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The impact of wildfires on US insurance firms: Evidence for the costliest wildfire in California

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ABSTRACT

This research study the short-term effect of the costliest wildfire in California (January 2025) on the US insurance industry. Employing an event study, we find a negative impact for Property & Casualty Insurance firms. This result agrees with damage hypothesis or claim effect, which argues that damage caused by catastrophic events results in a reduction of insurer market value due to insufficient *ex ante* premium to absorb the damage claims. Our study also shows that the level of loss, premiums, underwriting exposure, profitability, and leverage are significant determinants in the magnitude of the insurer's stock market reaction.

1. Introduction

Climate change results in more frequent and more intensive fires in California (e.g., Hoeppe, 2016; Dong et al., 2022). Dong et al. (2022) argue that large California's fire seasons will become more intense, starting earlier, and ending later. That authors predict that the number of large fire days will rise from 36 days per year between 1970 and 1999–58 days per year under a moderate greenhouse gas emission scenario, and up to 71 days per year by 2070–2099 under a high emission scenario. Thus, it is no surprise that wildfires that broke out in California in January 2025 (the costliest in state history), has become one of the worst natural catastrophes the US experienced, with an economic damage of $250 billion (approximately 4% of California's GDP), that is roughly what Hurricane Katrina caused in economic losses.[4]

Severe natural disasters touch the insurance industry by increasing the exposure risk to climate related events, which require adjustments in premiums and risk management strategies accordingly (e.g., Zhou et al., 2023). Higher premiums may surpass what consumers are willing to pay, making insurance unaffordable. This could diminish the risk diversification capacity of the (re)insurance market (Zhou et al., 2023). Moreover, severe natural disasters tend to cause large-scale losses that can exceed premiums, potentially resulting in financial instability or market exits (Born and Viscusi, 2006). On the other hand, natural disasters can also increase demand for insurance products, thereby boosting the profits and stock returns of the firms in insurance industry (*revenue hypothesis* or *long-term growth effect*).

The study's aim is to empirically examine the short-term effects of the January 2025 California wildfires on the US listed insurers (Property & Casualty and other sub-industry). Despite the existence of previous studies about the impact of natural disasters on the market value of the US insurance firms (e.g., Born and Viscusi, 2006; Hagendorff et al., 2015; Sharma and Rotthoff, 2020; Tavor, 2024), this event study has

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[4] https://hbr.org/2025/01/the-la-fires-could-change-the-insurance-industry.

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the particularity of analysing the wildfire with the highest economic costs in California. In this way, this study contributes to the debate on the short-term impact caused by severe natural disasters on insurance firm share prices.

Our findings suggest that the *claim effect* appears to predominate over the *long-term growth effect*, resulting in a decline in the market values of Property & Casualty insurance firms' equity. For the other insurers (non-Property & Casualty segment), for the generality of event windows, there were no significant effects on share prices. The results also show the presence of a higher decrease in stock market returns for insurers with a high market share in terms of written premiums in Property & Casualty segment in California. Regarding the other insurer-specific characteristics that influence their market value, the results reveal that insurers with higher premiums and profitability and a lower loss ratio and level of debt are those that are more resilient to the losses caused by the recent severe wildfire.

2. Short-term impact of natural disasters on the insurance industry

Past event studies about the effects of natural disasters show mixed evidence of the impact of these events on the firm's insurance industry. Most of the studies indicate that insurance firms typically evidence negative short-term abnormal returns because of their projected loss payments, i.e., the *damage hypothesis* or *claim effect* (e.g., Lamb, 1995; Gangopadhyay et al., 2010; Takao et al., 2013; Hagendorff et al., 2015; Schuh and Jaeckle, 2023; Tavor, 2024). The *damage hypothesis* or *claim effect* results in a reduction of insurer market value due to insufficient *ex ante* premium to absorb the damage claims from the natural disasters (Chen et al., 2008). It should also be noted that economic losses resulting from natural disasters have been increasing over recent decades and are expected to rise further due to climate change (e.g., Botzen et al., 2019; Zhou et al., 2023). Furthermore, catastrophic losses from natural disasters poses a significant challenge, given that their losses are unpredictable and can affect multiple policies at once, presenting substantial financial risks for insurers (Born and Viscusi, 2006; Benali and Feki, 2017). One of the consequences of the increased risk associated with climate change is the increase in average premiums (increase of 33% between 2020 and 2023 according to Keys and Mulder, 2024) primarily driven by the pass-through of reinsurance costs (Keys and Mulder, 2024) and greater market concentration due to the exit of insurers from high-risk zones (e.g., Born and Viscusi, 2006; Benali and Feki, 2017; Sharma and Rotthoff, 2020). Finally, increases in risk premiums may impede an individual's ability to purchase an insurance, since they may not be able to afford the premium (e.g., Born and Viscusi, 2006; Barnes et al., 2023), which can lead to consumers' financial distress (Ho et al., 2023).

There are studies that found positive returns, suggesting that investors anticipate insurers will gain from the catastrophic event due to increased demand for insurance and/or higher premium rates (e.g., Shelor et al., 1992; Aiuppa et al., 1993; Ragin and Halek, 2016). Catastrophic natural disasters are usually associated with a rise in both insurance demand (e.g., Nguyen and Mitrou, 2025) and in the premium rate (e.g., Born and Viscusi, 2006; Keys and Mulder, 2024), so insurers may see an increase of long-run profitability (*long-term growth effect* or *revenue hypothesis*). If the present value of increased long-term profitability from increased premiums and demand exceeds the value of claim payments, insurer stock prices will increase after a catastrophic natural event. Finally, Chen, Guo, Ji, and Zhang (2023) show that Chinese insurers tend to show insignificant abnormal returns in response to natural disasters.

The growing trend of destructive wildfires, partly attributable to an increase in wildfire risk because of climate change, necessitates a reassessment of their effects on insurance firms. The study contributes to the debate on the effects of natural disasters on insurers by analysing the costliest California wildfire in terms of insured losses.

Table 1
Determinants of CARs: Definition of Variables. This table displays the notation and definitions of explanatory variables in Eq. (5) on the insurer's Cumulative Abnormal Returns (CARs).

Variable	Notation	Measure	Author(s)	Expected Effect
Size	**SIZE**	Natural logarithm of total assets	Astakhov, Havranek, and Novak (2019)	+/-/No
Loss Ratio	**LOSS**	Ratio of losses incurred to total premiums earned (%)	Born and Klimaszewski-Blettner (2013)	-
Premium to Surplus Ratio	**PSR**	Net premiums written divided by policyholder surplus. Policyholder surplus is the difference between an insurance firm's assets and its liabilities	Born and Klimaszewski-Blettner (2013)	+
Profitability	**ROA**	Ratio of operating income to total average assets (%)	Martins *et al.* (2023); Hagendorff et al. (2015)	+/No
Leverage	**TLEV**	Ratio of total debt to total assets (%)	Martins *et al.* (2023)	-/No
Volume of Capital	**VOC**	Natural logarithm of total equity capital	Cummins, Doherty, and Lo (2002)	+
Exposure	**EXP**	Dummy variable that equals 1 if the insurer is in Top 25 of California Property & Casualty market share (written premiums) and 0 otherwise	Hagendorff et al. (2015)	-

The primary goal of this research is to investigate the short-term market impact of the January 2025 California wildfires on the US listed insurers (Property & Casualty and others). Thus, our research hypothesis is as follows:

Null Hypothesis (H_0): The January 2025 California wildfires had no short-term impact on the value of US insurance listed firms.

Finally, we also examine the insurance firm's specific characteristics that serve as value drivers during the 2025 California wildfires.

3. Data and methodology

The data employed in the present event study is gathered from different sources. The insurer's stock returns and S&P500 index (market index) were collected from Eikon Refinitiv. Our sample consists of 95 US listed insurance firms. Of these, 42 of the US listed insurers have Property & Casualty as their main line of business and the remaining US listed insurers (53 firms) have other lines of business (e.g., life, diversified, specialty, insurance brokers). Regarding insurer-specific variables

Table 2
Descriptive Statistics for Explanatory Variables and Matrix of Correlations. This table presents descriptive statistics and matrix of correlations for explanatory variables used in Eq. (5). All figures of insurance-specific explanatory variables are calculated from the previous year-end accounting figures. The variables are the following: $SIZE_i$ is the natural logarithm of total assets for property & casualty insurance firm *i*; $LOSS_i$ is the ratio of losses incurred to total premiums earned (%) for property & casualty insurance firm *i*; PSR_i is the net premiums written divided by policyholder surplus for property & casualty insurance firm *i*; ROA_i is the ratio of operating income to total average asset (%) for property & casualty insurance firm *i*; $TLEV_i$ is the ratio of total debt to total assets (%) for property & casualty insurance firm *i*; VOC_i is the natural logarithm of total equity capital for property & casualty insurance firm *i*; EXP_i is a dummy variable that equals 1 if the insurer is in Top 25 of California Property & Casualty market share (written premiums) and 0 otherwise.

Variable	Mean	SD	25th perc.	Median	75th perc.
Descriptive Statistics for Explanatory Variables – Property & Casualty Sample					
SIZE	\$22,322 ml	\$33,509 ml	\$1708 ml	\$4887 ml	\$29,787 ml
LOSS	63.4%	22.3%	52.1%	65.8%	76.4%
PSR	2.1	3.3	1.0	1.5	1.9
ROA	1.1%	5.3%	0.3%	2.2%	4.2%
TLEV	77.0%	9.7%	73.9%	78.0%	82.1%
VOC	\$4776 ml	\$7176 ml	\$411 ml	\$1202 ml	\$5107 ml
EXP	23.8%	42.6%	0	0	0

Matrix of Correlations

	SIZE	LOSS	PSR	ROA	TLEV	VOC	EXP
SIZE	1						
LOSS	0.177	1					
PSR	-0.115	0.415	1				
ROA	0.263	-0.354	-0.313	1			
TLEV	0.116	0.268	0.473	-0.028	1		
VOC	0.977	0.166	-0.129	0.286	0.012	1	
EXP	0.685	0.226	-0.062	0.251	0.126	0.651	1

used in the cross-section analysis, they were collected from ORBIS and Eikon Refinitiv (2024 year-end accounting figures). Table 1 presents the notation, definition and expected effect of insurer-specific variables.

In order to compute the research hypothesis offered on the preceding section, we apply the standard abnormal return (ARs) technique based on the market model (*MM*) and the Fama and French (1993) three-factor model (*FF3*). We calculate market model ARs as a residual return from estimating the regression equation below:

$$E(R_{i,t}) = \alpha + \beta R_{m,t} + \varepsilon_{i,t} \tag{1}$$

where, $E(R_{it})$ represents the expected rate of return of insurance firm *i* on the trading day *t*; R_{mt} represents the observed return of stock market index (benchmark index) on the trading day *t*; α_i and β_i refers to the regression coefficients that correspond to the daily rate of return of insurance firm *i* and the market rate of return, respectively. Additionally, e_{it} refers to the error term.

The Fama and French (1993) three-factor abnormal returns (*FF3*) are measured as the residual returns from estimating the following regression equation:

$$R_{i,t} - R_{f,t} = \alpha + \beta_1[R_{m,t} - R_{f,t}] + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{i,t} \tag{2}$$

where, R_{ft} is the risk-free rate of return at time *t*; R_{mt} is the benchmark index; *SMB* is the small minus large market capitalization risk factor, *HML* is the high book-to-value minus low-book-to-value risk factor. The Fama-French factors *SMB*, *HML* and the risk-free rate return are obtained from the homepage of Kenneth French at Dartmouth College.[5]

As the event date, we use January 7, 2025 (start date of a series of 14 destructive fires that affected California),[6] to calculate the ARs. Abnormal returns are computed by the difference between the observed returns of insurance firm *i* on day *t* (R_{it}) and the expected return produced by the market model $E(R_{it})$, using the following specification:

$$AR_{it} = R_{it} - E(R_{it}) \tag{3}$$

The event date is identified as day $t = 0$. As in Tavor (2024), the abnormal returns (ARs) are estimated using the 205 days prior to the occurrence of the wildfire. By accumulating the abnormal returns around a specific time interval, we compute the cumulative abnormal returns (CARs) using the following specification:

$$CAR[t_1, t_2] = \sum_{t_1}^{t_2} AR_t \tag{4}$$

We examine six different event windows for the CARs: [0,2], [0,3], [0,5], [0,10], [0,15], and [0,20]. Finally, for each event window, we compute the cumulative average abnormal returns (CAARs) using the following specification:

$$CAAR[t_1, t_2] = 1 \Big/ N \sum_{t_1}^{t_2} CAR_{[t1,t2]} \tag{5}$$

where, *N* represents the sample size of the sample.

We employ the cross-sectional *t*-test to analyse the level of significance of CAARs (Brown and Warner, 1980). To account for the dependence across firms' average residuals, in event time, Brown and Warner (1980) suggest that the standard deviation of average residuals should be estimated from the time series of the average abnormal returns over the estimation period. The formula for testing the significance of CAARs over a window [t_1;t_2] is:

$$t_{CAAR_t} = \frac{CAAR_{t1;t2}}{\frac{SD\quad(CAR_t)}{\sqrt{N}}} \tag{6}$$

where *SD* (CAR_t) is the cross-sectional standard deviation, and *N* is the number of firms.[7]

Additionally, as highlighted by Eckbo et al., 2022 a correction is needed for the contemporaneous cross-correlation of stock returns, which exists when the event affects all firms simultaneously in calendar time. Consequently, we use the corrections to the *t*-statistics proposed by Eckbo et al. (2022) to solve the contemporaneous cross-correlation of stock returns.

Regarding the analysis of abnormal returns differences between US

[5] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[6] https://en.wikipedia.org/wiki/January_2025_Southern_California_wildfires.

[7] More detailed information on cross-sectional *t*-test is available in Serra (2004).

Table 3
Descriptive statistics and tests for statistical significance of CAARs. This table presents the descriptive statistics of Cumulative Average Abnormal Returns (CAARs) and the differences in the CAARs for two different subsamples of insurance firms (Property & Casualty vs Other Insurance firms), calculated using the market model (*MM*) and the Fama-French three-factor model (*FF3*) as well as the results of tests for the statistical significance of CAARs. We apply the correction for the contemporaneous cross-correlation of stock returns described in Eckbo et al. (2022). θ_1 is the *p-value* of *t*-test statistic and based on Brown and Warner (1980) (see more details in Serra, 2004). The significance of the differences in CAARs is determined via two-sample *z*-test. ***, ** and * means statistical significance at the 1%, 5% and 10% level, respectively.

Variable	Mean	SD	25th perc.	Median	75th perc.	θ_1
Market Model (MM)						
Panel 1: All Sample (# 95 US Listed Insurance Firms)						
CAAR [0,2]	-2.649%	5.129%	-3.777%	-1.412%	-0.017%	0.087*
CAAR [0,3]	-2.263%	5.884%	-3.432%	-0.877%	0.304%	0.169
CAAR [0,5]	-1.219%	5.262%	-1.899%	-0.197%	1.705%	0.211
CAAR [0,10]	-3.628%	7.372%	-6.111%	-2.260%	0.274%	0.161
CAAR [0,15]	-2.628%	9.663%	-4.952%	-1.483%	0.926%	0.188
CAAR [0,20]	-2.441%	11.048%	-5.223%	-1.044%	1.251%	0.221
Panel 2: Property & Casualty Sample (# 42 US Listed Insurance Firms)						
CAAR [0,2]	-3.087%	4.888%	-4.387%	-1.952%	-0.472%	0.066*
CAAR [0,3]	-3.290%	6.090%	-4.211%	-1.694%	-0.031%	0.077*
CAAR [0,5]	-2.252%	5.893%	-3.461%	-0.937%	1.679%	0.082*
CAAR [0,10]	-6.645%	7.456%	-9.516%	-4.831%	-2.023%	0.084*
CAAR [0,15]	-5.947%	8.564%	-8.310%	-3.312%	-0.506%	0.090*
CAAR [0,20]	-4.598%	9.542%	-7.086%	-3.847%	0.497%	0.123
Panel 3: Other Insurance Firms (# 53 US Listed Insurance Firms)						
CAAR [0,2]	-2.301%	5.287%	-3.248%	-1.164%	0.114%	0.107
CAAR [0,3]	-1.449%	5.583%	-2.609%	-0.609%	0.509%	0.175
CAAR [0,5]	-0.497%	4.537%	-1.547%	0.311%	1.797%	0.356
CAAR [0,10]	-1.237%	6.358%	-3.354%	-0.814%	1.292%	0.390
CAAR [0,15]	-0.131%	9.571%	-2.902%	-0.484%	2.624%	0.489
CAAR [0,20]	-0.616%	11.752%	-4.330%	-0.577%	4.552%	0.491
Panel 4: Difference Test for CAARs: Property & Casualty vs Other Insurance Firms						
	Difference CAAR		*z*-test (p-value)			
CAAR [0,2]	-0.786%		0.227			
CAAR [0,3]	-1.841%		0.065*			
CAAR [0,5]	-1.755%		0.047**			
CAAR [0,10]	-5.408%		0.003***			
CAAR [0,15]	-5.816%		0.004***			
CAAR [0,20]	-3.982%		0.030**			
Variable	**Mean**	**SD**	**25th perc.**	**Median**	**75th perc.**	**θ_1**
Fama-French Three-Factor Model (FF3)						
Panel 1: All Sample (# 95 US Listed Insurance Firms)						
CAAR [0,2]	-2.152%	5.023%	-2.915%	-0.882%	0.209%	0.065*

Table 3 (*continued*)

Variable	Mean	SD	25th perc.	Median	75th perc.	θ_1
Market Model (MM)						
Panel 1: All Sample (# 95 US Listed Insurance Firms)						
CAAR [0,3]	-2.195%	5.855%	-3.144%	-1.071%	0.356%	0.097*
CAAR [0,5]	-2.222%	5.518%	-3.113%	-0.990%	0.314%	0.174
CAAR [0,10]	-2.846%	7.205%	-5.265%	-1.671%	0.953%	0.183
CAAR [0,15]	-2.040%	9.160%	-5.134%	-0.847%	2.867%	0.423
CAAR [0,20]	-2.092%	10.852%	-5.161%	-0.921%	2.368%	0.460
Panel 2: Property & Casualty Sample (# 42 US Listed Insurance Firms)						
CAAR [0,2]	-2.721%	4.735%	-3.489%	-1.989%	-0.394%	0.091*
CAAR [0,3]	-3.377%	5.972%	-4.556%	-2.335%	-0.465%	0.090*
CAAR [0,5]	-3.366%	6.091%	-4.416%	-1.947%	-0.052%	0.088*
CAAR [0,10]	-5.830%	6.939%	-9.279%	-4.080%	-1.957%	0.090*
CAAR [0,15]	-5.562%	8.281%	-9.135%	-2.842%	-0.638%	0.099*
CAAR [0,20]	-4.462%	10.030%	-7.870%	-2.944%	0.174%	0.156
Panel 3: Other Insurance Firms (# 53 US Listed Insurance Firms)						
CAAR [0,2]	-1.701%	5.196%	-2.089%	-0.382%	0.691%	0.131
CAAR [0,3]	-1.259%	5.586%	-2.445%	-0.431%	0.568%	0.305
CAAR [0,5]	-1.316%	4.828%	-2.066%	-0.446%	0.356%	0.390
CAAR [0,10]	-0.965%	6.501%	-1.843%	0.121%	2.274%	0.445
CAAR [0,15]	0.752%	8.856%	-1.687%	0.839%	4.386%	0.489
CAAR [0,20]	-0.215%	11.109%	-3.729%	0.192%	4.745%	0.534
Panel 4: Difference Test for CAARs: Property & Casualty vs Other Insurance Firms						
	Difference CAAR			*z*-test (p-value)		
CAAR [0,2]	-1.020%			0.159		
CAAR [0,3]	-2.118%			0.039**		
CAAR [0,5]	-2.050%			0.037**		
CAAR [0,10]	-4.865%			0.006***		
CAAR [0,15]	-6.314%			0.002***		
CAAR [0,20]	-4.247%			0.025**		

Property & Casualty and Other Insurance firms, we calculate the CAARs and their differences for each subsample. In this case, for each subsample, to allow for changing variance as part of the null hypothesis, we use the cross-section of CARs to form an estimator of variance for testing the null hypothesis (e.g., Mackinlay, 1997). The differences observed in the two subsamples are analysed using a two-sample *z*-test for statistical significance.

Finally, to examine the effect of insurance firm's specific characteristics on the cross-sectional variation of CARs, we compute the equation below by OLS, for the sample of property & casualty insurers (insurance sub-industry most affected by wildfires):

$$CAR_i = \beta_0 + \beta_1 \ln(SIZE_i) + \beta_2 LOSS_i + \beta_3 PSR_i + \beta_4 ROA_i + \beta_5 TLEV_i + \beta_6 \ln(VOC_i) + \beta_7 EXP_i + \quad \varepsilon_i \tag{7}$$

where CAR_i refers to the cumulative abnormal returns for insurance firm *i*. Three different event windows are used in the estimation of Eq. (5):

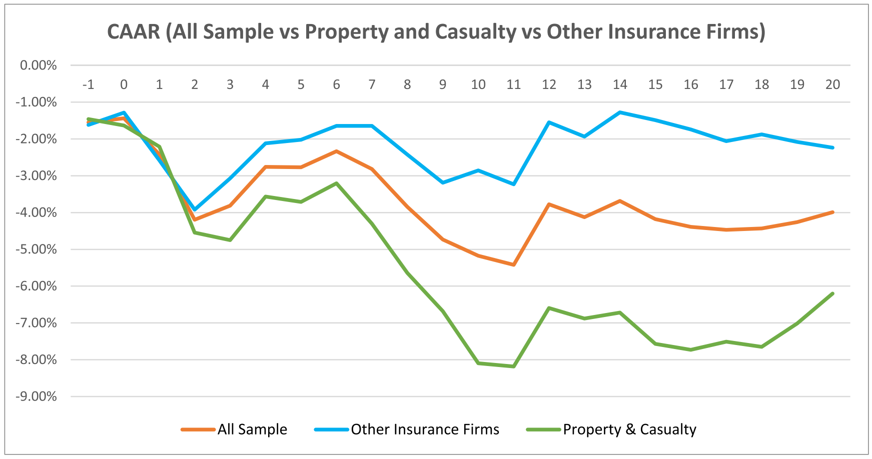

Fig. 1. US Insurance Firms CAARs Around the Event Window.

Table 4
Cross-sectional analysis. This table shows the cross-sectional estimation for the 42 US property & casualty insurance firms CARs' around the January 2025 California wildfire. The dependent variables are the insurer's CARs for three different time windows: [0;+ 5]; [0;+ 10]; and [0;+ 15], computed using the market model (*MM*) and the Fama-French three-factor model (*FF3*). The insurer-specific explanatory variables are computed from accounting data based on the prior year-end to the event. These explanatory variables are defined in Table 1. ***, ** and * mean statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors adjusted for heteroskedasticity are reported in parentheses. # Obs. denotes the number of observations used in the estimation.

	CAR [0;5]	CAR [0;10]	CAR [0;15]	CAR [0;5]	CAR [0;10]	CAR [0;15]
	MM			FF3		
Constant	0.315	0.238	0.333	0.290	0.244	0.367
	(0.512)	(0.333)	(1.041)	(0.520)	(0.344)	(1.054)
Ln(SIZE)	-0.007	-0.008	-0.019	-0.007	-0.008	-0.018
	(-1.105)	(-0.961)	(-1.201)	(-1.080)	(-0.954)	(-1.155)
LOSS	-0.109**	-0.124**	-0.155**	-0.099**	-0.103**	-0.124**
	(-2.176)	(-2.153)	(-2.143)	(-2.050)	(-2.122)	(-2.100)
PSR	0.083*	0.088*	0.097*	0.077*	0.080*	0.089*
	(1.777)	(1.789)	(1.922)	(1.690)	(1.711)	(1.875)
ROA	0.198*	0.224*	0.237*	0.194*	0.219*	0.232*
	(1.880)	(1.902)	(1.889)	(1.734)	(1.840)	(1.767)
TLEV	-0.261**	-0.252**	-0.319**	-0.245**	-0.210*	-0.299**
	(-2.174)	(-2.144)	(-2.455)	(-2.165)	(-1.098)	(-2.211)
Ln(VOC)	0.086	0.067	0.043	0.081	0.070	0.045
	(1.323)	(1.106)	(0.813)	(1.240)	(1.122)	(0.830)
EXP	-0.042**	-0.040**	-0.039**	-0.041**	-0.040**	-0.038**
	(-2.497)	(-2.106)	(-2.122)	(-2.350)	(-2.100)	(-2.077)
# Obs.	42	42	42	42	42	42
Adj. R^2	0.342	0.325	0.300	0.344	0.328	0.304

[0;+ 5]; [0;+ 10] and [0;+ 15]. Table 1 shows the explanatory variables used in the cross-sectional analysis and the empirical studies used in their selection. Descriptive statistics and matrix of correlations of exploratory variables are presented in Table 2.

4. Results

4.1. Abnormal returns

The CAARs observed around the January 2025 California wildfires are presented in Table 3. Fig. 1 illustrates the CAARs during the event window. The results in Panel 2 of Table 3 evidence a negative and weak statistically significant stock price response (statistical significance level of 10%) around the January 2025 California wildfires for Property & Casualty insurance firms. The table presents CARs of −3.087%, −6.645%, −5.947%, and −4.598% (MM) and −2.721%, −5.830%, −5.562%, and −4.462% (FF3) for the time windows [0;+ 2], [0;+ 10], [0;+ 15] and [0;+ 20], respectively. Although the empirical evidence allows the rejection of the null hypothesis, the conclusions drawn from the analysis must be analysed carefully given the small sample size and weak statistical significance of the tests performed. The result aligns with the majority of financial literature, that reveal that insurers generally experience negative abnormal returns around natural disasters because of their expected loss payments (*damage hypothesis* or *claim effect*). It is important to emphasize that US Property & Casualty insurances are the main intermediary in the financing of natural disaster risk (e.g., Benali and Feki, 2017). Therefore, it is not surprising that this insurance business segment presents more negative returns than the other segments, as shown in Fig. 1 and difference test for CAARs. The two-sample test for differences (Panel 4 of Table 3) shows a higher negative impact for Property & Casualty subsample.

Regarding other US insurers (non-Property & Casualty segment) no statistically significant impacts on stock prices are observed.

4.2. Cross-sectional analysis

We also investigate how insurer-specific characteristics affect CARs around the January 2025 California wildfires for Property & Casualty insurance firms. Table 4 shows the results of OLS cross-section regression for three-different time windows using the market model and the Fama-French three-factor model. Our results show a negative coefficient for *EXP* variable, which means a higher decrease in stock market returns for insurers with a high market share in terms of written premiums in Property & Casualty segment in California. A greater exposure to the Californian market translates into more substantial financial losses due to increased insurance claims (e.g., Born and Viscusi, 2006; Tavor, 2024).

Finally, the results also show that insurers with previous characteristics of higher premiums and profitability and lower loss ratios and level of debt are those that are more resilient to the losses caused by the recent severe wildfire. Unexpected severe natural events can increase the loss ratio (*LOSS*), disrupting insurers' activities and affecting their profitability (e.g., Benali and Feki, 2017). According to Born and Viscusi (2006) and Benali and Feki (2017), the insurers best able to remain in the market offering risk coverage and showing profitability are those with a history of high premiums (*PSR*) and low loss ratios (*LOSS*), which in the end tends to be reflected in greater profitability (*ROA*). Severe natural disasters by presenting significant financial risks for insurers, which may even jeopardize their financial solvency (e.g., Martins, Correia, & Gouveia, 2024), it leads to a lower stock market penalty for insurers with lower debt ratios (*TLEV*).

5. Conclusion

This research studies the short-term effects of the costliest wildfire in California on the US insurance industry. Applying an event study methodology, we find a negative and statistically significant reaction for Property & Casualty insurance firms. Our findings reveal that the *claim effect* appears to predominate over the *long-term growth effect*, resulting in a decrease in Property & Casualty insurers' equity market values. The damage caused by wildfires results in a reduction of insurer market value due to insufficient *ex ante* premium to absorb the damage claims. For the other US insurers (non-Property & Casualty segment), for the generality of event windows, there were no significant effects on equity values. Our findings also show the presence of a higher decrease in stock market returns for insurers with a high market share in terms of written premiums in Property & Casualty segment in California. Finally, we also show that insurers with previous characteristics of higher premiums and profitability and lower loss ratios and level of debt are those that are more resilient to the losses caused by the recent severe wildfire.

These results may have an important implication for investors, management, financial analysts, and governments. Due to climate change, the frequency and severity of wildfires have been increasing, with insurers seeing an increase in claims and liabilities. Consequently, this may lead to increased insurance premiums for consumers and, in certain situations, the withdrawal of insurance coverage from high-risk areas, exacerbating the economic effect on homeowners and businesses, like in Born and Viscusi (2006) and Benali and Feki (2017). Climate change thus brings new challenges to the industry, such as greater learning and forecast of risks, the introduction of new products, such as parametric insurance,[8] that pays out based on the magnitude of the event, risk sharing with local authorities and a mechanism to help poorer families acquire insurance.

While this study provides insightful implications, it is important to keep in mind its limitations. Our research conclusions are based on small subsamples, so it is crucial to exercise caution when generalizing those findings to a larger population. Furthermore, this study only examines the impacts caused by the costliest wildfire in California on the US insurance industry, which may have unique and unrepeatable characteristics. We believe that richer insights could be gained by expanding the sample to other wildfires.

[8] On the issue of parametric insurance read for example https://hbr.org/2025/01/the-la-fires-could-change-the-insurance-industry.

Declaration of Competing Interest

The authors confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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