

**Goal:**

Use Eventus software version 7.0 or higher to construct a mini-database of data obtained from any source, and run one or more event studies using the mini-database.

**Data:**

The request file listed below, `sasnoncrspdemo-request.dat`, summarizes the sample of three firm-events. The first column contains a ticker symbol. In a non-CRSP event study, the user decides how to identify securities. In this example the ticker is the security identifier. The event date is constant across firms here, but could just as easily vary across firms.

```
MSFT 19990407
IBM 19990407
CSCO 19990407
```

The user has downloaded data, for the three securities and the Russell 1000 index, in spreadsheet (CSV) format from Yahoo!® Finance (<http://chart.yahoo.com/d>). The user selected weekly data from 29 December 1997 through 29 October 2001. Eventus can accommodate daily, weekly, monthly, quarterly or annual data. The first few lines of the downloaded file for Cisco Systems are:

```
Week of,Open,High,Low,Close,Volume
29-Oct-01,17.23,17.70,16.06,17.26,78482900
22-Oct-01,16.52,17.83,16.15,17.29,77071600
```

The data include prices but not returns, and the observations are in reverse date order. The prices in Yahoo download files are adjusted for dividends, splits and spinoffs.

**Solution:**

SAS can be used to reorder the data and transform prices to returns. The following code and partial data illustrate the process of reading the download file for one security. The statement numbers do not appear in the actual code but are added here for reference.

```
❶ data csc0(index=(issudatkey=(ticker caldt)));
❷ infile datalines firstobs=2 dsd trunccover;
❸ input caldt:date9. (open high low close) (:7.) volume:9.0;
❹ ticker='CSCO';
❺ format caldt date9.;
❻ datalines;
Week of,Open,High,Low,Close,Volume
29-Oct-01,17.23,17.70,16.06,17.26,78482900
22-Oct-01,16.52,17.83,16.15,17.29,77071600
15-Oct-01,16.65,17.45,15.47,16.72,72493100
8-Oct-01,14.40,17.40,14.35,16.95,87359300
```

Statement 1 begins a data step and creates a SAS data set, also called a table, named `csc0`. The parenthesized material invokes a SAS data set option to index the data set. Indexing is a data management method that produces an effect equivalent to sorting, from the user's point of view. Statement 2 designates the data file to be read. The keyword `datalines` indicates that the data appear just below the data step statements. The data could instead be

left in a separate file.<sup>1</sup> In that case, `datalines` in statement 2 would be replaced by the quoted file specification (drive, folder and file name). Because the first line of the download file contains labels to be ignored by SAS, the option `firstobs=2` causes the input to start with the second line. The option `dsd` calibrates the input operation for comma separated data. The `truncover` option prevents an error condition arising if some data fields are less than their maximum width. Statement 3 designates the columns to read and their input formats. The `date9.` informat causes the `caldt` column to be defined as a SAS date variable. SAS stores dates as the number of days since January 1, 1960. Statement 4 creates the column named `ticker` and sets its value on every row to `CSCO`. Statement 5 specifies an output format so that `caldt` will appear as a recognizable date. This is done for user convenience when examining the data set; it is not necessary for Eventus purposes. Statement 6 flags the beginning of in-line input data. If the data were stored in a separate file, this statement would be omitted.

After reading the data for all three firms, the following steps are used to combine the firms, create returns and define the header file that Eventus needs.

```
data ret(index=(caldt ticker issuatkey=(ticker caldt)));
  set ibm msft csco;
  by ticker caldt;
  ret=dif(close)/lag(close);
  if first.ticker then ret=.;
  keep ticker caldt ret;
run;

proc summary nway data=ret;
  class ticker;
  var caldt;
  output out=header(keep=ticker begdt enddt index=(ticker))
    min=begdt max=enddt;
run;
```

The complete code to read and process the downloaded data for the three firms and one index is available from [www.eventstudy.com/sasnoncrspdemo-minidatabase.sas](http://www.eventstudy.com/sasnoncrspdemo-minidatabase.sas). A portion of code not displayed in this paper computes the Russell 1000 return using the column name `vwretd`. This is the column name that Eventus expects for a value-weighted index return with dividends.

The user now has a mini-database in the format that Eventus expects. The mini-database can be used for multiple event studies with different choices of event date, event period and estimation period. The Eventus statements on the next page run an event study using the mini-database. The Eventus statement option `sasnoncrsp` invokes the mini-database method that first became available in Eventus 7. Users of previous versions of Eventus

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<sup>1</sup> Yahoo identifies the download format as a spreadsheet format, but it is more specifically an ASCII text format that is recognized by spreadsheet software. The file should not be converted to Excel workbook or other proprietary format before use with the code in this paper.

may be familiar with the `noncrsp` option. The `noncrsp` option, which is still available, would invoke the older, less flexible method of using non-CRSP data.

The Eventus statement options `indexds`, `returnds` and `headds` point to components of the mini-database. The `request` statement options `issuekey` and `issuefmt` define the security identifier name and format, respectively, used in the mini-database. All other options in the example are common to CRSP and non-CRSP event studies. The `csecterr` option selects a cross-sectional test that is robust to calendar and industry clustering. The `value` option indicates that a value-weighted market index is to be used. In this case there is no choice, because the mini-database contains no other market index, but the `value` option still is required.

```
filename request 'F:\Folder\sasnoncrspdemo-request.dat';
Eventus weekly sasnoncrsp
  indexds=work.russell_1000
  returnds=work.ret
  headds=work.header;
  request autodate est=11 pool estlen=52 issuekey=ticker issuefmt=$4.;
  windows (-10,-1) (0,+3) (0,+5) (-10,+10);
  evtstudy value csecterr pre=10 post=10;
```

The results appear in the SAS Output window and are reproduced in the appendix.

#### Notes:

- The mini-database should contain enough data, for each security, to accommodate the estimation and event periods desired, but the time series need not be limited to the data for any one study.
- The mini-database in this example contains only the three securities in the sample. In general, however, the mini-database may contain more securities than used in any one study run from it.
- The SAS code in this example creates temporary data sets, which are referenced in the Eventus statements using the `work.` prefix. The prefix is omitted in the SAS code because `work` is the default, but cannot be omitted in Eventus. Alternatively, one can define a SAS library name in the SAS Explorer, or using a `libname` statement, to point to a particular folder. Then, to create a data set that persists beyond the current SAS session, one uses the SAS library name as the explicit prefix in place of the implied or explicit `work.`

## Appendix: Eventus Output

Eventus (R) Software from Cowan Research, L.C.

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Eventus (R) software is produced by Cowan Research, L.C.  
<http://www.eventstudy.com/>

ESTIMATION PERIOD: 52 weeks in length,  
 split before and after the event.

TOTAL NUMBER OF EVENTS: 3  
 EVENTS WITH USEABLE RETURNS: 3

NOTE: Any non-trading dates were converted to the next trading date.

STATISTICAL SIGNIFICANCE LEVELS: 1 tailed

NOTE: Useable returns means all nonmissing returns except the  
 first week after a missing estimation period return.

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Eventus (R) Software from Cowan Research, L.C.

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Results of Weekly Stock Return Data Input

ticker	Name on Event Date	Event Week
CSCO		Wednesday, April 7, 1999
IBM		Wednesday, April 7, 1999
MSFT		Wednesday, April 7, 1999

ticker	Esti- mation Period Returns <=52	Event Period Returns <=21	Reason if no useable returns
CSCO	52	21	
IBM	52	21	
MSFT	52	21	

Eventus (R) Software from Cowan Research, L.C.

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Parameter Estimates and Estimation Period Statistics

----- Index Weight=Value -----

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ticker	Event Date	Alpha	Beta	Mean Return	% of Raw Returns >0	Market Model Residuals >0	Total Variance	Residual Standard Deviation	Autocorrelation*
CSCO	07APR1999	0.01516	1.59	0.02316	59.61%	50.00%	0.00401	0.04171	-0.0704
IBM	07APR1999	0.00123	0.75	0.00498	53.84%	51.92%	0.00231	0.04288	-0.1351
MSFT	07APR1999	0.01094	1.21	0.01703	53.84%	40.38%	0.00371	0.04911	-0.0281
		0.00911	1.18	0.01506	55.76%	47.43%	0.00334	0.04457	-0.0779
		0.01094	1.21	0.01703	53.84%	50.00%	0.00371	0.04288	-0.0704

\* First order autocorrelation of market model abnormal returns

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Eventus (R) Software from Cowan Research, L.C.

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Market Model, Value Weighted Index

Week	N	Mean Abnormal Return	Positive: Negative	CS t	Generalized Sign Z
-10	3	-6.27%	0:3	-13.546***	-1.645*
-9	3	0.29%	1:2	0.132	-0.489
-8	3	-4.81%	0:3	-2.373**	-1.645*
-7	3	-0.42%	1:2	-0.800	-0.489
-6	3	-0.57%	1:2	-0.328	-0.489
-5	3	-0.65%	1:2	-1.002	-0.489
-4	3	-0.22%	1:2	-0.069	-0.489
-3	3	2.82%	3:0	2.891**	1.823*
-2	3	1.74%	3:0	15.372***	1.823*
-1	3	-0.84%	1:2	-0.454	-0.489
0	3	-7.80%	0:3	-11.628***	-1.645*
+1	3	4.81%	2:1	0.821	0.667
+2	3	-0.46%	1:2	-0.146	-0.489
+3	3	-2.99%	1:2	-0.933	-0.489
+4	3	4.11%	2:1	1.026	0.667
+5	3	-1.93%	1:2	-1.645*	-0.489
+6	3	1.99%	2:1	0.934	0.667
+7	3	-1.76%	1:2	-1.072	-0.489
+8	3	-0.19%	2:1	-0.424	0.667
+9	3	2.22%	3:0	2.617**	1.823*
+10	3	2.99%	3:0	3.257***	1.823*

The symbols \$, \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Eventus (R) Software from Cowan Research, L.C.

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Market Model, Value Weighted Index

Weeks	N	Mean Cumulative Abnormal Return	Positive: Negative	CS t	Generalized Sign Z
(-10, -1)	3	-8.94%	0:3	-2.191*	-1.645*
(0, +3)	3	-6.44%	1:2	-0.551	-0.489
(0, +5)	3	-4.25%	1:2	-0.297	-0.489
(-10, +10)	3	-7.95%	1:2	-0.439	-0.489

The symbols \$, \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.