317)	2.0294*** (0.5351)	2.0807*** (0.5315)
ROA _{t-1}		0.0405 (0.0176)		0.0150 (0.0108)		0.0254 (0.0171)
SIZE _{t-1}		−0.0228*** (0.0035)		−0.0078*** (0.0013)		−0.0150*** (0.0037)
LEV _{t-1}		0.0361 (0.0265)		0.0111 (0.0066)		0.0250 (0.0280)
MB _{t-1}		0.0002 (0.0005)		0.0001 (0.0003)		0.0001 (0.0005)
CASH _{t-1}		0.0963 (0.0960)		−0.1358*** (0.0222)		0.2321** (0.1015)
SUB-INDUSTRY	YES	YES	YES	YES		YES
YEAR	YES	YES	YES	YES		YES
ROBUST	YES	YES	YES	YES		YES
Constant	−6.5501*** (2.4373)	−6.5736*** (2.4037)	2.9094*** (0.6207)	2.8579*** (0.6261)	−9.4595*** (2.5315)	−9.4315 (2.5150)
Observations	1561	1548	749	742	812	806
Adj R-squared	0.022	0.072	0.028	0.082	0.033	0.064
F-test	2.63***	4.79***	5.10***	7.51***	3.64***	3.39***
VIF	1.00	1.03	1.02	1.03	1.05	1.09

Note: Standard deviations are presented in parenthesis. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

inefficiency. Thus, we calculate eqs. (2)–(4), including the square of variable LEV, which results are shown in columns 1, 3, and 5 in Table 5. The obtained results reveal that it exists an inverted U-shape for the relationship of firm leverage and investment inefficiency (INEFF). The threshold (calculated as $-\beta_1/2\beta_2$) is 1.4650, which means that the relationship between leverage and investment inefficiency is positive until the company reaches a leverage ratio of 146.50% when the relationship turns negative. The mean value for LEV in our sample is 43.66%, so we can assume that although the non-linear relationship mathematically exists, the expected positive effect for the case of hospitality firms is prevalent. For the case of the underinvestment and overinvestment scenarios, the non-linear relationship between a firm's capital structure and investment efficiency is also significant.

One last robustness analysis tests the effect of each hospitality sub-industry. Specifically, companies operating in the airline services and tourist services sub-industries may have some particularities in terms of investment structure, i.e., they are traditionally considered less capital-intensive (Singal, 2015). Consequently, we estimate eqs. (2)–(4), excluding observations from these two sub-industries, and the results are shown in columns 2, 4, and 6 in Table 5. The relationship between EPU and investment inefficiency remains the same; namely, there is a positive relationship between the absolute values of inefficiency (INEFF) and overinvestment (OVER). The relationship turns negative in the case of underinvestment (UNDER). In other words, the negative role of economic uncertainty in promoting corporate investment inefficiency is persistent in the hotels and resorts, and leisure and recreation sub-industries, which typically hold high levels of capital investments.

Consequently, we can assume that there is a persistent worsening effect of EPU across all hospitality sub-industries.

The consistency of the previous results is tested using the fixed-effects (FE)/random-effects (RE) analysis to overcome those pooled OLS regressions that do not control for unobserved individual effects. Accordingly, we first perform the Hausmann test, which reveals that the FE model is preferable to the RE. Hence, Table 6 shows the estimations of eqs. (2)–(4) based on the fixed-effects model, including the adjusted standard error (*robust* command). In any case, the obtained results are consistent with those previously calculated with the OLS models, confirming that there is a positive effect between EPU and investment inefficiency, exacerbating both the underinvestment and the over investment problems.

5. Conclusions and implications

Investment in the hospitality industry is an important decision and due to its singular nature (Singal, 2015), hospitality firms need to constantly invest in financing capacity expansion, growth, and renovation (Akron et al., 2020; Jiang & Dalbor, 2017). Thus, it becomes a critical issue to better understand what the factors that determine their investment policy are.

In this sense, previous studies have traditionally focused on internal determinants of hospitality firms' investment policy (Akron et al., 2020; Choi et al., 2018; Dalbor & Jiang, 2013; Jang & Park, 2011; Jiang & Dalbor, 2017; Kim & Jang, 2018; Moon & Sharma, 2014). However, one relevant question remains unknown for hospitality firms: what are the

Table 5
Alternative model specifications.

	INEFF		UNDER		OVER	
	(1)	(2)	(3)	(4)	(5)	(6)
LNEPU _{t-1}	1.5359*** (0.5106)	1.7423*** (0.5786)	−0.5463*** (0.1316)	−0.5993*** (0.1834)	2.0802*** (0.533)	2.3416*** (0.6076)
ROA _{t-1}	0.0415** (0.0177)	0.0580** (0.0248)	0.1618* (0.0109)	0.0027 (0.0160)	0.0254 (0.0172)	0.0553*** (0.0212)
SIZE _{t-1}	−0.0234*** (0.0037)	−0.0192*** (0.0041)	−0.0084*** (0.0013)	−0.0051*** (0.0015)	−0.0150*** (0.0039)	−0.0141*** (0.0043)
LEV _{t-1}	0.0586*** (0.0464)	−0.0214 (0.0136)	0.0356*** (0.0121)	0.0004 (0.0048)	0.0230** (0.0364)	−0.0210 (0.0141)
LEV ² _{t-1}	−0.0200*** (0.0225)		−0.0109** (0.0051)		−0.0009*** (0.0236)	
MB _{t-1}	0.0002 (0.0005)	0.0007 (0.0005)	0.0001 (0.0003)	0.0001 (0.0004)	0.0001 (0.0005)	0.0006 (0.0005)
CASH _{t-1}	0.1040* (0.0969)	−0.0550 (0.0708)	−0.1270*** (0.0225)	−0.0965*** (0.0250)	0.2314*** (0.1021)	0.0416 (0.0736)
SUB-INDUSTRY	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES
ROBUST	YES	YES	YES	YES	YES	YES
Constant	−6.5930*** (2.4101)	−7.6789*** (2.7097)	2.8367*** (0.6258)	3.0353*** (0.8820)	−9.4297*** (2.5027)	−10.7143*** (2.8442)
Observations	1548	905	742	434	806	471
Adj R-squared	0.073	0.058	0.085	0.049	0.064	0.055
F-test	4.51***	3.81***	7.46***	3.74***	3.19***	2.60***

Note: Standard deviations are presented in parenthesis. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

Table 6
Fixed effects regression estimations.

	INEFF	UNDER	OVER
LNEPU _{t-1}	1.8326*** (0.5083)	−0.5435*** (0.1191)	2.3761*** (0.5243)
ROA _{t-1}	−0.1527 (0.0209)	0.0122* (0.0123)	−0.0274 (0.0172)
SIZE _{t-1}	−0.1841*** (0.0374)	−0.0515*** (0.0097)	−0.2356*** (0.0414)
LEV _{t-1}	0.0659 (0.0746)	−0.0019** (0.0169)	0.0679 (0.0803)
MB _{t-1}	0.0004 (0.0007)	0.0000 (0.0003)	0.0005 (0.0006)
CASH _{t-1}	0.0834** (0.2254)	−0.1903*** (0.0480)	0.2737* (0.2455)
YEAR	YES	YES	YES
ROBUST	YES	YES	YES
Constant	−4.7990*** (2.4315)	1.6239*** (0.5973)	−6.4229*** (2.5062)
Observations	1548	742	806
R-squared (within)	0.096	0.095	0.141
F-test (overall)	3.74***	7.01***	4.89***
F-test that all u _i = 0	2.52***	2.16***	2.35***

Note: Standard deviations are presented in parenthesis. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

factors that lead a company to invest inefficiently? Or in other words, why are some companies investing above or under their optimal level? According to the neoclassical theory, firms should invest until their reach their optimal level, where the costs and benefits of investing equalize. Nevertheless, overinvestment or underinvestment problems arise, according to the agency theory, due to information asymmetries or financial constraints.

Since one of the relevant causes of information asymmetries is uncertainty, our research focuses on studying the relationship between Economic Policy Uncertainty and investment inefficiency for a sample of 213 U.S hospitality companies during the period from 2010 to 2019. We find that an increase in EPU causes an increase in firm-level investment inefficiency in the hospitality industry, implying that firms tend to worsen inefficient investment when facing heightened policy uncertainty. The underinvestment and the overinvestment problems are also

exacerbated by an increase in uncertainty.

Our results may provide several practical implications for different actors. Public authorities should be aware that economic policy uncertainty increases inefficiency in the hospitality industry. A more credible and consistent economic policy is needed to reduce information asymmetries and opportunistic behavior in companies (Akron et al., 2020). On the underinvestment side, uncertainty aggravates the financial constraints that do not allow a company to invest in profitable projects. In this sense, governments should support a more efficient financial system that allows financial intermediaries to facilitate sufficient funds to those companies that are investing under their optimal level. This is crucial for hospitality firms since they are capital-intensive businesses and highly dependent on economic stability (they are offering a non-essential service). Since the underinvestment issue appears not for internal reasons (companies may hold in their portfolio value-creating projects), policymakers should create a stable business environment and, if uncertainty is unavoidable, then act as guarantors for companies that cannot get funds easily. In case the governments are not able to provide adequate solutions, the underinvestment problem may slow down the recovery of the tourism industry and the overall economy after an economic downturn.

It is also important to note that firms that are overinvesting may be destroying value. Uncertainty may promote opportunistic behaviors and engage a company in financial problems, which, ultimately, can affect the economy. This extent is especially relevant in the U.S. hospitality industry since it represents the 7.8% of GDP in 2019.⁶ The overinvestment issue may lead to a misallocation of resources. Thus, stakeholders should better screen out the investment activities of companies, especially in uncertain periods, since the investment decisions can be over their optimal level and, hence, not create value for the stakeholders.

Lastly, our findings can provide practical implications for managers fundamentally because following inefficient investment policies jeopardizes company's value creation in the long run. First, it is essential to determine whether the inefficiency comes from the underinvestment or the overinvestment problem, which needs to identify the optimal level of investment. For those companies investing below their optimal level,

⁶ According to the National Travel and Tourism Office (NTTO).

managers should be aware that the increase in EPU may worsen their situation and make it more complicated to meet the customers' demand. Moreover, customers may be less satisfied if the company is not adequately allocating their investment efforts, which may worsen the company's reputation in the long term. In this scenario, managers should revise their investment decisions to match their optimal level, so they can better face a rise in economic policy uncertainty. For those companies in the overinvestment scenario, it is important to identify the high costs of that policy, besides the agency costs. Specifically, companies that are overinvesting suffer from an excess of capacity and misuse of resources. In the case of overinvestment, as the resources are overused, it may be difficult to realize new investment opportunities with good future prospects. An increase in EPU will make those companies more sensitive to a decrease in demand and, hence have to face financial problems. A rational investment policy is needed to, on the one hand, reduce opportunistic behavior and, on the other hand, reduce the default likelihood.

Our findings shed light on the role of economic uncertainty in firm-level investment inefficiency only in the U.S. hospitality industry. The research can be expanded to other countries to understand better whether the effect is different considering diverse hospitality services. Likewise, the impact of alternative uncertainty measures such as economic uncertainty and geopolitical risks can be compared. Lastly, it may be of worth interest to analyze the time horizon in which the relationship between uncertainty and investment inefficiency is expected.

Declaration of competing interest

None.

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