THE UNIVERSITY OF CHICAGO
Graduate School of Business
Business 41202, Spring Quarter 2006, Mr. Ruey S. Tsay

Solutions to Homework Assignment #1

I used **R** with package **fSeries** to answer the questions. The commands are given, but the output is omitted.

Answers

1. The commands used:

```
> library(fSeries)  % load the fSeries package.
> da=read.table("d-basp9505.txt")
> ba=da[,2]*100
> basicStats(ba)
> lnba=log(1+da[,2])*100
> basicStats(lnba)
> sp=da[,3]*100
> basicStats(sp)
> lnsp=log(1+da[,3])*100
> basicStats(lnsp)
```

(1) Simple percentage returns						
Tick	Mean	St.Dev.	Skew	Ex.Kur.	Min	Max
BA	.067	2.089	−.335	6.037	−17.63	11.63
SP	.042	1.111	−.0233	3.241	−6.867	5.732
(2) Log percentage returns						
BA	.045	2.099	−.606	7.502	−19.39	11.00
SP	.036	1.111	−.111	3.328	−7.114	5.573

The high excess kurtosis indicates non-normality of asset returns.

Part 3. Use the 95% confidence interval of the mean in the R output; see LCL Mean and UCL mean. Both intervals contain zero. Therefore, the means are not significantly different from zero. There is no major difference between the mean log return of BA stock and S&P 500 index.

2. Commands used:

```
> da=read.table("m-pg3dx7505.txt")
> pg=log(1+da[,2])*100
> basicStats(pg)
```

```
> vw=log(1+da[,3])*100
> basicStats(vw)
> ew=log(1+da[,4])*100
> basicStats(ew)
> sp=log(1+da[,5])*100
> basicStats(sp)
```

Log percentage returns						
Tick	Mean	St.Dev.	Skew	Ex.Kur.	Min	Max
PG	1.079	6.036	−1.131	8.064	−44.17	22.39
VW	1.063	4.485	−.917	3.629	−25.52	13.24
EW	1.397	5.542	−.717	5.370	−31.79	26.18
SP	0.780	4.356	−.740	3.115	−24.54	12.38

3. Commands used

```
> da=read.table("w-tb3ms.txt")
> tb=da[,4]
> basicStats(tb)
> x=diff(da[,4])
> basicStats(x)
```

Series	Mean	St.Dev.	Skew	Ex.Kur.	Min	Max
TB	5.181	2.832	1.088	1.729	.590	16.76
Change	0.001	0.202	−0.673	22.29	−1.82	1.92

4. Commands used:

```
> da=read.table("d-basp9505.txt")
> lnba=log(1+da[,2])
> t1=skewness(lnba)/sqrt(6/2771)
> t1
> t2=kurtosis(lnba)/sqrt(24/2771)
> t2
> jarqueberaTest(lnba)
```

   (a) The t-ratio of Skewness is skewness$/\sqrt{6/2771} = -13.02$, where 2771 is the sample size. This t-ratio is large in magnitude. Reject the null hypothesis.

   (a) (b)] The t-ratio of Kurtosis is kurtosis$/\sqrt{24/2771} = 80.61$, which is highly significant. Reject the null hypothesis.

   (c) The Jarque-Bera statistic is 6681.5 with p-value being 0. Reject the null hypothesis.

5. Commands used:

```
> da=read.table("d-jpus.txt")
> jp=log(da[,4])
> rtn=diff(jp)
> basicStats(rtn)
> da1=read.table("d-useu.txt")
> us=log(da1[,4])
> x=diff(us)
> basicStats(x)
> cor(rtn,x)
```

Series	Mean	St.Dev.	Skew	Ex.Kur.	Min	Max
JPUS	2.4×10^{-5}	.0064	$-.231$	1.984	-0.029	0.032
USEU	1.2×10^{-5}	.0063	.019	.627	-0.025	0.027

Part (c). The correlation is -0.349. The negative sign is expected from the definition of exchange rates. If U.S. dollar is strong, it costs more in yens. On the other hand, one Euro will cost less in dollars.