

estudy2: an R package for the event study

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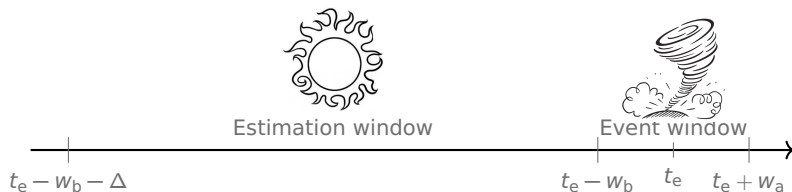
Introduction

Definition:

Event study is a statistical toolbox that allows to examine the impact of certain events on the stock valuation of a company(-ies).

Methodology (starting point)

- N securities (stocks of insurance companies)
- t_e : the day of the event
- Parameters:
 - Δ : the length of the estimation window
 - w_b : the # of days before the event
 - w_a : the # of days after the event



Methodology (market models)

- Adjusted mean-returns model

$$R_{i,t} = \bar{R}_i + \epsilon_{i,t}$$

$$A_{i,t} = R_{i,t} - \bar{R}_i$$

- Adjusted market-returns model

$$R_{i,t} = R_{M,t} + \epsilon_{i,t}$$

$$A_{i,t} = R_{i,t} - R_{M,t}$$

- Single-index market model

$$R_{i,t} = \alpha_i + \beta_i \cdot R_{M,t} + \epsilon_{i,t}$$

$$A_{i,t} = R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i \cdot R_{M,t}$$

Methodology (statistical tests)

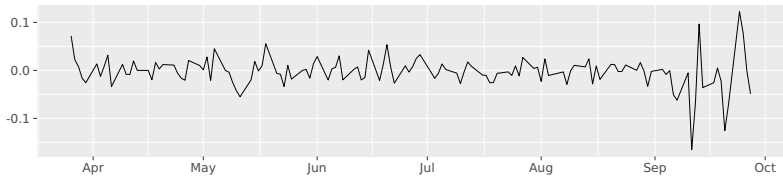
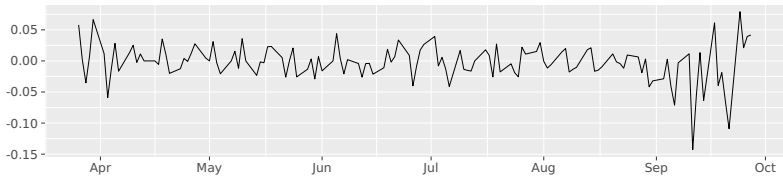
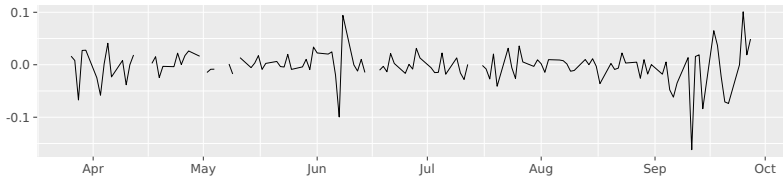
- Parametric tests:
 - Student's t -test
 - Brown and Warner (1980)
 - Brown and Warner (1985)
 - Patell (1976)
 - Boehmer et al. (1991)
 - Lamb (1995)
- Nonparametric tests:
 - Sign test
 - Generalized sign test
 - Corrado and Zivney (1992)
 - Rank test
 - Modified rank test
 - Wilcoxon signed-rank test

An example of event study: 9/11 terrorist attacks

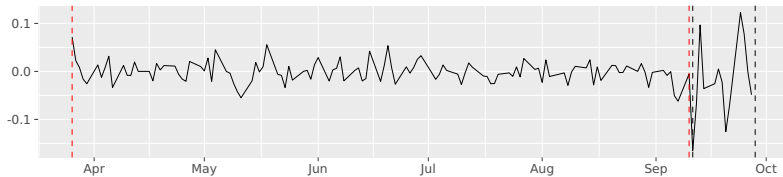
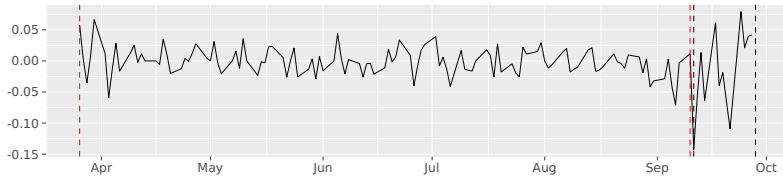
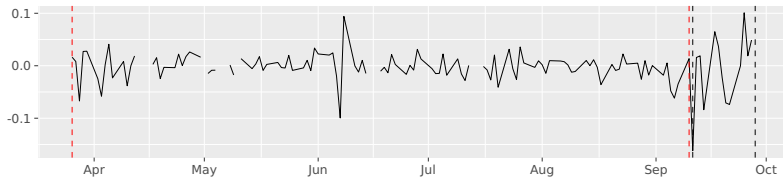
- 31 European non-life companies
17 FL, 10 P&C, 4 Re
- $\Delta = 120$, $w_b = 0$, $w_a = 17$
- Single-index market model with
STOXX Global 1800 as proxy is
used



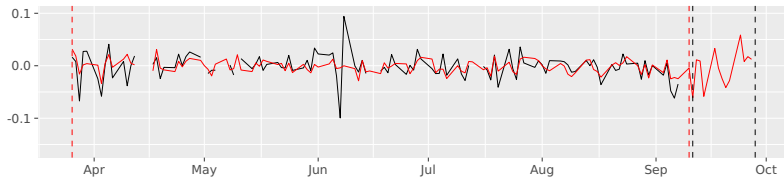
An example...(cont.)



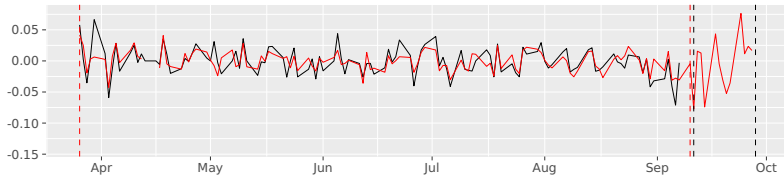
An example...(cont.)



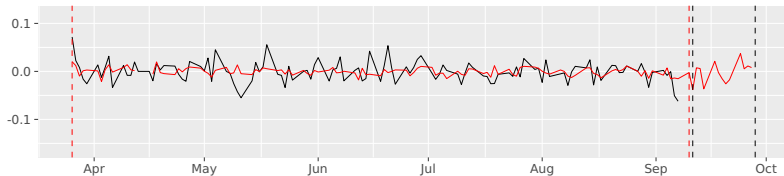
An example...(cont.)



$$R_{1,t} = -0.00017 + 0.91709 \cdot R_{M,t} + \epsilon_{i,t}$$

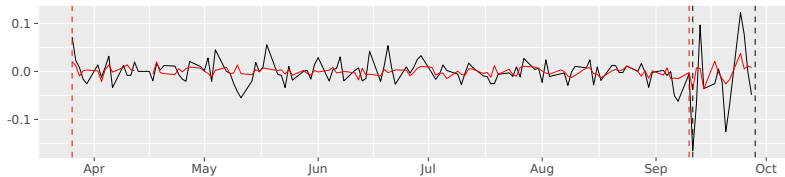
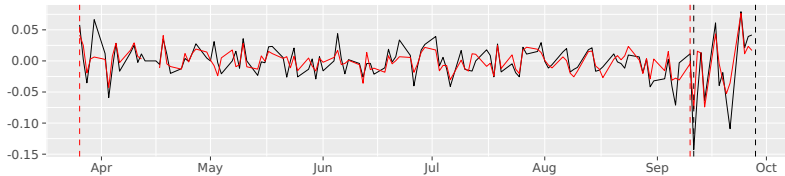
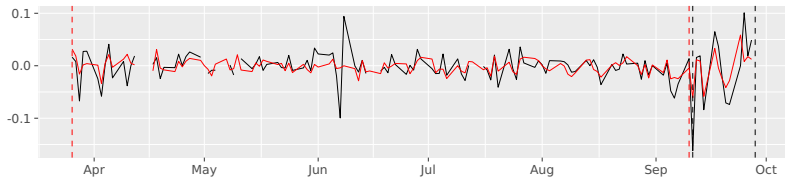


$$R_{2,t} = 0.00086 + 1.17992 \cdot R_{M,t} + \epsilon_{i,t}$$

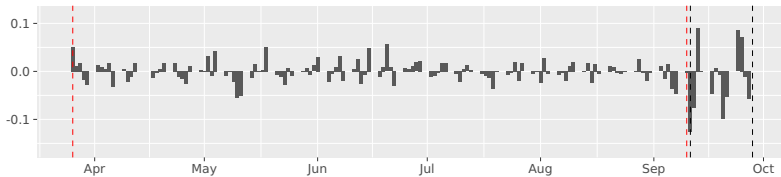
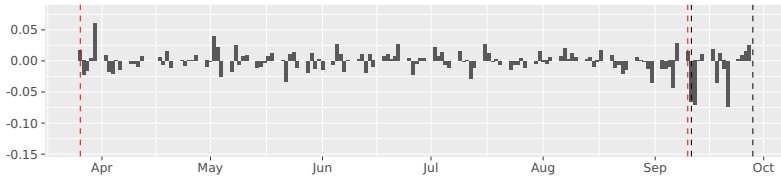
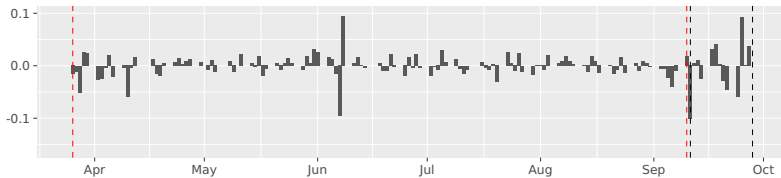


$$R_{31,t} = 0.00020 + 0.57736 \cdot R_{M,t} + \epsilon_{i,t}$$

An example...(cont.)



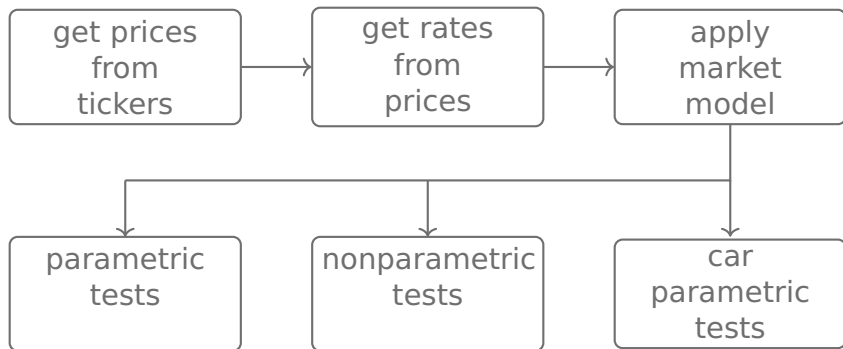
An example...(cont.)



Existing commercial solutions

- eventstudy.com
- eventstudymetrics.com
- eventstudytools.com*





Code snippet (example from help file)

```
tickers <- c("ALV.DE", ..., "TOP.CO")
prices <- get_prices_from_tickers(tickers,
  start = as.Date("2000-01-01"),
  end = as.Date("2002-01-01"),
  quote = "Close", retclass = "list")
rates <- get_rates_from_prices(prices,
  quote = "Close", multi_day = TRUE,
  compounding = "continuous")
securities_returns <- apply_market_model(
  rates = rates,
  market_model = "mean_adj",
  estimation_start = as.Date("2001-03-26"),
  estimation_end = as.Date("2001-09-10"))
parametric_tests(securities_returns,
  as.Date("2001-09-11"),
  as.Date("2001-09-28"))
```

Our research

Purposes:

- examine the impact of selected shocks and their significance on the stock valuation of insurance companies
- investigate the relation of companies characteristics and the effect caused by such events
- compare different test statistics on the same set of events and firms

> summary(research)

The impact of 13 major catastrophes (6 hurricanes, 3 earthquakes, 2 winter storms, and 2 airline crashes) on 87 listed non-life insurer have been analyzed:

- There is no clear pattern in stock responses to catastrophes
- North American and Western European companies behave differently
- Only for several events the market capitalization is the essential characteristic, which influence the reaction
- Reinsurance companies are the most sensitive to the catastrophe events

Thank you!