Why do an event study?

To measure the *effect* (magnitude, persistence) of an unanticipated event

Some applications:

- Financial Economics
  - announcements: merger and acquisition, earnings, issuance of debt or equity securities
- Law and Economics (survey: Bagat and Romano, 2001, 2002)
  - regulation (Schwert, 1981)
  - assess damages in legal liability cases (Mitchell and Netter, 1994)
- Program evaluation, labor economics (Ashenfelter and Card, 1985; Jacobson, LaLonde, and Sullivan, 1993)

How to conduct an event study?

1. Define the unanticipated event
   (firm's earnings announcement, worker job loss)
2. Outcome variable (value of the firm, individual earnings)
3. Horizon length, $L = t_2 - t_1 + 1$, and event window,
   typically $L = 41$ (20 + 1 + 20 days)
4. Model of normal or expected outcome

$$\text{Abnormal return} : e_{it} = R_{it} - E(R_{it}|X_t),$$

where

- R_{lt} is actual return
- $E(R_{it}|X_t)$ is model of normal return (for example, market-adjusted model, S&P 500 Index)
- X_t is the conditioning information for the normal return model

Example: Financial Economics (MacKinlay, 1997)

Investigate information content of firms' earnings announcement:
Higher (lower) than expected earnings should $\uparrow$ ($\downarrow$) value of equity

1. Categorize firms
   - If deviation of actual from average forecast $> 2.5\%$, then good news
   - If deviation of actual from average forecast $< 2.5\%$, then bad news
   - Otherwise, no news
2. Choose model of normal returns
3. Compute

$$AR_t = \frac{1}{N}\sum_{i=1}^{N} e_{it}, \quad \text{across } N \text{ firms, for each event period } t$$

4. Graph

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_t$$

Graph of Cumulative Abnormal Return

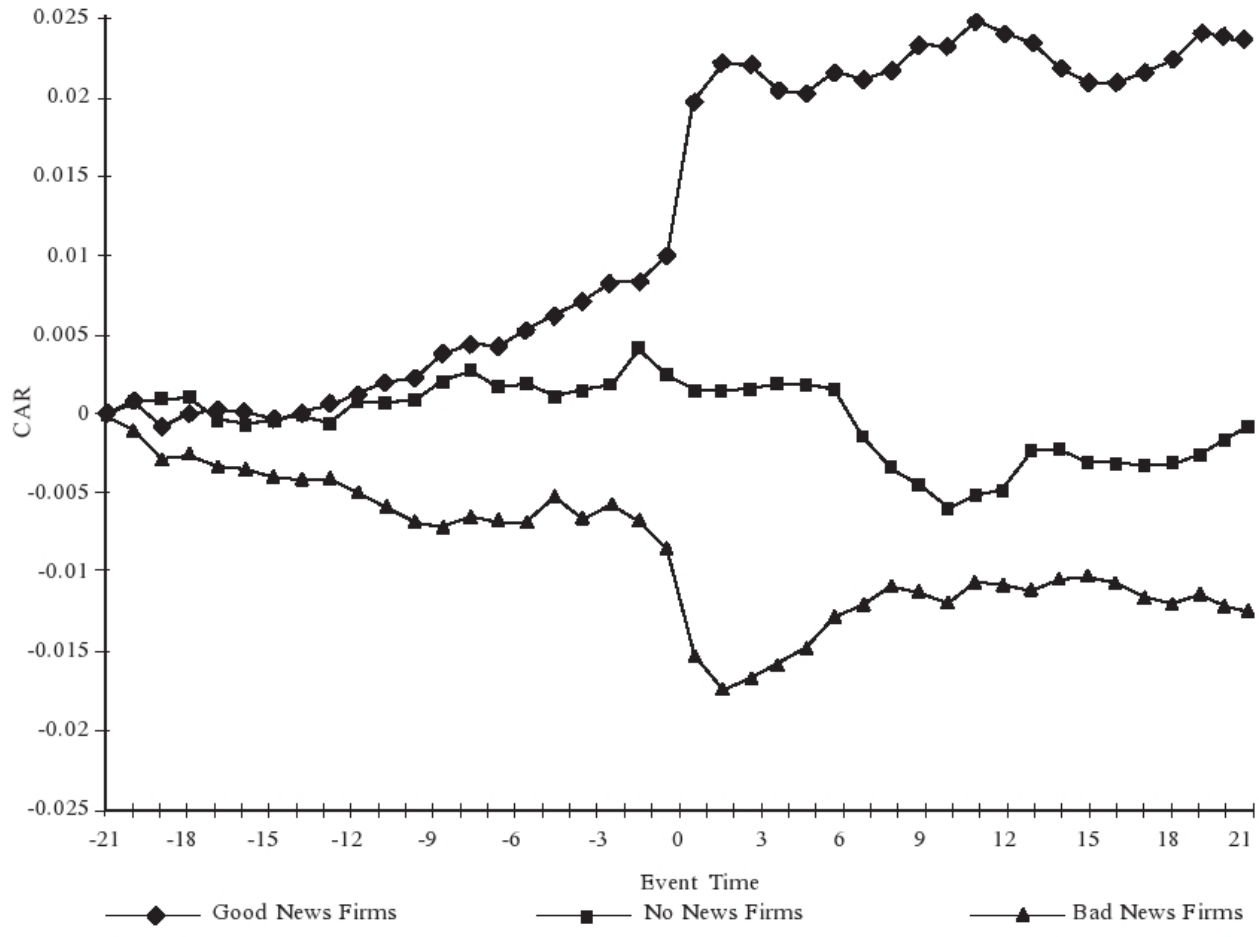

Figure 2a. Plot of cumulative abnormal return for earning announcements from event day -20 to event day 20. The abnormal return is calculated using the market model as the normal return measure.

Hypothesis Testing and Inference

For $H_0 : AR_t = 0$, use standard test statistic.

For $H_0 : CAR(t_1, t_2) = 0$, the test statistic is given by $\frac{CAR(t_1,t_2)}{(\sigma^2(t_1,t_2))^{1/2}}$, where $\sigma^2(t_1, t_2) = L\sigma^2(AR_t)$ (Kothari and Warner, 2007)

For cross-sectional regression,

$$AR_j = \delta_0 + \delta_1 x_{1j} + ... + \delta_M x_{Mj} + \eta_j,$$

can estimate model using OLS, with reasonable assumptions

Example: Labor Economics (Jacobson et al, 1993)

Q: What is the magnitude and persistence of earnings losses for high-tenured, prime age, displaced workers?

$$Y_{it} = \alpha_i + \gamma_t + X_{it}'\beta + \sum_{k=t_1}^{t_2} \beta_k D_{it}^k + u_{it}$$

where

- Y_{it} is earnings of individual i in quarter t
- α_i is fixed-effect: time-invariant individual characteristics
- γ_t captures general time pattern of earnings in the economy
- X_{it} are observed time-varying characteristics of worker

The β_k can then be plotted over time and provide estimates of mean earnings in "event time" after having taken out the individual and year specific effects.

Graph of Earnings Losses

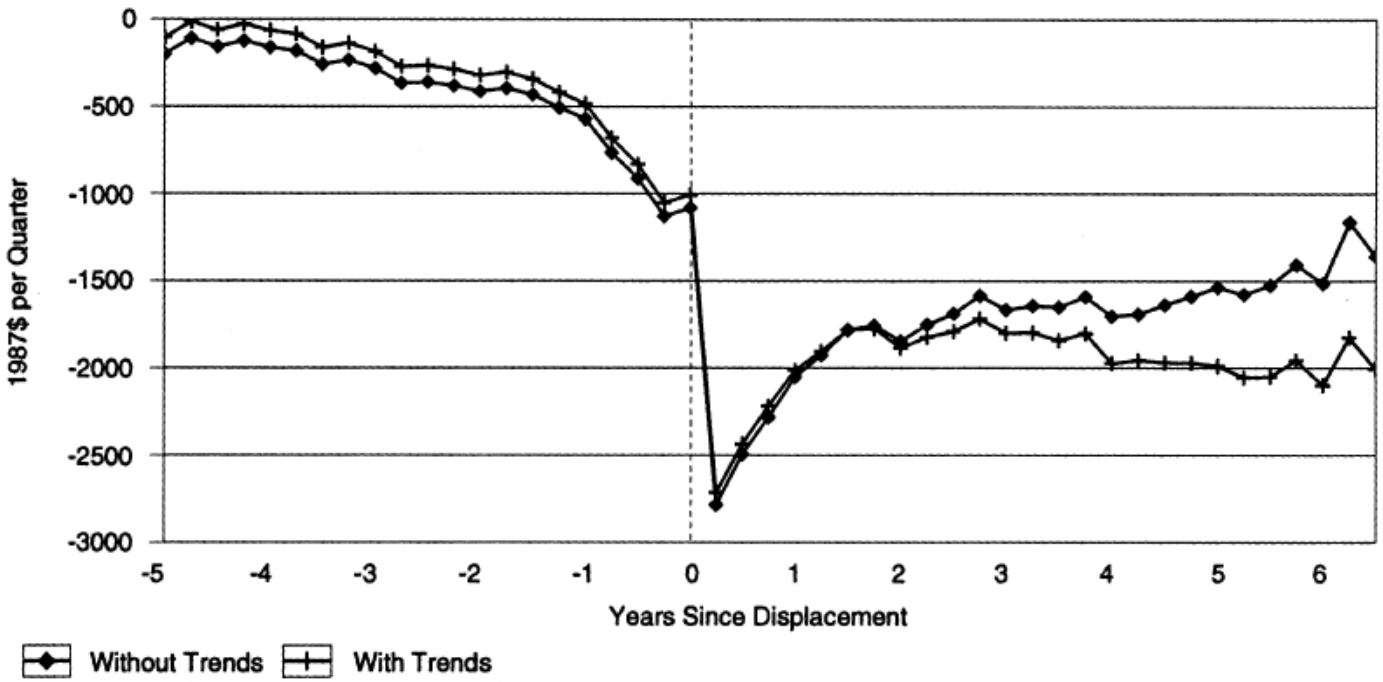

FIGURE 2. EARNINGS LOSSES FOR SEPARATORS IN MASS-LAYOFF SAMPLE

Issues

- Confounding events
  - Narrow event window: Daily data vs. monthly data
- Degree of anticipation and timing of event
  - Pre-event window
  - With regulation, may be some discussion prior to actual change
- Model of expected outcome
  - Sensitivity analysis
- In finance: joint test problem (market efficiency and model selection)
- Power improves with sample size, narrow event window
- Better results with short-horizon ($<$ 12 month studies)
- If overlap in calendar time or firms, cluster standard errors
- Firm's selection of event
- Simulations (see Brown and Warner, 1985)
- Statistical packages: SAS (eventus), R (eventstudies)