

R Notebook

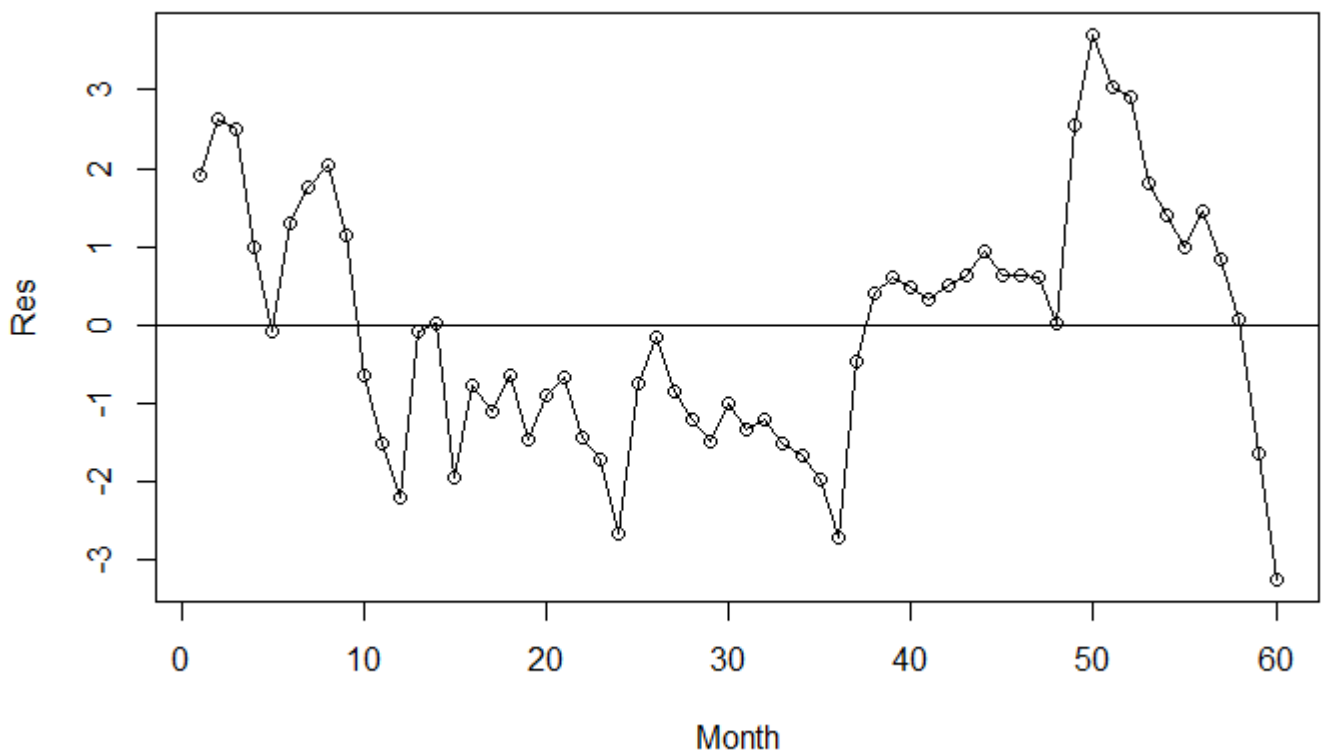
[Code ▾](#)

This is an R Markdown (<http://rmarkdown.rstudio.com>) Notebook. When you execute code within the notebook, the results appear beneath the code.

Try executing this chunk by clicking the *Run* button within the chunk or by placing your cursor inside it and pressing *Ctrl+Shift+Enter*.

[Hide](#)

```
library(openxlsx)
xlsxFile <- system.file("extdata","HW10_data.xlsx", package = "openxlsx")
df <- read.xlsx(xlsxFile = "HW10_data.xlsx", sheet = 1, skipEmptyRows = FALSE)
```

[Hide](#)

```
#a
linmod <- lm(metal~vendor, data=df)
res <- resid(linmod)
plot(df$time, res, ylab="Res", xlab="Month", type="o")
abline(0,0)
anova(linmod)
```

Analysis of Variance Table

Response: metal

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
vendor	1	426.72	426.72	168.83	< 2.2e-16 ***
Residuals	58	146.59	2.53		

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

Hide

```
#b
library(car)
durbinWatsonTest(linmod,max.lag=1,alternative="positive")
```

lag	Autocorrelation	D-W Statistic	p-value
1	0.772038	0.3592396	0

Alternative hypothesis: $\rho > 0$

Hide

```
#c&d
library(orcutt)
c <- cochrane.orcutt(linmod)
summary(c)
```

Call:

```
lm(formula = metal ~ vendor, data = df)
```

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	39.623789	5.958102	6.650	1.214e-08 ***
vendor	0.021390	0.012691	1.685	0.09737 .

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

Residual standard error: 0.6515 on 57 degrees of freedom

Multiple R-squared: 0.0475 , Adjusted R-squared: 0.0308

F-statistic: 2.8 on 1 and 57 DF, p-value: < 9.737e-02

Durbin-Watson statistic

(original): 0.35924 , p-value: 2.309e-17

(transformed): 1.86449 , p-value: 2.909e-01

Hide

```
install.packages("orcutt")
```

WARNING: Rtools is required to build R packages but is not currently installed. Please download and install the appropriate version of Rtools before proceeding:

<https://cran.rstudio.com/bin/windows/Rtools/>

Installing package into 'C:/Users/jrand/Documents/R/win-library/4.1'

(as 'lib' is unspecified)

also installing the dependencies 'zoo', 'lmtest'

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/zoo_1.8-10.zip'

Content type 'application/zip' length 1056582 bytes (1.0 MB)

downloaded 1.0 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/lmtest_0.9-40.zip'

Content type 'application/zip' length 415886 bytes (406 KB)

downloaded 406 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/orcutt_2.3.zip'

Content type 'application/zip' length 39389 bytes (38 KB)

downloaded 38 KB

package 'zoo' successfully unpacked and MD5 sums checked

package 'lmtest' successfully unpacked and MD5 sums checked

package 'orcutt' successfully unpacked and MD5 sums checked

The downloaded binary packages are in

C:\Users\jrand\AppData\Local\Temp\RtmpcNJEMK\downloaded_packages

Hide

```
# question 2
library(openxlsx)
xlsxFile <- system.file("extdata","HW10_data.xlsx", package = "openxlsx")
df <- read.xlsx(xlsxFile = "HW10_data.xlsx", sheet = 2, skipEmptyRows = FALSE)
#a
linmod <- lm(Share~Price, data=df)
summary(linmod)
```

Call:

```
lm(formula = Share ~ Price, data = df)
```

Residuals:

Min	1Q	Median	3Q	Max
-0.6403	-0.3767	0.1530	0.3318	0.5012

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	24.59405	1.20560	20.40	2.96e-11 ***
Price	-0.08918	0.01368	-6.52	1.94e-05 ***

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

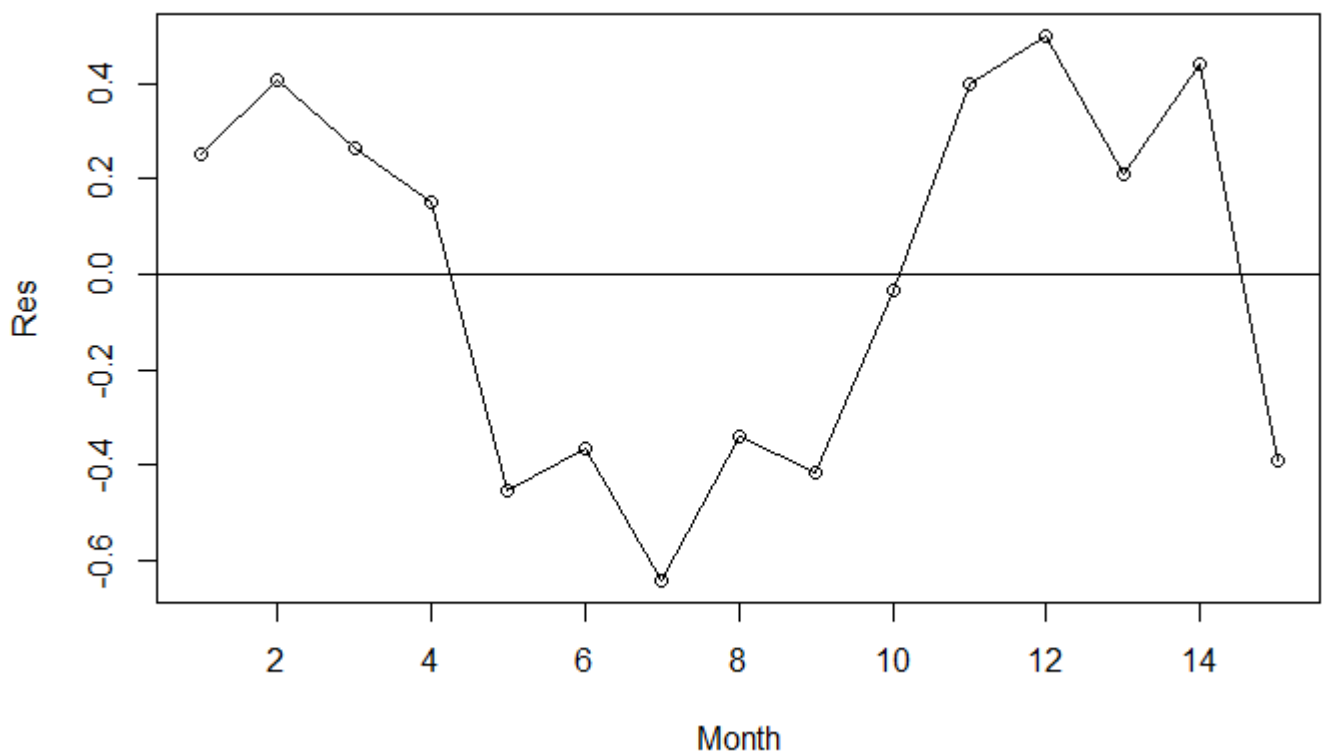
Residual standard error: 0.4077 on 13 degrees of freedom

Multiple R-squared: 0.7658, Adjusted R-squared: 0.7478

F-statistic: 42.51 on 1 and 13 DF, p-value: 1.943e-05

Hide

```
res <- resid(linmod)
plot(df$t, res, ylab="Res", xlab="Month", type="o")
abline(0,0)
```



Hide

```
anova(linmod)
```

Analysis of Variance Table

Response: Share

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Price	1	7.0656	7.0656	42.505	1.943e-05 ***
Residuals	13	2.1610	0.1662		

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

Hide

```
#b
library(car)
durbinWatsonTest(linmod,max.lag=1,alternative="positive")
```

lag	Autocorrelation	D-W Statistic	p-value
1	0.5410964	0.8182972	0.004

Alternative hypothesis: $\rho > 0$

Hide

```
#c&d
library(orcutt)
c <- cochrane.orcutt(linmod)
summary(c)
```

Call:

```
lm(formula = Share ~ Price, data = df)
```

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	26.611277	1.113022	23.909	1.719e-11 ***
Price	-0.115793	0.012955	-8.938	1.188e-06 ***

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

Residual standard error: 0.2999 on 12 degrees of freedom
Multiple R-squared: 0.8694 , Adjusted R-squared: 0.8585
F-statistic: 79.9 on 1 and 12 DF, p-value: < 1.188e-06

Durbin-Watson statistic
(original): 0.81830 , p-value: 1.563e-03
(transformed): 0.85205 , p-value: 1.243e-02

Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing *Ctrl+Alt+I*.

When you save the notebook, an HTML file containing the code and output will be saved alongside it (click the *Preview* button or press *Ctrl+Shift+K* to preview the HTML file).

The preview shows you a rendered HTML copy of the contents of the editor. Consequently, unlike *Knit*, *Preview* does not run any R code chunks. Instead, the output of the chunk when it was last run in the editor is displayed.