Four Realized Variance Stylized Facts

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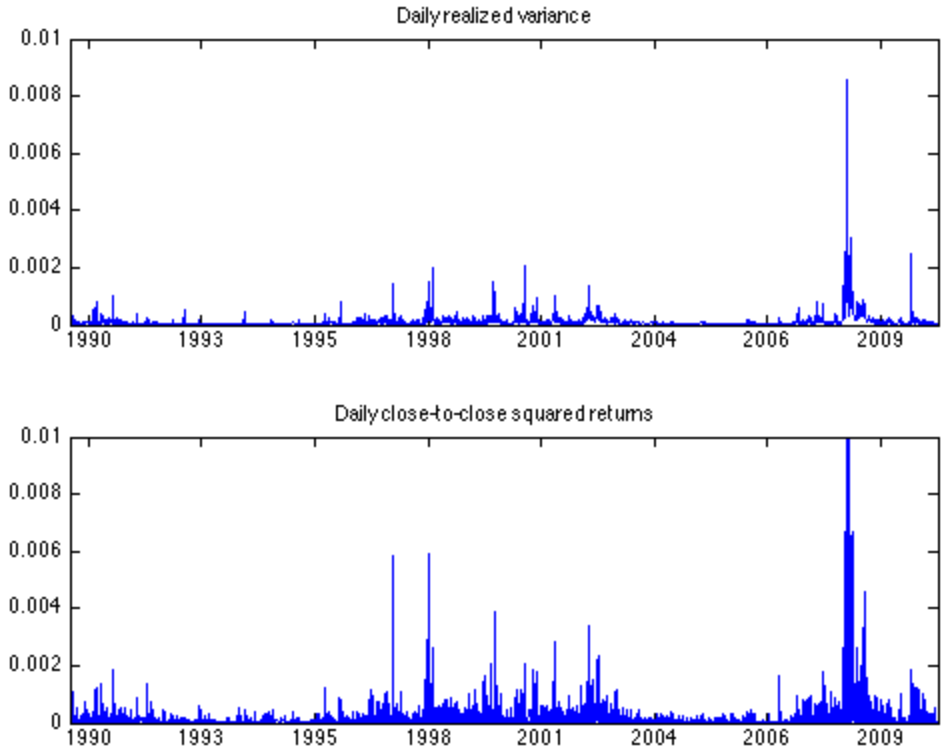
This is an illustration of four stylized facts on RV, from chapter 5 of EFRM

RV Stylized Fact 1

RVs are much more precise indicators of daily variance thanare daily squared returns.

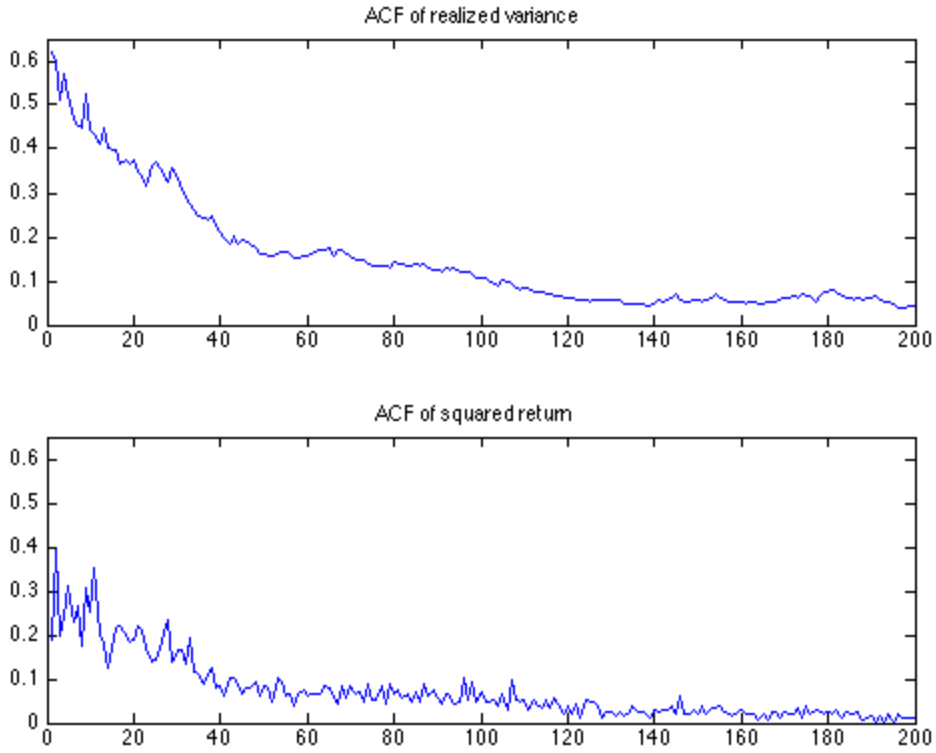
```
sp500data = readtable('RV_DATA.xlsx');
sp500ret = table2array(sp500data(:,2));
sp500rv = table2array(sp500data(:,3));
x_yr = x2mdate(sp500data.date);

figure(1)
subplot(2,1,1)
plot(x_yr,sp500rv/10000)
title('Daily realized variance')
datetick('x','keepticks','keeplimits')
xlim([x_yr(1) x_yr(end)])
ylim([0 0.01])
subplot(2,1,2)
plot(x_yr,sp500ret.^2/10000)
title('Daily close-to-close squared returns')
datetick('x','keepticks','keeplimits')
xlim([x_yr(1) x_yr(end)])
ylim([0 0.01])
```



RV Stylized Fact 2

RV has large positive autocorrelations for many lags

```
acf_rv = autocorr(sp500rv,200);
acf_sr = autocorr(sp500ret.^2,200);
figure(2)
subplot(2,1,1)
plot(1:200,acf_rv(2:end))
ylim([0 0.65])
title('ACF of realized variance')
subplot(2,1,2)
plot(1:200,acf_sr(2:end))
ylim([0 0.65])
title('ACF of squared return')
```

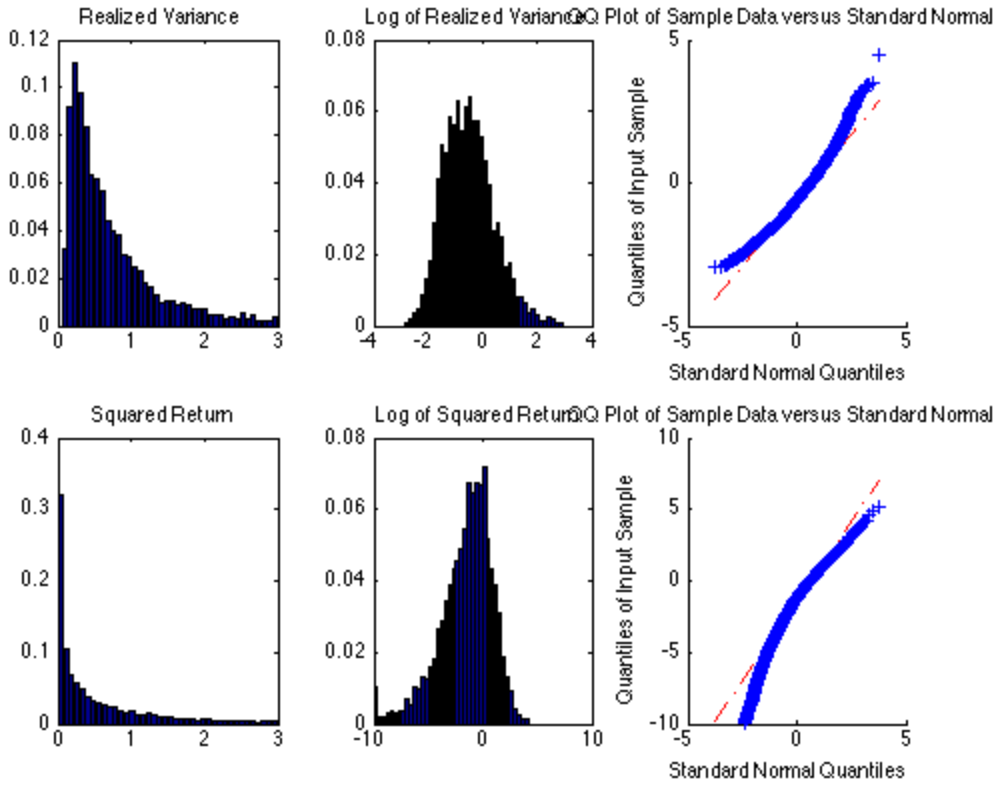


RV Stylized Fact 3

The log of RV is approximately normally distributed

```
figure(3)
subplot(2,3,1)
[c,x_hist] = hist(sp500rv(sp500rv<=3),40,'Normalization','probability');
bar(x_hist,c/sum(c));
xlim([0 3])
title('Realized Variance')
subplot(2,3,2)
[c,x_hist] = hist(log(sp500rv(sp500rv<=20)),40,'Normalization','probability');
bar(x_hist,c/sum(c));
xlim([-4 4])
title('Log of Realized Variance')
subplot(2,3,3)
qqplot(log(sp500rv))
subplot(2,3,4)
[c,x_hist] = hist(sp500ret(abs(sp500ret)<sqrt(3)).^2,40,'Normalization','probabili
bar(x_hist,c/sum(c));
xlim([0 3])
title('Squared Return')
subplot(2,3,5)
[c,x_hist] = hist(log(sp500ret(abs(sp500ret)<=10).^2),40,'Normalization','probabil
bar(x_hist,c/sum(c));
title('Log of Squared Return')
```

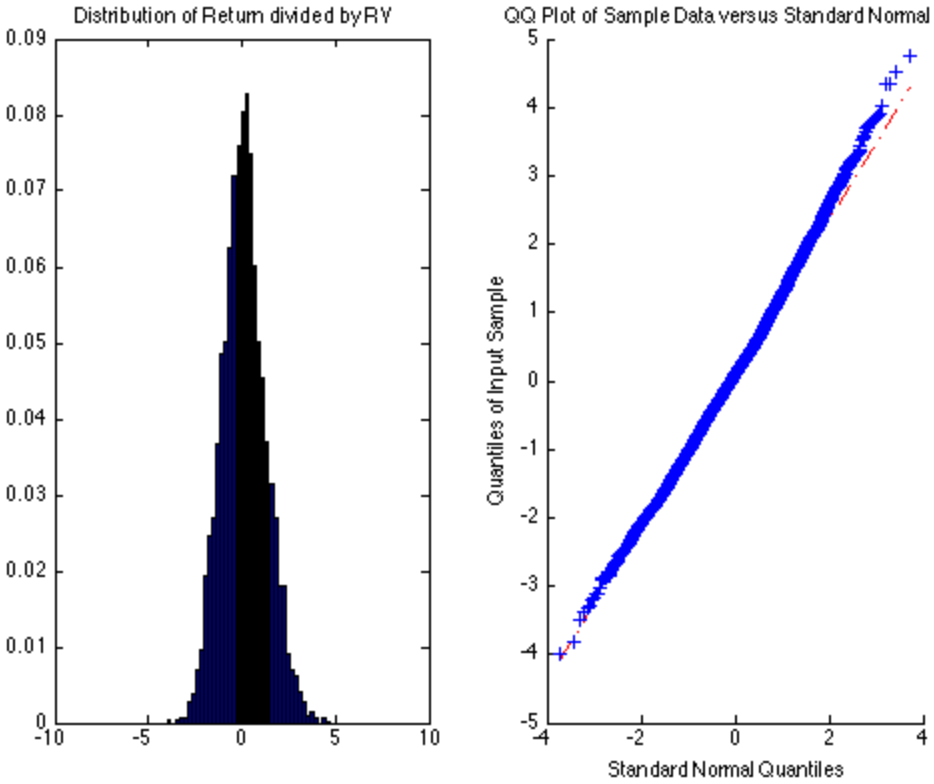
```
subplot(2,3,6)
qqplot(log(sp500ret.^2))
```



RV Stylized Fact 4

The daily return divided by the square root of RV is close to i.i.d. standard normal

```
figure(4)
subplot(1,2,1)
[c,x_hist] = hist(sp500ret./sqrt(sp500rv),40,'Normalization','probability');
bar(x_hist,c/sum(c));
title('Distribution of Return divided by RV')
xlim([-10 10])
subplot(1,2,2)
qqplot(sp500ret./sqrt(sp500rv))
```



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