Lecture 13:
Lecture 14:
Gauss Markov Theorem

Given assumptions I-VI
OLS is minimum variance among all linear unbiased estimators

Efficient unbiased smallest variance

Given all 7 assumptions OLS
1. Unbiased
2. Min variance
3. Consistent
4. normally distributed

t-test test one coefficient versus F-test which is a joint test of all coefficients

T-test of slope coefficient.

HO: Beta=0
Ha: Beta ~=0

$$t_k = \frac{\left(\hat{\beta}_k - \beta_{Ho}\right)}{S.E.\left(\hat{\beta}_k\right)}$$

degrees of freedom = n-(k+1)

Critical value (Tcrit) for T with large degrees of freedom at the 5% level is 1.96

confidence interval = $\hat{\beta}_k + t_{crit}(S.E.(\hat{\beta}_k))$

Don't misuse t-scores. They are only a test of statistical significance, not economic importance

F-test
HO: Beta_1=Beta_2=..=Beta_k=0
HA: HO not true

$$F = \frac{ESS/k}{RSS/(n-(k+1))}$$

Examples:

From Before:

```
COMMENT lets run our second regression adding yearsdg.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R /*I've removed the ANOVA from the default */
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT salary
  /METHOD=ENTER market yearsdg.
```

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.824[a]	.680	.678	7187.88271

a. Predictors: (Constant), yearsdg, market

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.599E10	2	2.799E10	541.813	.000[a]
	Residual	2.640E10	511	5.167E7		
	Total	8.239E10	513			

a. Predictors: (Constant), yearsdg, market

b. Dependent Variable: salary

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1685.118	2153.797		-.782	.434
	market	39630.458	2131.883	.467	18.589	.000
	yearsdg	979.458	34.221	.719	28.622	.000

a. Dependent Variable: salary

A t-test of the slope coefficients for the previous regression would go as follows.

For the coefficient on the market variable

$$t_k = \frac{\left(\hat{\beta}_k - \beta_{H_0}\right)}{S.E.\left(\hat{\beta}_k\right)}$$

T= (39630.458-0)/(2131.883) = 18.589 Which is greater than 1.96 so reject HO

For the coefficient on the yearsdg variable

T= (979.458-0)/(34.221) = 28.622 Which is greater than 1.96 so reject HO

Remember the F Test

$$F = \frac{ESS/k}{RSS/(n-(k+1))}$$

F=(5.599E10/2)/(2.640E10/(513-(2+1))) = 541.83

Lecture 15: October 22
EXAM I Chapter 16, 1-5