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Final project

- The analysis need the data of trading date in the period of 6 years from 2003-09-10 to 2009-09-09. To get the data frame with the trading date, I downloaded the daily stock price data from the link: https://wrds-web.wharton.upenn.edu/wrds/ds/crsp/stock_a/dsf.cfm?navGroupHeader=Annual%20Update&navGroup=Stock%20%2F%20Security%20Files.
- To get the list of trading date annually, I use Python for convenience, one more thing can be noticed here is that all the stocks were trading in the same days within the analysis period

No	Period	Number of trading days
1	2003-09-10 – End of 2003	79
2	2004	252
3	2005	252
4	2006	251
5	2007	251
6	2008	253
7	Begin of 2009 – 2009-09-09	173
	Total	**1511**

- Information of stock for analysis:

No	Ticker	Stock Market	Company name
1	WHR	N	WHIRLPOOL CORP
2	MOT		MOTOROLA INC
3	AMAT	Q	APPLIED MATERIALS INC
4	QCOM		QUALCOMM INC

To compute the liquidity variables, these steps were performed:

- **Step 1**: Create BuySellIndicators (Previous assignment).
- **Step 2**: Compute some parameters for each day. There are 17 parameters in total (Question 1). Then concatenate everyday data into one.
- **Step 3**: Perform analysis (Question 2).

Because **Step 1** is already mentioned in the previous assignment, I will only point out how I perform **Step 2** and **3**.

Question 1

It would be easier to get the data with all necessary variables before computing the parameters.

```
data mediate1;
 set BuySellIndicators;
 DV = size*price; *problem b;
 y = BuySellLR*size - lag(BuySellLR)*lag(size); *problem b;
 z = BuySellLR*size*price - lag(BuySellLR)*lag(size)*lag(price); *problem b;
 r = log(price) - log(lag(price)); *problem c;
 delta_pt = price-lag(price); *problem d;
 delta_pt1 = lag(price)-lag2(price); *problem d;
 A = abs(r)/(price*size); *problem e;
 wes_Dollar = (abs(price-midpoint))*2; *problem f;
 wes_Dollar_SW = wes_Dollar*size; *problem f;
 wres_Dollar_SW = wes_Dollar_SW/midpoint; *problem f;
 res = es/midpoint; *problem f;
 lag_y = lag(y); *problem g;
 lag_z = lag(z); *problem g;
 run;
```

a) For each day d (from 2003-09-10 to 2009-09-09), identify the last closing price.

– This can be done by using **last**.

```
/*problem a*/
data mediate2 (keep=date sym_root p_d m_d);
 set BuySellIndicators;
 by sym_root;
 if last.sym_root;
 rename price = p_d; *problem a;
 rename midpoint = m_d; *problem a;
 run;
```

b) Compute daily share trading volume Vd and dollar trading volume DVd. Further, define two order imbalances yt and zt at each time t and compute daily order imbalances (yd and zd).

```
/*problem b, c, e*/
proc means noprint data=mediate1 mean std;
 var size DV y z A;
 output out= mediate3
 mean(size) = V_d
 mean(DV) = DV_d
 mean(y) = y_d
 mean(z)= z_d
 std(r) = sigma_d
 mean(A) = A_d
 ;
 run;
```

– Problem b, c and e can be solved by using **proc means** in sas.

c) Compute the intra-day volatility of return series which is the standard deviation of return series r_t.

– Mentioned in b

d) Compute the Roll's implicit spread measures.

```
/*problem d*/
proc corr noprint data=mediate1 outp=mediate4 cov; *or outs;
var delta_pt delta_pt1;
run;

data mediate4(keep=s_d);
set mediate4;
where _NAME_ in ('delta_pt1') and _TYPE_ in ('COV');
s_d = sqrt(-delta_pt)/2;
run;
```

- To compute covariance, we can using **proc corr** in sas.
- Then, select the right number by accessing the row and column and compute s_d parameter.
- To plot s_d, we can use proc gplot:

```
/*problem d*/
title1 'Rolls Implicit Spread Measure (WHR)';
footnote1 ' ';
 /* Define symbol characteristics */
symbol1 color=vibg interpol=spline;

 /* Generate plot of two variables */
proc gplot data=whr;
plot s_d*date;
run;
quit;
```

e) Compute the daily Amihud' measure from intra-day data.

- Mentioned in b

f) Compute the daily volume(size) weighted average of e_ective spread (es_d) and relative e_ective spread (res_d). Plot.

```
/*problem f*/
proc sql;
create table effectivespread
as select
sum(size) as sumsize,
sum(wes_Dollar_SW) as waes_Dollar_SW,
sum(wres_Dollar_SW) as wares_Dollar_SW
from mediate1;
quit;

data mediate5 (keep= es_d res_d);
set effectivespread;
es_d = waes_Dollar_SW/sumsize;
res_d = wares_Dollar_SW/sumsize;
run;
```

- We already learn how to compute weighted average of effective spread in class.
- For the weighted average of relative effective spread, the computation is similar. The relative effective spread equals the effective spread over midpoint.
- Plot es_d and res_d:

```
title1 'Weighted Average of Effective Spread (WHR)';
footnote1 ' ';
 /* Define symbol characteristics */
symbol1 color=vibg interpol=spline;

 /* Generate plot of two variables */
proc gplot data=&ticker_name;
plot es_d*date;
run;
quit;
```

```
title1 'Weighted Average of Relative Effective Spread (W
footnote1 ' ';
 /* Define symbol characteristics */
symbol1 color=vibg interpol=spline;

 /* Generate plot of two variables */
proc gplot data=&ticker_name;
plot res_d*date;
run;
quit;
```

g) Estimate the two regressions for each stock. Plot.

```
/*problem g*/
proc reg noprint data=mediate1 outest=mediate6;
model r = y lag_y;
run;
data mediate6 (keep=lambda1_d psi1_d);
set mediate6;
rename y = lambda1_d;
rename lag_y = psi1_d;
run;

proc reg noprint data=mediate1 outest=mediate7;
model r = z lag_z;
run;
data mediate7 (keep=lambda2_d psi2_d);
set mediate7;
rename z = lambda2_d;
rename lag_z = psi2_d;
run;
```

- Estimate the coefficients can be done by using **proc reg**.
- We need to use some addition options: noprint (no need picture output), outest (to get value).

- Plot **Price Impact Coefficient** and **Price Reversal Coefficient.**

```
title1 'Price Impact Coefficient (WHR, i=1)';
footnote1 ' ';
 /* Define symbol characteristics */
symbol1 color=vibg interpol=spline;

 /* Generate plot of two variables */
proc gplot data=whr;
plot lambda1_d*date;
run;
quit;
```

```
title1 'Price Reversal Coefficient (WHR, i=1)';
footnote1 ' ';
 /* Define symbol characteristics */
symbol1 color=vibg interpol=spline;

 /* Generate plot of two variables */
proc gplot data=whr;
plot psi1_d*date;
run;
quit;
```

h) Estimate the two time series model for each stock.

```
/*problem h*/
proc arima data=mediate1;
identify var=BuySellLR noprint;
estimate p=1 q=1 method=ml outest=mediate8 noprint;
run;quit;

data mediate8 (keep=rho_d gamma_d);
set mediate8;
where _TYPE_ in ('EST');
rename AR1_1 = rho_d;
rename MA1_1 = gamma_d;
run;
```

- This problem is similar to problem g, we can use **proc arima**.
- The place to put options is slightly different.

Now, we have all variables denoted for everyday. We should merge all variables into one file named estim.

```
data estim (keep=date sym_root p_d m_d V_d DV_d y_d z_d sigma_d A_d s_d
            es_d res_d lambda1_d psi1_d lambda2_d psi2_d rho_d gamma_d);
set mediate2;
set mediate3;
set mediate4;
set mediate5;
set mediate6;
set mediate7;
set mediate8;
run;
```

Up to here, we just calculate for only one day. In order to derive all parameters for 6-year period, a loop running over many small chunk of time should be formed. Instead, I replicated the code to perform the computation for each stock during the whole period. Therefore, I have four sas file named **job_whr.sas**, **job_mot.sas**, **job_amat.sas** and **job_qcom.sas.**

Here is how I did looping:

- I used macro function, the argument of function is the list of date.

```
rsubmit;
    libname nbbo '/wrds/nyse/sasdata/taqms/nbbo';
    libname cq '/wrds/nyse/sasdata/taqms/cq';
    libname ct '/wrds/nyse/sasdata/taqms/ct';
    libname whr '/home/unist/hnguyen1/final/whr';
    option msglevel=i mprint source;

/*Function*/
%macro loop(vlist);
%let count=%sysfunc(countw(&vlist));

%do i=1 %to &count;
%let date=%scan(&vlist, &i);
%let ticker_name = WHR;

/*******Get BuySellIndicators*****/
/*******Compute variables*********/

*Save data into WRDS folder;
data whr.estim_&date;
set estim;
run;

%end;
%mend;
```

Code for this part is explained above.

- I called the function for each value in the list of date

```
/*Begin looping*/
%let date_list=20030910 20030911;
%loop(&date_list);

/*Get full estimation for the whole period*/
data whr.estim_full;
set whr.estim_:;
run;

endrsubmit;
```

Replace with the full list of date. This way is not good since we need to list all the date and may not be efficient to deal with longer period. However, I have no time to search for a function dealing with this in sas .

Merge all single estim into one for further analysis

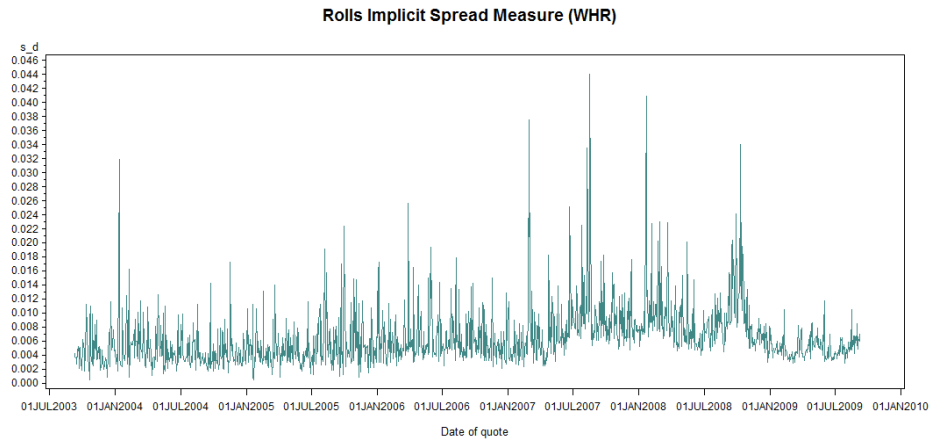
After getting the job code, I submitted into server by using command line. The downloading process may take 45 minutes for the whole period. This is how the dataset looks like:

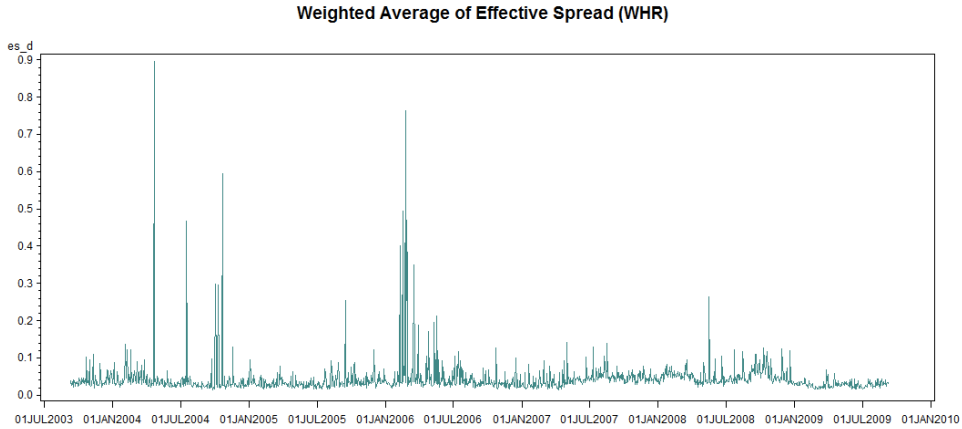
	DATE	SYM_ROOT	p_d	m_d	V_d	DV_d	y_d	z_d	sigma_d
1	10SEP2003	AMAT	20.7	20.705	549.33310044	11555.118566	-0.047162396	-0.995475904	0.0003633118
2	11SEP2003	AMAT	21.07	21.085	522.29490842	10808.725288	-0.017459486	-0.367474565	0.0006146994
3	12SEP2003	AMAT	20.97	20.97	485.35205455	10071.727682	0.0176549776	0.3703572926	0.0002702174
4	15SEP2003	AMAT	20.58	20.565	528.46683184	11098.373709	0.0025352437	0.0503507087	0.0003673603
5	16SEP2003	AMAT	21.4	21.39	486.57672677	10295.546395	0	0.0070947144	0.0003116159

A_d	s_d	es_d	res_d	lambda1_d	psi1_d	lambda2_d	psi2_d	gamma_d	rho_d
2.4968327E-8	0.0025259286	0.0159784762	0.0007576502	1.2201173E-8	9.890986E-11	5.912231E-10	4.819079E-12	0.4220937452	0.8728276471
2.9118349E-8	0.0043382974	0.0209094064	0.0010106446	2.9292372E-8	1.7439117E-9	1.4238475E-9	8.492653E-11	0.4066927022	0.8588921439
2.3721046E-8	0.001658087	0.0138664806	0.0006677232	3.2851057E-8	3.0834808E-9	1.5776372E-9	1.481403E-10	0.3868609739	0.8673254541
2.6761424E-8	0.0024243031	0.0159007453	0.0007561053	1.3930256E-8	2.634344E-10	6.685052E-10	1.275216E-11	0.4139080437	0.85870954
2.3523027E-8	0.0019537053	0.0154443082	0.0007290165	5.6791928E-8	2.3031525E-9	2.6712436E-9	1.090554E-10	0.4001699056	0.8706496892

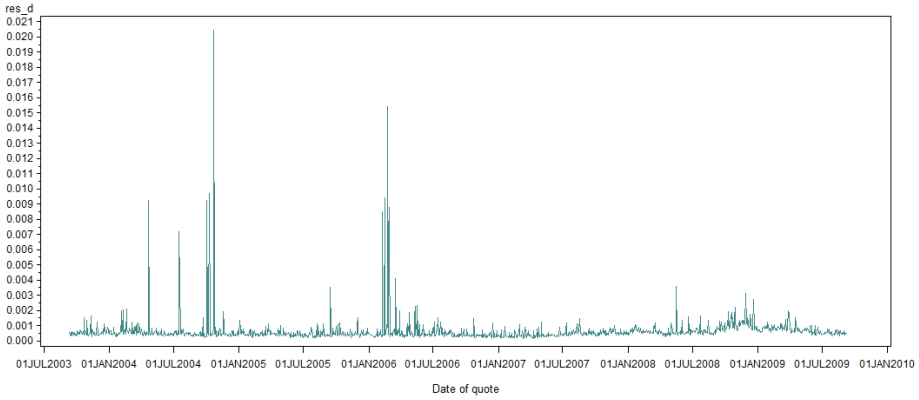
Result:

WHR

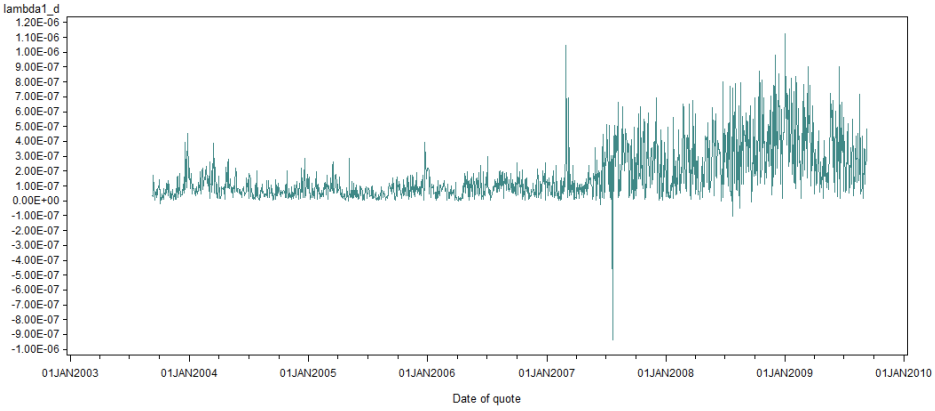




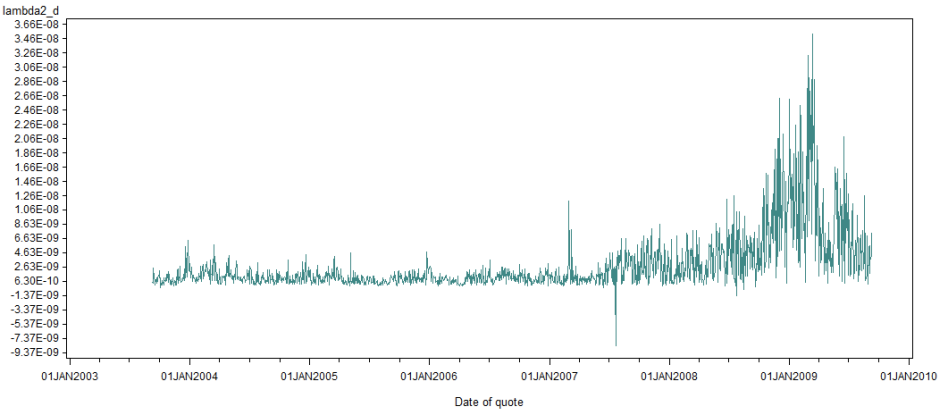
Weighted Average of Relative Effective Spread (WHR)



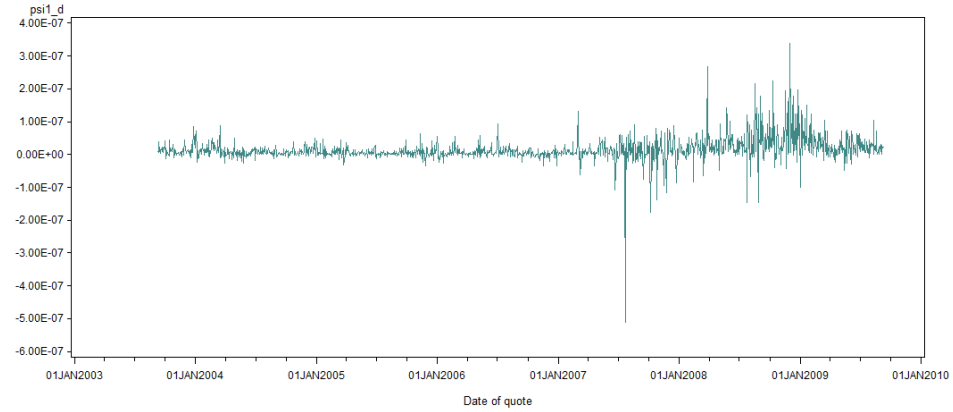
Price Impact Coefficient (WHR, i=1)



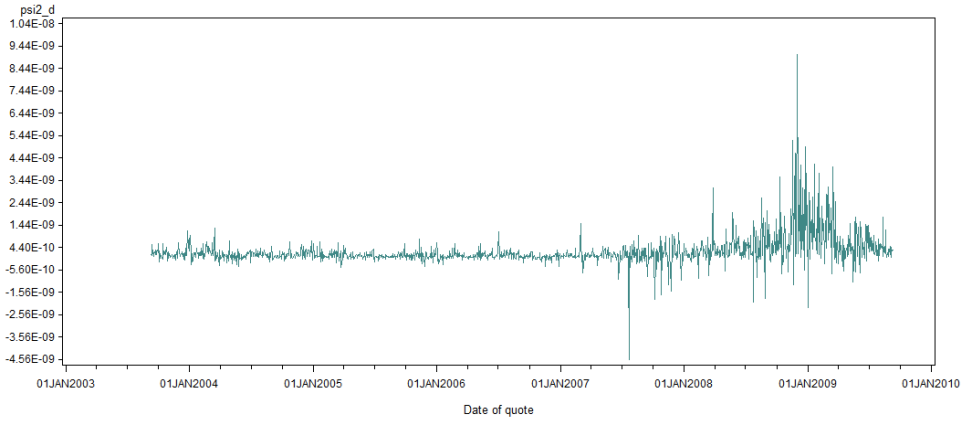
Price Impact Coefficient (WHR, i=2)



Price Reversal Coefficient (WHR, i=1)

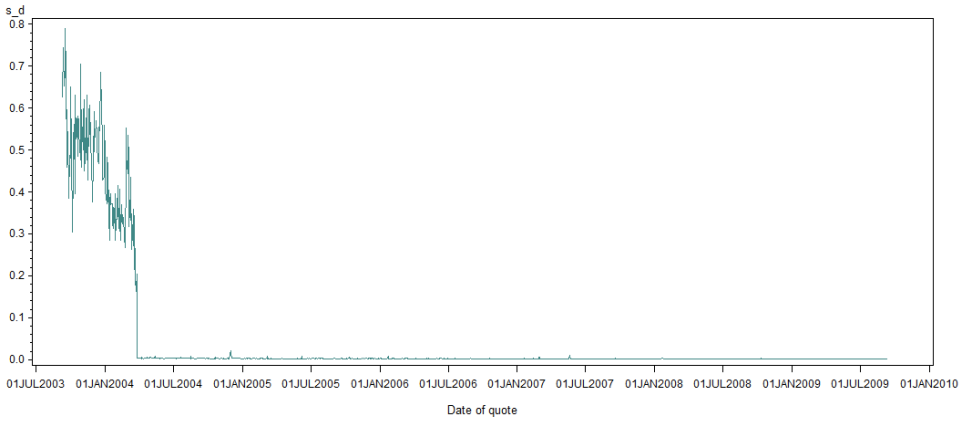


Price Reversal Coefficient (WHR, i=2)

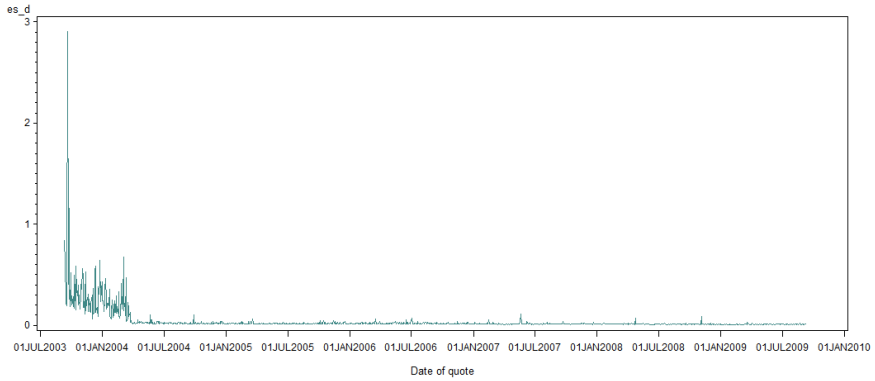


MOT

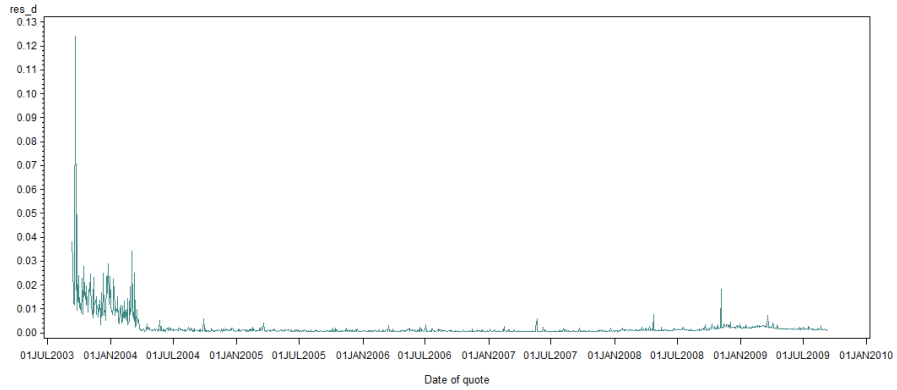
Rolls Implicit Spread Measure (MOT)



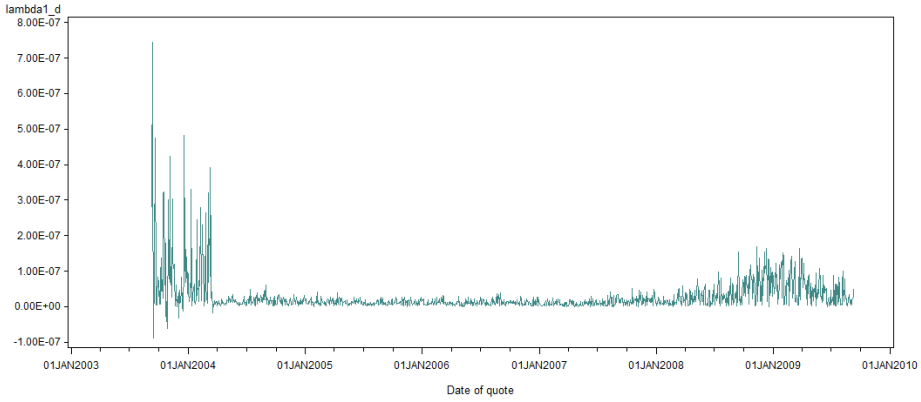
Weighted Average of Effective Spread (MOT)



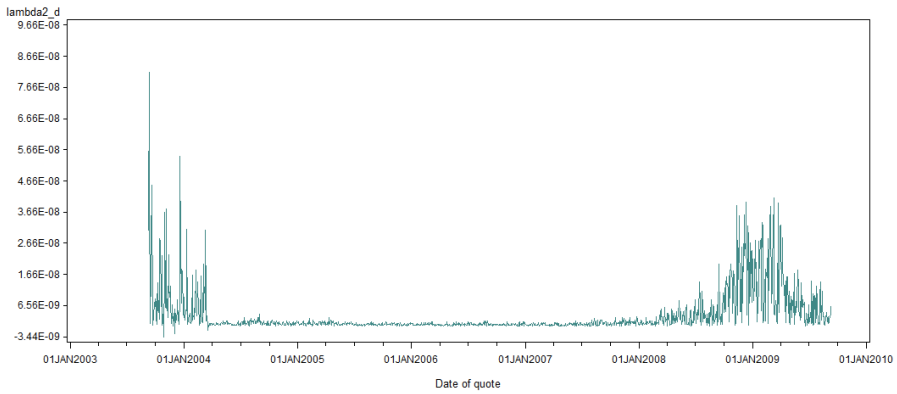
Weighted Average of Relative Effective Spread (MOT)



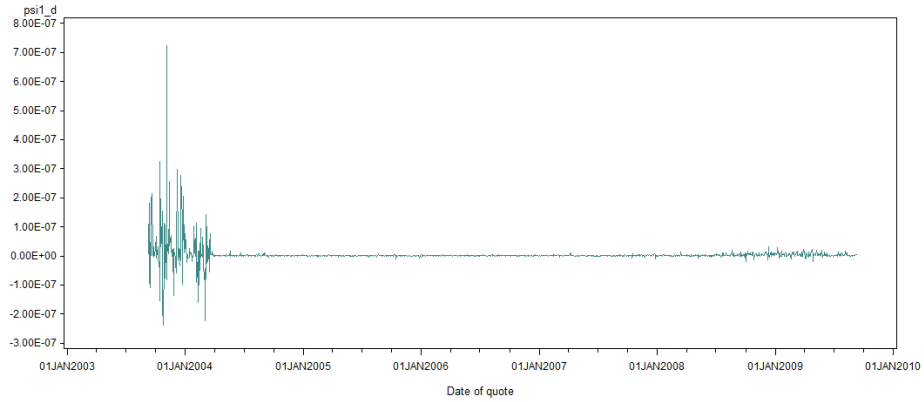
Price Impact Coefficient (MOT, i=1)



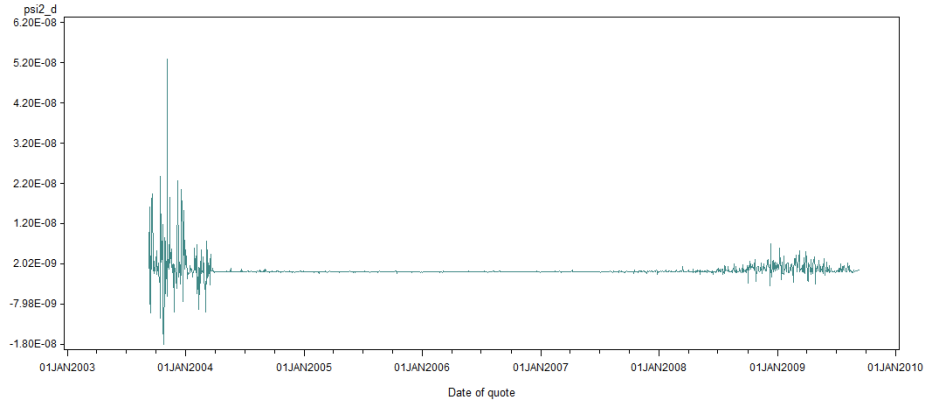
Price Impact Coefficient (MOT, i=2)



Price Reversal Coefficient (MOT, i=1)

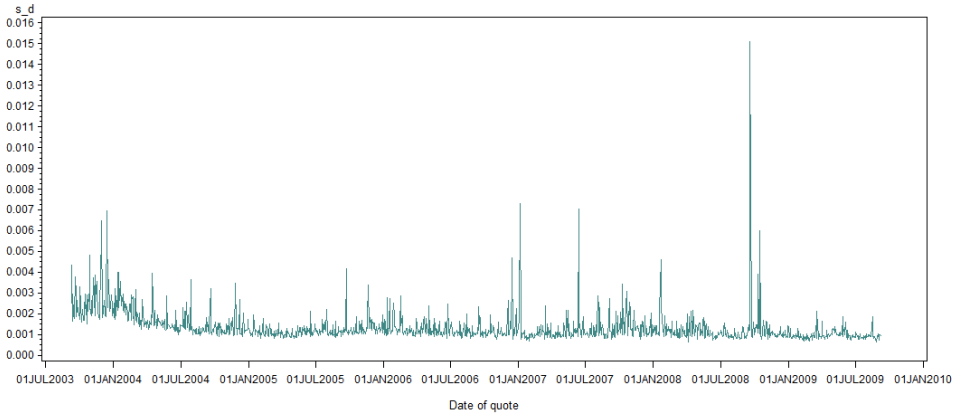


Price Reversal Coefficient (MOT, i=2)

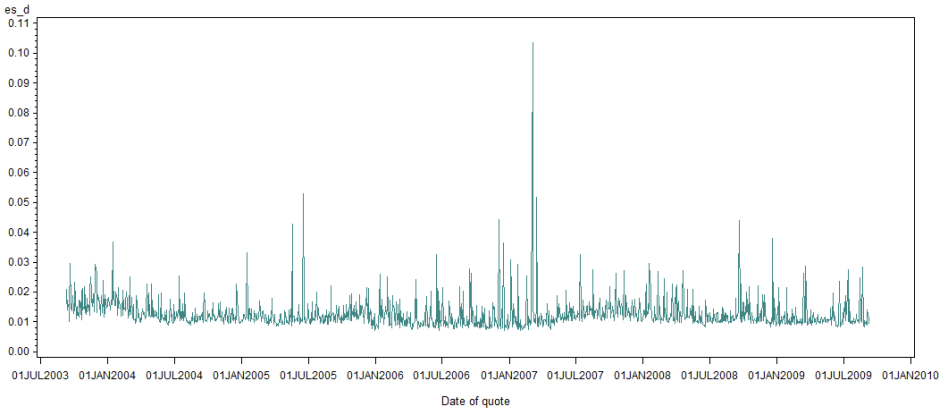


AMAT

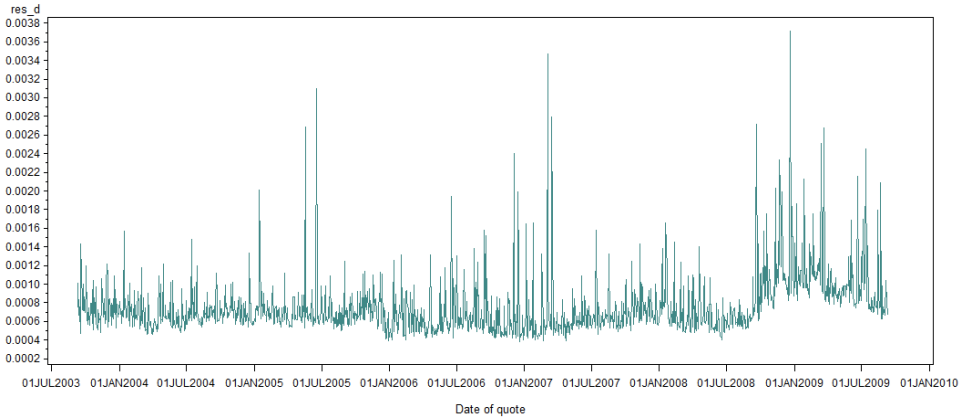
Rolls Implicit Spread Measure (AMAT)



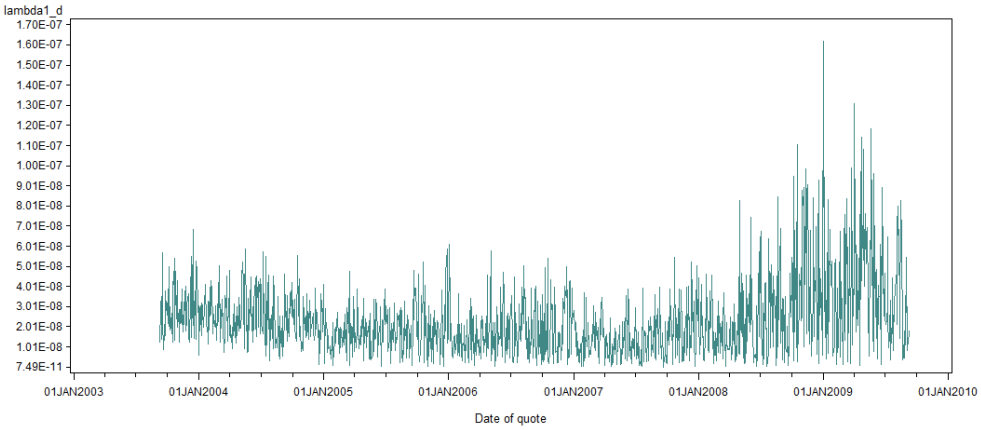
Weighted Average of Effective Spread (AMAT)



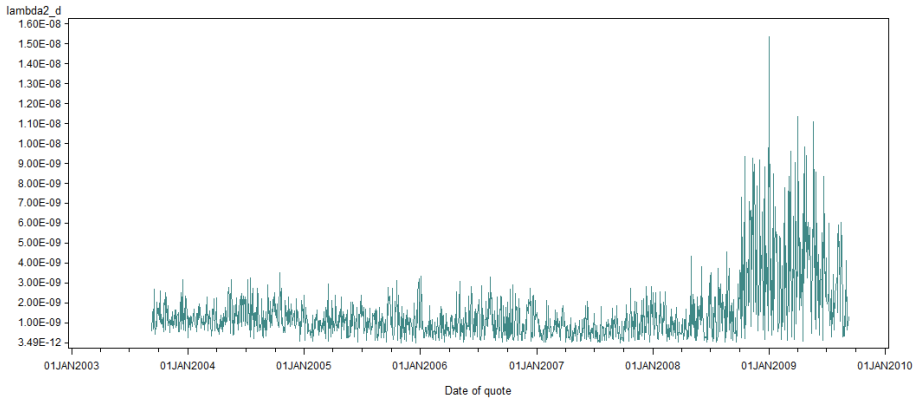
Weighted Average of Relative Effective Spread (AMAT)



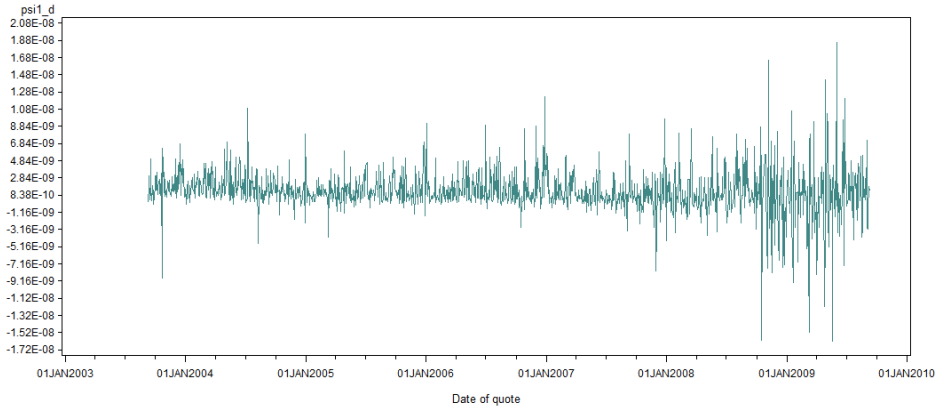
Price Impact Coefficient (AMAT, i=1)



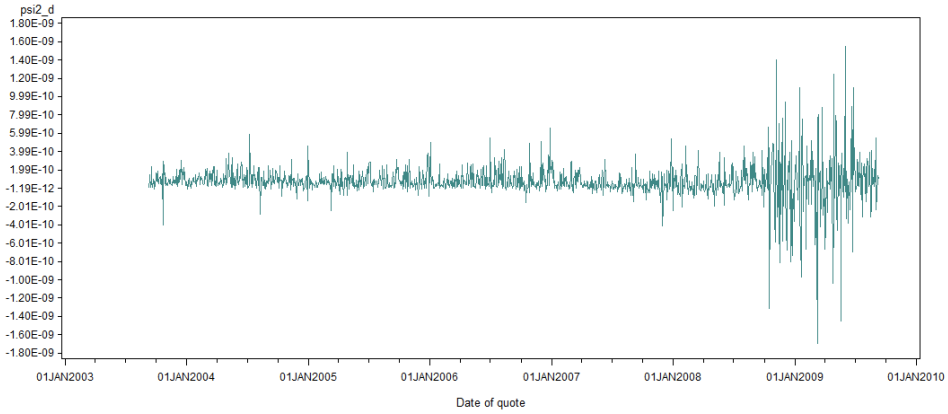
Price Impact Coefficient (AMAT, i=2)



Price Reversal Coefficient (AMAT, i=1)

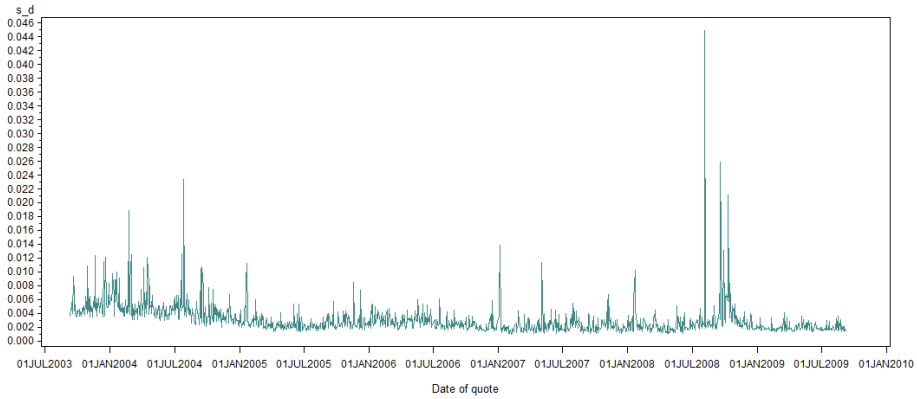


Price Reversal Coefficient (AMAT, i=2)

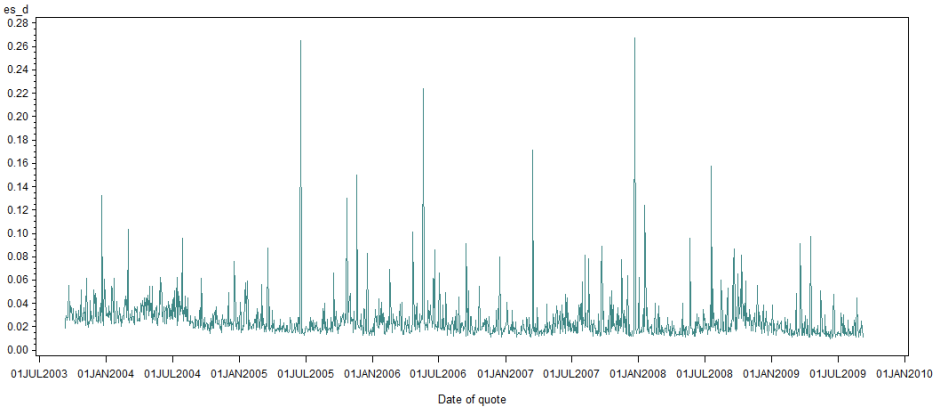


QCOM

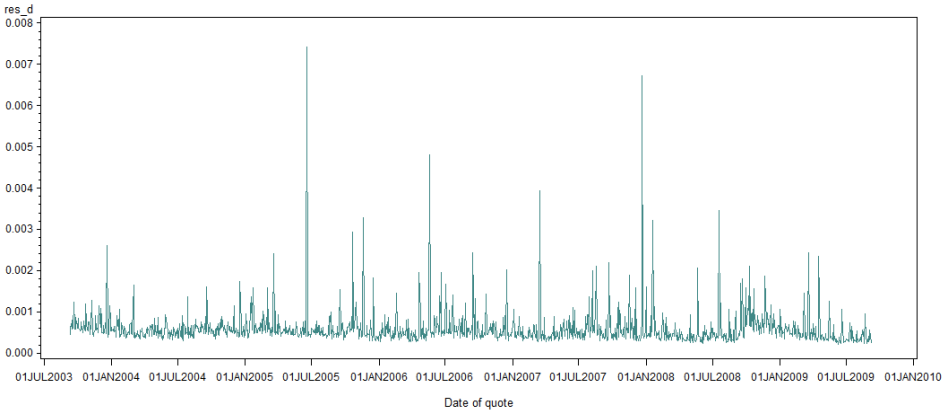
Rolls Implicit Spread Measure (QCOM)



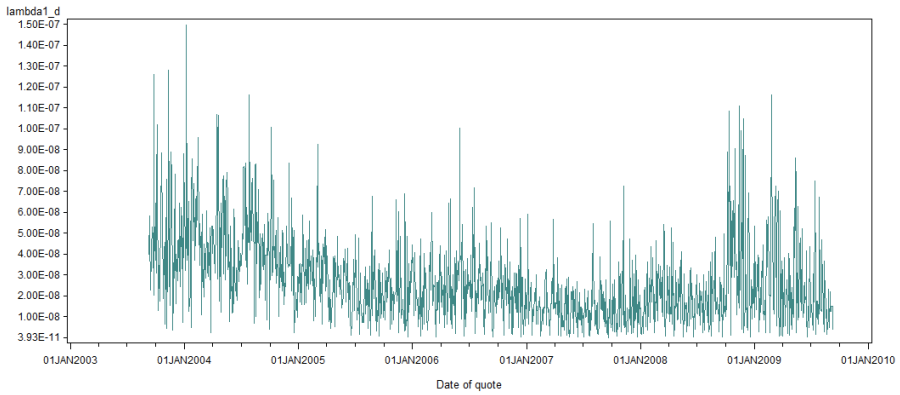
Weighted Average of Effective Spread (QCOM)



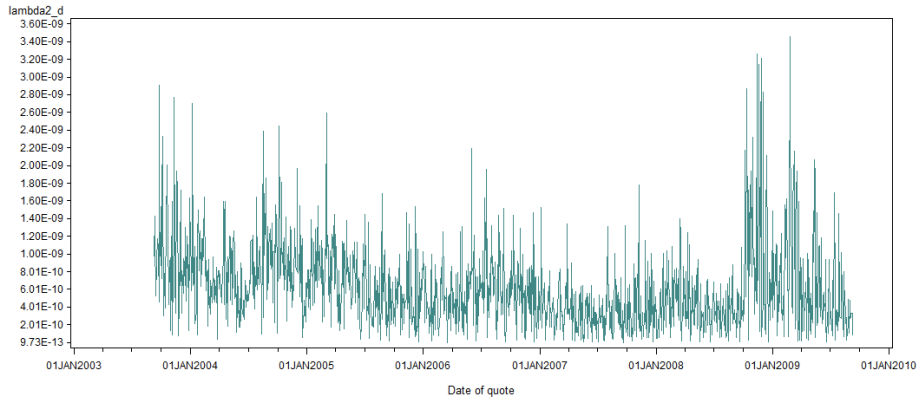
Weighted Average of Relative Effective Spread (QCOM)



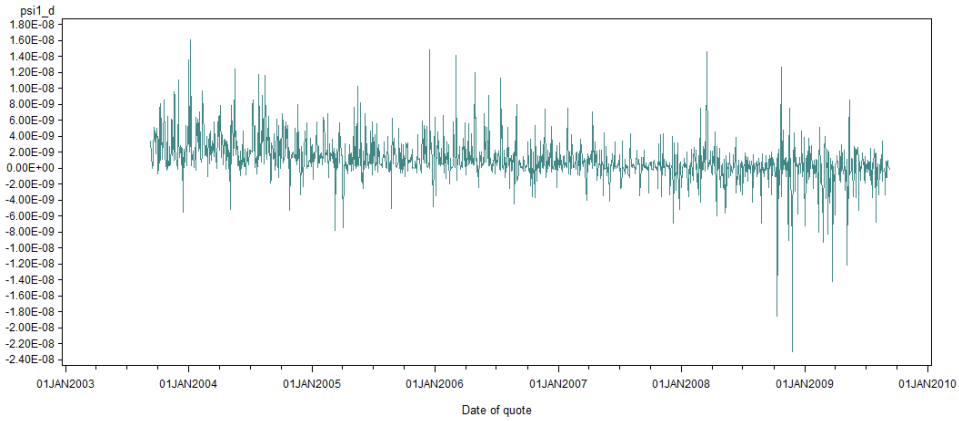
Price Impact Coefficient (QCOM, i=1)



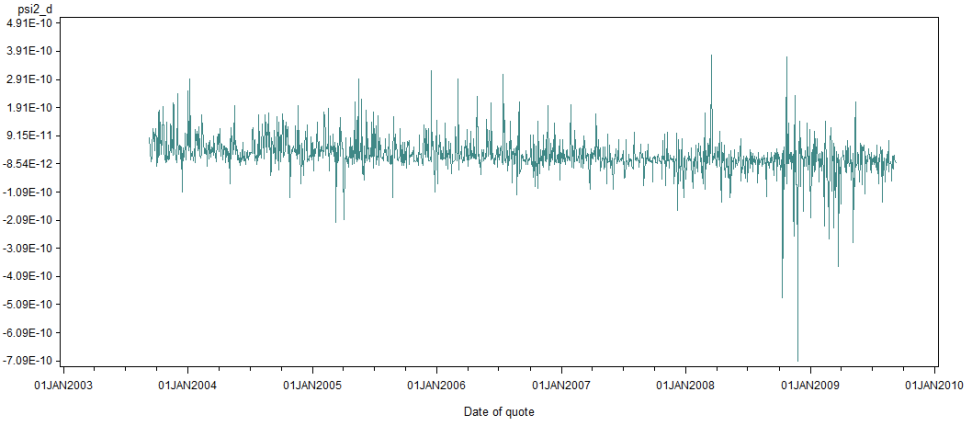
Price Impact Coefficient (QCOM, i=2)



Price Reversal Coefficient (QCOM, i=1)



Price Reversal Coefficient (QCOM, i=2)



Question 2

a) Provide correlation table for variables

```
libname estim 'C:\Users\Hoang\Dropbox\Final\data';

%let ticker_name = WHR;

data &ticker_name;
set estim.estim_&ticker_name;
run;

ods html body='ttest.htm' style=HTMLBlue;
proc corr data=&ticker_name;
   var  sigma_d A_d s_d es_d res_d lambda1_d lambda2_d
        psi1_d psi2_d rho_d gamma_d;
run;
ods html close;
```

b) Fit four regressions separately for each stock

c) Run regressions for each stock

```
libname estim 'C:\Users\Hoang\Dropbox\Final\data';

%let ticker_name = WHR;

data &ticker_name;
set estim.estim_&ticker_name;
r_d = log(p_d/lag(p_d));
w_d = log(m_d/lag(m_d));
lag_y = lag(y_d);
lag_z = lag(z_d);
log_dv = log(DV_d);
log_p = log(p_d);
run;

proc reg data=&ticker_name;
model1: model r_d = y_d lag_y;
model2: model r_d = z_d lag_z;
model3: model w_d = y_d lag_y;
model4: model w_d = z_d lag_z;
model5: model s_d = log_dv sigma_d log_p;
model6: model es_d = log_dv sigma_d log_p;
model7: model res_d = log_dv sigma_d log_p;
run;quit;
```

Result:

WHR

a)

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	sigma_d	A_d	s_d	es_d	res_d	lambda1_d	lambda2_d	psi1_d	psi2_d	rho_d	gamma_d
sigma_d	1.00000	0.55264	0.72322	0.15942	0.15757	0.33442	0.36784	0.12031	0.21368	0.21419	0.07018
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0063
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
A_d	0.55264	1.00000	0.07899	-0.02556	0.12880	0.55431	0.77222	0.31502	0.51093	0.28114	0.03433
	<.0001		0.0022	0.3208	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.1822
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
s_d	0.72322	0.07899	1.00000	0.21270	0.08812	0.20283	0.04535	0.02832	-0.01412	0.19685	0.04155
	<.0001	0.0022		<.0001	0.0006	<.0001	0.0793	0.2734	0.5850	<.0001	0.1079
	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498
es_d	0.15942	-0.02556	0.21270	1.00000	0.89035	-0.00524	-0.05119	0.01075	-0.01824	0.08920	0.07630
	<.0001	0.3208	<.0001		<.0001	0.8386	0.0467	0.6762	0.4787	0.0005	0.0030
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
res_d	0.15757	0.12880	0.08812	0.89035	1.00000	0.04487	0.06730	0.04647	0.06004	0.09990	0.08240
	<.0001	<.0001	0.0006	<.0001		0.0812	0.0089	0.0709	0.0196	0.0001	0.0013
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
lambda1_d	0.33442	0.55431	0.20283	-0.00524	0.04487	1.00000	0.87595	0.53949	0.57695	0.26423	0.00452
	<.0001	<.0001	<.0001	0.8386	0.0812		<.0001	<.0001	<.0001	<.0001	0.8606
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
lambda2_d	0.36784	0.77222	0.04535	-0.05119	0.06730	0.87595	1.00000	0.46558	0.64256	0.24848	0.00428
	<.0001	<.0001	0.0793	0.0467	0.0089	<.0001		<.0001	<.0001	<.0001	0.8681
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
psi1_d	0.12031	0.31502	0.02832	0.01075	0.04647	0.53949	0.46558	1.00000	0.89824	0.17431	0.04111
	<.0001	<.0001	0.2734	0.6762	0.0709	<.0001	<.0001		<.0001	<.0001	0.1102
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
psi2_d	0.21368	0.51093	-0.01412	-0.01824	0.06004	0.57695	0.64256	0.89824	1.00000	0.19056	0.03147
	<.0001	<.0001	0.5850	0.4787	0.0196	<.0001	<.0001	<.0001		<.0001	0.2215
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
rho_d	0.21419	0.28114	0.19685	0.08920	0.09990	0.26423	0.24848	0.17431	0.19056	1.00000	0.82524
AR Factor 1, Parameter 1	<.0001	<.0001	<.0001	0.0005	0.0001	<.0001	<.0001	<.0001	<.0001		<.0001
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511
gamma_d	0.07018	0.03433	0.04155	0.07630	0.08240	0.00452	0.00428	0.04111	0.03147	0.82524	1.00000
MA Factor 1, Parameter 1	0.0063	0.1822	0.1079	0.0030	0.0013	0.8606	0.8681	0.1102	0.2215	<.0001	
	1511	1511	1498	1511	1511	1511	1511	1511	1511	1511	1511

b) Regression

Model 1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00058850	0.00029425	0.42	0.6539
Error	1494	1.03452	0.00069245		
Corrected Total	1496	1.03511			

Root MSE	0.02631	R-Square	0.0006
Dependent Mean	0.00003319	Adj R-Sq	-0.0008
Coeff Var	79275		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00003299	0.00068717	-0.05	0.9617
y_d	1	-0.00000703	0.00017508	-0.04	0.9680
lag_y	1	-0.00016058	0.00017428	-0.92	0.3570

Model 2

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00052202	0.00026101	0.38	0.6860
Error	1494	1.03458	0.00069249		
Corrected Total	1496	1.03511			

Root MSE	0.02632	R-Square	0.0005
Dependent Mean	0.00003319	Adj R-Sq	-0.0008
Coeff Var	79278		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00002714	0.00068651	-0.04	0.9685
z_d	1	-1.29441E-7	0.00000221	-0.06	0.9533
lag_z	1	-0.00000191	0.00000220	-0.87	0.3861

Model 3

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00058564	0.00029282	0.42	0.6555
Error	1494	1.03555	0.00069314		
Corrected Total	1496	1.03613			

Root MSE	0.02633	R-Square	0.0006
Dependent Mean	0.00003423	Adj R-Sq	-0.0008
Coeff Var	76908		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00003367	0.00068751	-0.05	0.9609
y_d	1	-0.00001200	0.00017517	-0.07	0.9454
lag_y	1	-0.00015994	0.00017437	-0.92	0.3591

Model 4

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00051959	0.00025980	0.37	0.6875
Error	1494	1.03561	0.00069318		
Corrected Total	1496	1.03613			

Root MSE	0.02633	R-Square	0.0005
Dependent Mean	0.00003423	Adj R-Sq	-0.0008
Coeff Var	76910		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00002762	0.00068685	-0.04	0.9679
z_d	1	-1.88961E-7	0.00000221	-0.09	0.9320
lag_z	1	-0.00000190	0.00000220	-0.86	0.3885

c) Regression

Model 5

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.01882	0.00627	1718.40	<.0001
Error	1493	0.00545	0.00000365		
Corrected Total	1496	0.02427			

Root MSE	0.00191	R-Square	0.7754
Dependent Mean	0.00638	Adj R-Sq	0.7750
Coeff Var	29.94122		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.02761	0.00101	-27.41	<.0001
log_dv	1	-0.00085958	0.00011644	-7.38	<.0001
sigma_d	1	19.78960	0.30302	65.31	<.0001
log_p	1	0.00825	0.00022387	36.85	<.0001

Model 6

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.20385	0.06795	33.08	<.0001
Error	1493	3.06681	0.00205		
Corrected Total	1496	3.27065			

Root MSE	0.04532	R-Square	0.0623
Dependent Mean	0.04260	Adj R-Sq	0.0604
Coeff Var	106.38673		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.15056	0.02390	-6.30	<.0001
log_dv	1	0.00851	0.00276	3.08	0.0021
sigma_d	1	62.66714	7.18811	8.72	<.0001
log_p	1	0.02045	0.00531	3.85	0.0001

Model 7

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.00004320	0.00001440	17.32	<.0001
Error	1493	0.00124	8.313093E-7		
Corrected Total	1496	0.00128			

Root MSE	0.00091176	R-Square	0.0336
Dependent Mean	0.00062990	Adj R-Sq	0.0317
Coeff Var	144.74785		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00029600	0.00048076	0.62	0.5382
log_dv	1	0.00016770	0.00005557	3.02	0.0026
sigma_d	1	0.82650	0.14460	5.72	<.0001
log_p	1	-0.00037801	0.00010683	-3.54	0.0004

MOT

a)

Pearson Correlation Coefficients, N = 1511
Prob > |r| under H0: Rho=0

	sigma_d	A_d	s_d	es_d	res_d	lambda1_d	lambda2_d	psi1_d	psi2_d	rho_d	gamma_d
sigma_d	1.00000	0.96329 <.0001	0.99622 <.0001	0.73897 <.0001	0.76213 <.0001	0.49265 <.0001	0.33729 <.0001	0.24756 <.0001	0.25603 <.0001	-0.06832 0.0079	0.51760 <.0001
A_d	0.96329 <.0001	1.00000	0.94792 <.0001	0.70831 <.0001	0.74963 <.0001	0.55802 <.0001	0.45741 <.0001	0.25722 <.0001	0.28582 <.0001	-0.00842 0.7435	0.46122 <.0001
s_d	0.99622 <.0001	0.94792 <.0001	1.00000	0.72990 <.0001	0.75166 <.0001	0.48310 <.0001	0.31929 <.0001	0.23522 <.0001	0.24173 <.0001	-0.07708 0.0027	0.52740 <.0001
es_d	0.73897 <.0001	0.70831 <.0001	0.72990 <.0001	1.00000	0.98775 <.0001	0.53934 <.0001	0.34823 <.0001	0.20068 <.0001	0.22946 <.0001	-0.06067 0.0184	0.38564 <.0001
res_d	0.76213 <.0001	0.74963 <.0001	0.75166 <.0001	0.98775 <.0001	1.00000	0.58800 <.0001	0.42537 <.0001	0.21468 <.0001	0.25294 <.0001	-0.00155 0.9521	0.38652 <.0001
lambda1_d	0.49265 <.0001	0.55802 <.0001	0.48310 <.0001	0.53934 <.0001	0.58800 <.0001	1.00000	0.87264 <.0001	0.36452 <.0001	0.42401 <.0001	0.09576 0.0002	0.17465 <.0001
lambda2_d	0.33729 <.0001	0.45741 <.0001	0.31929 <.0001	0.34823 <.0001	0.42537 <.0001	0.87264 <.0001	1.00000	0.27057 <.0001	0.37007 <.0001	0.25772 <.0001	0.07568 0.0032
psi1_d	0.24756 <.0001	0.25722 <.0001	0.23522 <.0001	0.20068 <.0001	0.21468 <.0001	0.36452 <.0001	0.27057 <.0001	1.00000	0.97752 <.0001	0.02650 0.3033	0.12020 <.0001
psi2_d	0.25603 <.0001	0.28582 <.0001	0.24173 <.0001	0.22946 <.0001	0.25294 <.0001	0.42401 <.0001	0.37007 <.0001	0.97752 <.0001	1.00000	0.06359 0.0134	0.10693 <.0001
rho_d AR Factor 1, Parameter 1	-0.06832 0.0079	-0.00842 0.7435	-0.07708 0.0027	-0.06067 0.0184	-0.00155 0.9521	0.09576 0.0002	0.25772 <.0001	0.02650 0.3033	0.06359 0.0134	1.00000	-0.15165 <.0001
gamma_d MA Factor 1, Parameter 1	0.51760 <.0001	0.46122 <.0001	0.52740 <.0001	0.38564 <.0001	0.38652 <.0001	0.17465 <.0001	0.07568 0.0032	0.12020 <.0001	0.10693 <.0001	-0.15165 <.0001	1.00000

b)

Model 1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00059787	0.00029893	0.18	0.8334
Error	1507	2.47184	0.00164		
Corrected Total	1509	2.47244			

Root MSE	0.04050	R-Square	0.0002
Dependent Mean	-0.00020388	Adj R-Sq	-0.0011
Coeff Var	-19865		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00020037	0.00104	-0.19	0.8476
y_d	1	-0.00001842	0.00003685	-0.50	0.6172
lag_y	1	-0.00001304	0.00003685	-0.35	0.7235

Model 2

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00059787	0.00029893	0.18	0.8334
Error	1507	2.47184	0.00164		
Corrected Total	1509	2.47244			

Root MSE	0.04050	R-Square	0.0002
Dependent Mean	-0.00020388	Adj R-Sq	-0.0011
Coeff Var	-19865		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00020037	0.00104	-0.19	0.8476
y_d	1	-0.00001842	0.00003685	-0.50	0.6172
lag_y	1	-0.00001304	0.00003685	-0.35	0.7235

Model 3

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00079548	0.00039774	0.24	0.7847
Error	1507	2.47165	0.00164		
Corrected Total	1509	2.47244			

Root MSE	0.04050	R-Square	0.0003
Dependent Mean	-0.00020388	Adj R-Sq	-0.0010
Coeff Var	-19864		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00019852	0.00104	-0.19	0.8490
z_d	1	-0.00000131	0.00000207	-0.64	0.5247
lag_z	1	-6.16842E-7	0.00000207	-0.30	0.7654

Model 4

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00547	0.00273	1.41	0.2447
Error	1507	2.92336	0.00194		
Corrected Total	1509	2.92883			

Root MSE	0.04404	R-Square	0.0019
Dependent Mean	-0.00020377	Adj R-Sq	0.0005
Coeff Var	-21615		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00019451	0.00113	-0.17	0.8638
y_d	1	-0.00001766	0.00004008	-0.44	0.6596
lag_y	1	-0.00006544	0.00004008	-1.63	0.1027

c)

Model 5

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	27.71636	9.23879	69483.5	<.0001
Error	1506	0.20024	0.00013296		
Corrected Total	1509	27.91660			

Root MSE	0.01153	R-Square	0.9928
Dependent Mean	0.04298	Adj R-Sq	0.9928
Coeff Var	26.82964		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.02102	0.00348	-6.04	<.0001
log_dv	1	0.00209	0.00063194	3.31	0.0010
sigma_d	1	6.32948	0.01607	393.83	<.0001
log_p	1	0.00065360	0.00120	0.55	0.5851

Model 6

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	10.48168	3.49389	588.27	<.0001
Error	1506	8.94449	0.00594		
Corrected Total	1509	19.42617			

Root MSE	0.07707	R-Square	0.5396
Dependent Mean	0.03922	Adj R-Sq	0.5386
Coeff Var	196.50707		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00055253	0.02324	0.02	0.9810
log_dv	1	0.00010520	0.00422	0.02	0.9801
sigma_d	1	3.90629	0.10741	36.37	<.0001
log_p	1	0.00431	0.00800	0.54	0.5902

Model 7

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.02289	0.00763	703.17	<.0001
Error	1506	0.01634	0.00001085		
Corrected Total	1509	0.03923			

Root MSE	0.00329	R-Square	0.5835
Dependent Mean	0.00227	Adj R-Sq	0.5826
Coeff Var	145.25976		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00318	0.00099324	3.20	0.0014
log_dv	1	0.00006651	0.00018052	0.37	0.7126
sigma_d	1	0.18052	0.00459	39.32	<.0001
log_p	1	-0.00105	0.00034193	-3.06	0.0023

AMAT

a)

Pearson Correlation Coefficients, N = 1511
Prob > |r| under H0: Rho=0

	sigma_d	A_d	s_d	es_d	res_d	lambda1_d	lambda2_d	psi1_d	psi2_d	rho_d	gamma_d
sigma_d	1.00000	0.42041 <.0001	0.84607 <.0001	0.34713 <.0001	0.41806 <.0001	0.19222 <.0001	0.20481 <.0001	-0.05606 0.0293	-0.05813 0.0238	-0.25887 <.0001	-0.03499 0.1740
A_d	0.42041 <.0001	1.00000	0.05988 0.0199	0.01892 0.4624	0.51759 <.0001	0.47804 <.0001	0.65707 <.0001	-0.09205 0.0003	-0.04095 0.1115	-0.01203 0.6405	-0.08570 0.0009
s_d	0.84607 <.0001	0.05988 0.0199	1.00000	0.43834 <.0001	0.22653 <.0001	0.06456 0.0121	-0.03788 0.1411	-0.00544 0.8328	-0.04475 0.0821	-0.48952 <.0001	0.12152 <.0001
es_d	0.34713 <.0001	0.01892 0.4624	0.43834 <.0001	1.00000	0.76881 <.0001	-0.09859 0.0001	-0.12057 <.0001	-0.12285 <.0001	-0.11045 <.0001	-0.25913 <.0001	0.01662 0.5186
res_d	0.41806 <.0001	0.51759 <.0001	0.22653 <.0001	0.76881 <.0001	1.00000	0.11099 <.0001	0.22581 <.0001	-0.17324 <.0001	-0.11759 <.0001	0.02169 0.3995	-0.06117 0.0174
lambda1_d	0.19222 <.0001	0.47804 <.0001	0.06456 0.0121	-0.09859 0.0001	0.11099 <.0001	1.00000	0.93771 <.0001	0.17380 <.0001	0.14083 <.0001	-0.13249 <.0001	-0.06376 0.0132
lambda2_d	0.20481 <.0001	0.65707 <.0001	-0.03788 0.1411	-0.12057 <.0001	0.22581 <.0001	0.93771 <.0001	1.00000	0.06838 0.0078	0.07873 0.0022	0.01518 0.5554	-0.10760 <.0001
psi1_d	-0.05606 0.0293	-0.09205 0.0003	-0.00544 0.8328	-0.12285 <.0001	-0.17324 <.0001	0.17380 <.0001	0.06838 0.0078	1.00000	0.95983 <.0001	-0.07503 0.0035	0.03432 0.1824
psi2_d	-0.05813 0.0238	-0.04095 0.1115	-0.04475 0.0821	-0.11045 <.0001	-0.11759 <.0001	0.14083 <.0001	0.07873 0.0022	0.95983 <.0001	1.00000	-0.01242 0.6295	0.01219 0.6360
rho_d AR Factor 1, Parameter 1	-0.25887 <.0001	-0.01203 0.6405	-0.48952 <.0001	-0.25913 <.0001	0.02169 0.3995	-0.13249 <.0001	0.01518 0.5554	-0.07503 0.0035	-0.01242 0.6295	1.00000	0.19340 <.0001
gamma_d MA Factor 1, Parameter 1	-0.03499 0.1740	-0.08570 0.0009	0.12152 <.0001	0.01662 0.5186	-0.06117 0.0174	-0.06376 0.0132	-0.10760 <.0001	0.03432 0.1824	0.01219 0.6360	0.19340 <.0001	1.00000

b)

Model 1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00020744	0.00010372	0.18	0.8344
Error	1507	0.86341	0.00057293		
Corrected Total	1509	0.86361			

Root MSE	0.02394	R-Square	0.0002
Dependent Mean	-0.00026374	Adj R-Sq	-0.0011
Coeff Var	-9075.65319		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00025793	0.00061670	-0.42	0.6758
y_d	1	0.00011150	0.00043136	0.26	0.7961
lag_y	1	-0.00023172	0.00043136	-0.54	0.5912

Model 2

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00053046	0.00026523	0.46	0.6294
Error	1507	0.86308	0.00057272		
Corrected Total	1509	0.86361			

Root MSE	0.02393	R-Square	0.0006
Dependent Mean	-0.00026374	Adj R-Sq	-0.0007
Coeff Var	-9073.95529		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00025469	0.00061665	-0.41	0.6797
z_d	1	0.00001094	0.00002524	0.43	0.6647
lag_z	1	-0.00002140	0.00002523	-0.85	0.3965

Model 3

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00019268	0.00009634	0.17	0.8438
Error	1507	0.85459	0.00056708		
Corrected Total	1509	0.85478			

Root MSE	0.02381	R-Square	0.0002
Dependent Mean	-0.00026366	Adj R-Sq	-0.0011
Coeff Var	-9031.85442		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00025740	0.00061354	-0.42	0.6749
y_d	1	0.00009824	0.00042915	0.23	0.8190
lag_y	1	-0.00022770	0.00042915	-0.53	0.5958

Model 4

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00049818	0.00024909	0.44	0.6445
Error	1507	0.85428	0.00056688		
Corrected Total	1509	0.85478			

Root MSE	0.02381	R-Square	0.0006
Dependent Mean	-0.00026366	Adj R-Sq	-0.0007
Coeff Var	-9030.23990		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00025425	0.00061350	-0.41	0.6786
z_d	1	0.00001011	0.00002511	0.40	0.6871
lag_z	1	-0.00002099	0.00002511	-0.84	0.4032

c)

Model 5

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.00070982	0.00023661	4708.79	<.0001
Error	1506	0.00007567	5.024798E-8		
Corrected Total	1509	0.00078550			

Root MSE	0.00022416	R-Square	0.9037
Dependent Mean	0.00132	Adj R-Sq	0.9035
Coeff Var	16.96338		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00455	0.00012230	-37.21	<.0001
log_dv	1	0.00013892	0.00002406	5.77	<.0001
sigma_d	1	4.62054	0.04108	112.48	<.0001
log_p	1	0.00121	0.00005098	23.81	<.0001

Model 6

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.00618	0.00206	101.98	<.0001
Error	1506	0.03042	0.00002020		
Corrected Total	1509	0.03660			

Root MSE	0.00449	R-Square	0.1688
Dependent Mean	0.01246	Adj R-Sq	0.1672
Coeff Var	36.06113		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00893	0.00245	-3.64	0.0003
log_dv	1	0.00101	0.00048234	2.10	0.0363
sigma_d	1	13.14160	0.82361	15.96	<.0001
log_p	1	0.00316	0.00102	3.10	0.0020

Model 7

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.00004467	0.00001489	241.64	<.0001
Error	1506	0.00009280	6.162121E-8		
Corrected Total	1509	0.00013747			

Root MSE	0.00024824	R-Square	0.3249
Dependent Mean	0.00073991	Adj R-Sq	0.3236
Coeff Var	33.54973		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00191	0.00013544	14.09	<.0001
log_dv	1	0.00004757	0.00002664	1.79	0.0744
sigma_d	1	0.77290	0.04549	16.99	<.0001
log_p	1	-0.00063318	0.00005645	-11.22	<.0001

QCOM

a)

Pearson Correlation Coefficients, N = 1511
Prob > |r| under H0: Rho=0

	sigma_d	A_d	s_d	es_d	res_d	lambda1_d	lambda2_d	psi1_d	psi2_d	rho_d	gamma_d
sigma_d	1.00000	0.66847 <.0001	0.90961 <.0001	0.36867 <.0001	0.34030 <.0001	0.28946 <.0001	0.27212 <.0001	0.05464 0.0337	0.02792 0.2781	-0.22271 <.0001	0.25107 <.0001
A_d	0.66847 <.0001	1.00000	0.45546 <.0001	0.22710 <.0001	0.29426 <.0001	0.34000 <.0001	0.43168 <.0001	0.00384 0.8814	0.00253 0.9217	-0.39804 <.0001	0.19857 <.0001
s_d	0.90961 <.0001	0.45546 <.0001	1.00000	0.36801 <.0001	0.25428 <.0001	0.34137 <.0001	0.22769 <.0001	0.11947 <.0001	0.06078 0.0181	-0.18439 <.0001	0.38047 <.0001
es_d	0.36867 <.0001	0.22710 <.0001	0.36801 <.0001	1.00000	0.95574 <.0001	0.02212 0.3902	-0.04026 0.1178	-0.00359 0.8890	-0.02888 0.2619	-0.09359 0.0003	0.15658 <.0001
res_d	0.34030 <.0001	0.29426 <.0001	0.25428 <.0001	0.95574 <.0001	1.00000	-0.04220 0.1010	-0.02375 0.3562	-0.06270 0.0148	-0.05979 0.0201	-0.06654 0.0097	0.03399 0.1866
lambda1_d	0.28946 <.0001	0.34000 <.0001	0.34137 <.0001	0.02212 0.3902	-0.04220 0.1010	1.00000	0.93845 <.0001	0.25249 <.0001	0.16881 <.0001	-0.10647 <.0001	0.39217 <.0001
lambda2_d	0.27212 <.0001	0.43168 <.0001	0.22769 <.0001	-0.04026 0.1178	-0.02375 0.3562	0.93845 <.0001	1.00000	0.14282 <.0001	0.09689 0.0002	-0.09491 0.0002	0.25216 <.0001
psi1_d	0.05464 0.0337	0.00384 0.8814	0.11947 <.0001	-0.00359 0.8890	-0.06270 0.0148	0.25249 <.0001	0.14282 <.0001	1.00000	0.97726 <.0001	0.09817 0.0001	0.31494 <.0001
psi2_d	0.02792 0.2781	0.00253 0.9217	0.06078 0.0181	-0.02888 0.2619	-0.05979 0.0201	0.16881 <.0001	0.09689 0.0002	0.97726 <.0001	1.00000	0.11304 <.0001	0.25516 <.0001
rho_d AR Factor 1, Parameter 1	-0.22271 <.0001	-0.39804 <.0001	-0.18439 <.0001	-0.09359 0.0003	-0.06654 0.0097	-0.10647 <.0001	-0.09491 0.0002	0.09817 0.0001	0.11304 <.0001	1.00000	0.36329 <.0001
gamma_d MA Factor 1, Parameter 1	0.25107 <.0001	0.19857 <.0001	0.38047 <.0001	0.15658 <.0001	0.03399 0.1866	0.39217 <.0001	0.25216 <.0001	0.31494 <.0001	0.25516 <.0001	0.36329 <.0001	1.00000

b)

Model 1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00020302	0.00010151	0.12	0.8837
Error	1507	1.23764	0.00082126		
Corrected Total	1509	1.23784			

Root MSE	0.02866	R-Square	0.0002
Dependent Mean	0.00008522	Adj R-Sq	-0.0012
Coeff Var	33626		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00008138	0.00074054	0.11	0.9125
y_d	1	-0.00037691	0.00122	-0.31	0.7579
lag_y	1	0.00047560	0.00122	0.39	0.6974

Model 2

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00020376	0.00010188	0.12	0.8833
Error	1507	1.23764	0.00082126		
Corrected Total	1509	1.23784			

Root MSE	0.02866	R-Square	0.0002
Dependent Mean	0.00008522	Adj R-Sq	-0.0012
Coeff Var	33626		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00007718	0.00074040	0.10	0.9170
z_d	1	-0.00000793	0.00003102	-0.26	0.7982
lag_z	1	0.00001329	0.00003102	0.43	0.6684

Model 3

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00032928	0.00016464	0.20	0.8175
Error	1507	1.23103	0.00081688		
Corrected Total	1509	1.23136			

Root MSE	0.02858	R-Square	0.0003
Dependent Mean	0.00008540	Adj R-Sq	-0.0011
Coeff Var	33468		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00008119	0.00073856	0.11	0.9125
y_d	1	-0.00048972	0.00122	-0.40	0.6881
lag_y	1	0.00059786	0.00122	0.49	0.6240

Model 4

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.00032208	0.00016104	0.20	0.8211
Error	1507	1.23104	0.00081688		
Corrected Total	1509	1.23136			

Root MSE	0.02858	R-Square	0.0003
Dependent Mean	0.00008540	Adj R-Sq	-0.0011
Coeff Var	33468		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00007693	0.00073843	0.10	0.9170
z_d	1	-0.00001065	0.00003094	-0.34	0.7306
lag_z	1	0.00001629	0.00003094	0.53	0.5987

c)

Model 5

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.00674	0.00225	5586.41	<.0001
Error	1506	0.00060582	4.022718E-7		
Corrected Total	1509	0.00735			

Root MSE	0.00063425	R-Square	0.9175
Dependent Mean	0.00300	Adj R-Sq	0.9174
Coeff Var	21.14510		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.01523	0.00048104	-31.66	<.0001
log_dv	1	0.00018926	0.00007004	2.70	0.0070
sigma_d	1	14.56286	0.12426	117.20	<.0001
log_p	1	0.00351	0.00012461	28.18	<.0001

Model 6

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.09827	0.03276	137.15	<.0001
Error	1506	0.35968	0.00023883		
Corrected Total	1509	0.45795			

Root MSE	0.01545	R-Square	0.2146
Dependent Mean	0.02490	Adj R-Sq	0.2130
Coeff Var	62.05661		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.12672	0.01172	-10.81	<.0001
log_dv	1	0.01709	0.00171	10.01	<.0001
sigma_d	1	40.41951	3.02767	13.35	<.0001
log_p	1	-0.00446	0.00304	-1.47	0.1417

Model 7

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.00004515	0.00001505	108.15	<.0001
Error	1506	0.00020955	1.39141E-7		
Corrected Total	1509	0.00025469			

Root MSE	0.00037302	R-Square	0.1773
Dependent Mean	0.00057215	Adj R-Sq	0.1756
Coeff Var	65.19552		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.00065828	0.00028291	-2.33	0.0201
log_dv	1	0.00039777	0.00004119	9.66	<.0001
sigma_d	1	0.91841	0.07308	12.57	<.0001
log_p	1	-0.00071262	0.00007328	-9.72	<.0001