CUFE·CAFD

TITLE：Investment Assignment IV

GROUP NAME：GGM Never Die

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Question1

The code below is to transfer the regression result to a standard form and put the star signal of p-value. And we also write the macro code table(d_p) which is more convenient.

```
%macro table(d_p);
data dp;
    set &d_p;
    tvalue2=put(tvalue,7.2);
    if probt<0.1 then p='*  ';
    if probt<0.05 then p='** ';
    if probt<0.01 then p='***';
    T=compress('['||tvalue2||']');
    PARAM=compress(put(estimate,7.3)||p);
run;
proc transpose data=dp out=dp1;
    var param T p;
    by variable;
run;
proc reg data=d3;
    title '1972.01-1982.12 Regression results';
    model ret=delta_offer market_power;
    ODS OUTPUT ParameterEstimates=parms_out;
run;
* outest=reg tableout noprint;
quit;
options mautosource SASAUTOS='D:\investment\data\Lecture 3';
%table(parms_out);
```

The table are shown below:

Variable	_NAME_	COL1
Intercept	PARAM	12.922***
.	T	[5.75]
.	p	***
delta_offer	PARAM	40.001***
.	T	[4.18]
.	p	***
market_power	PARAM	8.797
.	T	[0.09]
.	p	

Variable	_NAME_	COL1
Intercept	PARAM	15.415***
.	T	[19.88]
.	p	***
delta_offer	PARAM	406.570***
.	T	[13.66]
.	p	***
market_power	PARAM	-180.05
.	T	[-4.57]
.	p	

Variable	_NAME_	COL1
Intercept	PARAM	12.237***
.	T	[13.99]
.	p	***
delta_offer	PARAM	39.878***
.	T	[10.08]
.	p	***
market_power	PARAM	-11.925
.	T	[-0.58]
.	p	

Variable	_NAME_	COL1
Intercept	PARAM	14.173***
.	T	[19.88]
.	p	***
delta_offer	PARAM	56.323***
.	T	[23.06]
.	p	***
market_power	PARAM	49.632*
.	T	[1.87]
.	p	*

Variable	_NAME_	COL1
Intercept	PARAM	16.924***
.	T	[9.13]
.	p	***
delta_offer	PARAM	112.931***
.	T	[24.46]
.	p	***
market_power	PARAM	444.108***
.	T	[6.50]
.	p	***

Variable	_NAME_	COL1
Intercept	PARAM	25.184***
.	T	[12.63]
.	p	***
delta_offer	PARAM	129.463***
.	T	[29.55]
.	p	***
market_power	PARAM	24.981
.	T	[0.69]
.	p	

Variable	_NAME_	COL1
Intercept	PARAM	14.619***
.	T	[19.58]
.	p	***
Age	PARAM	-0.120***
.	T	[-5.00]
.	p	***
Delta_offer	PARAM	44.840***
.	T	[14.88]
.	p	***
Market_power		-69.142**
		[-2.52]
		**

Variable	_NAME_	COL1
Intercept	PARAM	19.029***
.	T	[18.30]
.	p	***
Age	PARAM	45.145***
.	T	[15.13]
.	p	***
Delta_offer	PARAM	-3.045***
.	T	[-7.37]
.	p	***
Market_power		-64.164*
		[-1.82]
		*

Variable	_NAME_	COL1
Intercept	PARAM	15.125***
.	T	[17.70]

.	p	***
Age	PARAM	47.596***
.	T	[12.98]
.	p	***
Delta_offer	PARAM	-170.04***
.	T	[-3.95]
.	p	***
Market_power		-0.000*
		[-0.15]

Variable	_NAME_	COL1
Intercept	PARAM	21.208***
.	T	[15.49]
.	p	***
Age	PARAM	48.123***
.	T	[13.29]
.	p	***
Delta_offer	PARAM	-2.428***
.	T	[-5.64]
.	p	***
Market_power		-64.371
		[-1.39]

Question2

The first step is to merge all datasets together: first we the import parameter dataset: dp, market return and dsf_all, and we use proc sql to merge them together by matching &permno and date. Note that macro variable &dp can't be used in proc sql so we have to import it at the work space.

```
%macroevent_study(d_p,permno_p,date_p,lwindow,rwindow,graph_p,titl
e_p);
libname worklib'D:\investment\data\lecture4';
*merge all data together;
data dp;
    set worklib.&d_p;
run;
data ret;
    set worklib.dsf_all;
run;
data mret;
    set worklib.Mktret_daily;
run;
proc sql;
    create table d as select distinct
    dp.*,
    ret.date,
    ret.ret
    from dp left join ret
    on dp.&permno_p=ret.permno
    order by &permno_p, date;
quit;
proc sql;
    create table d1 as select distinct
    d.*,
    mret.vwretd
    from d left join mret
    on d.date = mret.date
    order by &permno_p, date;
quit;
```

```
proc sort data=d1;
    by &permno_p &date_p;
run;
*get the num_before;
proc means data=d1 noprint;
    var &permno_p;
    by &permno_p &date_p;
    output out=d_stats
    n=num_before;
    where DATE<&date_p;
run;
*get rel_day;
data d2;
    merge d1 d_stats(keep=&permno_p &date_p num_before);
    by &permno_p &date_p;
    if first.&date_p then
        rel_day=-num_before;
    else
        rel_day= rel_day +1;
        retain rel_day;
    label num_before= 'num_before';
run;
*keep (lwindow,rwindow) data and calculate car;
data d3;
    set d2;
    by &permno_p;
    if &lwindow<=rel_day<=&rwindow;
    ar=ret-vwretd;

data d3;
    set d3;
    by &permno_p;
```

Then we get the num_before and relative day by substituting permno and date variables to macro variables

Next, we use &lwindow and &rwindow to get the window period.

How to Calculate abnormal return and accumulative is just like assignment 2.

The last step is to print statistical table and graph if the value of graoh_p is 1.

Note that we enclose the fixed parts in title with single quotes and in graph part

```
proc means data=d3 noprint;
    var ar car;
    output out=d_stats1
    mean(ar)=mean_ar
    t(ar)=t_ar
    mean(car)=acar
    t(car)=t_car
    n(ar)=n_ar;
    by rel_day;
run;
proc print data=d_stats1 label noobs;
    title 'Event:' &title_p '-Abnormal Returns';
    var rel_day mean_ar t_ar acar t_car n_ar;
    label
    rel_day="Day"
    mean_ar="Average MAR(%)"
    t_ar="t-statistic"
    acar="Average CMAR(%)"
    t_car="t-statistic"
    n_ar="N";
run;
%if &graph_p=1 %then
%do;
        symbol1
        color=green interpol=spline width=1 value=square;
        axis1
        label=("Event Time")
        order=&lwindow to &rwindow by 1
        width=3;
        axis2
        label=("Acummulative Abnormal Return %")
        width=3;
    run;
    proc gplot data=d_stats1;
        title 'Event:' &title_p '-CAR';
        plot acar*rel_day/haxis=axis1 vaxis=axis2;
    run;
    quit;
%end;
%mend event_study;
```

the axis could vary with the value of car so we don't need to use "order …by" command.

Finally we separate the macro code and main code, use the main code file to call the six event_study functions at once:

```
options ls=72 mautosource SASAUTOs='F:\Investment\Code' mprint;
%event_study(ipo_ev,permno,recdats,-5,5,1,Initial Rec After
Ipos);
%event_study(quiet_ev,permno,quiet_period_end,-5,5,0,Quiet
Periods);
%event_study(seo_ev,permno,file_date_sas,-10,10,1,SEOs);
%event_study(added_sp500_ev,permno,anndate_sas,-
10,10,1,Announcement of inclusion in the SP500);
%event_study(added_sp500_ev,permno,effdate_sas,-
10,10,1,Effective inclusion in the SP500);
%event_study(merger_ev,target_permno,ann_date,-10,10,1,Merger
Targets);
```

Event 1: Initial recommendation after IPOs.

```
%event_study(ipo_ev,permno,recdats,-5,5,1,Initial Rec After Ipos);
```

Figure 1 summarizes this analysis by plotting the CMARs over a 10-day (-5,+5) window. Day 0 is the event day. Table below presents the average market-adjusted returns. The T-stats tests the null hypothesis that the percentage of abnormal returns is the same as zero in the estimation period assuming independence.

The t-stats of CMAR are all significant. There is a clear clustering of significant abnormal returns in the days surrounding the Initial recommendation of the initial public offer companies. Table below also shows that significant abnormal returns begin to occur several days before the event. The single largest daily abnormal return, 0.8 percent, occurs on day - 2, and abnormal returns are positive and significant on every day in the (- 5,-1) window. It is strange, we will discuss it later. In contrast, abnormal returns decrease to 0.19 percent on day 1, and continue to decrease in the (1, 4) window. We can also observe it from the figure below. As shown, the cumulative market-adjusted increase in value is about three percent. It also reinforces our earlier observations regarding the pre-event run-up in prices. After the event day, the CMAR curve began to go down. Thus, it appears that analyst is driving the abnormal returns documented in Table below.

The single largest daily abnormal return, 0.8 percent, occurs on day - 2, and abnormal returns are positive and significant on every day in the (- 5,-1) window. It is strange. Two potential (and nonexclusive) explanations for the market's apparent clairvoyance regarding initiations are (1) analyst behavior is highly predictable and (2) there is information leakage.

Event: Initial Rec After Ipos -Abnormal Returns

Day	Average MAR(%)	t-statistic	Average CMAR(%)	t-statistic	N
-5	0.37833	2.45877	0.37833	2.45877	1783
-4	0.64949	4.53637	1.02719	4.70254	1788
-3	0.52634	3.45193	1.55590	5.70368	1793
-2	0.83908	5.36855	2.38914	7.55990	1795
-1	0.76176	4.59419	3.15240	8.84736	1799
0	0.21632	1.19986	3.34711	8.45721	1808
1	0.19636	1.21229	3.55177	8.36756	1808
2	-0.27902	-1.91980	3.28302	7.24336	1808
3	-0.11823	-0.83768	3.15888	6.69228	1808
4	-0.38751	-2.70005	2.79741	5.70977	1808
5	-0.08841	-0.63361	2.73169	5.32158	1808

Figure 1. Printed output, macro event_study, for IPO sample

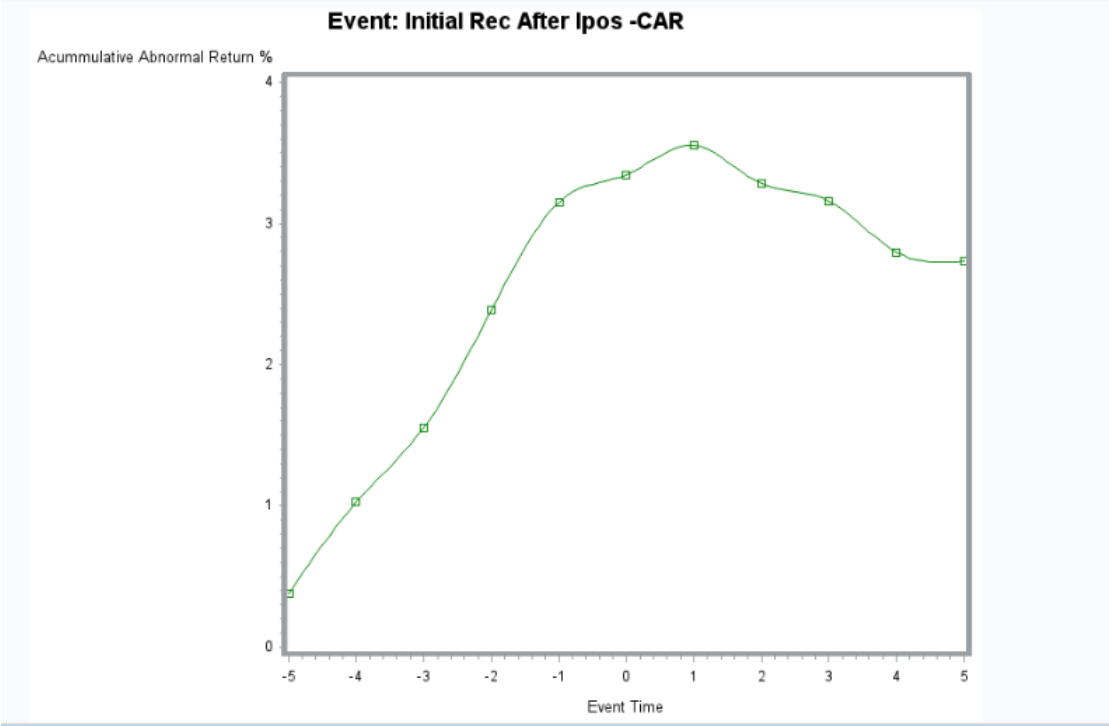

Figure 2. Graph output, macro event_study, for IPO sample

Event 2: End of quiet periods.

```
%event_study(quiet_ev,permno,quiet_period_end,-5,5,1,Quiet Periods);
```

This figure plots cumulative market-adjusted returns for the samples surrounding the end of the quiet period. Day 0 is the event day. Table below presents the average market-adjusted returns. The T-stats tests the null hypothesis that the percentage of abnormal returns is the same as zero in the estimation period assuming independence.

The t-stats of CMAR are all significant. There is a clear clustering of significant abnormal returns in the days surrounding the end of the quiet period. Table below also shows that significant abnormal returns begin to occur several days before the end of the quiet period. The single largest daily abnormal return, 1.44 percent, occurs on day - 1, and abnormal returns are positive and significant on every day in the (- 5,0) window. In contrast, abnormal returns decrease to 0.11 percent on day 1, and continue to decrease in the (1, 5) window. We can also observe it from the figure below, after the event day, the CMAR line began to go down.

As with the price drops associated with lockup expirations, the significant abnormal returns in Table below at the end of the quiet period appear to **be inconsistent with market efficiency** because the relevant dates are known ahead of time with complete certainty. The fact that the abnormal returns occur in advance of the event date is similarly puzzling.

Event: Quiet Periods -Abnormal Returns

Day	Average MAR(%)	t-statistic	Average CMAR(%)	t-statistic	N
-5	0.41434	2.68713	0.41434	2.6871	2011
-4	0.30691	2.29755	0.72125	3.5783	2011
-3	0.55585	4.15759	1.27710	5.2949	2011
-2	0.88607	6.36990	2.16317	7.6415	2011
-1	1.43837	9.52876	3.60154	11.3871	2011
0	0.50697	3.18967	4.09070	11.7955	2010
1	0.11320	0.73733	4.20390	11.4946	2010
2	0.07760	0.53365	4.28150	11.0017	2010
3	-0.09698	-0.72162	4.18452	10.0850	2010
4	-0.07122	-0.51197	4.11330	9.5247	2010
5	-0.47123	-3.31894	3.64208	8.0154	2010

Figure 3. Printed output, macro event_study, for Quiet Periods sample

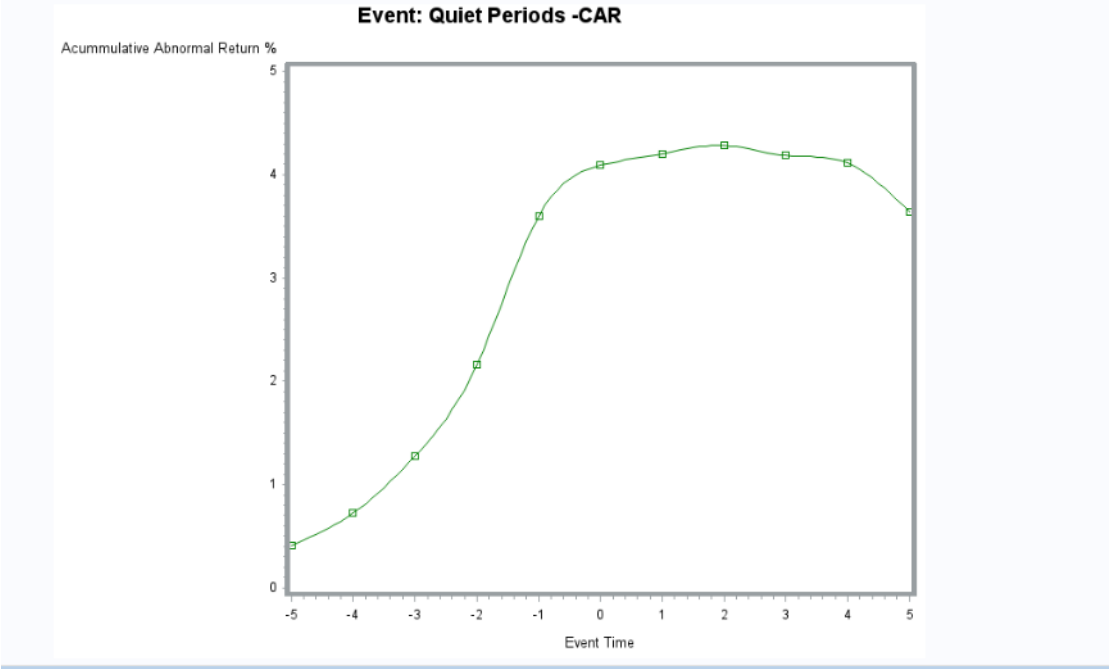

Figure 4. Graph output, macro event_study, for Quiet Periods sample

Event 3: Seasoned Equity Offerings.

```
%event_study(seo_ev,permno,file_date_sas,-10,10,1,SEOs);
```

This figure is quite strange. It plots cumulative market-adjusted returns for the samples surrounding the Seasoned Equity Offerings (not all SEOs). Day 0 is the event day. Table below presents the average market-adjusted returns. The T-stats tests the null hypothesis that the percentage of abnormal returns is the same as zero in the estimation period assuming independence.

As we can see, the curve experienced a sharp drop and then increased rapidly, with CMAR reaching its lowest point on the event day. The sharp decline comes from the increase in the number of shares outstanding after the issuance of new shares, the supply increases. But it is quite strange why it occurs on day -1 instead of day 0, It means that considering the decline in the value of a stock, some investors sell their stocks in advance. After that, it experienced a rapidly increase. Maybe it's because investors see it as a sign of the company's ability to raise capital and therefore have more confidence in the company.

And what we found is the same thing as the first event, investors react in advance to what is going to happen. Also, we have two potential (and nonexclusive) explanations for the market's apparent clairvoyance regarding initiations are (1) this behavior is highly predictable and (2) there is information leakage.

Event: SEOs -Abnormal Returns

Day	Average MAR(%)	t-statistic	Average CMAR(%)	t-statistic	N
-10	0.06784	0.93931	0.61101	3.30623	2991
-9	0.19504	2.60751	0.80466	4.05575	2992
-8	0.05465	0.78778	0.85709	4.07904	2992
-7	0.13044	1.86632	0.99220	4.55081	2992
-6	0.25828	3.12515	1.24164	5.29988	2992
-5	0.06629	0.90745	1.30959	5.43456	2992
-4	0.06555	0.80016	1.36058	5.39041	2991
-3	-0.16806	-2.32642	1.19086	4.55186	2991
-2	-0.27475	-3.59596	0.91491	3.39759	2989
-1	-0.59762	-7.40357	0.27362	0.97137	2936
0	-0.59126	-6.51241	-0.27370	-0.92455	2926
1	0.22202	2.53813	-0.07148	-0.23571	2946
2	0.28716	4.69863	0.23211	0.75075	2950
3	0.16057	2.61385	0.40243	1.28515	2951
4	0.14024	2.16907	0.52830	1.65737	2949
5	0.11380	1.82152	0.65911	2.02057	2949
6	0.13213	2.07112	0.78945	2.34684	2949
7	0.16348	2.58572	0.96529	2.85134	2949
8	0.14275	2.28500	1.11365	3.21810	2949
9	0.10095	1.62008	1.24103	3.52428	2949
10	0.11482	1.85378	1.34858	3.75776	2949

Figure 5. Printed output, macro event_study, for SEOs sample

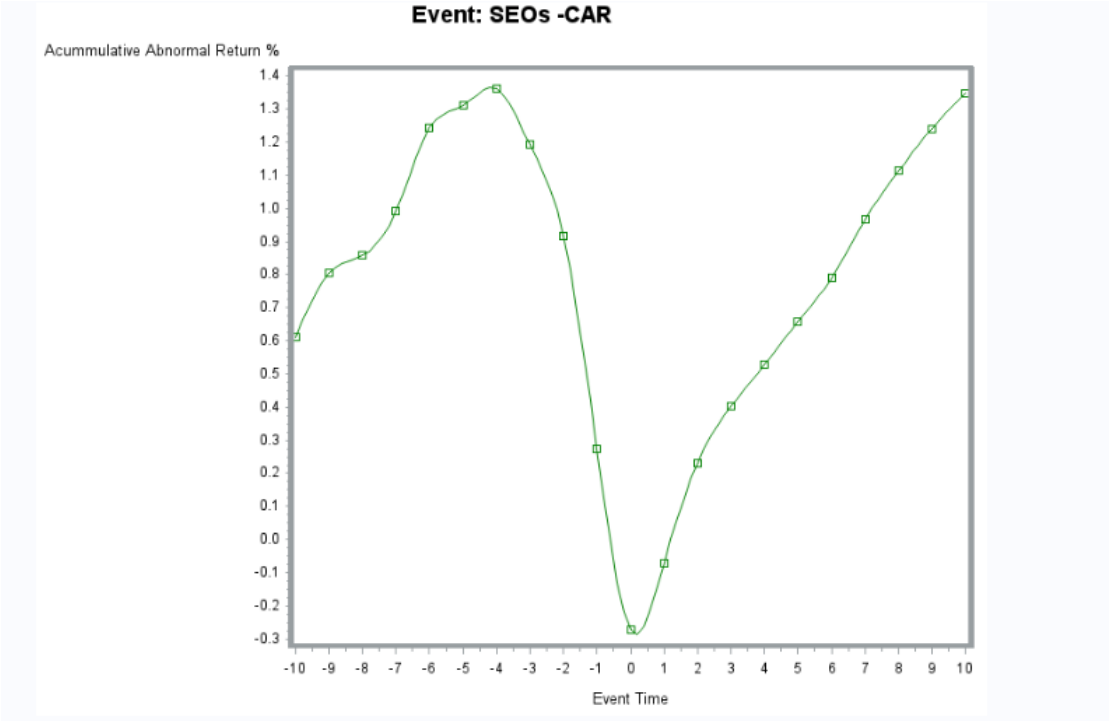

Figure 6. Graph output, macro event_study, for SEOs sample

Event 4: Announcement of inclusion in the S&P 500.

```
%event_study(added_sp500_ev,permno,anndate_sas,-10,10,1,Announcement
of inclusion in the SP500);
```

Event: Announcement of inclusion in the SP500 -Abnormal Returns

Day	Average MAR(%)	t-statistic	Average CMAR(%)	t-statistic	N
-10	0.06620	0.5624	0.06981	0.57948	570
-9	0.14539	1.3259	0.21520	1.45131	570
-8	-0.13849	-1.3797	0.07670	0.44393	570
-7	-0.11531	-1.0777	-0.03861	-0.18587	570
-6	0.04355	0.3875	0.00494	0.02030	570
-5	-0.08252	-0.7981	-0.07758	-0.30832	570
-4	0.15577	1.5589	0.07819	0.29106	570
-3	0.20716	1.8639	0.28535	0.98330	570
-2	0.10798	1.1240	0.39333	1.32245	570
-1	0.07338	0.6809	0.46671	1.52516	570
0	0.41251	3.5507	0.87607	2.70759	571
1	1.97535	11.2192	2.85302	7.53592	571
2	-0.11071	-1.0381	2.73992	7.05994	571
3	0.31599	2.7780	3.06135	7.44514	571
4	-0.00147	-0.0118	3.05971	7.14882	571
5	0.11002	0.9644	3.17167	7.12237	571
6	0.04959	0.4972	3.22004	6.97584	571
7	0.03364	0.3345	3.25682	6.90805	571
8	-0.01266	-0.1239	3.24405	6.82224	571
9	0.03300	0.2652	3.27523	6.67809	571
10	-0.10317	-1.0879	3.17083	6.33950	571

Figure 7. printed out, macro event_study, for announcement of inclusion in the S&P 500

The fourth event is firms' announcement of inclusion in the S&P 500.

Figure 7 prints out the result of the average market-adjusted returns for this event. The t-statistic tests the null hypothesis that the percentage of abnormal returns equals zero in the estimation period assuming independence. Day 0 is the day that firms announce they will be included in the S&P 500. We can see that from day 0 to day 1, there exists a sharp increase in abnormal returns, about 2.4%. And these two days' t-statistics show that these two days' abnormal returns are very significant. During other periods except day 0 and day 1, according to t-statistics and value of abnormal returns, we can find abnormal returns are not so obvious and significant.

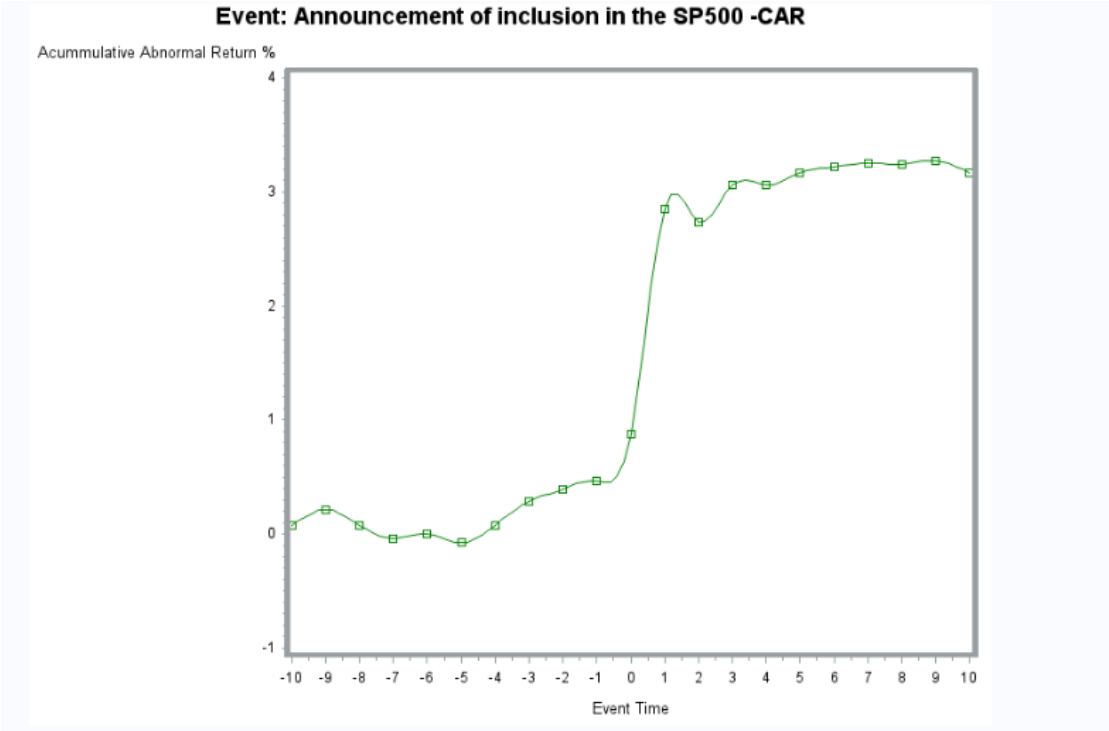

Figure 8. graph output, macro event_study, for announcement of inclusion in the S&P 500

This figure 8 plots cumulative market-adjusted returns for the event we study, announcement of inclusion in the S&P 500. Day 0 is the event day. The window [-10,+10] is plotted. Similar to figure 7 and more obviously, we can see that there exists a sharp increase in abnormal returns from day 0 to day 1, about 2.4%. And during other periods except day 0 and day 1, abnormal returns are not so obvious and significant, which shows a relatively flat curve.

We all know S&P 500 Index is a market-capitalization-weighted index of the 500 largest U.S. publicly traded companies. Therefore, the inclusion of S&P 500 Index is a piece of good news for firms. That is why after the announcement, firms' abnormal returns will increase so much.

Event 5: Effective inclusion in the S&P 500.

```
%event_study(added_sp500_ev,permno,effdate_sas,-10,10,1,Effective
inclusion in the SP500);
```

Event: Effective inclusion in the SP500 -Abnormal Returns

Day	Average MAR(%)	t-statistic	Average CMAR(%)	t-statistic	N
-10	0.02950	0.31013	0.03311	0.33298	570
-9	-0.02482	-0.24058	0.00830	0.05859	570
-8	-0.02467	-0.25451	-0.01638	-0.09184	570
-7	0.22679	1.91384	0.21041	0.95656	570
-6	0.18920	1.72662	0.39961	1.67354	570
-5	0.05995	0.56798	0.45956	1.76213	570
-4	0.60026	4.72990	1.05982	3.69794	570
-3	0.48896	4.30975	1.54878	4.95385	570
-2	0.25633	2.52413	1.80511	5.63898	570
-1	0.71296	5.72360	2.51807	7.31499	570
0	1.38044	8.05419	3.89706	9.65841	571
1	-0.49178	-4.43269	3.40255	8.45192	571
2	-0.22137	-2.24549	3.17860	7.57218	571
3	-0.19969	-1.81770	2.98345	6.99242	571
4	-0.02622	-0.23900	2.95701	6.91480	571
5	0.07357	0.78901	3.03245	6.93642	571
6	-0.12744	-1.27577	2.90347	6.49280	571
7	0.10704	0.97698	3.01378	6.47398	571
8	-0.02310	-0.22026	2.99056	6.22305	571
9	0.06095	0.57005	3.04975	6.33096	571
10	-0.07816	-0.80449	2.97039	6.00192	571

Figure 9. printed out, macro event_study, for effective inclusion in the S&P 500

The fifth event is firms' effective inclusion in the S&P 500.

Figure 9 prints out the result of the average market-adjusted returns for this event. The t-statistic tests the null hypothesis that the percentage of abnormal returns equals zero in the estimation period assuming independence. Day 0 is the day that firms are effectively included in the S&P 500. We can see that from day -4 to day 0, there exists a persistent increase in abnormal returns, about total 3.5%. And these two days' t-statistics show that these two days' abnormal returns are very significant.

Before the event day, there already exists some significant abnormal returns gradually. This phenomenon shows that there may be information leakage and the market is not strong efficient, but semi-strong efficient market.

After the event day, firms perform persistent negative abnormal returns during day 1 to day 4. This phenomenon shows that to some extent, investors overreact the event of merger. After the event happens, market goes back to a right position.

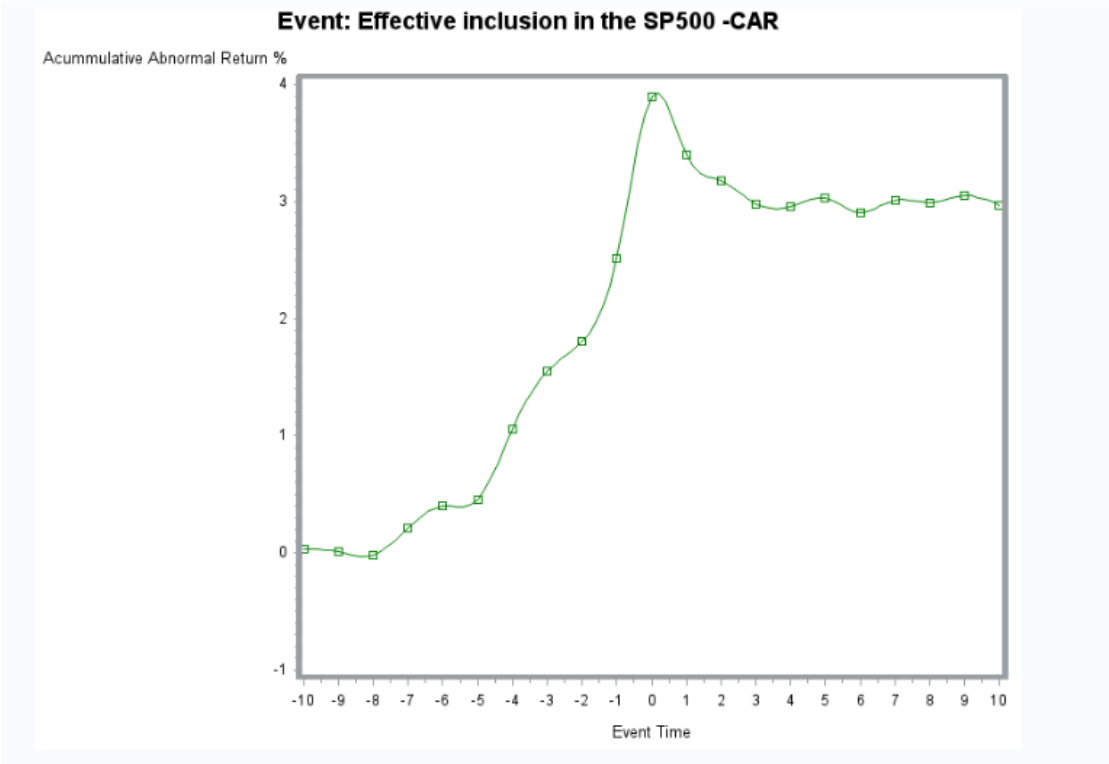

Figure 10. graph out, macro event_study, for effective inclusion in the S&P 500

This figure 10 plots cumulative market-adjusted returns for the event we study, announcement of inclusion in the S&P 500. Day 0 is the event day. The window [-10,+10] is plotted. Similar to figure 9 and more obviously, we can see that there exists a persistent increase in abnormal returns from day -4 to day 0, about 3.5%.

After the event day, firms perform persistent negative abnormal returns during day 1 to day 4. This phenomenon shows that to some extent, investors overreact the event of inclusion in the S&P 500 Index. After the event happens, market goes back to a right position.

The reason which is same as event 4, is that S&P 500 Index is a market-capitalization-weighted index of the 500 largest U.S. publicly traded companies. Therefore, the inclusion of S&P 500 Index is a piece of good news for firms. That is why after the announcement, firms' abnormal returns will increase so much.

Event 6: Merger Targets.

```
%event_study(merger_ev,target_permno,ann_date,-10,10,1,Merger
Targets);
```

Event: Merger Targets -Abnormal Returns

Day	Average MAR(%)	t-statistic	Average CMAR(%)	t-statistic	N
-10	-0.20083	-1.5030	-0.20083	-1.5030	1280
-9	-0.09433	-0.5669	-0.29516	-1.4687	1280
-8	-0.08841	-0.6356	-0.38356	-1.6621	1280
-7	-0.13028	-0.8984	-0.51384	-1.8827	1280
-6	0.11342	0.7421	-0.40042	-1.3351	1280
-5	-0.32915	-1.9009	-0.72957	-2.0929	1280
-4	0.26825	1.1797	-0.46132	-1.2121	1280
-3	0.11930	0.7813	-0.33559	-0.8322	1279
-2	0.27243	1.4427	-0.06316	-0.1409	1279
-1	0.18516	1.1265	0.12200	0.2518	1279
0	6.65716	13.4047	6.82833	9.8421	1279
1	2.05040	7.1576	8.97666	12.3127	1276
2	0.14162	1.1197	9.16188	12.4640	1274
3	0.10148	0.8574	9.25928	12.5516	1274
4	0.14853	1.3727	9.41241	12.6594	1274
5	0.02409	0.2146	9.45012	12.4720	1273
6	0.06259	0.5845	9.52629	12.4159	1272
7	0.01769	0.1658	9.54510	12.1851	1272
8	-0.05179	-0.4218	9.49280	11.9577	1272
9	-0.06555	-0.6612	9.42757	11.8184	1272
10	0.05433	0.5084	9.58586	12.0026	1270

Figure 11. printed out, macro event_study, for Merger Targets

The sixth event is firms' announcement of merger.

Figure 11 prints out the result of the average market-adjusted returns for this event. The t-statistic tests the null hypothesis that the percentage of abnormal returns equals zero in the estimation period assuming independence. Day 0 is the event day that firms make an announcement. We can see that from day -1 to day 1, there exists a sharp increase in abnormal returns, which is 8.8%. And these days' t-statistics show that these days' abnormal returns are very significant.

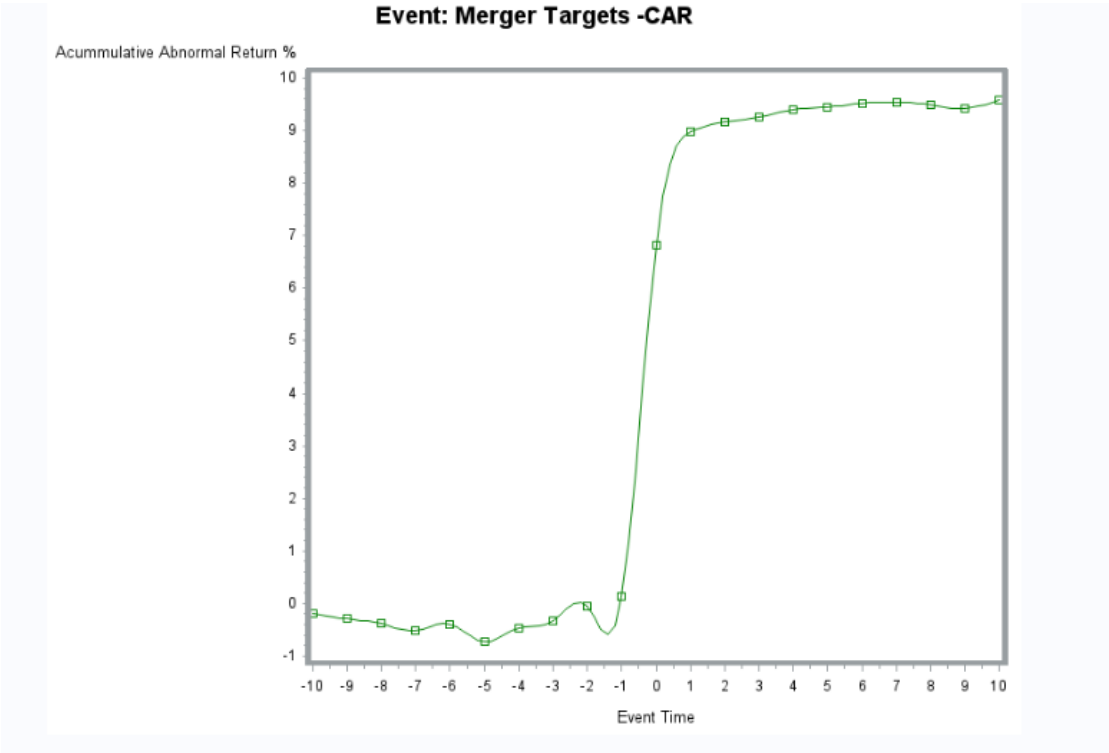

Figure 12. graph out, macro event_study, for Merger Targets

This figure 12 plots cumulative market-adjusted returns for the event we study, firms' announcement of merger. Day 0 is the event day. The window [-10,+10] is plotted. Similar to figure 11 and more obviously, we can see that there exists a sharp increase in abnormal returns from day -1 to day 1, about 8.8%. This abnormal return is very huge. And we can also see before day -1 and after day 1, the abnormal returns are relatively zero, which show that the curve of accumulative abnormal returns is nearly flat during these periods.

Merger means the act or the process of merging two or more parts into a single unit. From investors' perspective, merger means a piece of good news for the firms because after merger, firm's scale will become larger or that means firms will participate in some new industry filed. These changes will enhance firms' competitiveness, improve firms' management. And firms will have a better development prospect. Thus, they will have a rising expectation for the stocks and want to buy more. This action will induce an increase of the stock price and generate abnormal returns.