

Event studies with daily stock returns in Stata – Which command to use?

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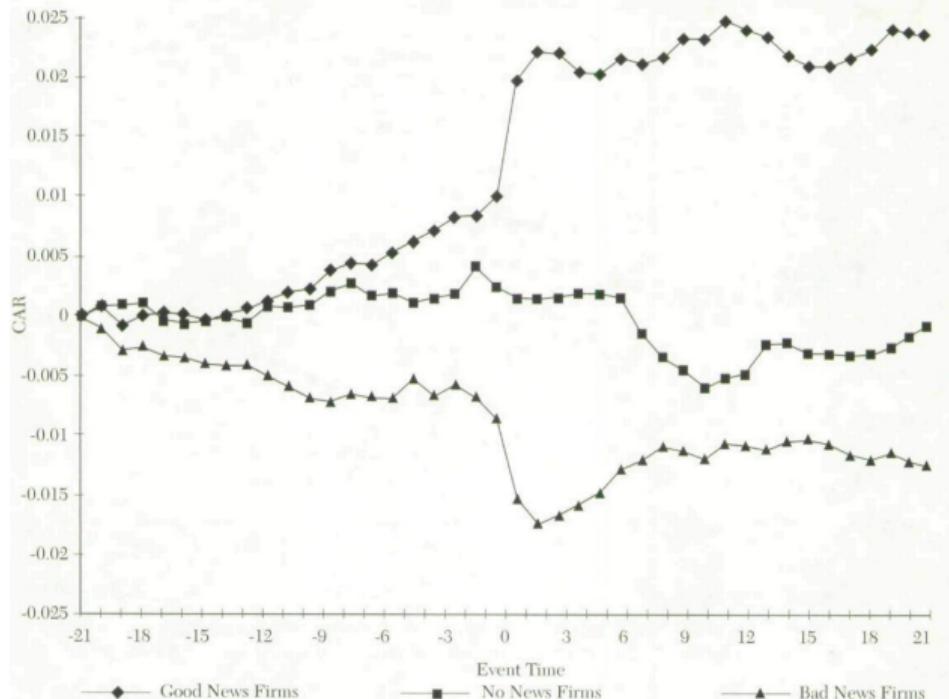
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- 2 What should event study commands be able to do?
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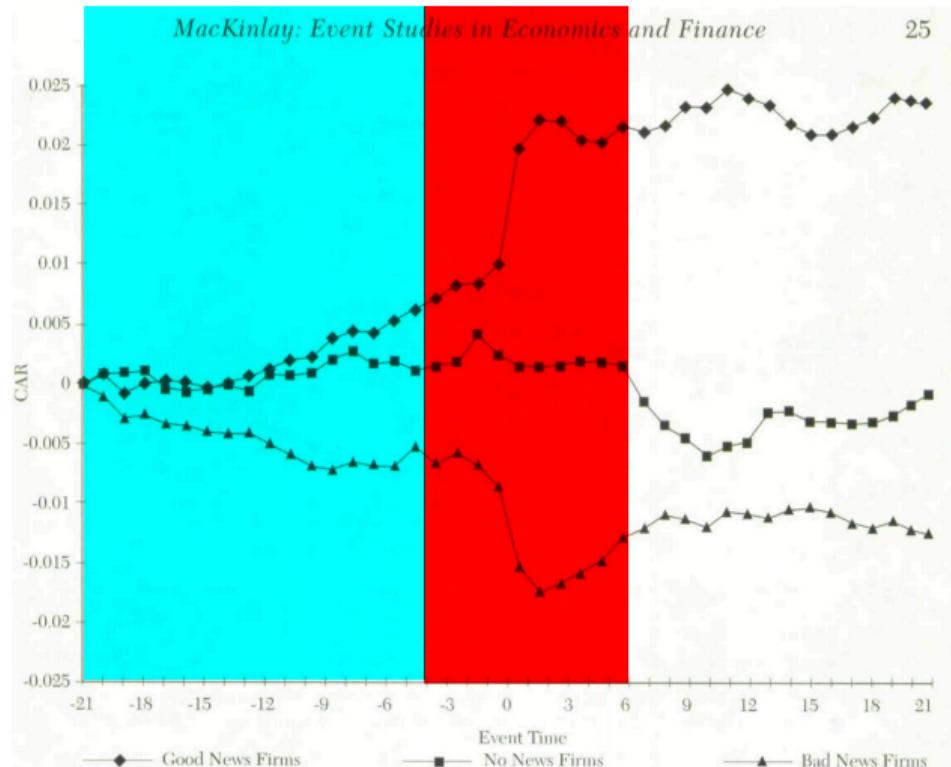
Event studies measure stock prices reactions to news.

MacKinlay: Event Studies in Economics and Finance

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Implementation of solution:

Estimation of a (market) index model during the estimation period.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_i$$

Event studies have been applied to many research questions.

- ▶ Is accounting information decision useful?
- ▶ Do changes in dividend policy affects shareholder value?
- ▶ Do mergers and acquisitions create or destroy shareholder value?
- ▶ Do CEO changes/deaths affect share prices?
- ▶ Do announcements of adhering to sustainability principles create shareholder value?
- ▶ Do Covid 19 news affect stock prices?
- ▶ ...

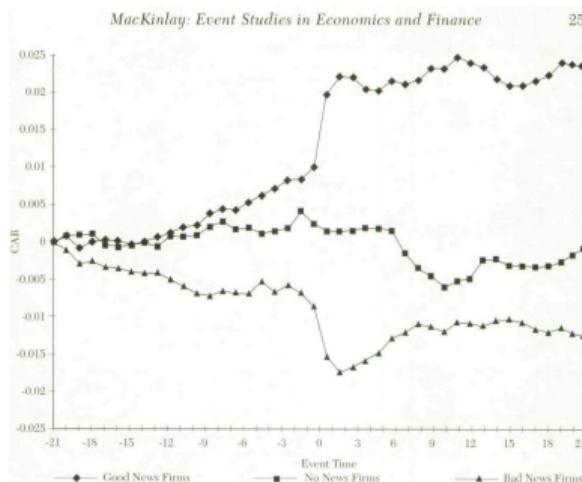
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Event study commands should have at least have the following features:

1. Data management (transforming calendar time to event time)
2. Calculation of average abnormal returns (market index and other models)
3. Assessment of statistical significance of average abnormal returns.
4. Generating output (abnormal return graph, result tables, etc.)

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Journal of Economic Literature, Vol. XXXV (March 1997)

TABLE I

Event Day	Market Model					
	Good News		No News		Bad News	
	AR	CAR	AR	CAR	AR	CAR
-3	.117	.832	.036	.183	.098	-.568
-2	.006	.838	.226	.409	-.112	-.680
-1	.164	1.001	-.169	.241	-.180	-.860
0	.965	1.966	-.691	.150	-.679	-.1539
1	.351	2.217	-.009	.142	-.204	-.1743
2	-.014	2.303	.007	.148	.072	-.1672
3	-.164	2.039	.042	.190	.083	-.1589
4	-.014	2.024	.000	.190	.106	-.1483
5	.135	2.160	-.038	.152	.194	-.1289
6	-.052	2.107	-.302	-.150	.076	-.1213

What should event study commands be able to do?

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There are currently three user-written commands:

- ▶ eventstudy (Zhang et al. 2013)
- ▶ eventstudy2 (Kaspereit 2015, 2020)
- ▶ estudy (Pacicco et al. 2017, 2020)

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Feature ↓ Command →	eventstudy	eventstudy2	estudy	
Data management (Synchronization)	YES - Market model	YES - Market model - Raw returns - Constant mean returns - Market adjusted returns - Factor model (up to 12 factors) - Factor model with (G)ARCH - Buy-and-hold raw returns - Buy-and-hold abnormal returns - t-test (assuming independence) - t-test (crude adjustment) - Patell Z-statistic - Adjusted Patell statistic - Boehmer et al. test - Kolari and Pynnonen test - Generalized sign test - Wilcoxon signed-ranks test - Corrado rank test - Corrado and Zivney rank test - GRANK test - Bootstrapped t-ratio - Tabulation of average abnormal returns and significance levels - Tabulation of cumulative average abnormal returns and significance levels - Extensive reporting on dropped events - Graphical display of cumulative average abnormal returns - (Cumulative) abnormal returns are available for cross-sectional testing	YES - Market model - Constant mean returns - Market adjusted returns - Factor model (up to 12 factors) - Factor model with (G)ARCH - Buy-and-hold raw returns - Buy-and-hold abnormal returns - t-test (assuming independence) - t-test (crude adjustment) - Patell Z-statistic - Adjusted Patell statistic - Boehmer et al. test - Kolari and Pynnonen test - Generalized sign test - Wilcoxon signed-ranks test - Corrado rank test - Corrado and Zivney rank test - GRANK test - Bootstrapped t-ratio - Tabulation of average abnormal returns and significance levels - Tabulation of cumulative average abnormal returns and significance levels - Extensive reporting on dropped events - Graphical display of cumulative average abnormal returns - (Cumulative) abnormal returns are available for cross-sectional testing	YES - Market model - Constant mean returns - Market adjusted returns - Factor model (no restriction) - t-test (assuming independence) - Patell Z-statistic - Adjusted Patell statistic - Boehmer et al. test - Kolari and Pynnonen test - Wilcoxon signed-ranks test - GRANK test - Tabulation of cumulative average abnormal returns and significance levels - Graphical display of cumulative average abnormal returns - (Cumulative) abnormal returns are available for cross-sectional testing
Calculation of abnormal returns (Benchmark model)				
Hypothesis testing (Test statistics)				
Presentation (Tabulating abnormal returns; reporting on dropped observations)				

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What is the level of applicability of the three commands?

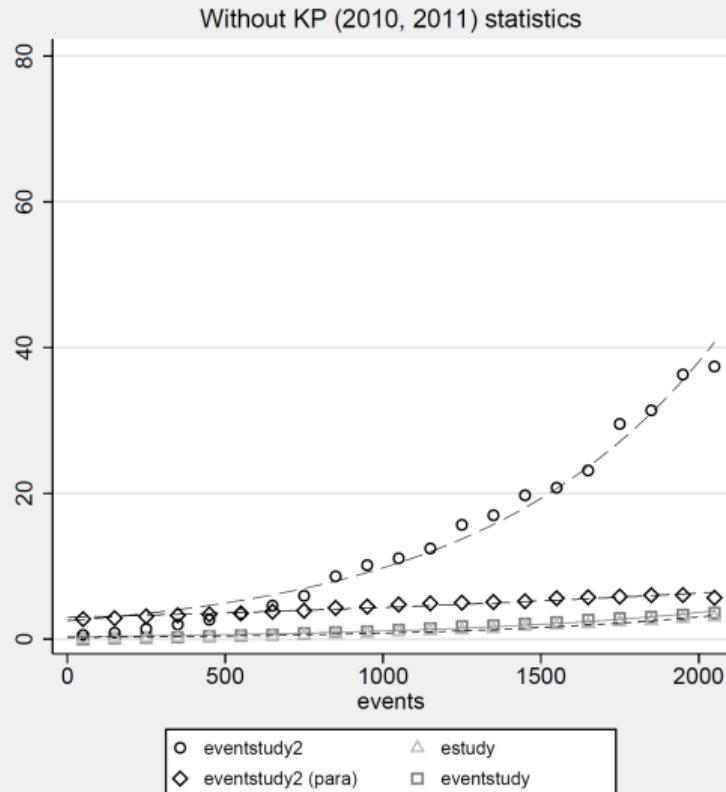
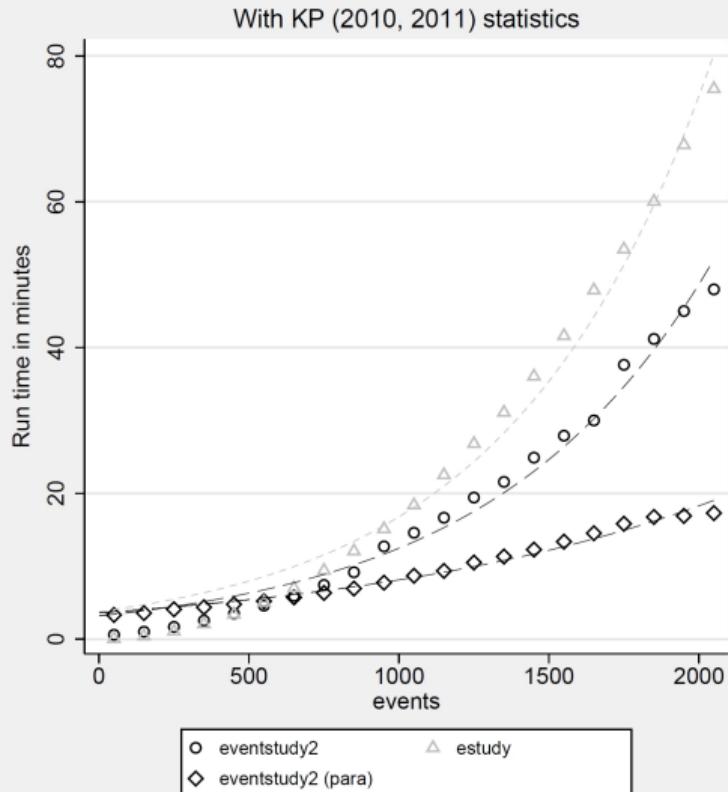
Literature screening of three leading field journals:

- ▶ Journal of Accounting Research
- ▶ Journal of Finance
- ▶ Management Science

Selection and analysis of all 180 event studies that appeared in these journals during the period 2009–2018.

Authors	Sample period	Datasources	Benchmark models	Test statistics	Events
Abarbanell and Park (2017)	1993–2012	CRSP	BH_MATCH	t-Stat	47,977
Abrahamsen et al. (2011)	1998–2007	CRSP	MA	None	2,788
Agarwal et al. (2013)	2004–2007	CRSP	MM	Patell Z, GenSign	66
Agarwal et al. (2016)	1998–2010	CRSP	MA	None	3,046
Aggarwal et al. (2015)	2007–2009	CRSP	RAW	None	3,053
kenneth R. Ahern and Harford (2014)	1986–2010	CRSP	MA	None	not reported
Akbas (2016)	1980–2011	CRSP	MA	None	366,454
Albuquerque and Schroth (2015)	1990–2010	CRSP	RAW	None	114
Allee and DeAngelis (2015)	2004–2014	CRSP	MA, FM	None	33,428
Ammann et al. (2016)	1992–2008	CRSP	MM	t-Stat	1,875
Anderson et al. (2012)	2005–2007	CRSP	PEA	t-Stat	1,571
Anderson et al. (2018)	1992–2014	CRSP	RAW	None	27,615
Arikan and Stulz (2016)	1975–2008	CRSP	MA	t-Stat, Wilcoxon	3,081
Ashbaugh-Skaife et al. (2009)	2003–2005	CRSP	BH_IND	Wilcoxon	787
Babenko (2009)	1996–2002	CRSP	MM	None	1,174
Badoer and James (2016)	2001–2001	CRSP Treasury	COMEAN	t-Stat	1
Becher et al. (2015)	1993–2008	CRSP	RAW, CAL	None, t-Stat	5,381
Berkman and Truong (2009)	2000–2004	CRSP, yahoo!Finance	BA	t-Stat	38,031
Berkman et al. (2014)	1999–2010	Compustat Global	MA	t-Stat	4,136
Bernhardt et al. (2016)	2003–2010	CRSP	BH_IND	t-Stat	24,793
Betton et al. (2014)	1980–2008	CRSP	MM	None	6,150
Bhojraj et al. (2009)	1988–2006	CRSP	MA, BH_MATCH, CAL	t-Stat, BS t-Stat	35,530
Blankespoor et al. (2017)	2011–2013	CRSP	BH_MATCH	None	224
Bradley et al. (2017)	1983–2011	CRSP	MA	None	40,719
Brennan et al. (2016)	1983–2010	CRSP	MA	None	not reported
Brown and Tucker (2011)	1997–2006	CRSP	MA	None	23,487
Bruno et al. (2016)	1999–2003	CRSP	BH_MATCH	t-Stat	2,002
Bushee et al. (2010)	1993–2004	CRSP	MA	None	27,987
Bushee et al. (2011)	1999–2007	CRSP	BH_MATCH	t-Stat, Wilcoxon	95,105
Bushman et al. (2017)	2000–2012	CRSP	MA	None	41,760
Call et al. (2018)	1978–2012	CRSP	MA	None	658
Cao and Narayananmoorthy (2012)	1987–2008	CRSP	BH_IND	None	305,908
Cao et al. (2015)	2000–2010	CRSP	BH_IND, PEA	None	40,807
Cen et al. (2016)	1979–1995	CRSP	BH_MATCH	None	62,041
Chang et al. (2010)	1992–2002	CRSP	MM, FM, BH_IND, BH_MATCH	t-Stat, Wilcoxon	298
Chava et al. (2018)	1989–2007	CRSP	MM	None	1,677
Cheong and Thomas (2018)	1993–2013	CRSP	MA	None	197,004
Chhaochharia et al. (2017)	1999–2006	CRSP	MM	None	6,643
Choudhary et al. (2009)	2004–2005	CRSP	MM	t-Stat	365
Christensen et al. (2009)	2004–2004	CRSP	MA	None	136
Cohen and Schmidt (2009)	1993–2003	CRSP	MA	None	266,520
Cohn et al. (2016)	2010–2010	CRSP	COMEAN	CDA	3
Collin-Dufresne and Fos (2015)	1994–2010	CRSP	BH_IND	t-Stat	3,126
Crane and Koch (2018)	1980–2012	CRSP	MA	None	26,766

	eventstudy		eventstudy2		estudy	
Panel A: All three journals						
Fully applicable	15	8.33%	163	90.56%	96	53.33%
Partially applicable	4	2.22%	5	2.78%	17	9.44%
Not applicable	161	89.44%	12	6.67%	67	37.22%
 Panel B: Journal of Accounting Research						
Fully applicable	3	5.45%	54	98.18%	31	56.36%
Partially applicable	1	1.82%	0	0.00%	5	9.09%
Not applicable	51	92.73%	1	1.82%	19	34.55%
 Panel C: Journal of Finance						
Fully applicable	6	8.45%	65	91.55%	41	57.75%
Partially applicable	2	2.82%	1	1.41%	4	5.63%
Not applicable	63	88.73%	5	7.04%	26	36.62%
 Panel D: Management Science						
Fully applicable	6	11.11%	44	81.48%	24	44.44%
Partially applicable	1	1.85%	4	5.63%	8	14.81%
Not applicable	47	87.04%	6	8.45%	22	40.74%



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The three command do not represent evolutions but can be best choices in different scenarios:

- ▶ **eventstudy**: simple studies, Stata beginners, assessment of statistical significance not required
- ▶ **eventstudy2**: very complex and large studies, extremely accurate results
- ▶ **estudy**: complexer studies of limited size (<24,000 events), comfortable output (LaTeX), by event assessment of statistical significance

Many thanks to...

- ▶ **Bill Rising** for setting up and testing my Zoom connection.
- ▶ the **Stata Corp. crew** for organizing the conference.
- ▶ **Joe Newton** for providing valuable input during the ongoing review process in the Stata Journal.