EC331 Presentation

Estimating the Costs of Terror

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Introduction

- Research aims to estimate the economic impact/cost of terrorism.
  - Currently only looking at the UK from 1970-2016.
- Using asset market responses as a proxy for economic costs.
  - Clear issues with this approach but offers best identification of terror response.
- Results so far suggest that only events at the tail of the terror distribution move markets significantly.

The Big Picture - Why does this matter?

- Modern macro models often struggle to explain equity premium puzzle.
- Barro (2006) argues that incorporating rare disaster 'black swan' risk can solve this.
- Previous literature either treats disasters as endogenous e.g. measuring a disaster as $>10\%$ fall in GDP or uses warfare as a proxy for disaster.
- The UK has been involved with a handful of conflicts since 1980 but subjected to 3041 terror attacks.
- An estimate of the cost and distribution of terror attacks would let us test the hypothesis that terror attacks can help explain this puzzle.

Methodology

- Event Study
  - Calculating Cumulative Abnormal Returns and then taking an average across events to get a Cumulative Average Abnormal Return.
- Non-parametric approach
  - Kernel regression on index returns to produce an empirical distribution of returns, compare post terror event returns to non-parametric conditional distribution to determine whether events can be labeled extreme.

Event Study

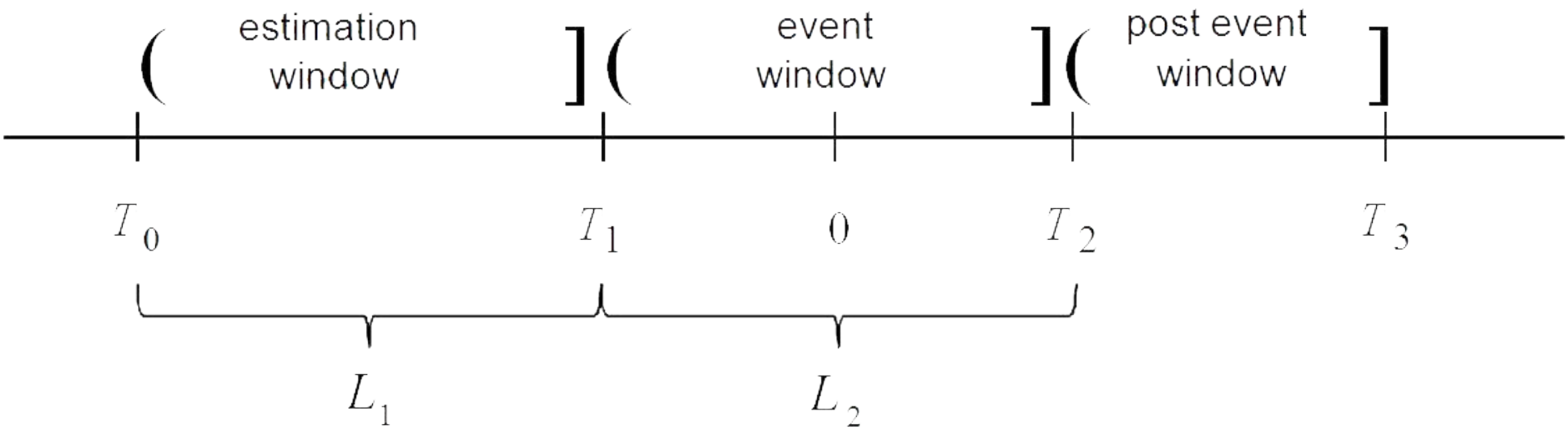


Figure 1

- Formulae for cumulative abnormal returns:
  - $AR_{i,\tau} = R_{i,\tau} - E[R_{i,\tau}|\Omega_{i,\tau}]$
  - $CAR_{i(\tau_1,\tau_2)} = \sum_{t=\tau_1}^{\tau_2} AR_{i,t}$
- And then taking an average: $CAAR_{(\tau_1,\tau_2)} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i(\tau_1,\tau_2)}$
- There's a range of different ways of specifying $E[R_{i,\tau}|\Omega_{i,\tau}]$
- But for index data can only use constant mean return model.

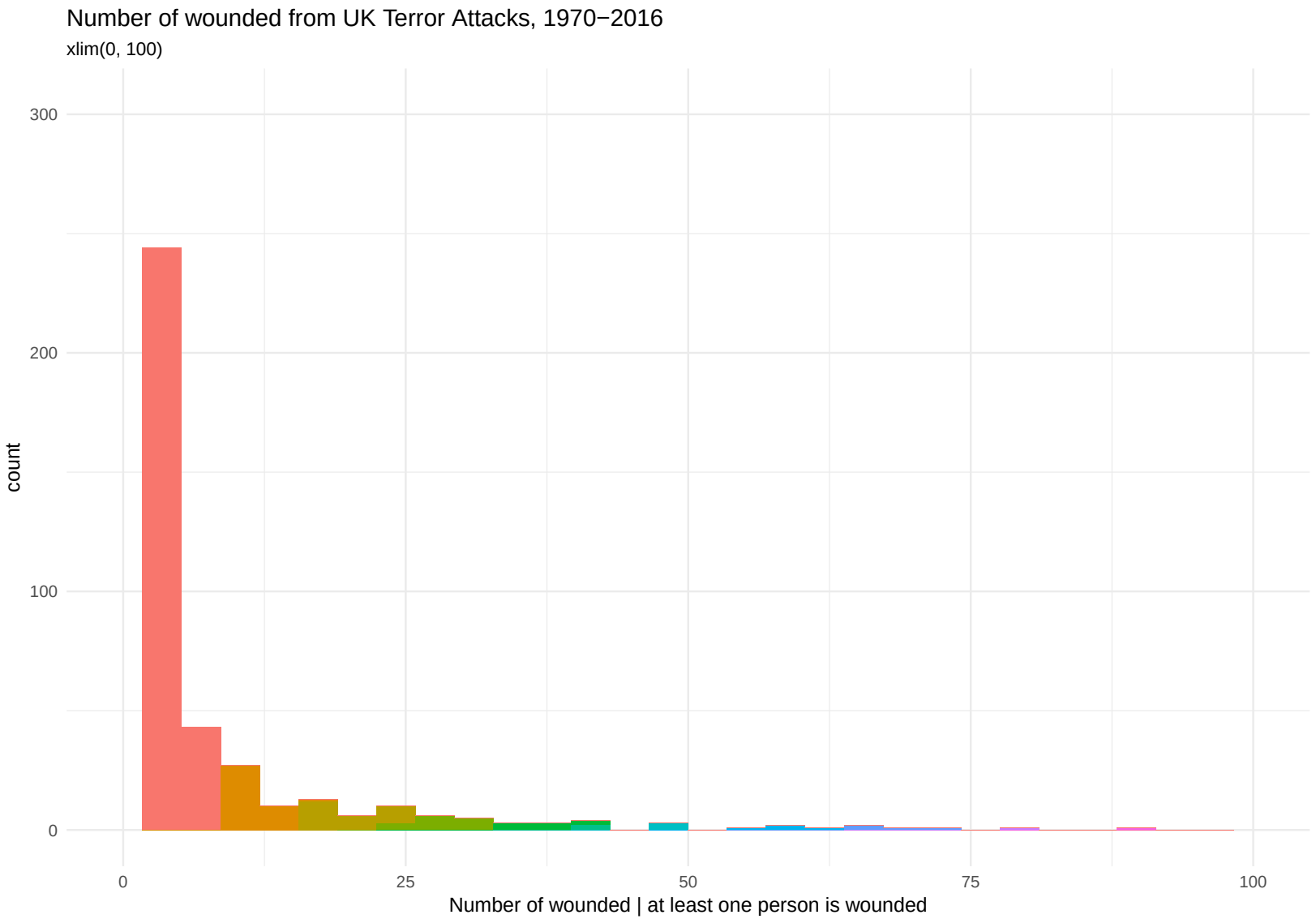
Terror Data

- Using terror data from the Global Terrorism Database compiled by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) at the University of Maryland.
  - Includes a range of variables such as wounded, killed, property damage, target, perpetrator group, ideology and weapon used.
  - All data from 1993 is missing - potentially quite problematic as 1993 Bishopsgate Bombing is one of the largest terror events ever on UK soil.
  - Since 1970 there have been 3041 events classed as terrorism by the GTD.
  - On average that implies an attack occurs every 6 days.
- Only two data transformations:
  - Terror attacks occurring on weekends (i.e. non-market days) moved to following Monday.
  - Construction of a terrorism intensity variable similar to Global Terrorism Index approach.

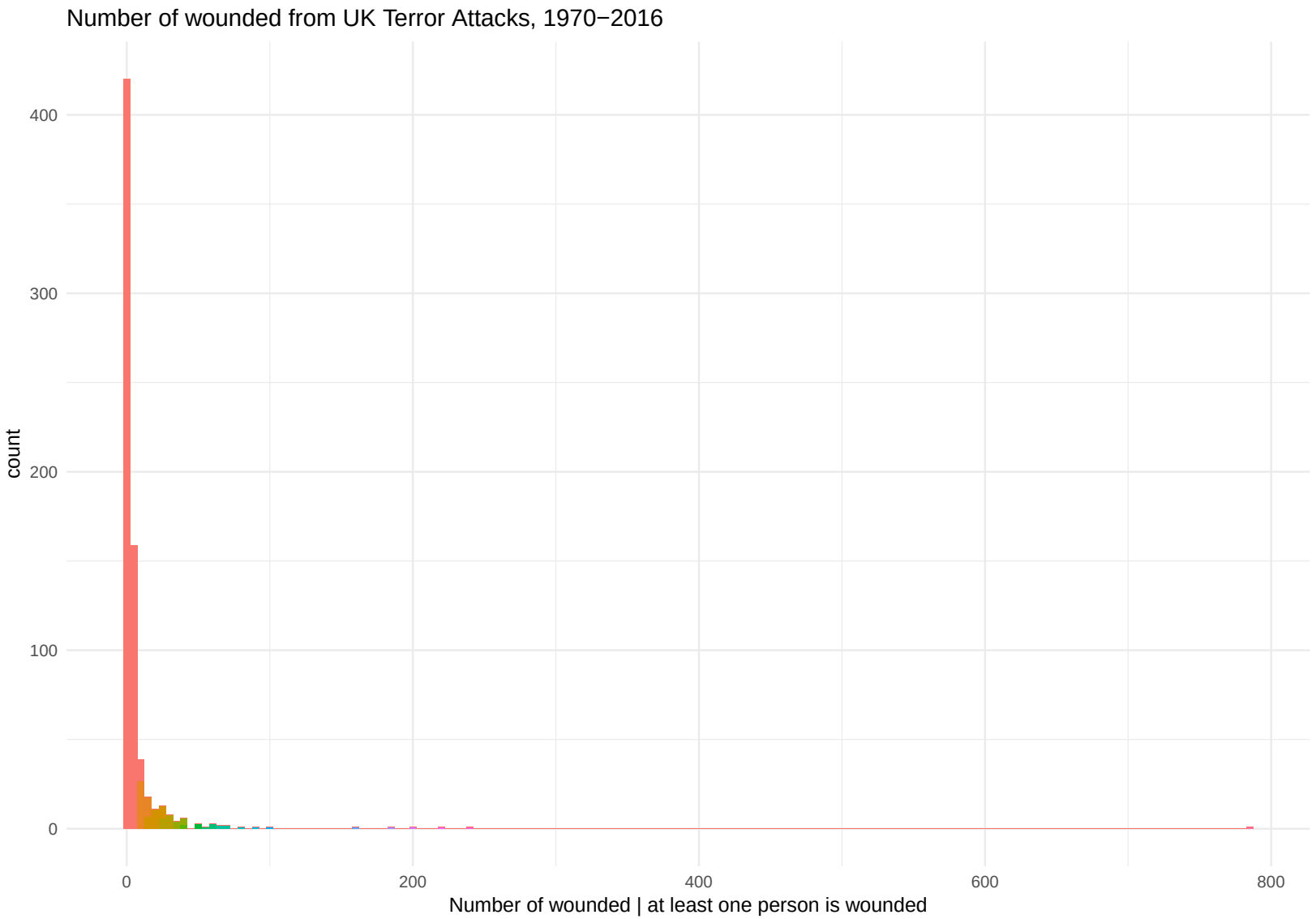
Index Data

- Index data comes from Thomson Reuters' Datastream and is collected at the daily level.
  - UK indices include:
    - ★ FTSE ALLSHARE, 11611 market day observations.
    - ★ FTSE 100 (from 1983 onwards).
    - ★ FT 30 (predecessor to the FTSE).
    - ★ MSCI UK.
    - ★ GBP:USD forex data.

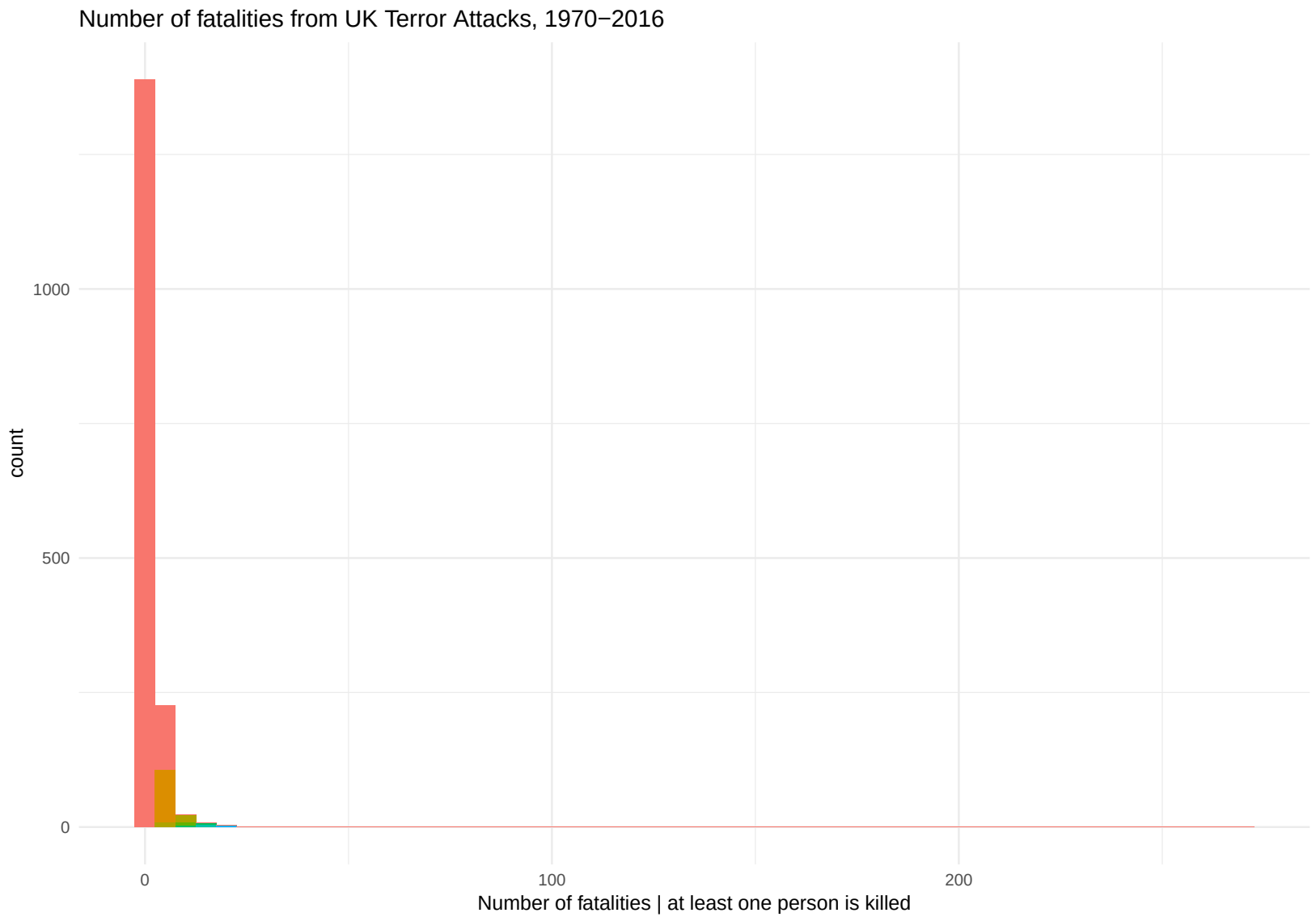
Summary Statistics I



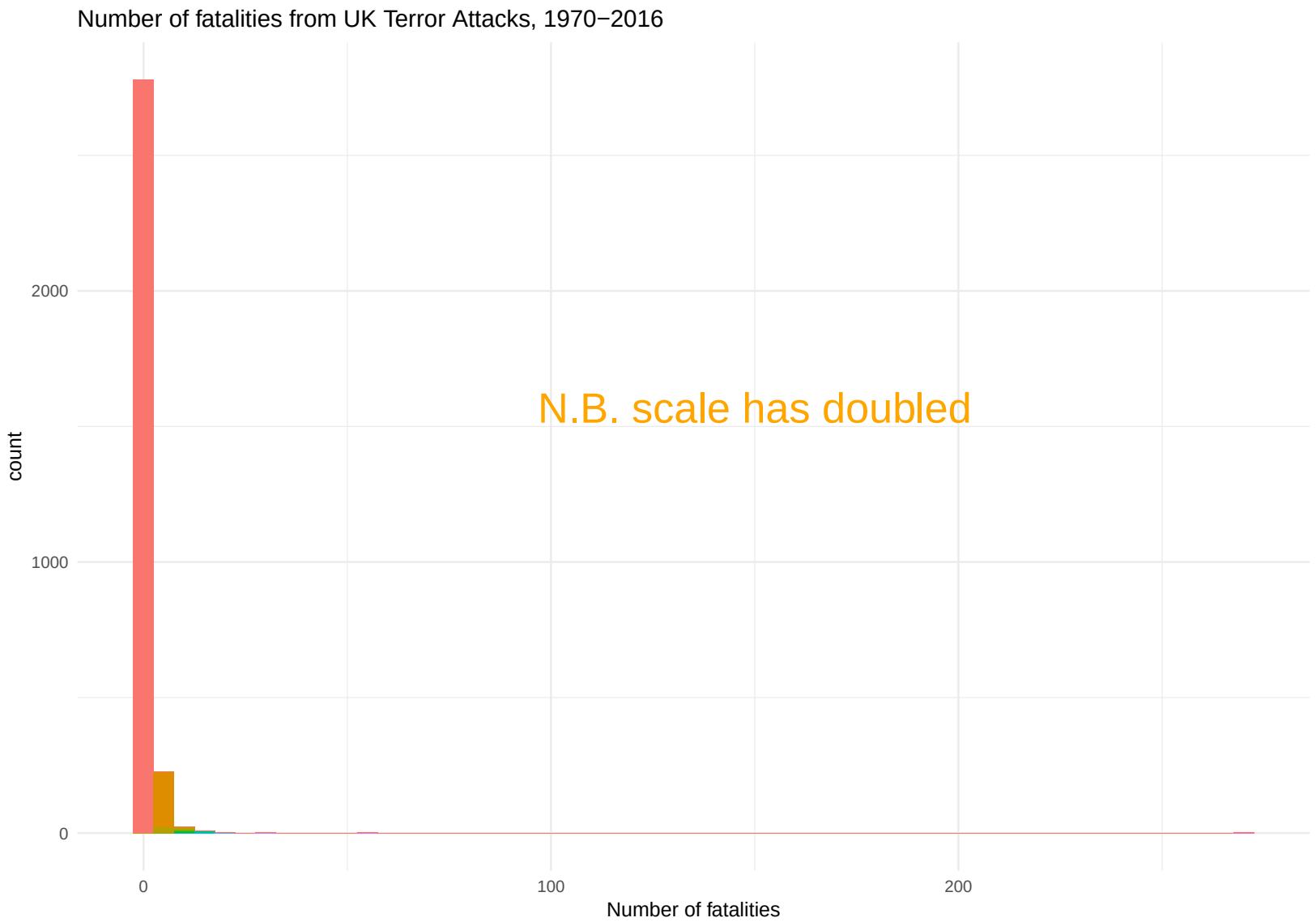
Summary Statistics II



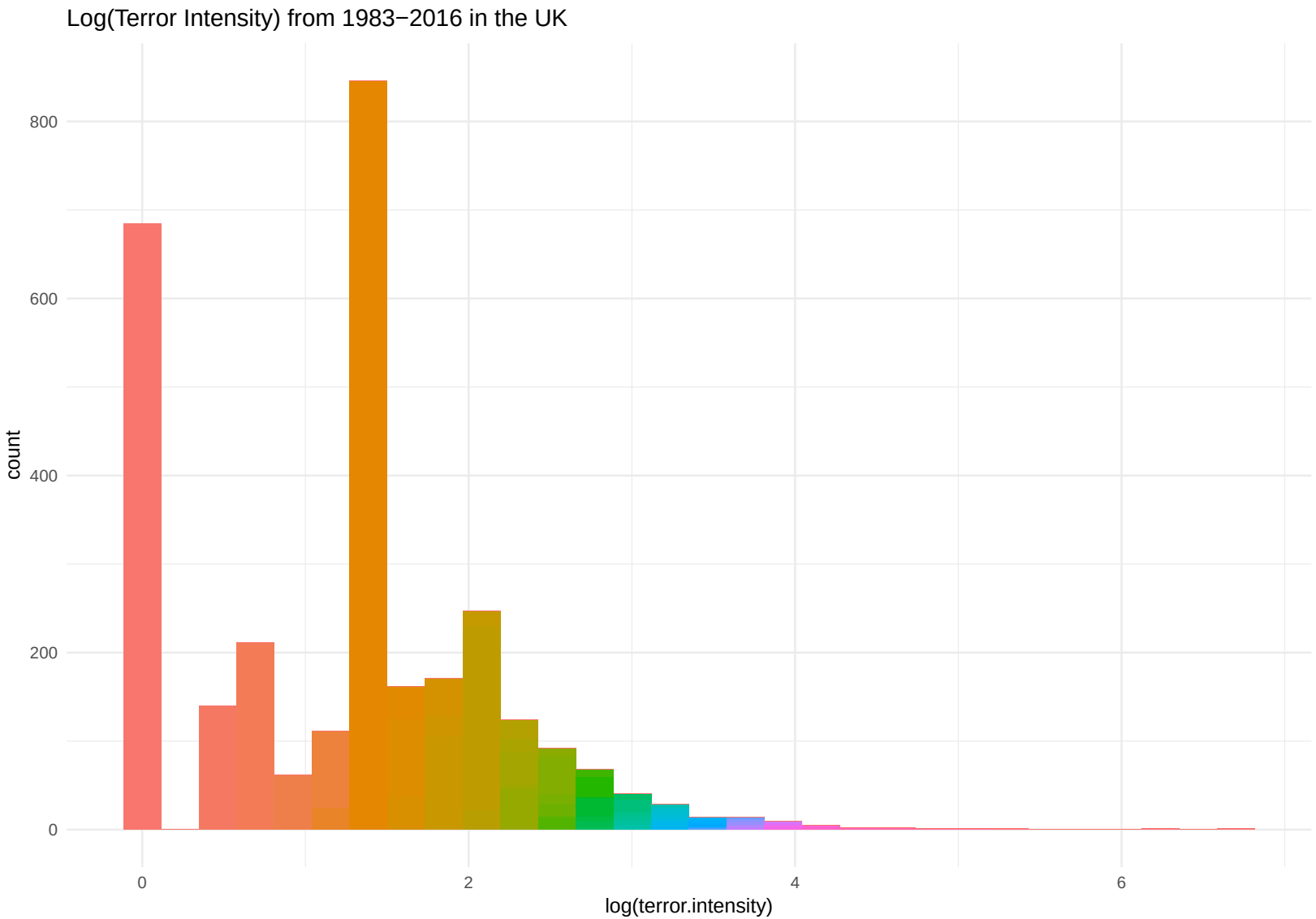
Summary Statistics III



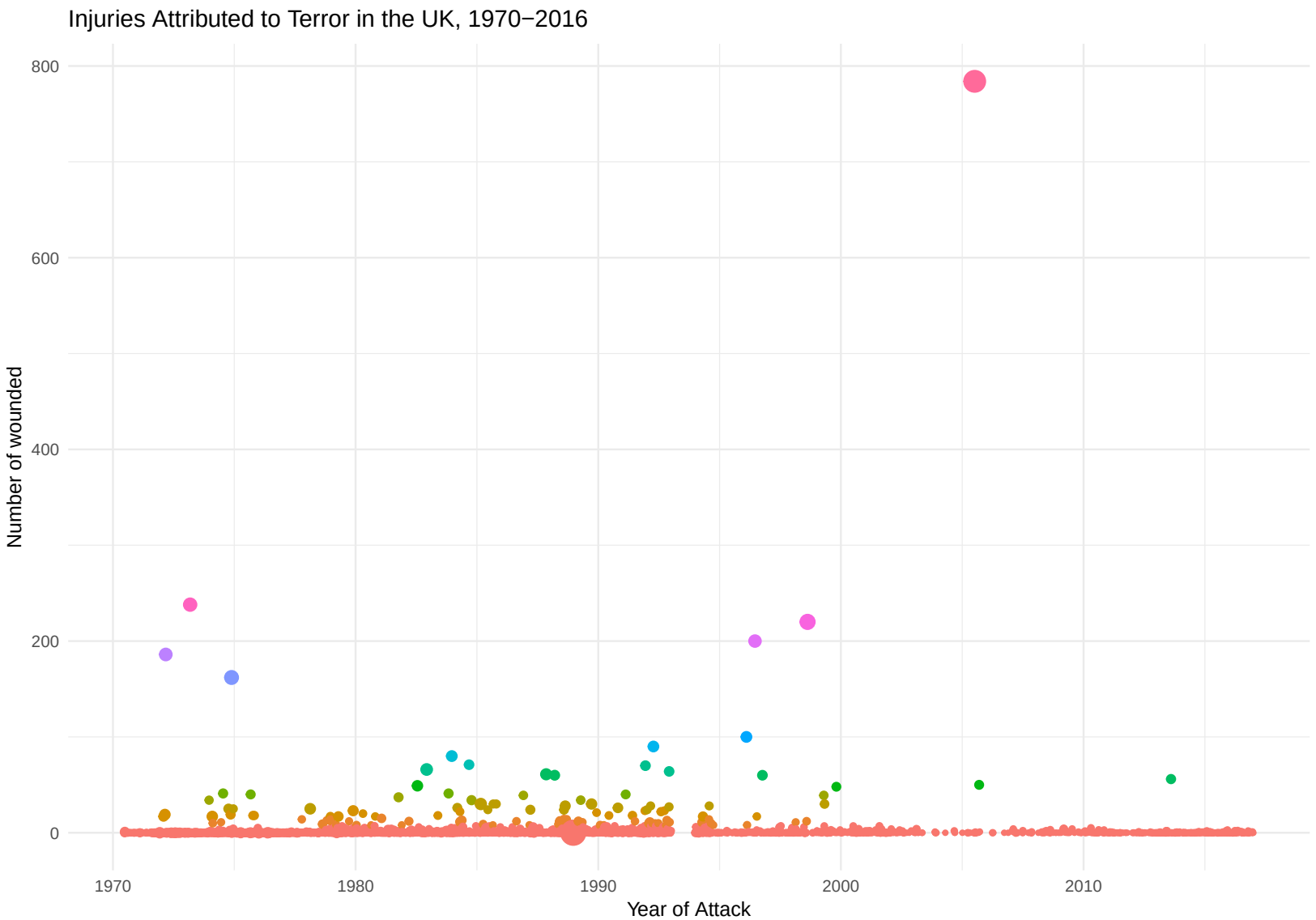
Summary Statistics IV



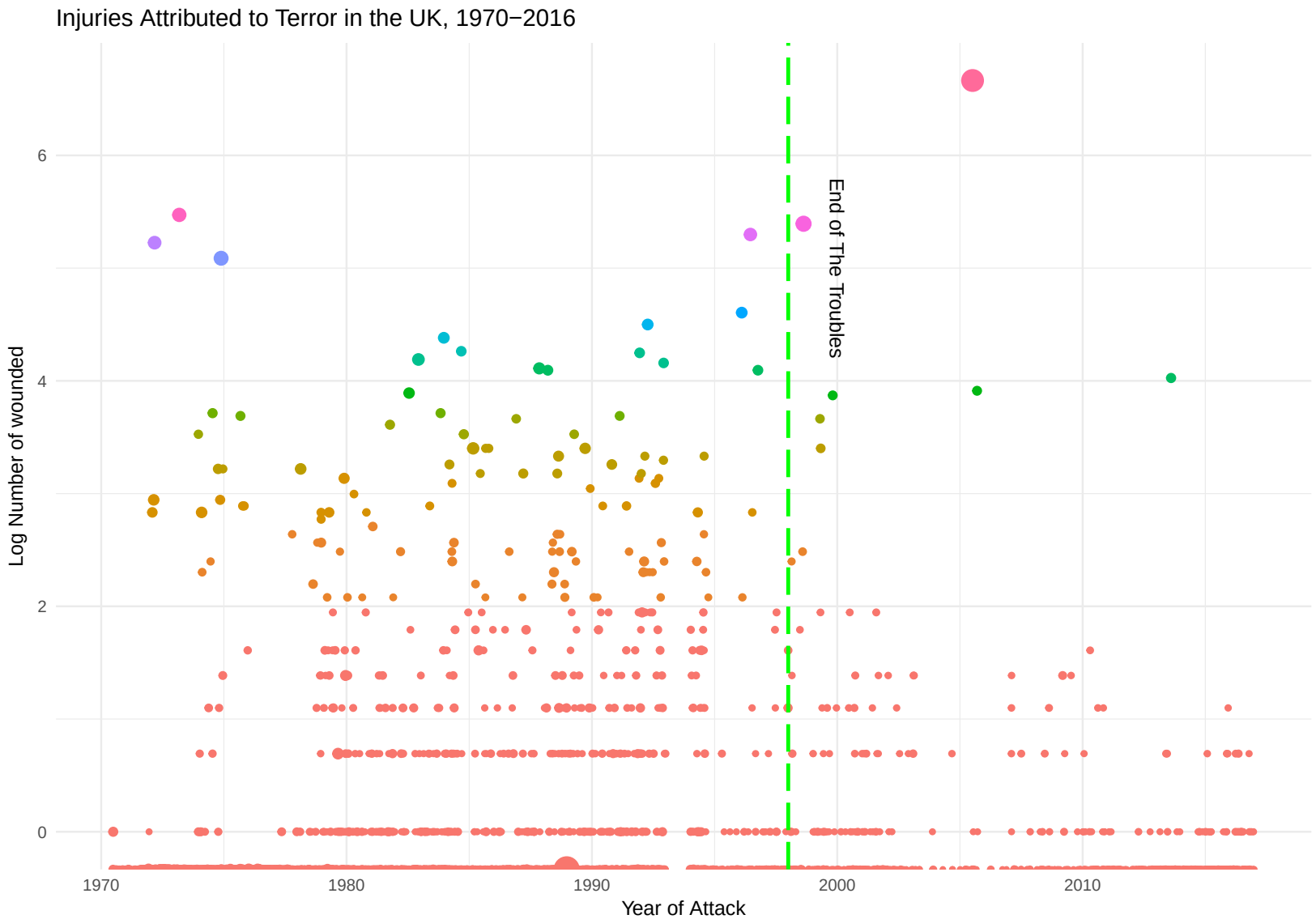
Summary Statistics V



Terror Trends Over Time I



Terror Trends Over Time II

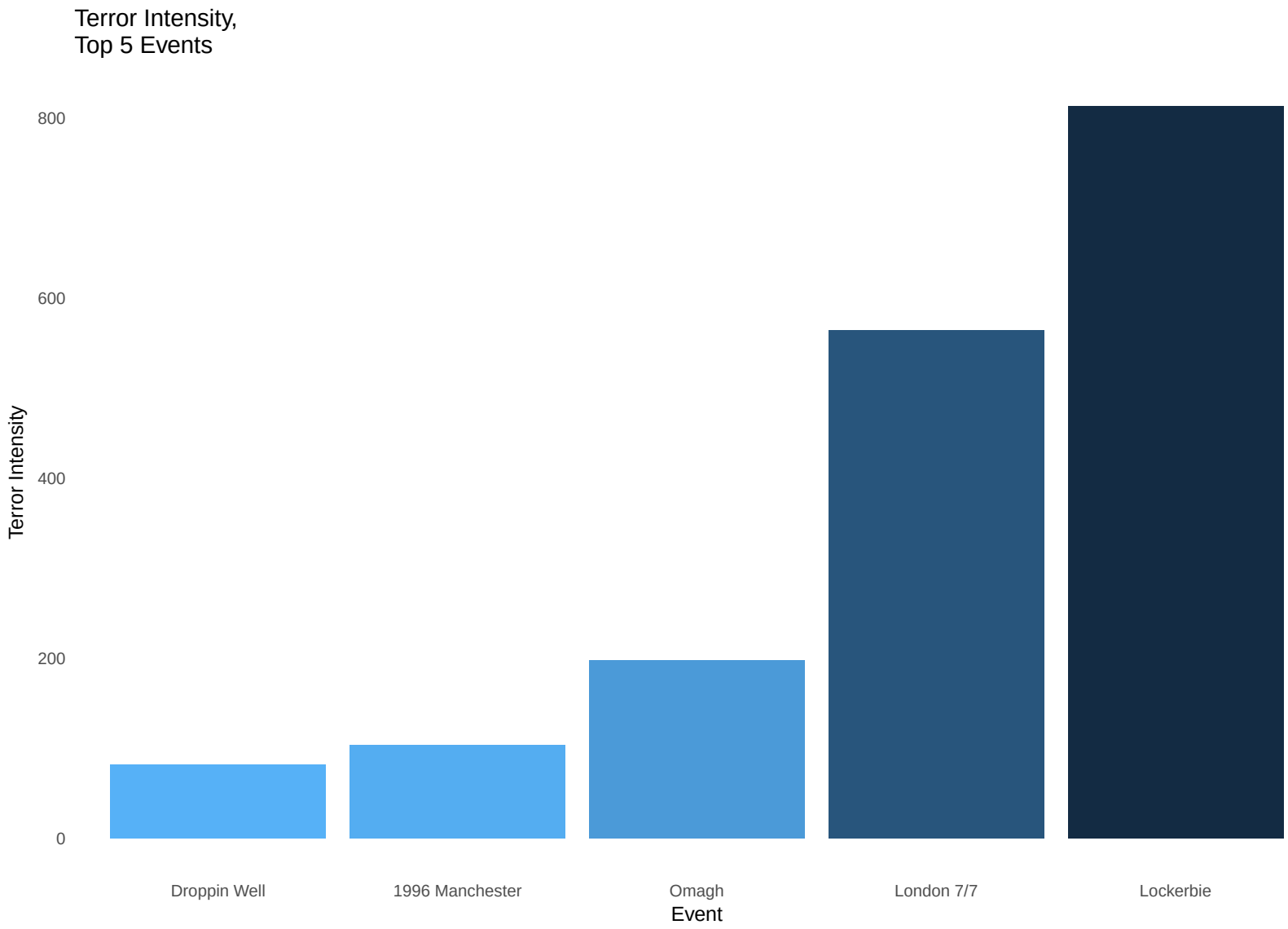


Index Returns and Terror Attacks

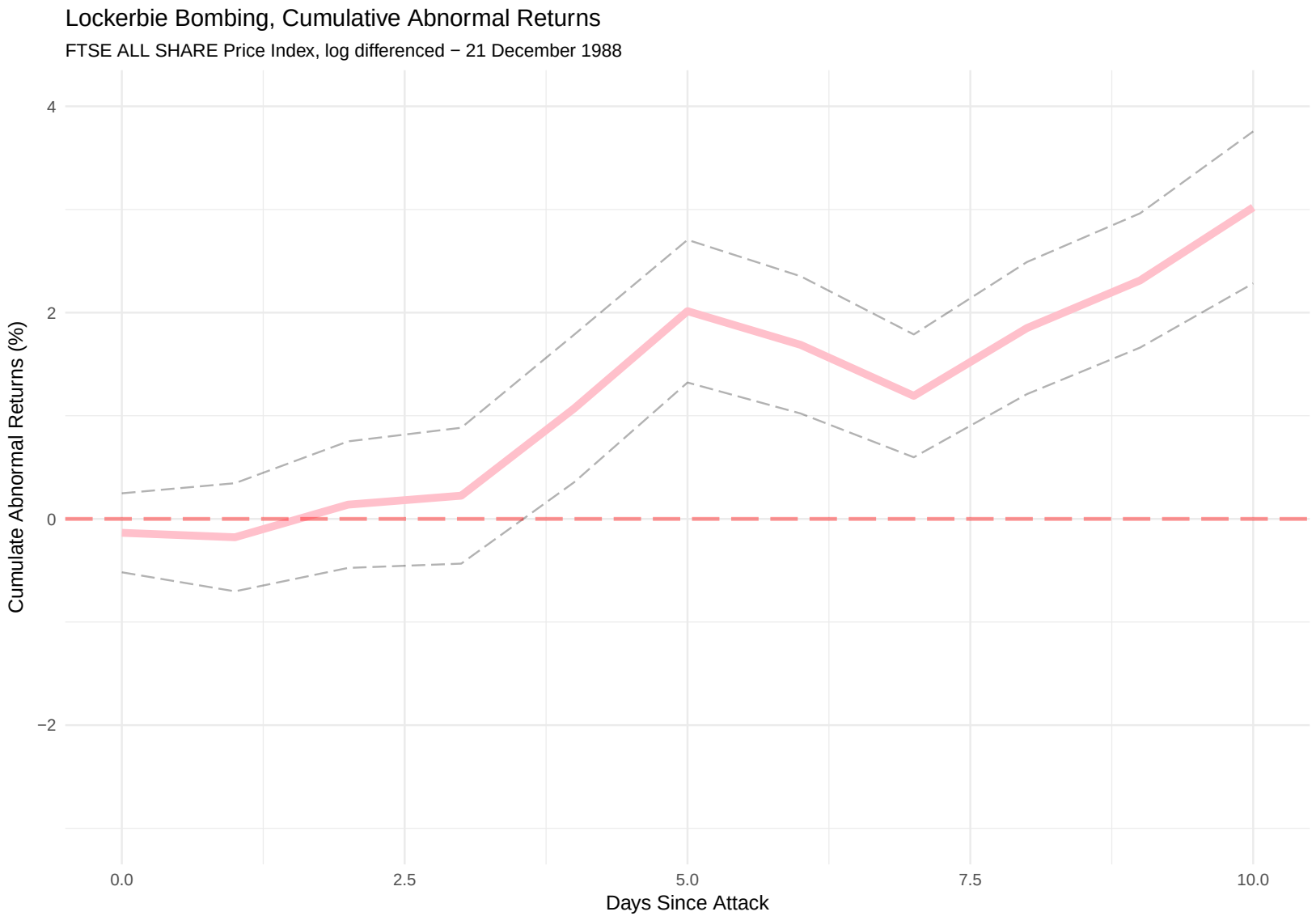
Terror Attacks

Date	nkill	nwound	propvalue	terror.intensity	event.name
1988-12-21	270	0	0	813	Lockerbie
2005-07-07	56	784	0	564	London 7/7
1998-08-17	29	220	0	198	Omagh
1996-06-17	0	200	1079120000	104	1996 Manches
1982-12-06	16	66	0	82	Droppin Well

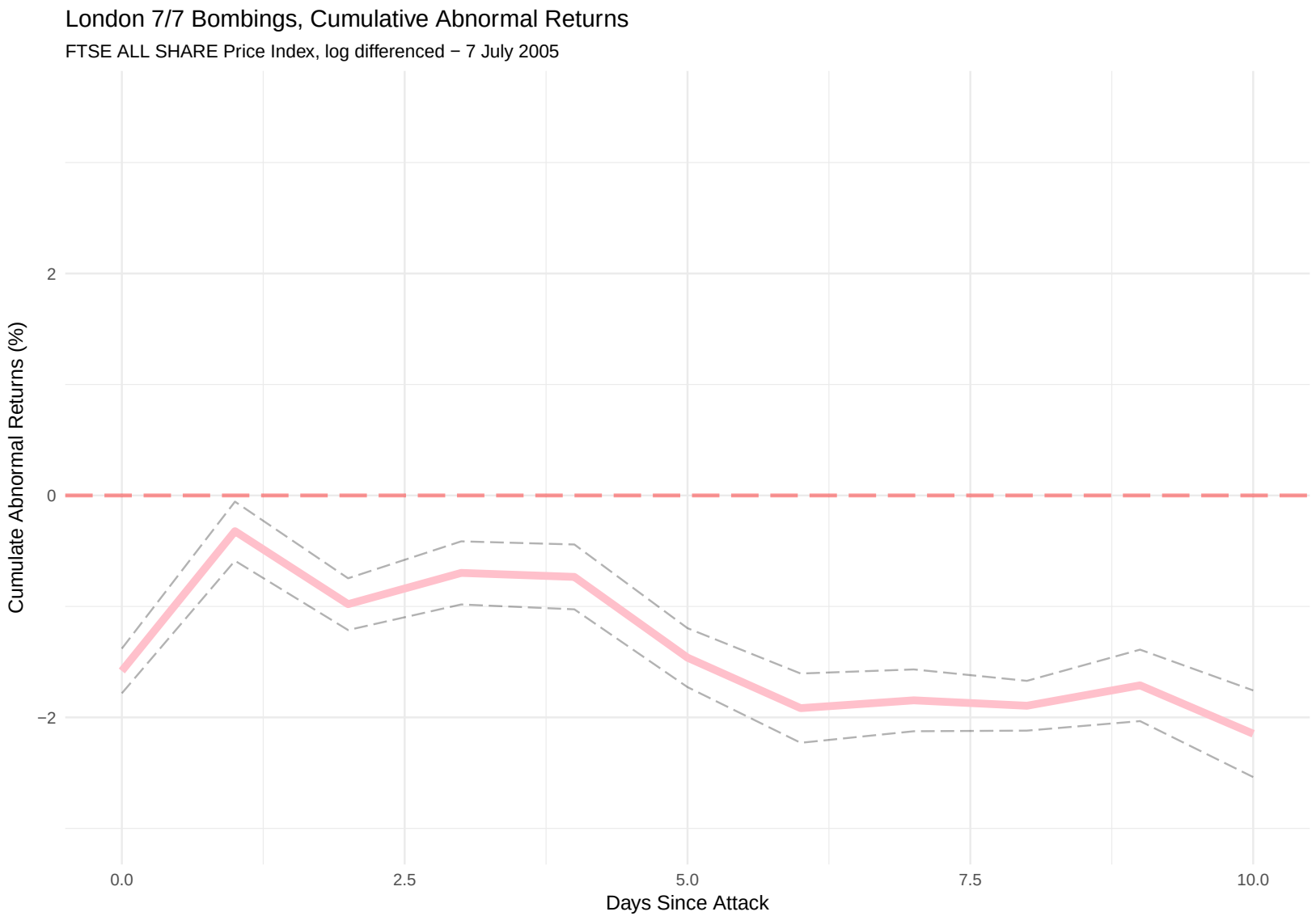
Terror Intensity



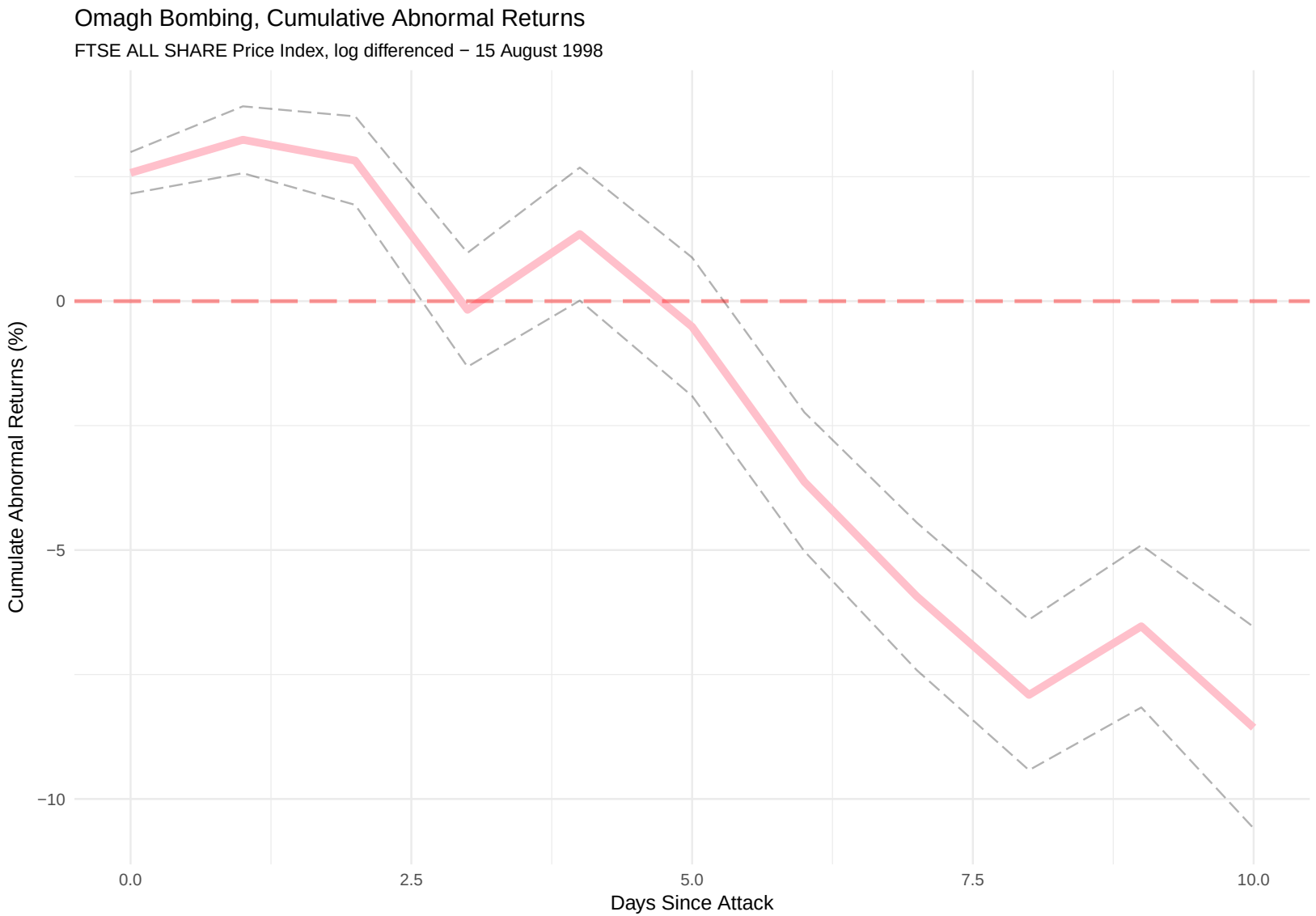
Results I - Lockerbie Bombing



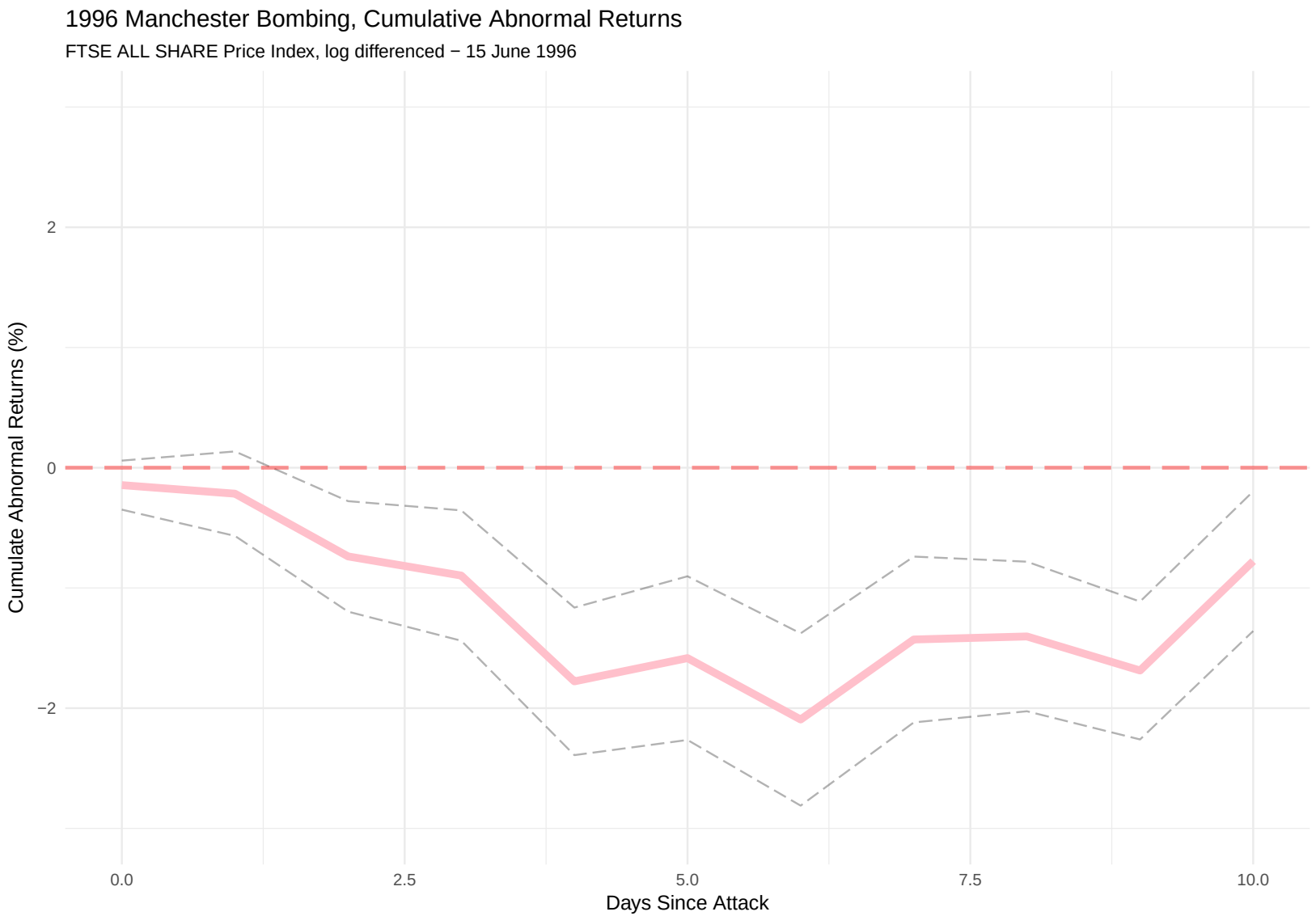
Results II - 7/7 London



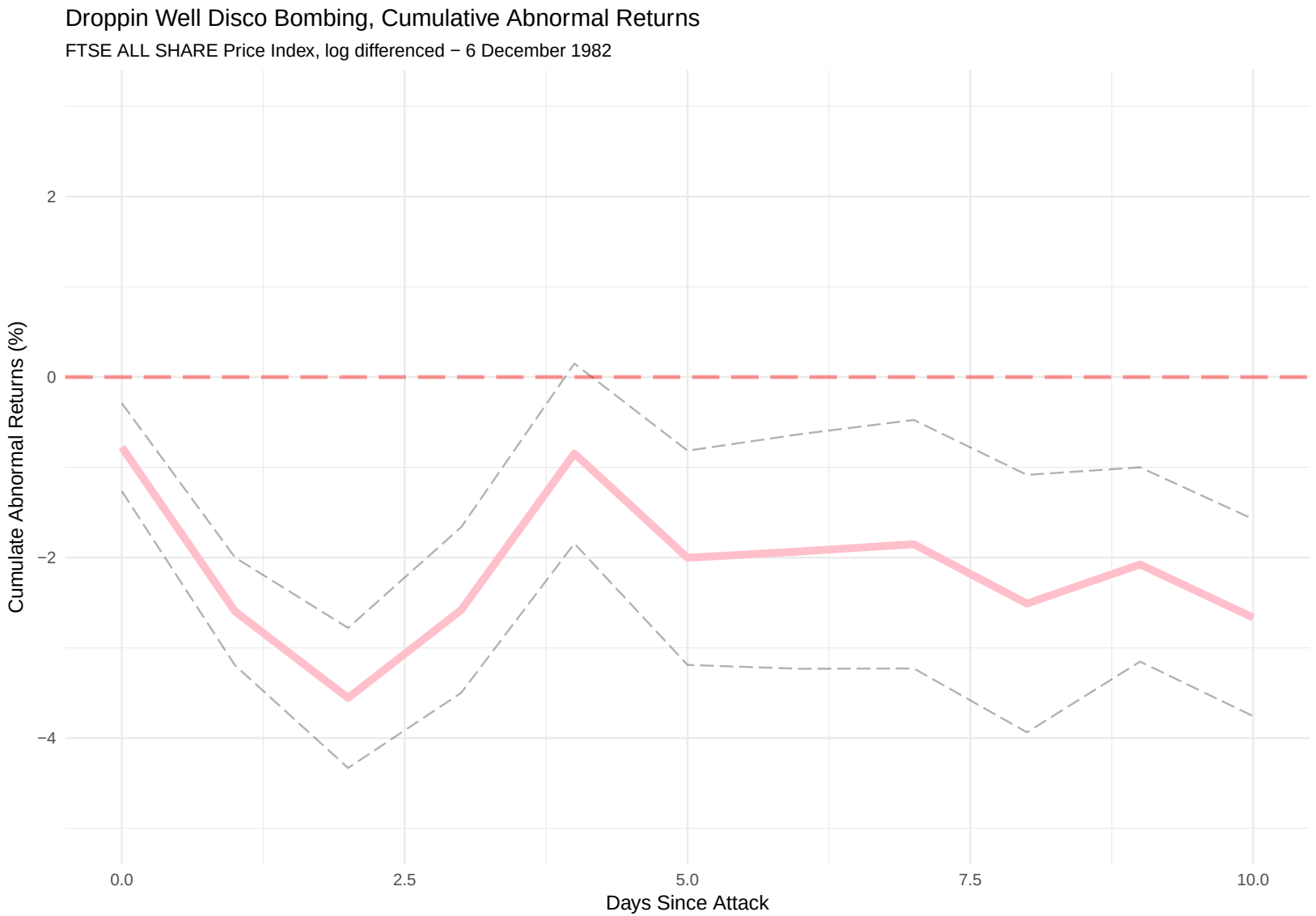
Results III - Omagh Bombing



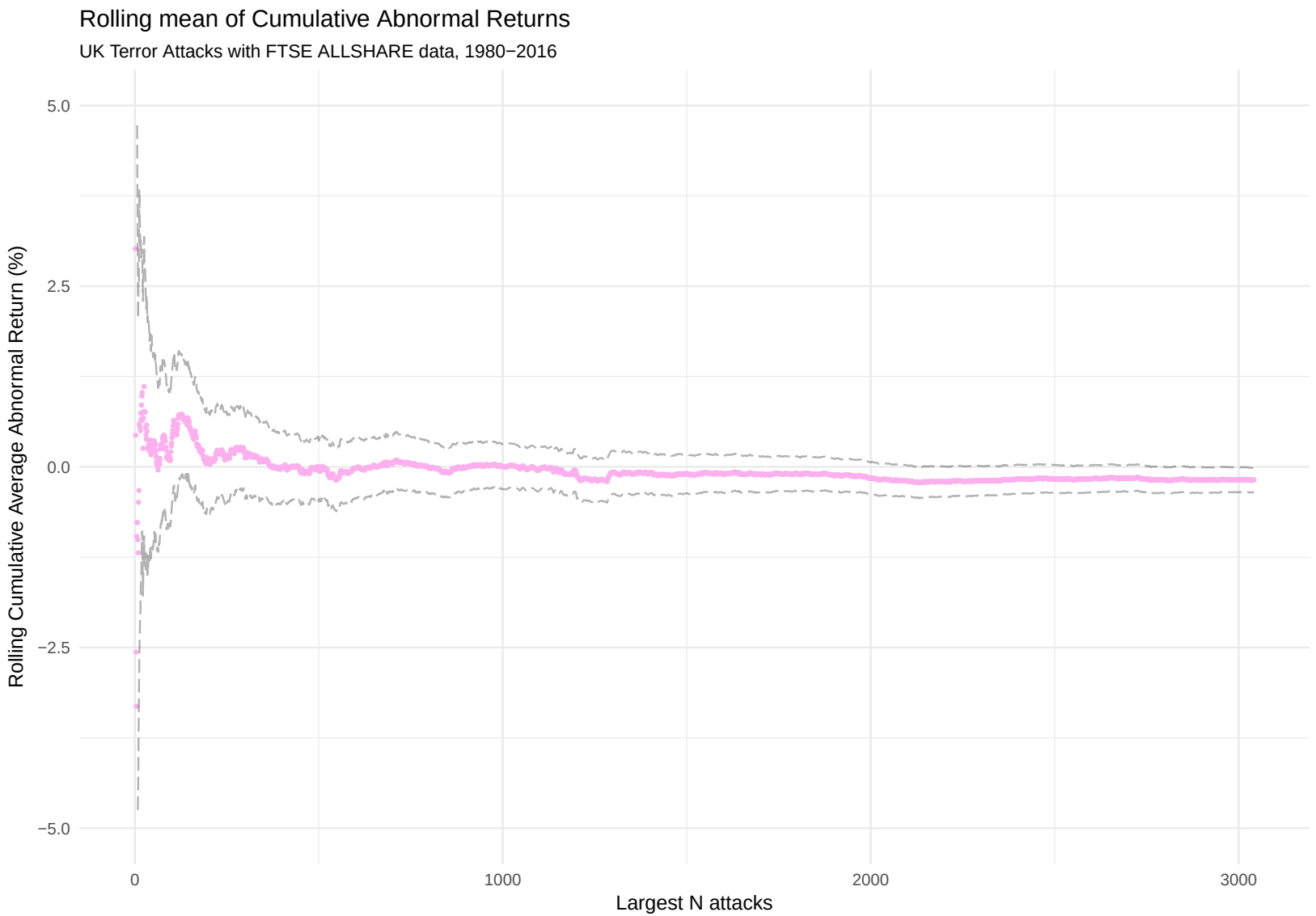
Results IV - 1996 Manchester Bombing



Results V - Droppin Well Disco Bombing



Results VI - Cumulative Average Abnormal Returns



Conclusion/To Do

- Slicing data by industry rather than just looking at index data.
- Other stock market indicators such as volatility.
- Non-parametric approach and robustness/sensitivity checks.
- Come up with a model to link asset responses to economic costs.
  - Tobin's Q?
  - Consumption Euler equation, linking real returns on an asset to stochastic discount factor?
  - Lucas 'Tree' Asset Pricing model?

Bibliography

- Figure 1 on slide 5 from https://eventstudymetrics.com/index.php/event-study-methodology/
- Barro (2006) refers to: Barro, Robert J. 2006. Rare disasters and asset markets in the twentieth century. The Quarter Journal of Economics 121, no. 3: 823-866.