Internet Appendix **for** "Making Sense of Cents: An Examination of Firms That Marginally Miss or Beat Analyst Forecasts"[*]

Subsection A of this appendix includes supplemental analysis that we conducted to try to determine the effect of the tech bubble, because tech firms tend to be heavy users of research and development. In subsection B, we provide the SAS code necessary to estimate long-run returns with bootstrapped p-values, and the calendar-time regressions.

A. *Are the Results a Manifestation of the 'Tech' Effect?*

A potential concern with our results is whether they are simply due to the unusual returns patterns during the late 1990s experienced by R&D intensive firms (i.e., the tech bubble). Because there is no guidance in the asset pricing literature to modify expected returns for the tech effect, we run our analysis on a subsample that excludes all technology-heavy firms as a robustness test. In order to have enough observations, we expand the sample by classifying missers as all firms that miss by 1 to 5 cents per share and beaters as all firms that beat by 1 to 5 cents per share. This yields a total sample of 1,882 observations, with 1,058 beaters and 824 missers. We use Murphy's (2003) methodology to classify firms as "new-economy" firms or not. This results in a sample of 462 tech firms and 1,420 non-tech firms. We rerun the returns analysis in Tables III and IV separately for these subsamples.

Panels E and F of Table IA.I show that for non-tech firms we obtain significant differences in the long-run returns in the predicted direction in two of the four specifications, yielding three-year value-weighted BHARs of 9.7% and three-year equal-weighted CARs of 7.7%. The equal-weighted BHARs are in the expected direction, but not statistically significant, and value-weighted CARs are in the expected direction, but only marginally significant at the 10% level. In the calendar-time analysis shown in Panel C of Table IA.II, the equal-weighted and value-weighted portfolio alphas for non-tech firms are 53 and 50 basis points, respectively, with corresponding p-values of 0.04 and 0.07. The long-run returns results therefore hold up under most specifications when only non-tech firms are used, although the magnitude of the return is lower than that of the full sample.

For the tech firms, the equal-weighted BHARs and CARs are not statistically significant (p-value = 0.18 and 0.09, respectively), but the value-weighted returns are both statistically significant and yield very large long-run returns (three-year BHARs and CARs of 83.7% and 43.6%, respectively). In the calendar-time analysis, however, there is not a significant alpha for either the equal-weighted or value-weighed tech firm portfolios. Overall, this analysis allays the concerns that our results are primarily due to large returns generated by tech firms in the late 1990s.

Overall, our results suggest that the tech effect leaves a much larger footprint in the event-time analysis, where it is dominant. In the calendar-time analysis, the non-tech firms show more evidence of mispricing in a statistical sense, but the economic magnitudes are smaller than for tech firms. The observed differences between the event-time analysis (BHARs and CARs) and the calendar-time analysis (three-factor model) are likely due to the fact that in event time, each event

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constitutes an observation. In calendar time, each monthly portfolio return constitutes an observation. So the clustering of large returns associated with tech firms can dominate in event time, while not having too much of an effect in calendar time.

Bibliography

Fama, Eugene F., and Kenneth F. French, 1993, Common risk factors in the returns on stocks and bonds, Journal of Financial Economics 33, 3-56.

Murphy, Kevin J., 2003, Stock-based pay in new economy firms, *Journal of Accounting and Economics* 34, 129-147.

Future Stock Performance Based on Earnings Quality and Miss/Beat

To assess the impact of high tech firms on the results, we expand the sample and classify missers as all firms that miss by 1 to 5 cents per share and beaters as all firms that beat by 1 to 5 cents per share. Panel A presents average compounded buy-and-hold abnormal returns (BHARs) for firms with low earnings quality that beat the consensus analyst forecast by one penny ("beaters") and firms with high earnings quality that missed the consensus analyst forecast by one penny ("missers"). Returns are compounded 12 and 36 months after the announcement of earnings. We assign firms to matching book-to-market (BM)/size (ME) portfolios using the quintile breakpoints from Ken French's website. We calculate BHARs by first compounding returns for each firm and then subtracting the compounded return on the matching BM/ME portfolio. We report both equal-weighted (EW) and value-weighted (VW) average returns. For VW returns, we construct the weights using the firm's ME at the beginning of the announcement year, scaled by the level of the CRSP VW index at that date. Panel B presents cumulative abnormal returns (CARs) for beaters and missers. The CARs are similar to the BHARs, except we subtract the matching portfolio return each month and then sum (rather than compound) returns over the cumulation window. All returns presented in the table are expressed as percentages. Panels C through F then repeat the analysis for tech firms and non-tech firms, using the classification methodology in Murphy (2003). Differences significant at 5% or less (one-tailed) are indicated with *.

Panel A: Buy and Hold Abnormal Returns (BHARs) (Full Sample)

Month		Equal-Weighted			Value-Weighted		
		BHAR	p-value		BHAR	p-value	
12	beaters	1.04	0.65		-4.45	0.00	
	missers	13.90	0.00		-4.02	0.02	
	diff.	-12.86	0.01	*	-0.43	0.41	
36	beaters	6.72	0.20		-9.65	0.00	
	missers	23.15	0.00		20.01	0.00	
	diff.	-16.43	0.04	*	-29.66	0.00	*

Panel B: Cumulative Abnormal Returns (CARs) (Full Sample)

Month		Equal-Weighted			Value-Weighted		
		CAR	p-value		CAR	p-value	
12	beaters	0.89	0.54		-3.17	0.00	
	missers	8.13	0.00		-3.04	0.01	
	diff.	-7.24	0.00	*	-0.13	0.47	
36	beaters	8.51	0.00		-0.21	0.87	
	missers	23.72	0.00		13.77	0.00	
	diff.	-15.21	0.00	*	-13.98	0.00	*

Panel C: Buy and Hold Abnormal Returns (BHARs) (Tech Firms)

Month		Equal-Weighted			Value-Weighted		
		BHAR	p-value		BHAR	p-value	
12	beaters	3.34	0.57		-11.44	0.00	
	missers	29.63	0.01		3.07	0.52	
	diff.	-26.29	0.02	*	-14.51	0.01	*
36	beaters	34.00	0.12		-23.83	0.00	
	missers	61.11	0.00		59.88	0.00	
	diff.	-27.11	0.18		-83.71	0.00	*

Panel D: Cumulative Abnormal Returns (CARs) (Tech Firms)

Month		Equal-Weighted			Value-Weighted		
		CAR	p-value		CAR	p-value	
12	beaters	5.65	0.22		-9.70	0.00	
	missers	16.80	0.00		4.23	0.14	
	diff.	-11.15	0.07		-13.93	0.00	
36	beaters	32.36	0.00		-9.29	0.01	
	missers	45.65	0.00		34.31	0.00	
	diff.	-13.29	0.09		-43.60	0.00	

Panel E: Buy and Hold Abnormal Returns (BHARs) (Non-Tech Firms)

Month		Equal-Weighted			Value-Weighted		
		BHAR	p-value		BHAR	p-value	
12	beaters	0.60	0.81		-2.33	0.02	
	missers	5.27	0.10		-6.80	0.00	
	diff.	-4.67	0.13		4.47	0.01	*
36	beaters	1.49	0.75		-5.34	0.01	
	missers	2.32	0.64		4.39	0.10	
	diff.	-0.83	0.45		-9.73	0.00	*

Panel F: Cumulative Abnormal Returns (CARs) (Non Tech Firms)

Month		Equal-Weighted			Value-Weighted		
		CAR	p-value		CAR	p-value	
12	beaters	-0.02	0.98		-1.19	0.19	
	missers	3.37	0.15		-5.88	0.00	
	diff.	-3.39	0.11		4.69	0.00	*
36	beaters	3.94	0.11		2.54	0.08	
	missers	11.69	0.00		5.73	0.00	
	diff.	-7.75	0.04	*	-3.19	0.09	

Calendar-time Regressions of Portfolios Formed on Earnings Quality and Miss/Beat

Table IV of the text presents calendar-time regressions of portfolios formed on earnings quality and miss/beat. To assess the impact of high tech firms on the results, we expand the sample and classify missers as all firms that miss by 1 to 5 cents per share and beaters as all firms that beat by 1 to 5 cents per share. Panel A presents long-term calendar-time regressions for the full sample. Each month over the sample period, we form portfolios of all beaters and missers that announced earnings between 12 and 36 months of the calendar date. We also form a zero-investment hedge portfolio that goes long (short) in beaters (missers). To ensure adequate portfolio size, we require at least 10 monthly observations to form the portfolio. We calculate both EW and VW portfolio returns. We then regress monthly portfolio returns on the three factors in Fama and French (1993). For VW returns, we construct the weights using the firm's ME at the beginning of the announcement year, scaled by the level of the CRSP VW index at that date. All returns are expressed as percentages. Panels B and C then repeat the analysis for tech firms and non-tech firms, using the classification methodology in Murphy (2003). Differences in hedge returns significant at 5% or less (one tailed) are indicated with *.

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Panel A: Long-term Calendar-time Regressions (Full Sample)

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Equal-Weighted

	Beaters			Missers			Hedge		
	Estimate	p-value		Estimate	p-value		Estimate	p-value	
alpha	0.06	0.74	alpha	0.62	0.02	alpha	-0.56	0.03	*
mktret	1.04	0.00	mktret	1.26	0.00	mktret	-0.22	0.00	
smb	0.66	0.00	smb	0.80	0.00	smb	-0.14	0.11	
hml	0.30	0.00	hml	-0.24	0.01	hml	0.54	0.00	
R^2	0.80			0.80			0.33		

Value-Weighted

	Beaters			Missers			Hedge		
	Estimate	p-value		Estimate	p-value		Estimate	p-value	
alpha	0.14	0.55	alpha	1.24	0.00	alpha	-1.10	0.01	
mktret	0.90	0.00	mktret	1.12	0.00	mktret	-0.22	0.05	
smb	-0.12	0.07	smb	0.12	0.24	smb	-0.24	0.04	
hml	0.15	0.07	hml	-0.20	0.10	hml	0.35	0.01	
R^2	0.56			0.55			0.16		

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Panel B: Long-term Calendar-time Regressions (Tech Firms)

Equal-Weighted

	Beaters			Missers			Hedge	
	Estimate	p-value		Estimate	p-value		Estimate	p-value
alpha	1.14	0.13	alpha	1.22	0.08	alpha	-0.08	0.47
mktret	1.09	0.00	mktret	1.47	0.00	mktret	-0.38	0.15
smb	1.11	0.00	smb	0.82	0.00	smb	0.29	0.26
hml	-0.62	0.02	hml	-0.53	0.02	hml	-0.09	0.79
R^2	0.69			0.72			0.01	

Value-Weighted

	Beaters			Missers			Hedge	
	Estimate	p-value		Estimate	p-value		Estimate	p-value
alpha	0.76	0.47	alpha	2.20	0.00	alpha	-1.44	0.12
mktret	0.81	0.00	mktret	1.02	0.00	mktret	-0.21	0.51
smb	0.35	0.20	smb	0.42	0.03	smb	-0.07	0.82
hml	-0.36	0.31	hml	-1.10	0.00	hml	0.74	0.08
R^2	0.23			0.65			0.08	

Panel C: Long-term Calendar-time Regressions (Non-Tech Firms)

Equal-Weighted

	Beaters			Missers			Hedge		
	Estimate	p-value		Estimate	p-value		Estimate	p-value	
alpha	0.02	0.93	alpha	0.55	0.07	alpha	-0.53	0.04	*
mktret	0.99	0.00	mktret	1.12	0.00	mktret	-0.13	0.12	
smb	0.57	0.00	smb	0.72	0.00	smb	-0.15	0.09	
hml	0.43	0.00	hml	0.00	0.99	hml	0.43	0.00	
R^2	0.76			0.68			0.21		

Value-Weighted

	Beaters			Missers			Hedge		
	Estimate	p-value		Estimate	p-value		Estimate	p-value	
alpha	0.06	0.79	alpha	0.56	0.09	alpha	-0.50	0.07	*
mktret	0.88	0.00	mktret	0.89	0.00	mktret	-0.01	0.85	
smb	-0.16	0.01	smb	-0.10	0.28	smb	-0.06	0.52	
hml	0.23	0.00	hml	0.17	0.15	hml	0.06	0.60	
R^2	0.54			0.38			0.01		

B. SAS Code to Compute Long-Run Returns Tests

```
**********************************************************************;
*EVENT TIME ANALYSIS;
/*sample construction is described in the paper*/
/*LTm1 =1 for low quality beaters and zero otherwise;  STm1 =1 for high quality
missers and zero otherwise*/
**********************************************************************;
data sample;
set b.sampleall;
where STm1=1 or LTm1=1;
LT=LTm1;ST=STm1;
format stdt end1dt end2dt end3dt date9.;
stdt = intnx('month',rdate,1);
end1dt = intnx('month',stdt,11,'end');
end2dt = intnx('month',stdt,23, 'end');
end3dt = intnx('month',stdt,35,'end');
if end3dt le '31dec2006'd;
run;
/* Bm and me contain the portfolio breakpoints from French's website*/
data bm;
set b.bm;
run;

data me;
set b.me;
run;

*This step sets up remote access to WRDS' server;
%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
proc upload data=sample;run;
*This step pulls monthly return data from CRSP;
proc sql;
create table crsp as select
sample.*, i.date, i.ret
from sample as j, crsp.msf as i
where j.permno eq i.permno and j.stdt le i.date le j.end3dt
order by permno, date;
quit;

proc sql;
create table crsp2 as select
crsp.*, i.dlstcd, i.dlret,
i.date as dldate
from crsp left join crsp.mse as i
on crsp.permno eq i.permno and i.date le crsp.date and
 i.event='DELIST' and i.dlstcd ne 100
order by permno, date;
quit;

proc download data=crsp2;run;
endrsubmit;

*This step gets Book value from compustat;
%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
```

```
signon username=_prompt_;
rsubmit;

data comp;
set comp.compann (keep=gvkey yeara data216 data10 data35 data330);
where yeara ge 1987;
if missing(data10)=1 then data10=0;
if missing(data35)=1 then data35=0;
if missing(data330)=1 then data330=0;
book=data216-data10+data35+data330;
run;

proc sql;
create table comp1 as select
sample.*, i.book
from sample as j, comp as i
where j.gvkey eq i.gvkey and j.year eq i.yeara
order by permno, rdate;
quit;

proc download data=comp1; run;
endrsubmit;

data comp1;
set comp1;
bm=book/mval;
format brkdt date9.;
brkdt = intnx('year',rdate,-1, 'end');
run;
proc sql;
create table comp2 as select
comp1.*, i.me1, i.me2, i.me3, i.me4
from comp1 as j, me as i
where month(j.brkdt) eq i.month and year(j.brkdt) eq i.year;

quit;

proc sql;
create table comp3 as select
comp2.*, i.bm1, i.bm2, i.bm3, i.bm4
from comp2 as j, bm as i
where year(j.brkdt) eq i.year;
quit;

data comp3;
set comp3;
if mval le me1 then sizeq=1;
if me1 < mval le me2 then sizeq=2;
if me2 < mval le me3 then sizeq=3;
if me3 < mval le me4 then sizeq=4;
if mval > me4 then sizeq=5;
if bm le bm1 then bmq=1;
if bm1 < bm le bm2 then bmq=2;
if bm2 < bm le bm3 then bmq=3;
if bm3 < bm le bm4 then bmq=4;
if bm > bm4 then bmq=5;
run;

data comp4;
```

```sas
set comp3;
keep permno rdate stdt end1dt end2dt end3dt sizeq bmq;
run;

*This step pulls 25 FF portfolios from WRDS;
%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
proc upload data=comp4;run;
proc sql;
create table ff as select
comp4.*, i.date, i.s1b1_vwret as s1b1, i.s2b1_vwret as s2b1, i.s3b1_vwret as
s3b1,
i.s4b1_vwret as s4b1, i.s5b1_vwret as s5b1, i.s1b2_vwret as s1b2, i.s2b2_vwret
as s2b2,
i.s3b2_vwret as s3b2, i.s4b2_vwret as s4b2, i.s5b2_vwret as s5b2, i.s1b3_vwret
as s1b3,
i.s2b3_vwret as s2b3, i.s3b3_vwret as s3b3, i.s4b3_vwret as s4b3, i.s5b3_vwret
as s5b3,
i.s1b4_vwret as s1b4, i.s2b4_vwret as s2b4, i.s3b4_vwret as s3b4, i.s4b4_vwret
as s4b4,
i.s5b4_vwret as s5b4, i.s1b5_vwret as s1b5, i.s2b5_vwret as s2b5, i.s3b5_vwret
as s3b5,
i.s4b5_vwret as s4b5, i.s5b5_vwret as s5b5
from comp4 as j, ff.portfolios25 as i
where j.stdt le i.date le j.end3dt
order by permno, rdate, date;
quit;
proc download data=ff;run;
endrsubmit;

data ff1;
set ff;
if sizeq=1 and bmq=1 then benchret=s1b1; if sizeq=2 and bmq=1 then
benchret=s2b1;
if sizeq=3 and bmq=1 then benchret=s3b1; if sizeq=4 and bmq=1 then
benchret=s4b1;
if sizeq=5 and bmq=1 then benchret=s5b1; if sizeq=1 and bmq=2 then
benchret=s1b2;
if sizeq=2 and bmq=2 then benchret=s2b2; if sizeq=3 and bmq=2 then
benchret=s3b2;
if sizeq=4 and bmq=2 then benchret=s4b2; if sizeq=5 and bmq=2 then
benchret=s5b2;
if sizeq=1 and bmq=3 then benchret=s1b3; if sizeq=2 and bmq=3 then
benchret=s2b3;
if sizeq=3 and bmq=3 then benchret=s3b3; if sizeq=4 and bmq=3 then
benchret=s4b3;
if sizeq=5 and bmq=3 then benchret=s5b3; if sizeq=1 and bmq=4 then
benchret=s1b4;
if sizeq=2 and bmq=4 then benchret=s2b4; if sizeq=3 and bmq=4 then
benchret=s3b4;
if sizeq=4 and bmq=4 then benchret=s4b4; if sizeq=5 and bmq=4 then
benchret=s5b4;
if sizeq=1 and bmq=5 then benchret=s1b5; if sizeq=2 and bmq=5 then
benchret=s2b5;
if sizeq=3 and bmq=5 then benchret=s3b5; if sizeq=4 and bmq=5 then
benchret=s4b5;
if sizeq=5 and bmq=5 then benchret=s5b5;
```

```sas
run;

proc sql;
create table crsp3 as select
crsp2.*, i.benchret, i.date as ffdate, i.rdate as ffrdate, i.permno as ffpermno,
i.stdt as ffstdt, i.end1dt as ffend1dt, i.end2dt as ffend2dt, i.end3dt as
ffend3dt
from crsp2 as j right join ff1 as i
on j.permno=i.permno and j.date=i.date and j.rdate=i.rdate;
quit;

data crsp4;
set crsp3;
if missing(date)=1 then date=ffdate;
if missing(dlret)=1 then do;
if 400 le dlstcd le 599 then dlret=-1;end;
if missing(ret)=0 and missing(dlret)=0 then ret=((1+ret)*(1+dlret))-1;
if missing(ret)=1 then ret=dlret;
if missing(ret)=1 then ret=benchret;
if missing(date)=1 then date=ffdate;
if missing(rdate)=1 then rdate=ffrdate;
if missing(permno)=1 then permno=ffpermno;
if missing(stdt)=1 then stdt=ffstdt;
if missing(end1dt)=1 then end1dt=ffend1dt;
if missing(end2dt)=1 then end2dt=ffend2dt;
if missing(end3dt)=1 then end3dt=ffend3dt;

run;

proc sort data=crsp4;
by permno rdate date;
run;

%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
proc upload data=comp1;run;
proc sql;
create table bhar1 as select
comp1.*, i.vwindd
from comp1 as j, crsp.msix as i
where month(j.brkdt)=month(i.caldt) and year(j.brkdt)=year(i.caldt)
order by permno, rdate;
quit;
proc download data=bhar1 out=bhar2;run;
endrsubmit;
```

```
**************************************;
*BHAR's;
**************************************;
data crsp5;
set crsp4;
lret=log(1+ret);
lbenchret=log(1+benchret);
run;
%macro loop(e=);
data crsp6;
set crsp5;
enddt = intnx('month',stdt,&e,'end');
run;

proc means data=crsp6 noprint;
by permno rdate;
where stdt le date le enddt;
output out=BHAR1 sum(lret)= sum(lbenchret)=;
run;
quit;

data bhar1;
set bhar1;
ret=(exp(lret))-1;
benchret=(exp(lbenchret))-1;
bhar1=(ret-benchret)*100;
keep permno rdate bhar1;
run;

proc sort data=comp1;
by permno rdate;
run;
proc sort data=bhar1;
by permno rdate;
run;

data bhar;
merge comp1 bhar1;
by permno rdate;
run;

proc sql;
create table bhar3 as select
bhar.*, i.vwindd
from bhar as j, bhar2 as i
where j.permno=i.permno and j.rdate=i.rdate
order by permno, rdate;
quit;

data bhar3;
set bhar3;
wt=mval/vwindd;
run;

proc means data=bhar3 noprint;
class st;
output out=stat1 mean(bhar1)= probt(bhar1)=pbhar1;
run;
```

```
proc means data=bhar3 noprint;
class st;
weight wt;
output out=stat2 mean(bhar1)= probt(bhar1)=pbhar1;
run;

proc ttest data=bhar3;
class st;
var bhar1;
ODS output ttests=t statistics=s;
run;
proc ttest data=bhar3;
class st;
var bhar1;
weight wt;
ODS output ttests=tw statistics=sw;
run;

proc datasets;
append base=ew data=stat1;
run;
quit;
proc datasets;
append base=vw data=stat2;
run;
quit;

proc datasets;
append base=ewht data=t;
run;
quit;

proc datasets;
append base=ewhs data=s;
run;
quit;
proc datasets;
append base=vwht data=tw;
run;
quit;

proc datasets;
append base=vwhs data=sw;
run;
quit;
%mend loop;
%loop(e=2);
%loop(e=5);
%loop(e=11);
%loop(e=35);
data ew;
set ew;
where missing(ST)=0;
run;
data vw;
set vw;
where missing(ST)=0;
run;
```

```
proc export data=ew
   dbms=excel2000
   outfile='C:\event.xls';

      sheet=ew;
run;

proc export data=vw
   dbms=excel2000
   outfile='C:\event.xls';

      sheet=vw;
run;
proc export data=ewhs
   dbms=excel2000
   outfile='C:\event.xls';

      sheet=ewhs;
run;

proc export data=ewht
   dbms=excel2000
   outfile='C:\event.xls';

      sheet=ewht;
run;
proc export data=vwhs
   dbms=excel2000
   outfile='C:\event.xls';

      sheet=vwhs;
run;

proc export data=vwht
   dbms=excel2000
   outfile='C:\event.xls';

      sheet=vwht;
run;
```

```
*****************************************************;
*CAR's;
*****************************************************;

data crsp7;
set crsp4;
aret=ret-benchret;
run;

%macro loop(e=);
data crsp8;
set crsp7;
enddt = intnx('month',stdt,&e,'end');
run;
proc means data=crsp8 noprint;
by permno rdate;
where stdt le date le enddt;
output out=CAR1 sum(aret)=;
run;
quit;

data CAR1;
set CAR1;
car1=aret*100;
keep permno rdate CAR1;
run;

proc sort data=comp1;
by permno rdate;
run;
proc sort data=car1;
by permno rdate;
run;

data car;
merge comp1 car1;
by permno rdate;
run;


proc sql;
create table carf as select
car.*, i.vwindd
from car as j, bhar2 as i
where j.permno=i.permno and j.rdate=i.rdate
order by permno, rdate;
quit;

data carf;
set carf;
wt=mval/vwindd;
run;

proc means data=carf noprint;
class st;
output out=stat1 mean(car1)= probt(car1)=pcar1;
run;
```

```
proc means data=carf noprint;
class st;
output out=stat2 mean(car1)= probt(car1)=pcar1;
weight wt;
run;

proc ttest data=carf;
class st;
var car1;
ODS output ttests=t statistics=s;
run;
proc ttest data=carf;
class st;
var car1;
weight wt;
ODS output ttests=tw statistics=sw;
run;
proc datasets;
append base=ew data=stat1;
run;
quit;
proc datasets;
append base=vw data=stat2;
run;
quit;

proc datasets;
append base=ewht data=t;
run;
quit;

proc datasets;
append base=ewhs data=s;
run;
quit;
proc datasets;
append base=vwht data=tw;
run;
quit;

proc datasets;
append base=vwhs data=sw;
run;
quit;
%mend loop;
%loop(e=2);
%loop(e=5);
%loop(e=11);
%loop(e=35);
data ew;
set ew;
where missing(ST)=0;
run;
data vw;
set vw;
where missing(ST)=0;
run;

proc export data=ew
```

```
    dbms=excel2000
    outfile='C:\event.xls';
        sheet=ew;
run;

proc export data=vw
    dbms=excel2000
    outfile='C:\event.xls';
        sheet=vw;
run;
proc export data=ewhs
    dbms=excel2000
    outfile='C:\event.xls';
        sheet=ewhs;
run;

proc export data=ewht
    dbms=excel2000
    outfile='C:\event.xls';
        sheet=ewht;
run;
proc export data=vwhs
    dbms=excel2000
    outfile='C:\event.xls';
        sheet=vwhs;
run;

proc export data=vwht
    dbms=excel2000
    outfile='C:\event.xls';
        sheet=vwht;
run;
```

```
*******************************************************;
*CALENDAR TIME ANALYSIS;
*******************************************************;

data sample;
set b.sampleall;
where STm1=1 or LTm1=1;
LT=LTm1;ST=STm1;
format ststdt stenddt ltstdt ltenddt date9.;
ststdt = intnx('month',rdate,1);
stenddt = intnx('month',ststdt,11,'end');
ltstdt = intnx('month',rdate,12);
ltenddt = intnx('month',ltstdt,23,'end');
run;
*ST mispricing;
*This step sets up remote access to WRDS' server;
%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
proc upload data=sample;run;
*This step pulls monthly return data from CRSP;
proc sql;
create table crsp as select
sample.*, i.date, i.ret
from sample as j, crsp.msf as i
where j.permno eq i.permno and j.ststdt le i.date le j.stenddt;
quit;

*this step pulls the excess market return, the rf rate, and the FF factors from
WRDS;
proc sql;
create table crsp1 as select
crsp.*, i.mktrf as mktret, i.smb, i.hml, i.rf
from crsp, ff.factors_monthly as i
where crsp.date=i.dateff
order by date, st;
quit;
proc download data=crsp1;run;
endrsubmit;
*This step calculates equal and value-weighted returns on portfolios formed each
month;
data crsp1;
set crsp1;
peret=(ret-rf)*100;
pmktret=mktret*100;
phml=hml*100;
psmb=smb*100;
run;
data crsp1;
set crsp1;
enddt = intnx('month',ststdt,5,'end');
run;
proc means data=crsp1 noprint;
by date st;
where ststdt le date le enddt;
output out=port mean(peret)=portret;
run;
```

```sas
proc means data=crsp1 noprint;
by date st;
where ststdt le date le enddt;
weight mval;/*value-weighting by MVE*/
output out=port1 mean(peret)=vwportret;
run;
data port1;
set port1 (keep=date st vwportret _freq_ );
rename _freq_=vwn;
run;

*This step creates a dataset to conduct portfolio-time series regressions (FF
1993);
data crsp2;
set crsp1(keep=date pmktret psmb phml);
by date;
if first.date;
run;

proc sql;
create table portret1 as select
port.date, port.portret, port.st, port._freq_ as ewn,
crsp2.pmktret, crsp2.psmb, crsp2.phml
from port, crsp2
where port.date=crsp2.date
order by date, st;
quit;
data portret1;
merge portret1 port1;
by date st;
if ewn ge 10;/*keeps only portfolios with at least 10 observations*/
if vwn ge 10;
run;

*This step creates a hedge portfolio going long in beaters and
short in missers;

data portret2a;
set portret1;
where st =0;
run;
data portret2b;
set portret1;
where st =1;
run;
proc sql;
create table portret2bb as select
portret2b.*
from portret2b as j, portret2a as i
where j.date=i.date and missing(j.portret)=0 and missing(j.vwportret)=0;
quit;
proc sql;
create table portret2aa as select
portret2a.*
from portret2a as j, portret2bb as i
where j.date=i.date and missing(j.portret)=0 and missing(j.vwportret)=0;
quit;
proc sql;
create table portret2bbb as select
```

```
portret2bb.*
from portret2bb as j, portret2aa as i
where j.date=i.date;
quit;
proc sql;
create table portret2c as select
portret2aa.*, i.portret as lportret1, i.vwportret as lvwportret1
from portret2aa as j, portret2bbb as i
where j.date=i.date;
quit;

data portret2c;
set portret2c;
portret=portret-lportret1;
vwportret=vwportret-lvwportret1;
st=2;
drop lportret1 lvwportret1;
run;

data portret3;
set portret2aa portret2bbb portret2c;
run;

proc sort data=portret3;
by st;
run;

*Time-Series Portfolio Regressions;
*VW;
proc reg data=portret3;
by st;
model vwportret=pmktret psmb phml;
*ods output parameterestimates=ts;
run;
quit;

proc sort data=ts;
by st;
run;
*EW;
proc reg data=portret3;
by st;
model portret=pmktret psmb phml;
*ods output parameterestimates=ts1;
run;
quit;

proc sort data=ts1;
by st;
run;
proc surveyreg data=portret3;
cluster date;
by st;
*model portret=;
*model portret=pmktret;
model portret=pmktret psmb phml;
ods output parameterestimates=ts;
run;
quit;
```

```sas
proc surveyreg data=portret3;
cluster date;
by st;
*model vwportret=;
*model vwportret=pmktret;
model vwportret=pmktret psmb phml;
ods output parameterestimates=ts1;
run;
quit;

proc export data=ts
    dbms=excel2000
    outfile='C:\calender.xls';
      sheet=ew;
run;
 proc export data=ts1
    dbms=excel2000
    outfile='C:\calender.xls';
      sheet=vw;
run;

*LT Mispricing;
*This step sets up remote access to WRDS' server;
%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
proc upload data=sample;run;
*This step pulls monthly return data from CRSP;
proc sql;
create table crsp as select
sample.*, i.date, i.ret
from sample as j, crsp.msf as i
where j.permno eq i.permno and j.ltstdt le i.date le j.ltenddt;
quit;

*this step pulls the excess market return, the rf rate, and the FF factors from
WRDS;
proc sql;
create table crsp1 as select
crsp.*, i.mktrf as mktret, i.smb, i.hml, i.rf, i.umd
from crsp, ff.factors_monthly as i
where crsp.date=i.dateff
order by date, st;
quit;
proc download data=crsp1;run;
endrsubmit;
*This step calculates equal and value-weighted returns on portfolios formed each
month;
data crsp1;
set crsp1;
peret=(ret-rf)*100;
pmktret=mktret*100;
phml=hml*100;
psmb=smb*100;
pumd=umd*100;
run;
```

```sas
proc means data=crsp1 noprint;
by date st;
output out=port mean(peret)=portret;
run;
proc means data=crsp1 noprint;
by date st;
weight mval;/*value-weighting by MVE*/
output out=port1 mean(peret)=vwportret;
run;
data port1;
set port1 (keep=date st vwportret _freq_);
rename _freq_=vwn;
run;
*This step creates a dataset to conduct portfolio-time series regressions (FF
1993);
data crsp2;
set crsp1(keep=date pmktret psmb phml pumd);
by date;
if first.date;
run;

proc sql;
create table portret1 as select
port.date, port.portret, port.st, port._freq_ as ewn,
crsp2.pmktret, crsp2.psmb, crsp2.phml, crsp2.pumd
from port, crsp2
where port.date=crsp2.date
order by date, st;
quit;
data portret1;
merge portret1 port1;
by date st;
if ewn ge 10;/*keeps only portfolios with at least 10 observations*/
if vwn ge 10;
run;

*This step creates a hedge portfolio going long in missers and
short in beaters;

data portret2a;
set portret1;
where st =0;
run;
data portret2b;
set portret1;
where st =1;
run;
proc sql;
create table portret2bb as select
portret2b.*
from portret2b as j, portret2a as i
where j.date=i.date;
quit;

proc sql;
create table portret2aa as select
portret2a.*
from portret2a as j, portret2bb as i
where j.date=i.date;
```

```
quit;

proc sql;
create table portret2c as select
portret2bb.*, i.portret as lportret1, i.vwportret as lvwportret1
from portret2bb as j, portret2aa as i
where j.date=i.date;
quit;

data portret2c;
set portret2c;
portret=portret-lportret1;
vwportret=vwportret-lvwportret1;
st=2;
drop lportret1 lvwportret1;
run;

proc sql;
create table portret2aa as select
portret2a.*
from portret2a as j, portret2b as i
where j.date=i.date;
quit;

proc sql;
create table portret2bb as select
portret2b.*
from portret2b as j, portret2aa as i
where j.date=i.date;
quit;

proc sql;
create table portret2c as select
portret2aa.*, i.portret as lportret1, i.vwportret as lvwportret1
from portret2aa as j, portret2bb as i
where j.date=i.date;
quit;

data portret2c;
set portret2c;
portret=portret-lportret1;
vwportret=vwportret-lvwportret1;
st=2;
drop lportret1 lvwportret1;
run;


data portret3;
set portret2aa portret2bb portret2c;
wt=sqrt(ewn);
run;

proc sort data=portret3;
by st;
run;

*Time-Series Portfolio Regressions;
*VW;
proc reg data=portret3;
```

```
by st;
*weight wt;
/*model vwportret=;
model vwportret=pmktret;*/
model vwportret=pmktret psmb phml;
*ods output parameterestimates=ts;
run;
quit;
proc sort data=ts;
by st model variable;
run;
*EW;
proc reg data=portret3;
by st;
*weight wt;
/*model portret=;
model portret=pmktret;*/
model portret=pmktret psmb phml;
*ods output parameterestimates=ts1;
run;
quit;
proc sort data=ts1;
by st model variable;
run;

proc surveyreg data=portret3;
cluster date;
by st;
*model portret=;
*model portret=pmktret;
model portret=pmktret psmb phml;
ods output parameterestimates=ts;
run;
quit;

proc surveyreg data=portret3;
cluster date;
by st;
*model vwportret=;
*model vwportret=pmktret;
model vwportret=pmktret psmb phml;
ods output parameterestimates=ts1;
run;
quit;

proc export data=ts
    dbms=excel2000
    outfile='C:\calender.xls';
      sheet=ew;
run;
 proc export data=ts1
    dbms=excel2000
    outfile='C:\calender.xls';
      sheet=vw;
run;



****************************************************************;
```

```sas
*BOOTSTRAPPING BHAR's;
*Make sure to use your own library names;
*Link is the cstlink file for the CRSP merged dataset;
*****************************************************************;

*STEP1 - GET THE SAMPLE READY FOR MATCHING;
data sample;
set b.sampleall;
where STm1=1 or LTm1=1;
LT=LTm1;ST=STm1;
format stdt end1dt end2dt end3dt date9.;
stdt = intnx('month',rdate,1);
end1dt = intnx('month',stdt,11,'end');
end2dt = intnx('month',stdt,23, 'end');
end3dt = intnx('month',stdt,35,'end');
if end3dt le '31dec2006'd;
run;


data me;
set b.me;
run;
data bm;
set b.bm;
run;
*This step gets Book value from compustat;
%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
proc upload data=sample;run;
data comp;
set comp.compann (keep=gvkey yeara data216 data10 data35 data330);
where yeara ge 1987;
if missing(data10)=1 then data10=0;
if missing(data35)=1 then data35=0;
if missing(data330)=1 then data330=0;
book=data216-data10+data35+data330;
run;

proc sql;
create table comp1 as select
sample.*, i.book
from sample as j, comp as i
where j.gvkey eq i.gvkey and j.year eq i.yeara
order by permno, rdate;
quit;

proc download data=comp1; run;
endrsubmit;

data comp1;
set comp1;
bm=book/mval;
format brkdt date9.;
brkdt = intnx('year',rdate,-1, 'end');
run;
proc sql;
create table comp2 as select
```

```
comp1.*, i.me1, i.me2, i.me3, i.me4
from comp1 as j, me as i
where month(j.brkdt) eq i.month and year(j.brkdt) eq i.year;

quit;

proc sql;
create table comp3 as select
comp2.*, i.bm1, i.bm2, i.bm3, i.bm4
from comp2 as j, bm as i
where year(j.brkdt) eq i.year;
quit;

data comp3;
set comp3;
if mval le me1 then sizeq=1;
if me1 < mval le me2 then sizeq=2;
if me2 < mval le me3 then sizeq=3;
if me3 < mval le me4 then sizeq=4;
if mval > me4 then sizeq=5;
if bm le bm1 then bmq=1;
if bm1 < bm le bm2 then bmq=2;
if bm2 < bm le bm3 then bmq=3;
if bm3 < bm le bm4 then bmq=4;
if bm > bm4 then bmq=5;
run;

data comp4;
set comp3;
keep permno rdate stdt end1dt end2dt end3dt sizeq bmq st brkdt mval year;
run;

*This step gets Book value from compustat;
%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
proc upload data=me;run;
proc upload data=bm;run;
proc upload data=bond.link out=link;run;


data comp;
set comp.compann (keep=gvkey yeara fyr data216 data10 data35 data330 data25
data199);
where yeara ge 1987;
if missing(data10)=1 then data10=0;
if missing(data35)=1 then data35=0;
if missing(data330)=1 then data330=0;
b=data216-data10+data35+data330;
mval=data25*data199;
if mval ne 0 then bm=b/mval;
if fyr in (6,7,8,9) then reqyr=yeara-1;
else reqyr=yeara;
if missing(mval*bm)=0;
run;

proc sql;
create table comp2 as select
```

```
comp.*, i.me1, i.me2, i.me3, i.me4
from comp as j, me as i
where j.reqyr eq i.year;
quit;

proc sql;
create table comp3 as select
comp2.*, i.bm1, i.bm2, i.bm3, i.bm4
from comp2 as j, bm as i
where j.reqyr eq i.year;
quit;

data comp3;
set comp3;
if mval le me1 then sizeq=1;
if me1 < mval le me2 then sizeq=2;
if me2 < mval le me3 then sizeq=3;
if me3 < mval le me4 then sizeq=4;
if mval > me4 then sizeq=5;
if bm le bm1 then bmq=1;
if bm1 < bm le bm2 then bmq=2;
if bm2 < bm le bm3 then bmq=3;
if bm3 < bm le bm4 then bmq=4;
if bm > bm4 then bmq=5;
run;
data comp3;
set comp3;
yrdate=mdy(1,1,yeara);
run;

data link;
set link;
where linktype eq 'LU' or linktype eq 'LC';
lastyear=year(linkenddt);
firstyear=year(linkdt);
lastmonth=month(linkenddt);
firstmonth=month(linkdt);
if lastyear='.' then lastyear=2006;
if missing(linkenddt)=1 then linkenddt=date();
run;

proc sql;
create table crsp1 as select
comp3.*, link.npermno as permno
from comp3, link
where link.gvkey = comp3.gvkey AND link.linkdt le comp3.yrdate le
link.linkenddt;
quit;

data crsp1;
set crsp1;
if missing(bmq*sizeq*permno*yeara)=0;
keep permno yeara sizeq bmq;
run;
proc download data=crsp1;run;
endrsubmit;

data crsp2;
set crsp1;
```

```
dum=rannor(0);
run;

data comp5;
set comp4;
dum=rannor(0);
run;


%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
libname bob '/projects/uiowa/jmcinnis/';
proc upload data=comp5 out=bob.comp5;run;
proc upload data=crsp2 out=bob.crsp2;run;
endrsubmit;

*STEP2 - GET A MATCHED SAMPLE - REPEAT THIS PROCESS 1000 TIMES;
*This part of the code (UNTIL STEP 5) is meant to be run remotely through WRDS'
Unix system (i.e., not rusbmit);
libname john '/sastemp2/john';
libname bob '/projects/uiowa/jmcinnis/';

data crsp2;
set bob.crsp2;
run;

data comp5;
set bob.comp5;
run;

%macro loopt(nloops=);
%do i=1 %to &nloops;

data crsp2;
set crsp2;
dum=rannor(0);
run;

data comp5;
set comp5;
dum=rannor(0);
run;
proc sql;
create table comp6 as select
comp5.*, i.permno as mpermno, abs(i.dum-j.dum) as diff
from comp5 as j, crsp2 as i
where i.bmq=j.bmq and i.sizeq=j.sizeq and i.yeara=j.year
order by permno, rdate, diff;
quit;

data comp6;
set comp6;
by permno rdate diff;
if first.rdate;
run;

proc datasets;
```

```
append base=john.test2 data=comp6;
run;
quit;
%end;
%mend loopt;

**** Invoke the macro *****;
%loopt(nloops=1000);

*STEP 3 - GATHER RETURNS FOR THE 1,000 SAMPLES;
data comp6a;
set john.test2(keep=mpermno rdate sizeq bmq stdt end1dt end2dt end3dt permno);
k=ceil(_n_/610);/*NUMBER OF OBSERVATIONS IN MAIN SAMPLE - MAY HAVE TO CHANGE FOR
YOUR SAMPLE*/
run;

proc datasets;
modify comp6a;
index create k;
run;

%macro loopt(nloops=);
%do i=1 %to &nloops;

data comp6;
set comp6a;
where k=&i;
run;

proc sql;
create table crsp as select
comp6.*, i.date, i.ret
from comp6 as j, crsp.msf as i
where i.permno eq j.mpermno and j.stdt le i.date le j.end3dt;
quit;

proc sql;
create table crsp2a as select
crsp.*, i.dlstcd, i.dlret,
i.date as dldate
from crsp left join crsp.mse as i
on crsp.mpermno eq i.permno and i.date le crsp.date and
 i.event='DELIST' and i.dlstcd ne 100;
quit;

proc sql;
create table ff as select
j.*, i.date, i.s1b1_vwret as s1b1, i.s2b1_vwret as s2b1, i.s3b1_vwret as s3b1,
i.s4b1_vwret as s4b1, i.s5b1_vwret as s5b1, i.s1b2_vwret as s1b2, i.s2b2_vwret
as s2b2,
i.s3b2_vwret as s3b2, i.s4b2_vwret as s4b2, i.s5b2_vwret as s5b2, i.s1b3_vwret
as s1b3,
i.s2b3_vwret as s2b3, i.s3b3_vwret as s3b3, i.s4b3_vwret as s4b3, i.s5b3_vwret
as s5b3,
i.s1b4_vwret as s1b4, i.s2b4_vwret as s2b4, i.s3b4_vwret as s3b4, i.s4b4_vwret
as s4b4,
i.s5b4_vwret as s5b4, i.s1b5_vwret as s1b5, i.s2b5_vwret as s2b5, i.s3b5_vwret
as s3b5,
i.s4b5_vwret as s4b5, i.s5b5_vwret as s5b5
```

```
from  comp6 as j, ff.portfolios25 as i
where j.stdt le i.date le j.end3dt
order by mpermno, rdate, date;
quit;

data ff1;
set ff;
if sizeq=1 and bmq=1 then benchret=s1b1; if sizeq=2 and bmq=1 then
benchret=s2b1;
if sizeq=3 and bmq=1 then benchret=s3b1; if sizeq=4 and bmq=1 then
benchret=s4b1;
if sizeq=5 and bmq=1 then benchret=s5b1; if sizeq=1 and bmq=2 then
benchret=s1b2;
if sizeq=2 and bmq=2 then benchret=s2b2; if sizeq=3 and bmq=2 then
benchret=s3b2;
if sizeq=4 and bmq=2 then benchret=s4b2; if sizeq=5 and bmq=2 then
benchret=s5b2;
if sizeq=1 and bmq=3 then benchret=s1b3; if sizeq=2 and bmq=3 then
benchret=s2b3;
if sizeq=3 and bmq=3 then benchret=s3b3; if sizeq=4 and bmq=3 then
benchret=s4b3;
if sizeq=5 and bmq=3 then benchret=s5b3; if sizeq=1 and bmq=4 then
benchret=s1b4;
if sizeq=2 and bmq=4 then benchret=s2b4; if sizeq=3 and bmq=4 then
benchret=s3b4;
if sizeq=4 and bmq=4 then benchret=s4b4; if sizeq=5 and bmq=4 then
benchret=s5b4;
if sizeq=1 and bmq=5 then benchret=s1b5; if sizeq=2 and bmq=5 then
benchret=s2b5;
if sizeq=3 and bmq=5 then benchret=s3b5; if sizeq=4 and bmq=5 then
benchret=s4b5;
if sizeq=5 and bmq=5 then benchret=s5b5;
run;

proc sql;
create table crsp3 as select
crsp2a.*, i.benchret, i.date as ffdate, i.rdate as ffrdate, i.mpermno as
ffpermno,
i.stdt as ffstdt, i.end1dt as ffend1dt, i.end2dt as ffend2dt, i.end3dt as
ffend3dt,
i.k as ffk, i.permno as ffpermno1
from ff1 as i left join crsp2a as j
on j.mpermno=i.mpermno and j.date=i.date and j.rdate=i.rdate and
i.permno=j.permno;
quit;

data crsp4;
set crsp3;
if missing(date)=1 then date=ffdate;
if missing(dlret)=1 then do;
if 400 le dlstcd le 599 then dlret=-1;end;
if missing(ret)=0 and missing(dlret)=0 then ret=((1+ret)*(1+dlret))-1;
if missing(ret)=1 then ret=dlret;
if missing(ret)=1 then ret=benchret;
if missing(date)=1 then date=ffdate;
if missing(rdate)=1 then rdate=ffrdate;
if missing(mpermno)=1 then mpermno=ffpermno;
if missing(permno)=1 then permno=ffpermno1;
if missing(k)=1 then k=ffk;
```

```
if missing(stdt)=1 then stdt=ffstdt;
if missing(end1dt)=1 then end1dt=ffend1dt;
if missing(end2dt)=1 then end2dt=ffend2dt;
if missing(end3dt)=1 then end3dt=ffend3dt;
if ret=-1 then ret=-.9999999;
run;

proc sort data=crsp4 nodupkey;
by permno rdate date;
run;
proc datasets;
append base=full data=crsp4;
run;
%end;
%mend loopt;

%loopt(nloops=1000);



*STEP 4 - CALCULATE BHAR'S FOR EACH OBSERVATION OF THE 1,000 SAMPLES;

data crsp5a;
set full (keep=k rdate ret benchret stdt date permno);
run;

proc datasets;
modify crsp5a;
index create k;
run;

%macro loopt(nloops=);
%do i=1 %to &nloops;

data crsp5;
set crsp5a;
where k=&i;
lret=log(1+ret);
lbenchret=log(1+benchret);
end2dt = intnx('month',stdt,2,'end');
end5dt = intnx('month',stdt,5,'end');
end11dt = intnx('month',stdt,11,'end');
end35dt = intnx('month',stdt,35,'end');
run;

proc means data=crsp5 noprint;
by permno rdate;
where stdt le date le end2dt;
output out=BHAR1 sum(lret)= sum(lbenchret)=;
run;
quit;

data bhar1;
set bhar1;
ret=(exp(lret))-1;
benchret=(exp(lbenchret))-1;
bhar3=(ret-benchret)*100;
keep permno rdate bhar3;
run;
```

```
proc means data=crsp5 noprint;
by permno rdate;
where stdt le date le end5dt;
output out=BHAR2 sum(lret)= sum(lbenchret)=;
run;
quit;

data bhar2;
set bhar2;
ret=(exp(lret))-1;
benchret=(exp(lbenchret))-1;
bhar6=(ret-benchret)*100;
keep permno rdate bhar6;
run;

proc means data=crsp5 noprint;
by permno rdate;
where stdt le date le end11dt;
output out=BHAR3 sum(lret)= sum(lbenchret)=;
run;
quit;

data bhar3;
set bhar3;
ret=(exp(lret))-1;
benchret=(exp(lbenchret))-1;
bhar12=(ret-benchret)*100;
keep permno rdate bhar12;
run;

proc means data=crsp5 noprint;
by permno rdate;
where stdt le date le end35dt;
output out=BHAR4 sum(lret)= sum(lbenchret)=;
run;
quit;

data bhar4;
set bhar4;
ret=(exp(lret))-1;
benchret=(exp(lbenchret))-1;
bhar36=(ret-benchret)*100;
keep permno rdate bhar36;
run;

data bhar;
merge bhar1 bhar2 bhar3 bhar4;
by permno rdate;
run;

proc datasets;
append base=john.full2 data=bhar;
run;
%end;
%mend loopt;

%loopt(nloops=1000);
```

```
*STEP 5 - CALCULATE EMPIRICAL DISTRIBUTION OF AVERAGE (EW AND VW) BHAR'S ACROSS
1,000 SAMPLES;
*BACK ON RSUBMIT NOW;
data sample;
set b.sampleall;
where STm1=1 or LTm1=1;
LT=LTm1;ST=STm1;
format stdt end1dt end2dt end3dt date9.;
stdt = intnx('month',rdate,1);
end1dt = intnx('month',stdt,11,'end');
end2dt = intnx('month',stdt,23, 'end');
end3dt = intnx('month',stdt,35,'end');
if end3dt le '31dec2006'd;
format brkdt date9.;
brkdt = intnx('year',rdate,-1, 'end');
run;


%let wrds = wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
rsubmit;
libname john '/sastemp2/john';
libname bob '/projects/uiowa/jmcinnis/';
proc upload data=sample;run;
proc sql;
create table bhar as select
j.*, i.brkdt, i.st, i.year
from john.full2 as j, sample as i
where i.permno=j.permno and i.rdate=j.rdate;
quit;

data bhar;
set bhar;
k=ceil(_n_/610);
run;

data test2;
set john.test2(keep=permno mpermno rdate);
k=ceil(_n_/610);
run;

proc sql;
create table bhar1 as select
j.*, i.mpermno
from bhar as j, test2 as i
where i.permno=j.permno and i.rdate=j.rdate and i.k=j.k;
quit;

data comp;
set comp.compann(keep=gvkey yeara data25 data199);
where yeara ge 1987;
mval=data25*data199;
yrdate=mdy(1,1,yeara);
if missing(mval)=0;
run;
data link;
set bob.link;
```

```
where linktype eq 'LU' or linktype eq 'LC';
lastyear=year(linkenddt);
firstyear=year(linkdt);
lastmonth=month(linkenddt);
firstmonth=month(linkdt);
if lastyear='.' then lastyear=2006;
if missing(linkenddt)=1 then linkenddt=date();
run;

proc sql;
create table crsp1 as select
comp.*, link.npermno as permno
from comp, link
where link.gvkey = comp.gvkey AND link.linkdt le comp.yrdate le link.linkenddt;
quit;

proc sql;
create table bhar2 as select
j.*, i.mval
from bhar1 as j, crsp1 as i
where i.permno=j.mpermno and i.yeara=j.year;
quit;


proc sql;
create table bhar3 as select
bhar2.*, i.vwindd
from bhar2 as j, crsp.msix as i
where month(j.brkdt)=month(i.caldt) and year(j.brkdt)=year(i.caldt)
order by k, permno, rdate;
quit;

data bhar3;
set bhar3;
wt=mval/vwindd;
run;

proc means data=bhar3 noprint;
class st;
by k;
var bhar3 bhar6 bhar12 bhar36;
output out=stat1 mean(bhar3)=  mean(bhar6)=
mean(bhar12)= mean(bhar36)=;
run;

proc means data=bhar3 noprint;
class st;
by k;
var bhar3 bhar6 bhar12 bhar36;
weight wt;
output out=stat2 mean(bhar3)=  mean(bhar6)=
mean(bhar12)= mean(bhar36)=;
run;
/*
data bob.stat1;
set stat1;
run;

data bob.stat2;
```

```
set stat2;
run;*/

proc download data=stat1;run;
proc download data=stat2;run;
endrsubmit;

data stat1a;
set stat1;
where st=0;
run;

data stat1b;
set stat1;
where st=1;
run;

proc sql;
create table stat1c as select
j.*, i.bhar3 as bhar31, i.bhar6 as bhar61, i.bhar12 as bhar121, i.bhar36 as
bhar361
from stat1a as j, stat1b as i
where i.k=j.k
order by k;
quit;

data stat1c;
set stat1c;
bhar3d=bhar3-bhar31;
bhar6d=bhar6-bhar61;
bhar12d=bhar12-bhar121;
bhar36d=bhar36-bhar361;
run;

proc sort data=stat1a;
by bhar36; run;
proc sort data=stat1b;
by bhar36; run;
proc sort data=stat1c;
by bhar36d; run;


data stat2a;
set stat2;
where st=0;
run;

data stat2b;
set stat2;
where st=1;
run;

proc sql;
create table stat2c as select
j.*, i.bhar3 as bhar31, i.bhar6 as bhar61, i.bhar12 as bhar121, i.bhar36 as
bhar361
from stat2a as j, stat2b as i
where i.k=j.k
order by k;
```

```
quit;

data stat2c;
set stat2c;
bhar3d=bhar3-bhar31;
bhar6d=bhar6-bhar61;
bhar12d=bhar12-bhar121;
bhar36d=bhar36-bhar361;
run;

proc sort data=stat2a;
by bhar36; run;

proc sort data=stat2b;
by bhar36; run;

proc sort data=stat2c;
by bhar36d; run;
```