

```
In [1]: install.packages("plm")
install.packages("lmtest")
install.packages("xtable")
install.packages("plyr")
install.packages("car")
library(xtable)
#library(broom)
#library(knitr)
library(plm)
library(lmtest)
#library(tidyverse)
#library(plyr)
library(car)

library(lmtest)
```

```
Updating HTML index of packages in '.Library'
Making 'packages.html' ... done
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Making 'packages.html' ... done
Loading required package: zoo
```

Attaching package: 'zoo'

The following objects are masked from 'package:base':

as.Date, as.Date.numeric

Loading required package: carData

```
In [2]: getwd()
data <- read.csv("NYSE.csv", header = TRUE, sep = ",")

'/Users/haojuanhe/ECON140'
```

```
In [3]: install.packages("Hmisc")
library(Hmisc)
head(data)
```

```
Updating HTML index of packages in '.Library'
Making 'packages.html' ... done
Loading required package: lattice
Loading required package: survival
Loading required package: Formula
Loading required package: ggplot2
Registered S3 methods overwritten by 'ggplot2':
  method      from
[.quosures    rlang
c.quosures    rlang
print.quosures rlang
```

```
Attaching package: 'Hmisc'
```

```
The following objects are masked from 'package:xtable':
```

```
label, label<-
```

```
The following objects are masked from 'package:base':
```

```
format.pval, units
```

Date	Close	Return
11/22/2010	7610.30	-0.0040283
11/23/2010	7470.77	-0.0183343
11/24/2010	7579.26	0.0145219
11/26/2010	7500.54	-0.0103862
11/29/2010	7483.34	-0.0022932
11/30/2010	7430.94	-0.0070022

```
In [4]: data$return_t1 <- Lag(data$return,shift = -1)
#Lag(c(0,1,2,3,4,5,6,7,8), shift = 1)
data$return_tsquare <- data$return_t1^2
```

```
In [5]: head(data)
```

Date	Close	Return	return_t1	return_tsquare
11/22/2010	7610.30	-0.0040283	-0.0183343	3.361466e-04
11/23/2010	7470.77	-0.0183343	0.0145219	2.108856e-04
11/24/2010	7579.26	0.0145219	-0.0103862	1.078732e-04
11/26/2010	7500.54	-0.0103862	-0.0022932	5.258766e-06
11/29/2010	7483.34	-0.0022932	-0.0070022	4.903080e-05
11/30/2010	7430.94	-0.0070022	0.0232528	5.406927e-04

```
In [6]: fit_regular <- lm(Return ~ return_t1, data = data)
```

```
In [7]: summary(fit_regular)
deviance(fit_regular)
```

Call:

```
lm(formula = Return ~ return_t1, data = data)
```

Residuals:

Min	1Q	Median	3Q	Max
-0.112586	-0.004250	0.000412	0.005099	0.103717

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.0003354	0.0002182	1.537	0.124
return_t1	-0.1175191	0.0198070	-5.933	3.38e-09 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01094 on 2513 degrees of freedom

(1 observation deleted due to missingness)

Multiple R-squared: 0.01381, Adjusted R-squared: 0.01342

F-statistic: 35.2 on 1 and 2513 DF, p-value: 3.38e-09

0.30067383652467

```
In [8]: fit_regular1 <- lm(Return ~ return_t1 + return_tsquare, data = data)
summary(fit_regular1)
deviance(fit_regular1)
```

Call:

```
lm(formula = Return ~ return_t1 + return_tsquare, data = data)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-0.105802	-0.004305	0.000318	0.004976	0.106273

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.0006141	0.0002232	2.752	0.00597 **
return_t1	-0.1372960	0.0200429	-6.850	9.25e-12 ***
return_tsquare	-2.2483710	0.4202631	-5.350	9.59e-08 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01088 on 2512 degrees of freedom
(1 observation deleted due to missingness)

Multiple R-squared: 0.02492, Adjusted R-squared: 0.02415

F-statistic: 32.11 on 2 and 2512 DF, p-value: 1.706e-14

0.297286572632298

```
In [9]: install.packages("estimatr")
library(estimatr)
```

Updating HTML index of packages in '.Library'

Making 'packages.html' ... done

```
In [10]: fit_regular2 <- lm_robust(Return ~ return_t1, data = data)
summary(fit_regular2)
```

Call:

```
lm_robust(formula = Return ~ return_t1, data = data)
```

Standard error type: HC2

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	CI Lower	CI Upper
DF						
(Intercept)	0.0003354	0.0002177	1.541	0.12356	-9.152e-05	0.0007623
2513						
return_t1	-0.1175191	0.0575316	-2.043	0.04119	-2.303e-01	-0.0047048
2513						

Multiple R-squared: 0.01381, Adjusted R-squared: 0.01342

F-statistic: 4.173 on 1 and 2513 DF, p-value: 0.04119

```
In [11]: fit_regular2_fit <- c(fit_regular2$fitted.values)
#sqaured <- c(data$return - fit_regular2_fit)
same_1 <- head(data$return,-1)
temp <- c(same_1 - fit_regular2_fit)
squared <- temp^2
sum(squared)
```

0.30067383652467

```
In [12]: reg1_u2 <- residuals(fit_regular)^2
fix_1 <- append(reg1_u2,NA)
reg2_u2 <- residuals(fit_regular1)^2
fix_2 <- append(reg1_u2,NA)
data$reg1.u2 <- fix_1
data$reg2.u2 <- fix_2
head(data)
```

Date	Close	Return	return_t1	return_tsquare	reg1.u2	reg2.u2
11/22/2010	7610.30	-0.0040283	-0.0183343	3.361466e-04	4.248877e-05	4.248877e-05
11/23/2010	7470.77	-0.0183343	0.0145219	2.108856e-04	2.877471e-04	2.877471e-04
11/24/2010	7579.26	0.0145219	-0.0103862	1.078732e-04	1.681149e-04	1.681149e-04
11/26/2010	7500.54	-0.0103862	-0.0022932	5.258766e-06	1.208044e-04	1.208044e-04
11/29/2010	7483.34	-0.0022932	-0.0070022	4.903080e-05	1.191287e-05	1.191287e-05
11/30/2010	7430.94	-0.0070022	0.0232528	5.406927e-04	2.120569e-05	2.120569e-05

```
In [13]: residual_reg1 <- lm(reg1.u2 ~ return_t1, data = data)
summary(residual_reg1)
deviance(residual_reg1)
```

Call:

```
lm(formula = reg1.u2 ~ return_t1, data = data)
```

Residuals:

Min	1Q	Median	3Q	Max
-0.0002105	-0.0001154	-0.0000931	-0.0000338	0.0124218

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.188e-04	9.767e-06	12.161	< 2e-16 ***
return_t1	2.607e-03	8.866e-04	2.941	0.00331 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.0004896 on 2513 degrees of freedom
(1 observation deleted due to missingness)

Multiple R-squared: 0.003429, Adjusted R-squared: 0.003033

F-statistic: 8.647 on 1 and 2513 DF, p-value: 0.003305

0.000602409290699661

```
In [14]: residual_reg2 <- lm(reg2.u2 ~ return_t1 + return_tsquare, data = data)
summary(residual_reg2)
deviance(residual_reg2)
```

Call:

```
lm(formula = reg2.u2 ~ return_t1 + return_tsquare, data = data)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-0.0040240	-0.0000850	-0.0000489	-0.0000083	0.0111962

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	6.842e-05	9.078e-06	7.537	6.65e-14 ***
return_t1	6.180e-03	8.153e-04	7.580	4.83e-14 ***
return_tsquare	4.062e-01	1.709e-02	23.760	< 2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

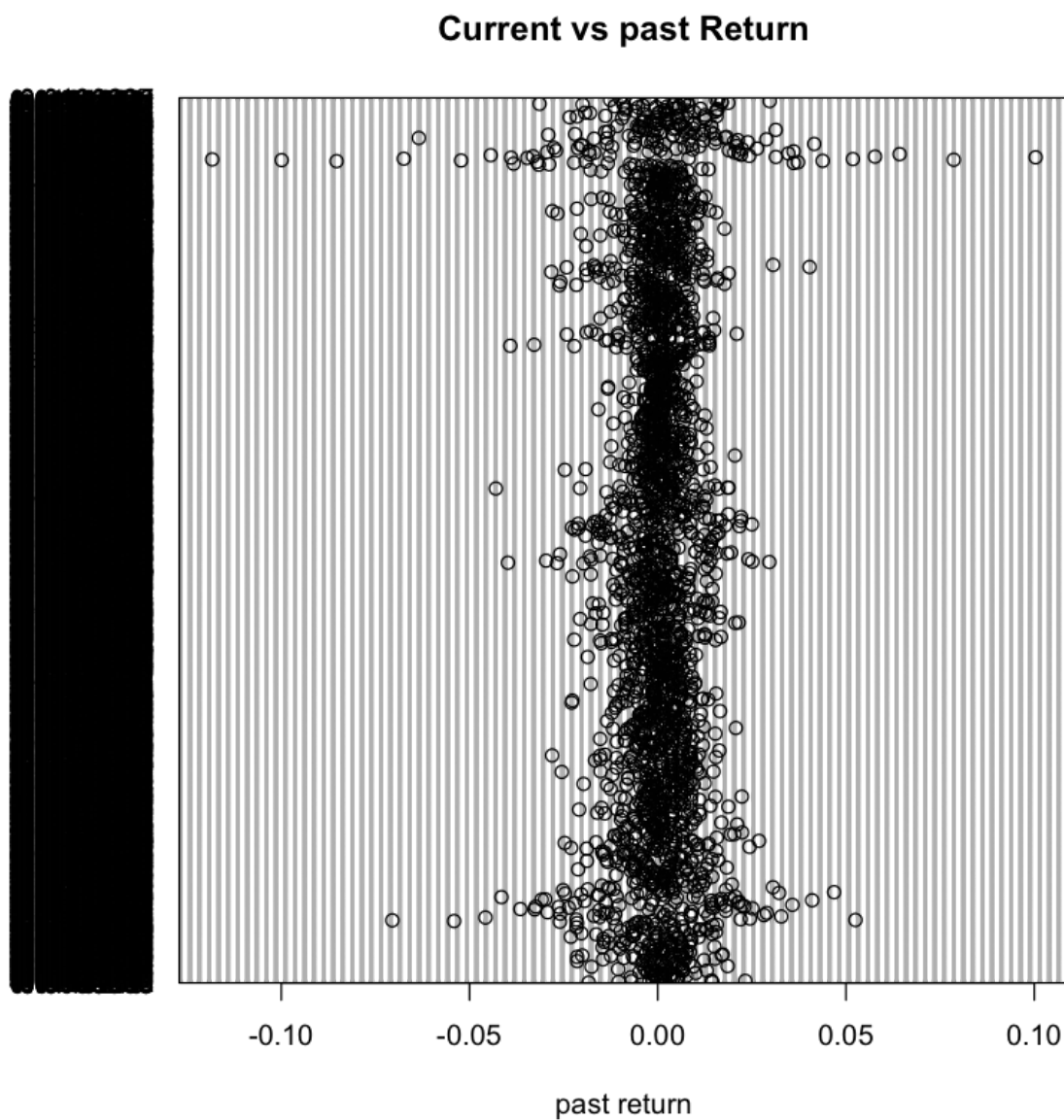
Residual standard error: 0.0004425 on 2512 degrees of freedom
(1 observation deleted due to missingness)

Multiple R-squared: 0.1863, Adjusted R-squared: 0.1857

F-statistic: 287.6 on 2 and 2512 DF, p-value: < 2.2e-16

0.000491868304024203

```
In [15]: dotchart(data$return_t1, labels=data$return, main="Current vs past Return", xl
```



```
In [16]: linearHypothesis(fit_regular1,c('return_tsquare=0'))
```

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
2513	0.3006738	NA	NA	NA	NA
2512	0.2972866	1	0.003387264	28.62156	9.594746e-08

```
In [17]: resettest(Return ~ return_t1 + return_tsquare, power=2,type=c('fitted'),dat
```

RESET test

```
data: Return ~ return_t1 + return_tsquare
RESET = 19.183, df1 = 1, df2 = 2511, p-value = 1.236e-05
```

```
In [27]: regression4_hx <- lm(log(data$reg1.u2) ~ return_t1, data = data)
reg4_gx <- regression4_hx$fitted.value
reg4.fitted_h <- exp(reg4_gx)
reg4.fitted_h
```

```
1 1.7126918912975e-05
2 1.40582040174635e-05
3 1.63281122875873e-05
4 1.55530135155311e-05
5 1.59994215902988e-05
6 1.33396242409231e-05
7 1.40793401520553e-05
8 1.48771680552329e-05
9 1.54702107176358e-05
10 1.53526574590387e-05
11 1.52134723285672e-05
12 1.49663000926244e-05
13 1.48602537824738e-05
14 1.50285043078875e-05
15 1.52792103025651e-05
16 1.60170164628039e-05
17 1.48578160687051e-05
```



```
In [48]: regression5_hx <- lm(log(data$reg2.u2) ~ return_t1 + return_tsquare, data =
reg5_gx <- regression5_hx$fitted.value
reg5.fitted_h <- exp(reg5_gx)
reg5.fitted_h
```

```
1 1.78850765379046e-05
2 1.68753876552438e-05
3 1.49013323177148e-05
4 1.3819413942985e-05
5 1.4244533536968e-05
6 2.2632300902483e-05
7 1.67661510100864e-05
8 1.42198256077536e-05
9 1.37989117980437e-05
10 1.38017947135207e-05
11 1.38549041106742e-05
12 1.40888613355236e-05
13 1.42476198593399e-05
14 1.40124878585174e-05
15 1.38229981952418e-05
16 1.42721685745024e-05
17 1.42517011111151e-05
```

```
In [63]: reg5.fitted_h1 <- append(reg5.fitted_h, NA)
reg1_newy <- data$Return/reg5.fitted_h1
WLG_reg1 <- lm(Return ~ return_t1, weights = 1/reg5.fitted_h1, data = data)
summary(WLG_reg1)
```

Call:

```
lm(formula = Return ~ return_t1, data = data, weights = 1/reg5.fitted_h1)
```

Weighted Residuals:

Min	1Q	Median	3Q	Max
-17.569	-1.127	0.042	1.285	17.534

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.0005067	0.0001926	2.630	0.00858 **
return_t1	-0.0479392	0.0235161	-2.039	0.04160 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.506 on 2513 degrees of freedom

(1 observation deleted due to missingness)

Multiple R-squared: 0.001651, Adjusted R-squared: 0.001254

F-statistic: 4.156 on 1 and 2513 DF, p-value: 0.0416

NULL

```
In [61]: #reg5.fitted_h1 <- append(reg5.fitted_h,NA)
#reg2_newy <- data$Return/reg5.fitted_h1
#WLG_reg1 <- lm(Return ~ return_t1 + return_tsquare, weights = 1/reg5.fitted_h1)
#summary(WLG_reg1)
```

In []:

In []: