OLS Examples

OLS Regression

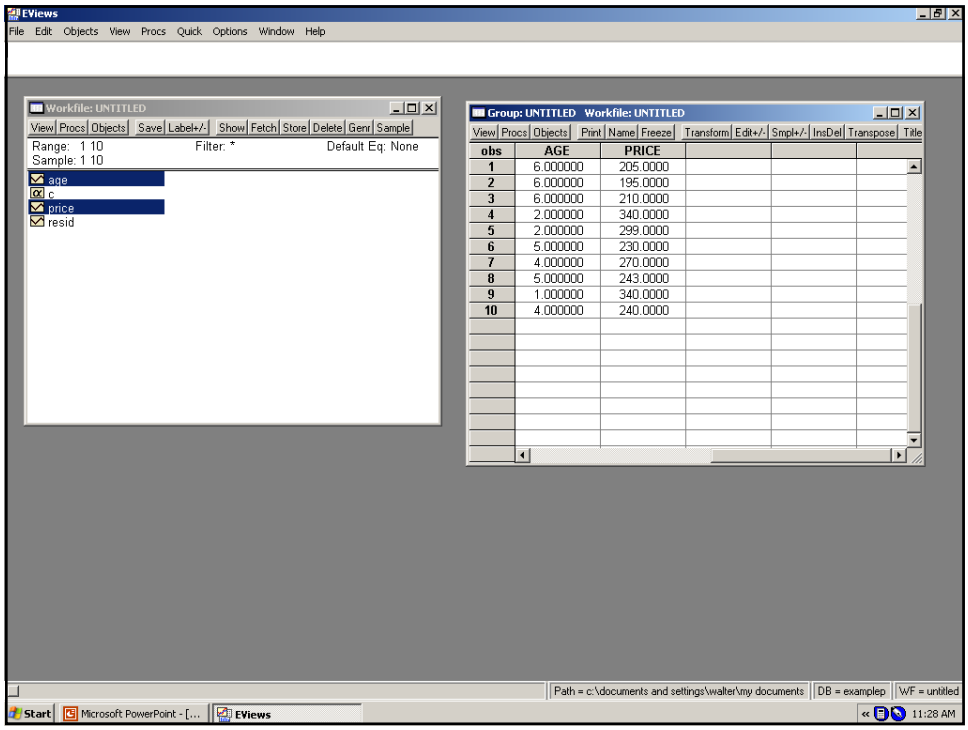
- Problem
  - The *Kelley Blue Book* provides information on wholesale and retail prices of cars. Following are age and price data for 10 randomly selected Corvettes between 1 and 6 years old. Here, age is in years, and price is in hundreds of dollars.

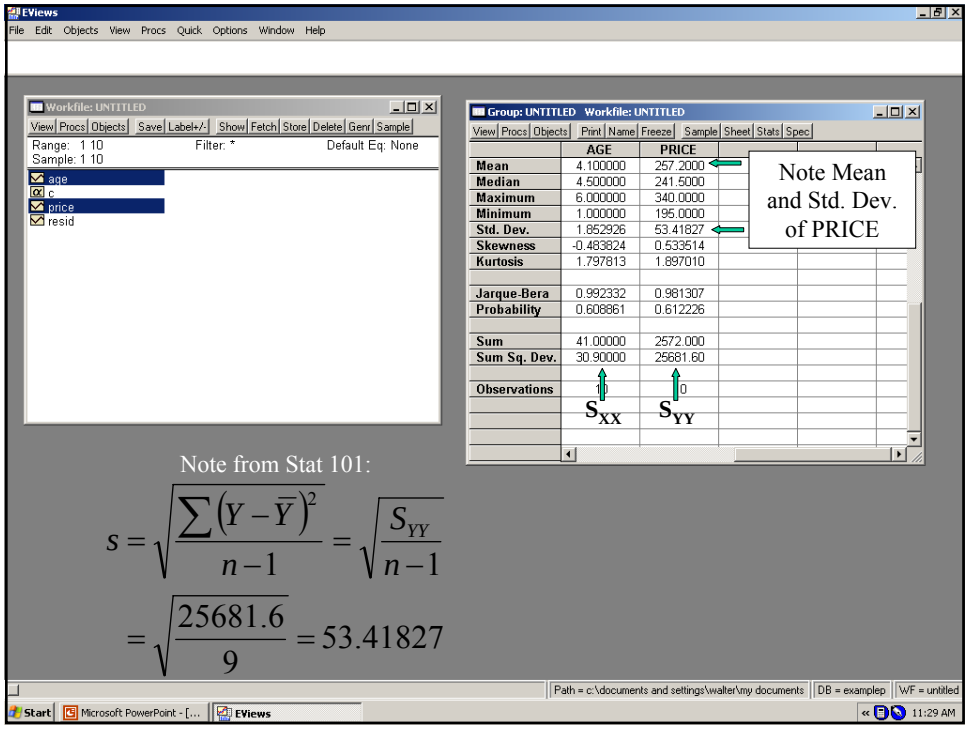
age	6	6	6	2	2	5	4	5	1	4
price	205	195	210	340	299	230	270	243	340	240

OLS Regression

Coding Sheet for Corvette Data			
Variable	**Possible Values**	**Source**	**Mnemonic**
Age of Corvettes	Years	Kelley Blue Book, various issued	age
Price of Corvettes	Hundred of Dollars, Nominal	IBID.	price

Page 3

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Filter: *
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age
c
price
resid
Group: UNTITLED Workfile: UNTITLED
View Procs Objects Print Name Freeze Sample Sheet Stats Spec
AGE PRICE
Mean 4.100000 257.2000
Median 4.500000 241.5000
Maximum 6.000000 340.0000
Minimum 1.000000 195.0000
Std. Dev. 1.852926 53.41827
Skewness -0.483824 0.533514
Kurtosis 1.797813 1.897010
Jarque-Bera 0.992332 0.981307
Probability 0.608861 0.612226
Sum 41.00000 2572.000
Sum Sq. Dev. 30.90000 25681.60
Observations 10 10
Note Mean and Std. Dev. of PRICE
S_{XX}
S_{YY}
Note from Stat 101:
$s = \sqrt{\frac{\sum (Y - \bar{Y})^2}{n-1}} = \sqrt{\frac{S_{YY}}{n-1}}$
$= \sqrt{\frac{25681.6}{9}} = 53.41827$
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EViews
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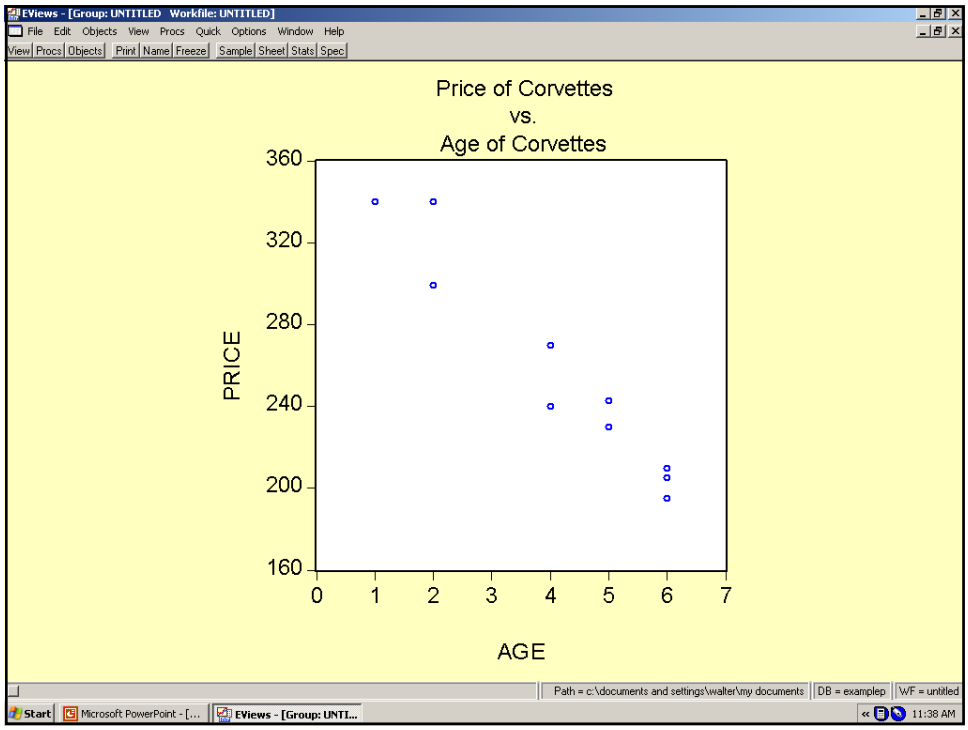
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File Edit Objects View Procs Quick Options Window Help
View Procs Objects Print Name Freeze Sample Sheet Stats Spec
Price of Corvettes
vs.
Age of Corvettes
PRICE
360
320
280
240
200
160
0 1 2 3 4 5 6 7
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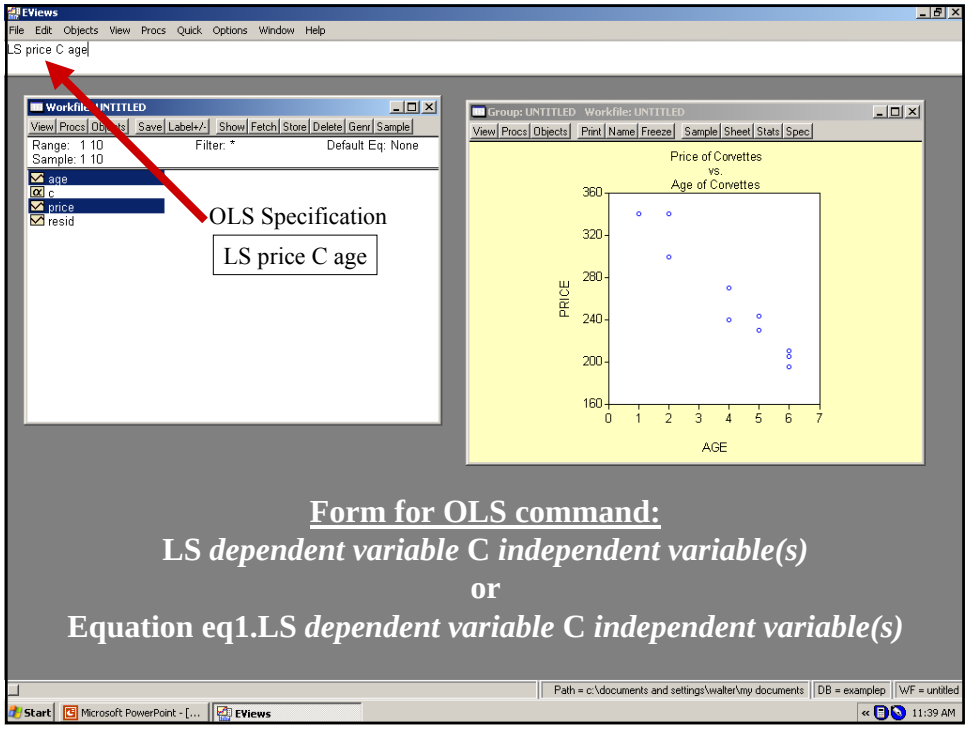
EViews
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LS price C age
Workfile: UNTITLED
View Procs Objects Save Label+/- Show Fetch Store Delete Genr Sample
Range: 1 10
Sample: 1 10
Filter: *
Default Eq: None
age
c
price
resid
OLS Specification
LS price C age
Group: UNTITLED Workfile: UNTITLED
View Procs Objects Print Name Freeze Sample Sheet Stats Spec
Price of Corvettes
vs.
Age of Corvettes
PRICE
AGE
360
320
280
240
200
160
0 1 2 3 4 5 6 7
Form for OLS command:
LS dependent variable C independent variable(s)
or
Equation eq1.LS dependent variable C independent variable(s)
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WF = untitled
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EViews
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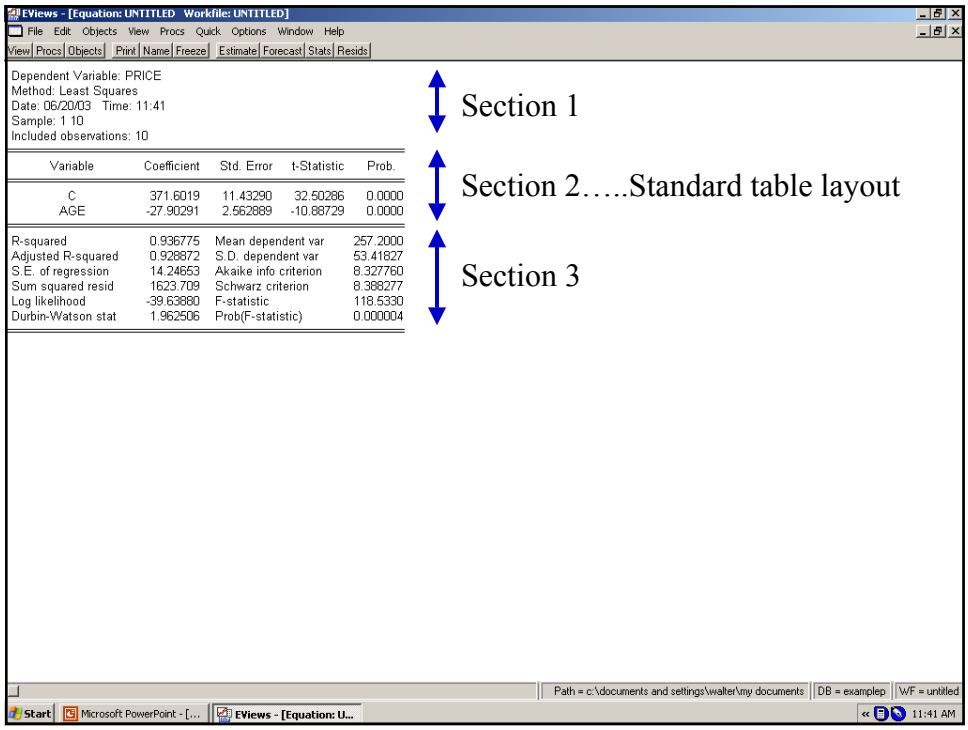
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File Edit Objects View Procs Quick Options Window Help
View Procs Objects Print Name Freeze Estimate Forecast Stats Resids
Dependent Variable: PRICE
Method: Least Squares
Date: 06/20/03 Time: 11:41
Sample: 1 10
Included observations: 10
Variable Coefficient Std. Error t-Statistic Prob.
C 371.6019 11.43290 32.50286 0.0000
AGE -27.90291 2.562889 -10.88729 0.0000
R-squared 0.936775 Mean dependent var 257.2000
Adjusted R-squared 0.928872 S.D. dependent var 53.41827
S.E. of regression 14.24653 Akaike info criterion 8.327760
Sum squared resid 1623.709 Schwarz criterion 8.388277
Log likelihood -39.63880 F-statistic 118.5330
Durbin-Watson stat 1.962506 Prob(F-statistic) 0.000004
Section 1
Section 2…..Standard table layout
Section 3
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WF = untitled
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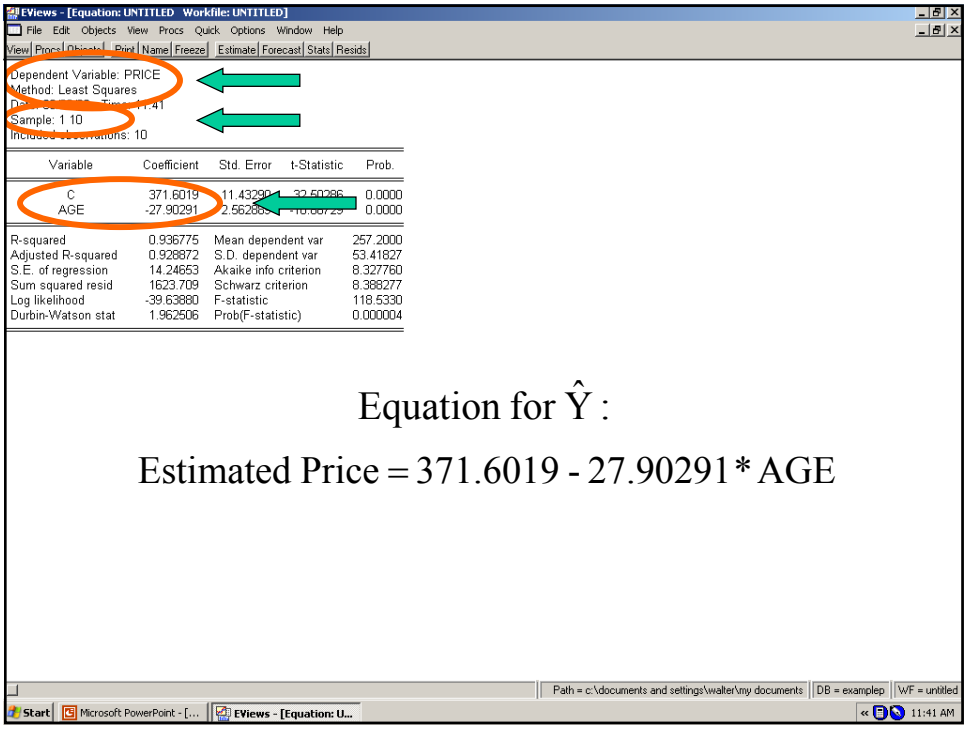
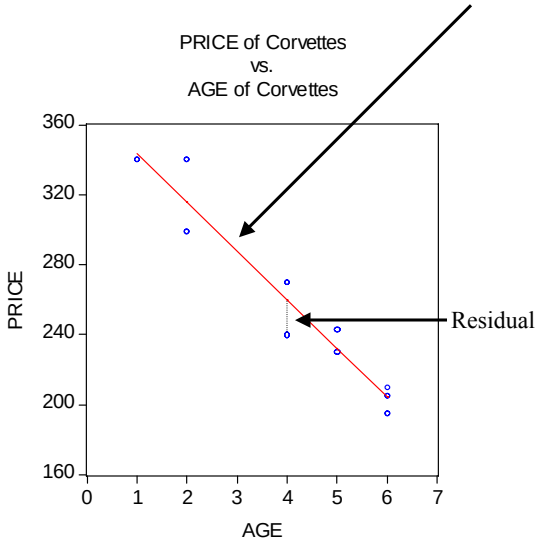
EViews - [Equation: U...
11:41 AM



Equation for $\hat{Y}$:

Estimated Price = 371.6019 - 27.90291 * AGE

Estimated Price = 371.6019 - 27.90291 * AGE



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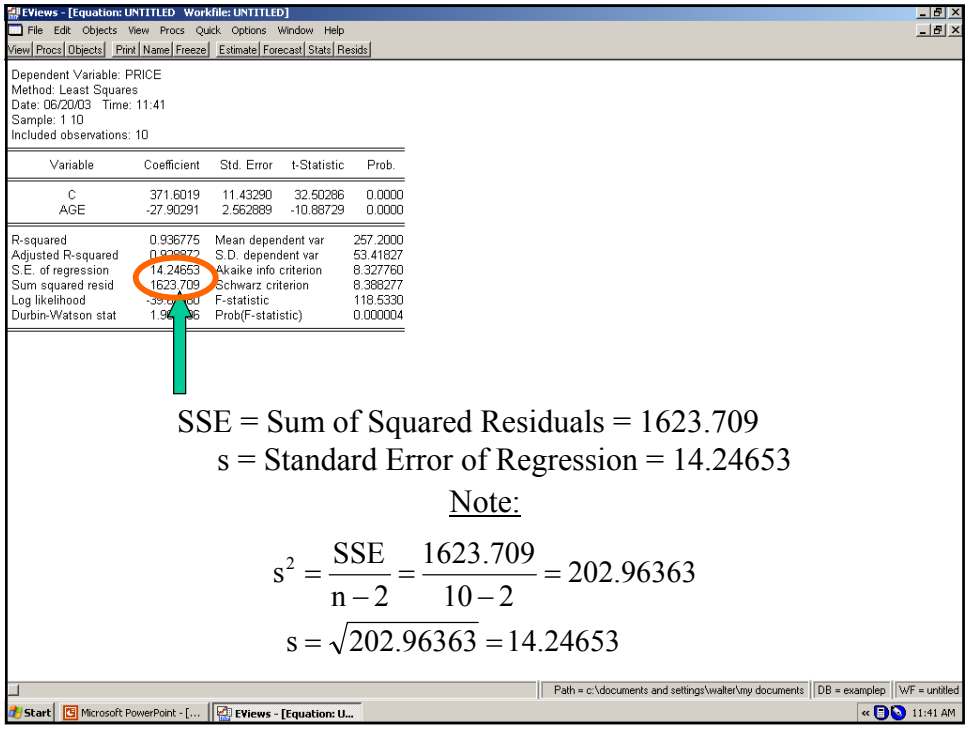


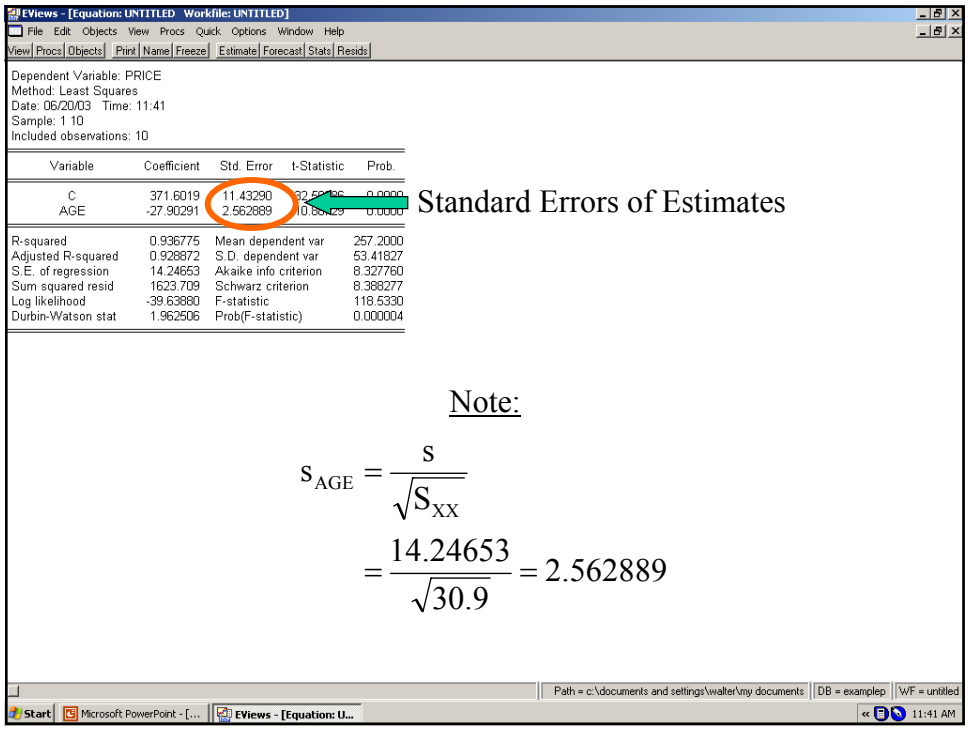
SSE = Sum of Squared Residuals = 1623.709

s = Standard Error of Regression = 14.24653

Note:

$$s^2 = \frac{SSE}{n-2} = \frac{1623.709}{10-2} = 202.96363$$

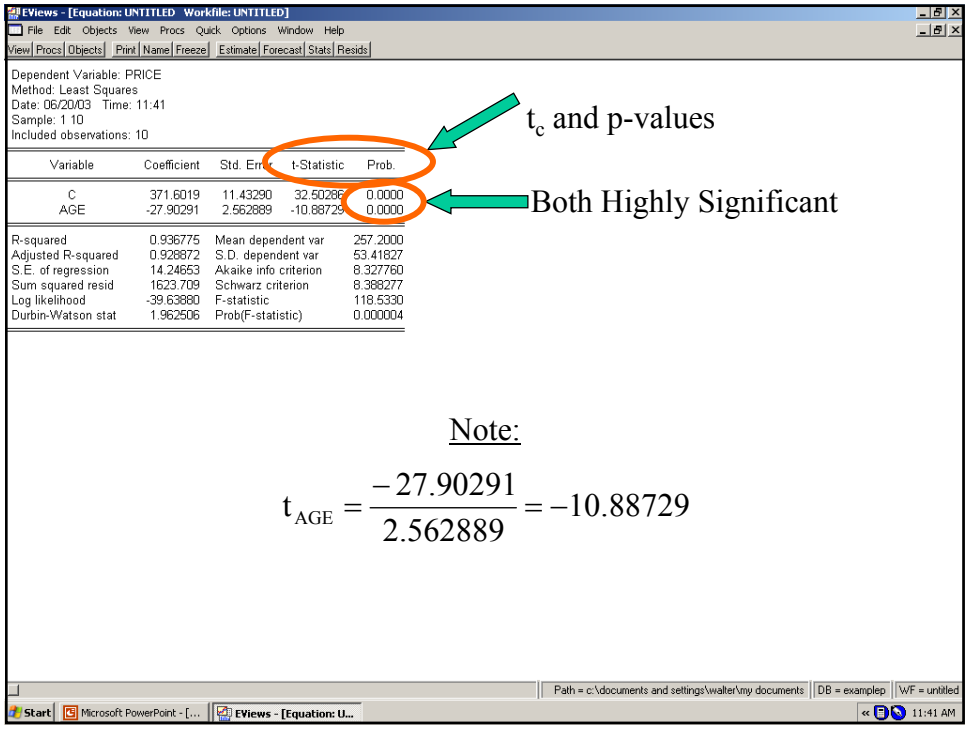
$$s = \sqrt{202.96363} = 14.24653$$



Standard Errors of Estimates

Note:

$$s_{AGE} = \frac{s}{\sqrt{S_{XX}}} = \frac{14.24653}{\sqrt{30.9}} = 2.562889$$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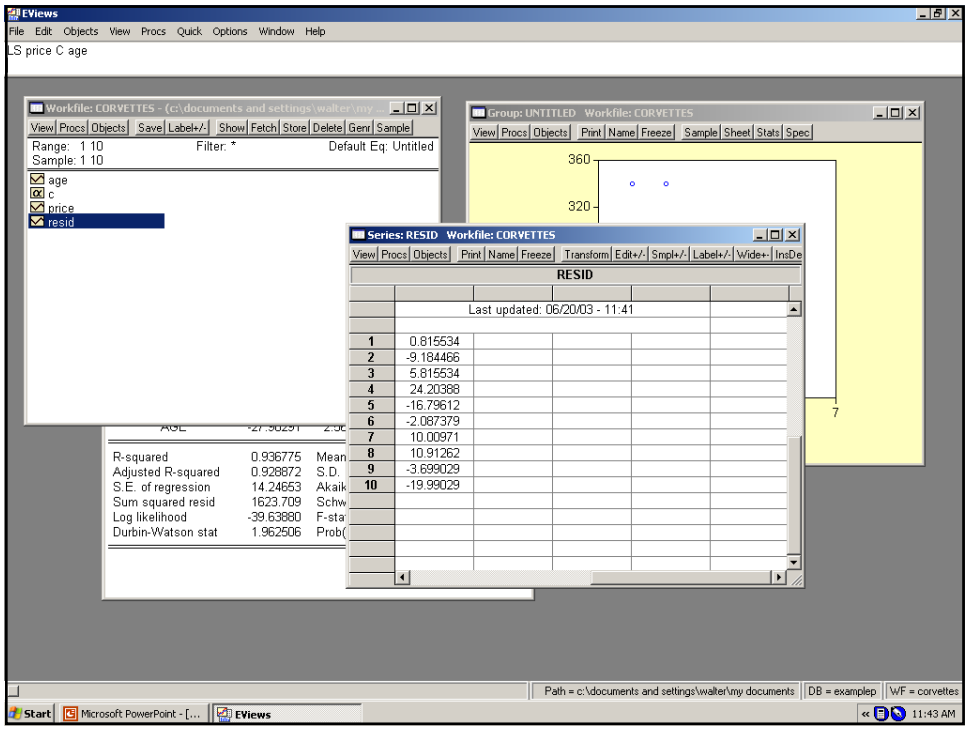
Dependent Variable: PRICE
Method: Least Squares
Date: 06/20/03 Time: 11:41
Sample: 1 10
Included observations: 10
Variable Coefficient Std. Err t-Statistic Prob.
C 371.6019 11.43290 32.50286 0.0000
AGE -27.90291 2.562889 -10.88729 0.0000
R-squared 0.936775 Mean dependent var 257.2000
Adjusted R-squared 0.928872 S.D. dependent var 53.41827
S.E. of regression 14.24653 Akaike info criterion 8.327760
Sum squared resid 1623.709 Schwarz criterion 8.388277
Log likelihood -39.63880 F-statistic 118.5330
Durbin-Watson stat 1.962506 Prob(F-statistic) 0.000004
t_c and p-values
Both Highly Significant
Note:
$t_{AGE} = \frac{-27.90291}{2.562889} = -10.88729$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Range: 1 10
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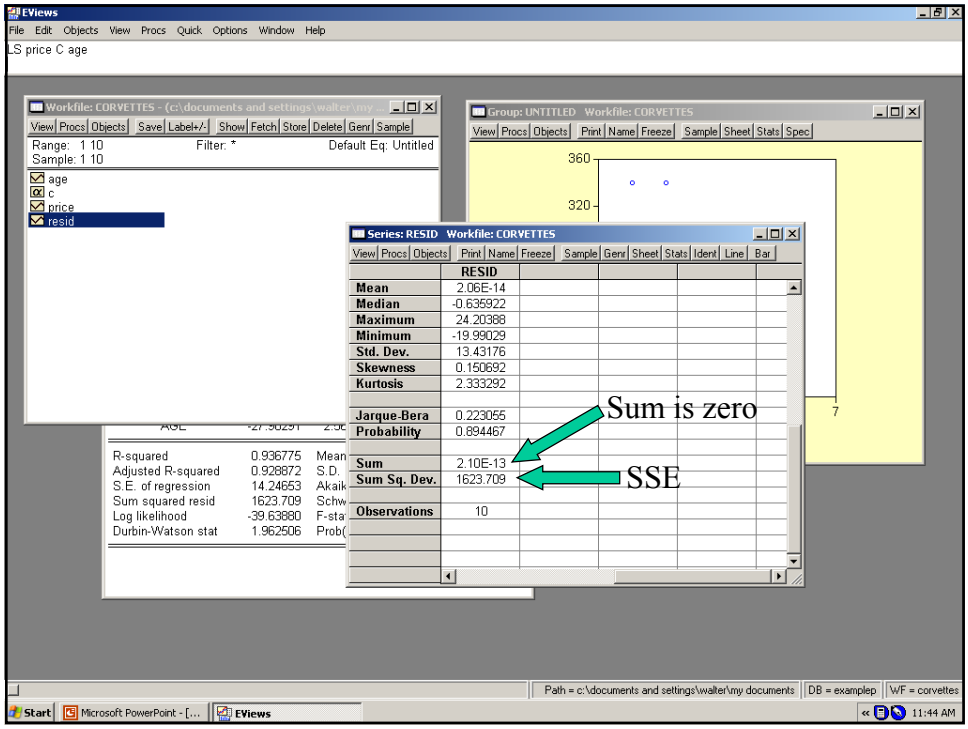
Filter: *
Default Eq: Untitled
age
c
price
resid
Group: UNTITLED Workfile: CORVETTES
Series: RESID Workfile: CORVETTES
RESID
Last updated: 06/20/03 - 11:41
1 0.815534
2 -9.184466
3 5.815534
4 24.20388
5 -16.79612
6 -2.087379
7 10.00971
8 10.91262
9 -3.699029
10 -19.99029
R-squared 0.936775
Adjusted R-squared 0.928872
S.E. of regression 14.24653
Sum squared resid 1623.709
Log likelihood -39.63880
Durbin-Watson stat 1.962506


EViews
File Edit Objects View Procs Quick Options Window Help
LS price C age
Workfile: CORVETTES - (c:\documents and settings\walter\my ...
View Procs Objects Save Label+/- Show Fetch Store Delete Genr Sample
Range: 1 10
Sample: 1 10
Filter: *
Default Eq: Untitled
age
c
price
resid
Group: UNTITLED Workfile: CORVETTES
View Procs Objects Print Name Freeze Sample Sheet Stats Spec
360
320
7
Series: RESID Workfile: CORVETTES
View Procs Objects Print Name Freeze Sample Genr Sheet Stats Ident Line Bar
RESID
Mean 2.06E-14
Median -0.635922
Maximum 24.20388
Minimum -19.99029
Std. Dev. 13.43176
Skewness 0.150692
Kurtosis 2.333292
Jarque-Bera 0.223055
Probability 0.894467
Sum 2.10E-13
Sum Sq. Dev. 1623.709
Observations 10
Sum is zero
SSE
R-squared 0.936775
Adjusted R-squared 0.928872
S.E. of regression 14.24653
Sum squared resid 1623.709
Log likelihood -39.63880
Durbin-Watson stat 1.962506
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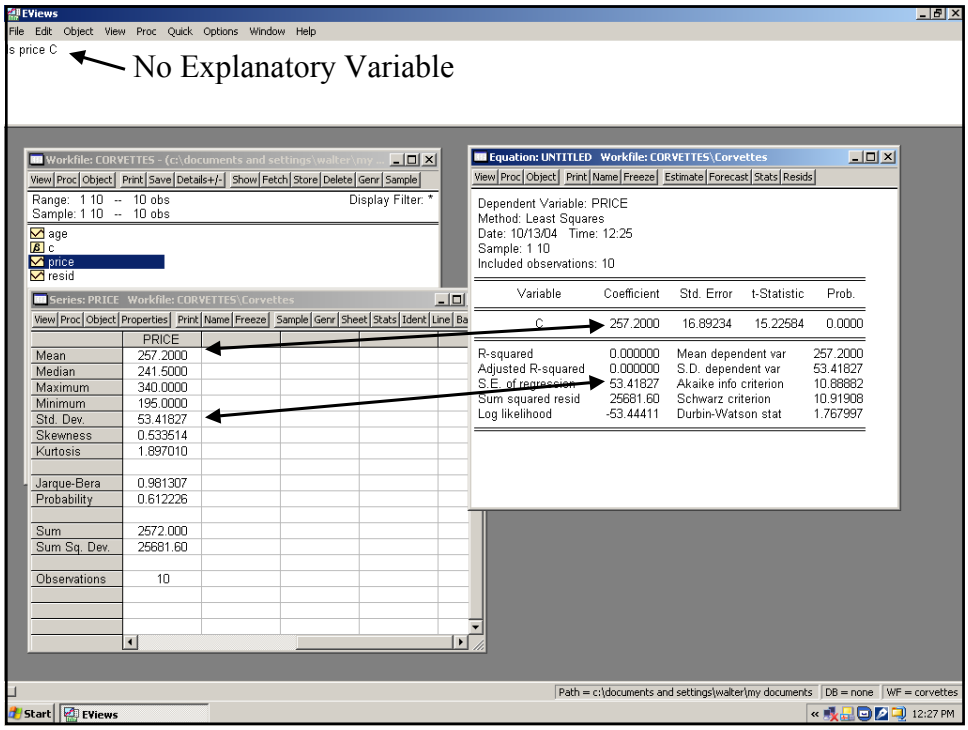
EViews
File Edit Object View Proc Quick Options Window Help
s price C
No Explanatory Variable
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View Proc Object Print Save Details+/- Show Fetch Store Delete Genr Sample
Range: 1 10 -- 10 obs
Sample: 1 10 -- 10 obs
Display Filter: *
age
c
price
resid
Series: PRICE Workfile: CORVETTES\Corvettes
View Proc Object Properties Print Name Freeze Sample Genr Sheet Stats Ident Line Ba
PRICE
Mean 257.2000
Median 241.5000
Maximum 340.0000
Minimum 195.0000
Std. Dev. 53.41827
Skewness 0.533514
Kurtosis 1.897010
Jarque-Bera 0.981307
Probability 0.612226
Sum 2572.000
Sum Sq. Dev. 25681.60
Observations 10
Equation: UNTITLED Workfile: CORVETTES\Corvettes
View Proc Object Print Name Freeze Estimate Forecast Stats Resids
Dependent Variable: PRICE
Method: Least Squares
Date: 10/13/04 Time: 12:25
Sample: 1 10
Included observations: 10
Variable Coefficient Std. Error t-Statistic Prob.
C 257.2000 16.89234 15.22584 0.0000
R-squared 0.000000 Mean dependent var 257.2000
Adjusted R-squared 0.000000 S.D. dependent var 53.41827
S.E. of regression 53.41827 Akaike info criterion 10.88882
Sum squared resid 25681.60 Schwarz criterion 10.91908
Log likelihood -53.44411 Durbin-Watson stat 1.767997
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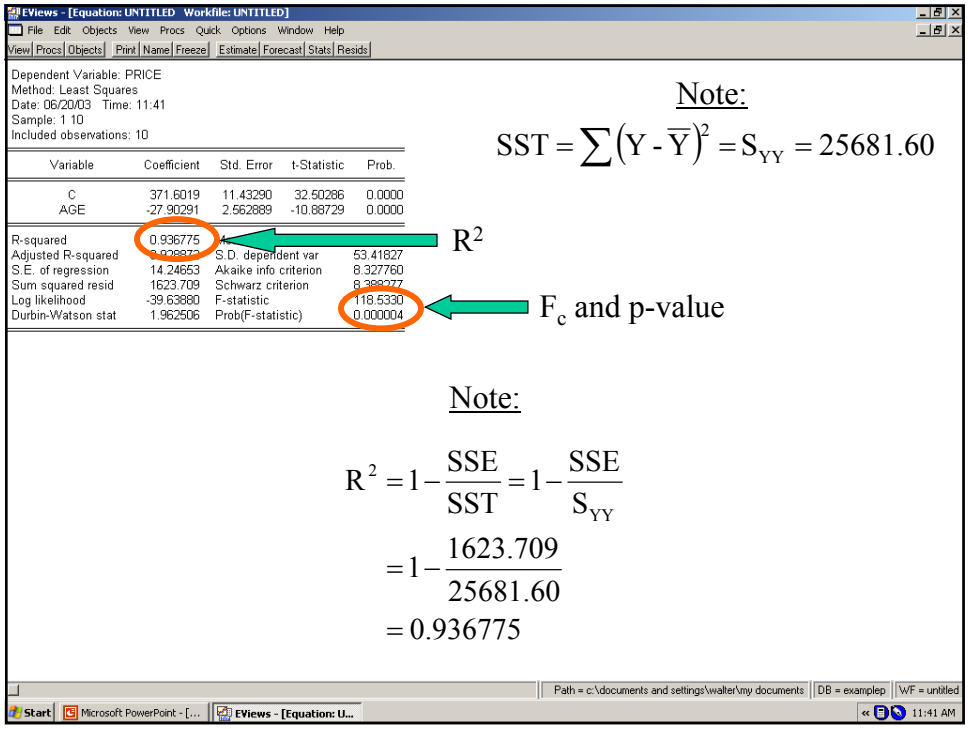
WF = corvettes
Start
EViews
12:27 PM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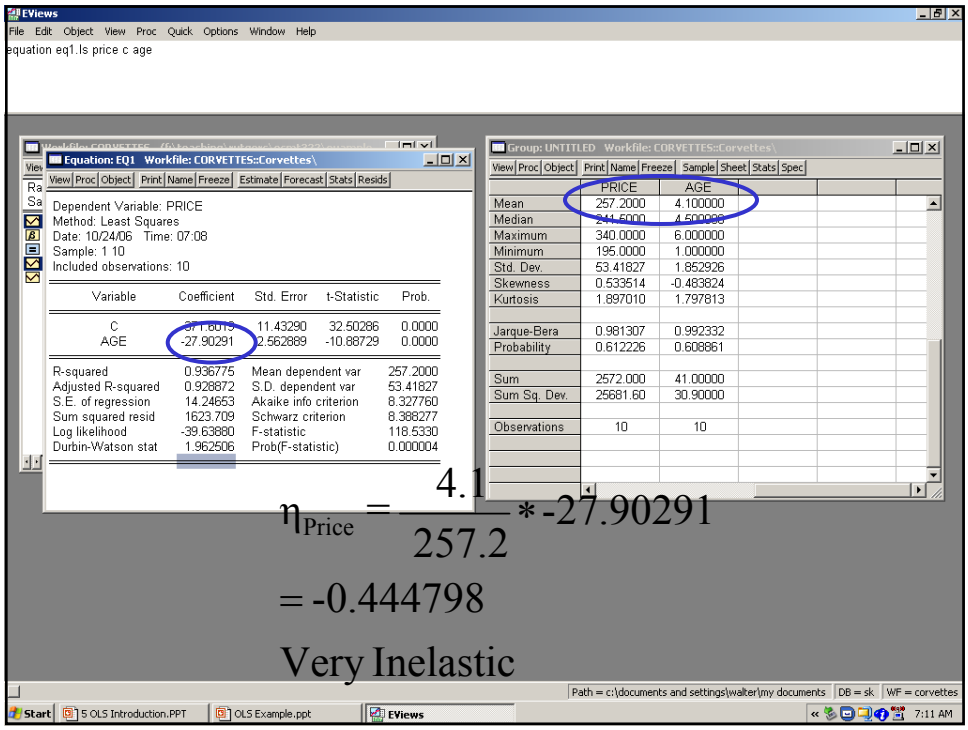
Dependent Variable: PRICE
Method: Least Squares
Date: 06/20/03 Time: 11:41
Sample: 1 10
Included observations: 10
Variable Coefficient Std. Error t-Statistic Prob.
C 371.6019 11.43290 32.50286 0.0000
AGE -27.90291 2.562889 -10.88729 0.0000
R-squared 0.936775
Adjusted R-squared
S.E. of regression 14.24653
Sum squared resid 1623.709
Log likelihood -39.63880
Durbin-Watson stat 1.962506
S.D. dependent var 53.41827
Akaike info criterion 8.327760
Schwarz criterion
F-statistic 118.5330
Prob(F-statistic) 0.000004
Note:
$SST = \sum (Y - \bar{Y})^2 = S_{YY} = 25681.60$
R^2
F_c and p-value
Note:
$R^2 = 1 - \frac{SSE}{SST} = 1 - \frac{SSE}{S_{YY}}$
$= 1 - \frac{1623.709}{25681.60}$
$= 0.936775$


EViews
equation eq1.ls price c age
Equation: EQ1 Workfile: CORVETTES::Corvettes\
Dependent Variable: PRICE
Method: Least Squares
Date: 10/24/06 Time: 07:08
Sample: 1 10
Included observations: 10
Variable Coefficient Std. Error t-Statistic Prob.
C 371.6019 11.43290 32.50286 0.0000
AGE -27.90291 2.562889 -10.88729 0.0000
R-squared 0.936775 Mean dependent var 257.2000
Adjusted R-squared 0.928872 S.D. dependent var 53.41827
S.E. of regression 14.24653 Akaike info criterion 8.327760
Sum squared resid 1623.709 Schwarz criterion 8.388277
Log likelihood -39.63880 F-statistic 118.5330
Durbin-Watson stat 1.962506 Prob(F-statistic) 0.000004
Group: UNTITLED Workfile: CORVETTES::Corvettes\
PRICE AGE
Mean 257.2000 4.100000
Median 244.5000 4.500000
Maximum 340.0000 6.000000
Minimum 195.0000 1.000000
Std. Dev. 53.41827 1.852926
Skewness 0.533514 -0.483824
Kurtosis 1.897010 1.797813
Jarque-Bera 0.981307 0.992332
Probability 0.612226 0.608861
Sum 2572.000 41.00000
Sum Sq. Dev. 25681.60 30.90000
Observations 10 10
$\eta_{Price} = \frac{4.1}{257.2} * -27.90291$
$= -0.444798$
Very Inelastic

OLS Regression

Elasticity Summary Table

Variable	Estimate	Mean	Elasticity	Classification
Price	-27.90291	4.1	-0.444798	Inelastic

Interpretation: Price of a corvette is inelastic with respect to the age of the corvette so that a 1% increase in age decreases the price by only 0.4%. Other factors are at play regarding the lower prices, but age is certainly a major factor as evidenced by the R^2 of 0.94.

Other Examples
Problem 1: CAPM

Problem 1: CAPM

- Problem
  - Estimate β , the systematic risk, for CAPM
    - CAPM is

$$E(r_i \mid \Omega_t) = r_f + \beta_i \left[E(r_m \mid \Omega_t) - r_f \right]$$

    - An empirical version is $\tilde{r}_i = \alpha + \beta_i \tilde{r}_m + \varepsilon_i$

$$\varepsilon \sim N(0,\ \sigma^2)$$

$$\tilde{r}_i = r_i - r_f$$

$$\tilde{r}_m = r_m - r_f$$

$$\alpha = 0$$

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Problem 1: CAPM

- *beta* is key
  - Each security has a beta
  - Each portfolio has a beta
    - Portfolio beta is weighted average of individual betas

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Problem 1: CAPM

- *beta* is proportionality factor

$$\beta_i = \frac{E(r_i \mid \Omega_t) - r_f}{E(r_m \mid \Omega_t) - r_f}$$

  - Excess returns for security over riskless return is proportional to excess returns in market over riskless returns
  - Excess is extra return to compensate for risk for not holding the market portfolio
    - Premium on security is proportional to premium on the market portfolio

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Problem 1: CAPM

- If

$$\beta_i = \frac{E(r_i \mid \Omega_t) - r_f}{E(r_m \mid \Omega_t) - r_f} > 1 \Rightarrow \text{Premium}_i > \text{Premium}_m$$

then asset *i* is viewed as riskier than the market

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Problem 1: CAPM

beta	Interpretation	Example
1	Moves With Market	Conglomerates (AT&T)
>1	More Volatile	Companies Sensitive To Macro Events (Autos)
0<beta<1	Less Volatile	Mildly Sensitive To Macro Events (Electric Utilities)
<0	Move Counter To Market	Goldmining Stocks

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Coding Sheet for CAPM Data			
Variable	**Possible Values**	**Source**	**Mnemonic**
Excess returns for an overall stock market index of the total market in the UK. Monthly, 1/80-12/99.	Percentages*	DataStream (2000)	rendmark
Excess returns on an index of 104 stocks in the cyclical consumer goods sector in the UK. Monthly, 1/80-12/99.	Percentages*	IBID.	rendcyco
Excess returns on an index of 104 stocks in the noncyclical consumer goods sector in the UK. Monthly, 1/80-12/99.	Percentages*	IBID.	rendncco
Excess returns on an index of 104 stocks in the information tech sector in the UK. Monthly, 1/80-12/99.	Percentages*	IBID.	rendit
Excess returns on an index of 104 stocks in the telcom sector in the UK. Monthly, 1/80-12/99.	Percentages*	IBID.	rendtel

*Note: See calculations note.

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Problem 1: CAPM

- Excess returns are calculated as follows
  - Let p_i be the closing price of the index at the last trading day in month i and let r_i be the one-month interest rate at the start of month i. Then the return v_i of the index is $v_i = (p_i - p_{i-1})/\, p_{i-1}$ and the excess return is $v_i - r_i$. The reported numbers are $100(v_i - r_i)$.

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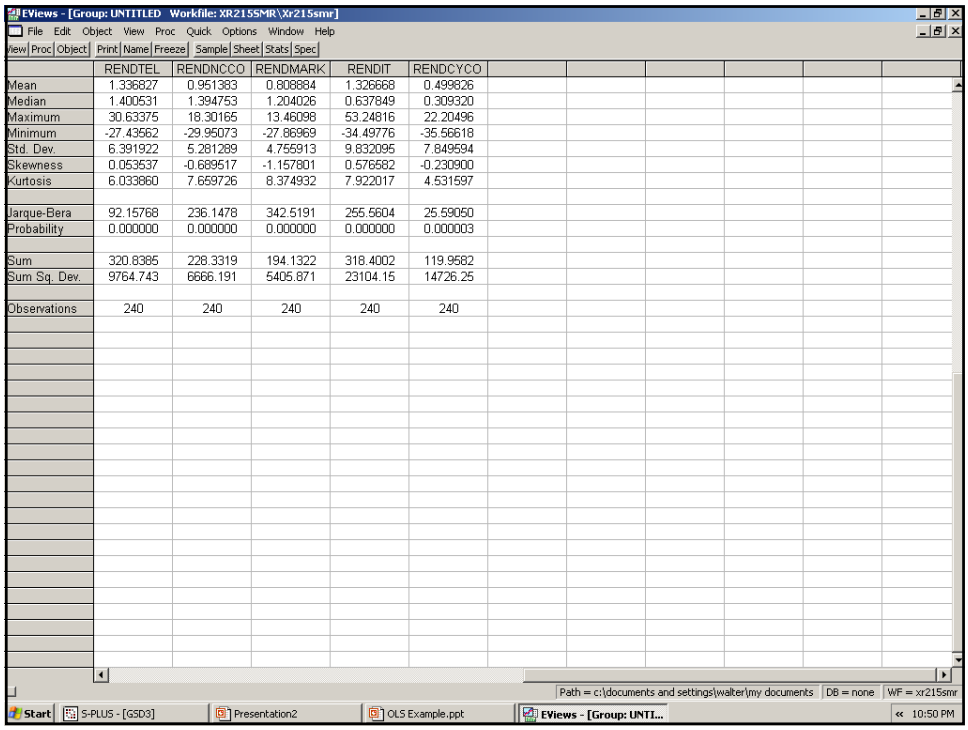
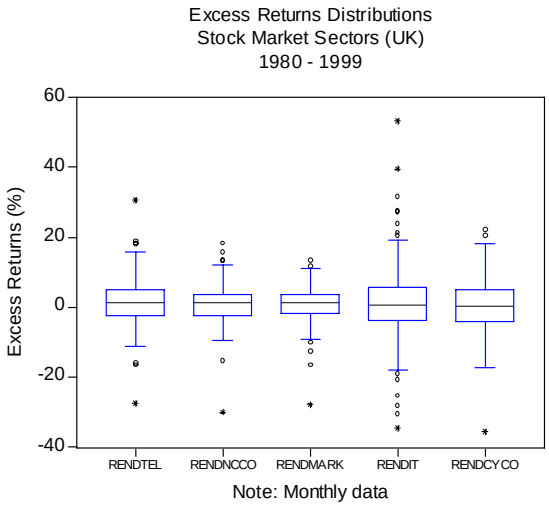


	RENDTEL	RENDNCCO	RENDMARK	RENDIT	RENDCYCO
Mean	1.336827	0.951383	0.808884	1.326668	0.499826
Median	1.400531	1.394753	1.204026	0.637849	0.309320
Maximum	30.63375	18.30165	13.46098	53.24816	22.20496
Minimum	-27.43562	-29.95073	-27.86969	-34.49776	-35.56618
Std. Dev.	6.391922	5.281289	4.755913	9.832095	7.849594
Skewness	0.053537	-0.689517	-1.157801	0.576582	-0.230900
Kurtosis	6.033860	7.659726	8.374932	7.922017	4.531597
Jarque-Bera	92.15768	236.1478	342.5191	255.5604	25.59050
Probability	0.000000	0.000000	0.000000	0.000000	0.000003
Sum	320.8385	228.3319	194.1322	318.4002	119.9582
Sum Sq. Dev.	9764.743	6666.191	5405.871	23104.15	14726.25
Observations	240	240	240	240	240



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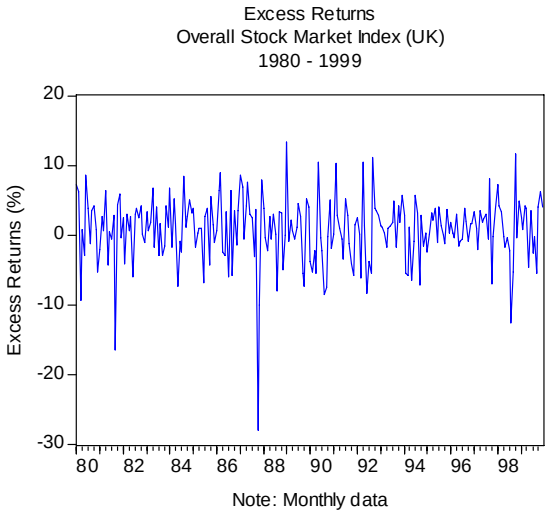

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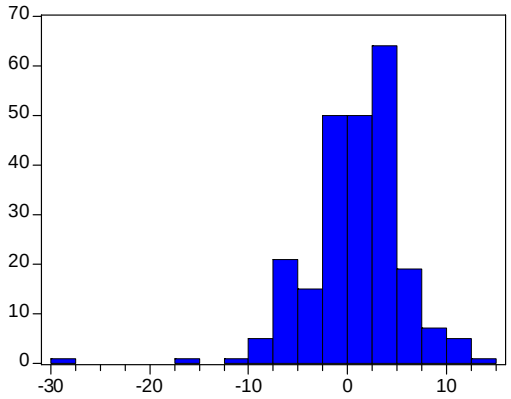
Excess Returns
Overall Stock Market Index (UK)
1980 - 1999



Series: RENDMARK	
Sample 1980M01 1999M12	
Observations 240	
Mean	0.808884
Median	1.204026
Maximum	13.46098
Minimum	-27.86969
Std. Dev.	4.755913
Skewness	-1.157801
Kurtosis	8.374932
Jarque-Bera	342.5191
Probability	0.000000

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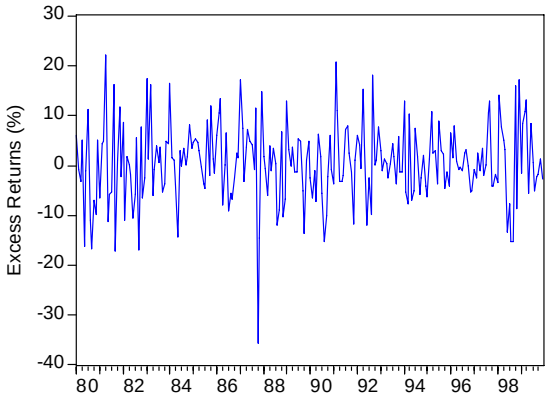
Excess Returns
Cyclical Consumers Goods Sector (UK)
1980 - 1999



Note: Monthly data

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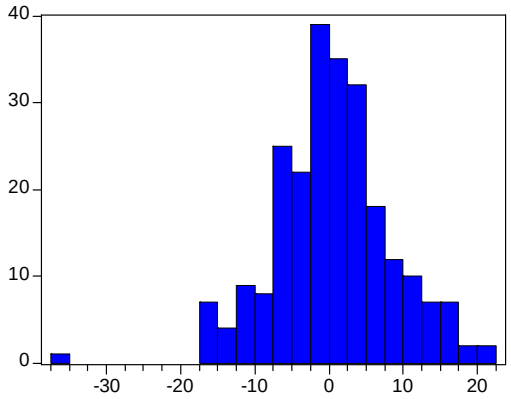
Excess Returns
Cyclical Consumer Goods Sector (UK)
1980 - 1999



Series: RENDCYCO	
Sample 1980M01 1999M12	
Observations 240	
Mean	0.499826
Median	0.309320
Maximum	22.20496
Minimum	-35.56618
Std. Dev.	7.849594
Skewness	-0.230900
Kurtosis	4.531597
Jarque-Bera	25.59050
Probability	0.000003

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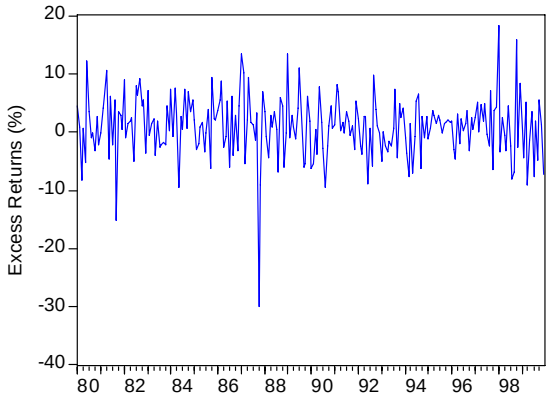
Excess Returns
Noncyclical Consumer Goods Sector (UK)
1980 - 1999



Note: Monthly data

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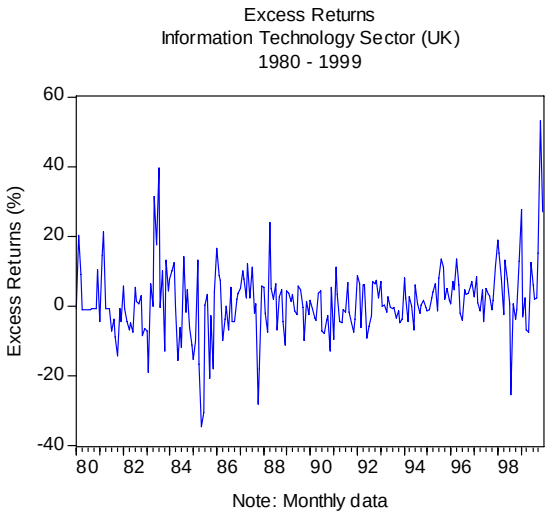
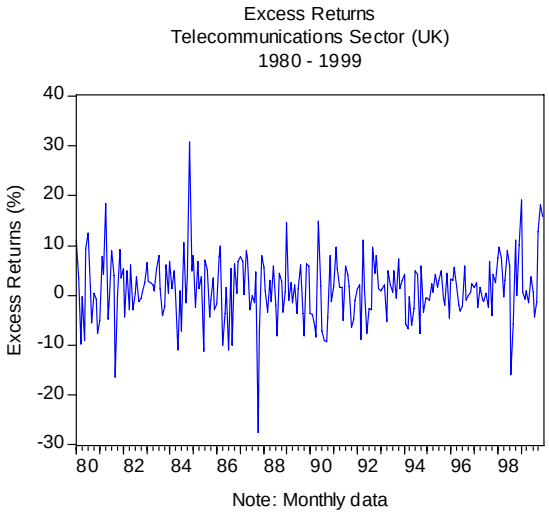
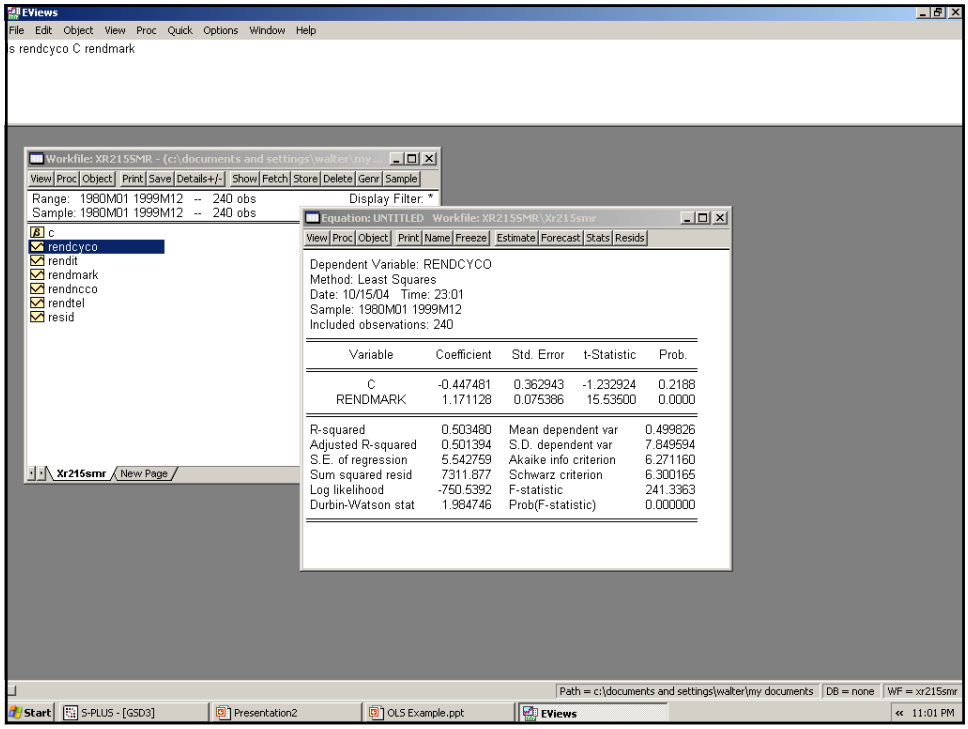


Page 35



Page 36



Problem 1: CAPM

- Interpretation
  - The intercept is highly insignificant suggesting that the line goes through the origin
  - The slope is highly significant and positive at the 0.0 level indicating that the market rate of return (excess returns) have a positive effect on the returns for the cyclical consumer goods sector in the UK
  - The R^2 is 0.50 suggesting that 50% of the variation in returns in the cyclical consumer goods sector is accounted for by the market excess returns
  - The model is significantly different from the naïve model as indicated by the p-value for F

Problem 1: CAPM

- Interpretation
  - Since this is a CAPM, the slope has the interpretation of systematic risk
    - Since it is greater than 1.0, this indicates that the cyclical consumer goods sector is riskier that the market as a whole
    - When the market rises, the excess returns in this sector will rise more than the market

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Problem 1: CAPM

Model Portfolio

	Model
Intercept	-0.477 (0.2188)
RendMark	1.17* (0.0000)
R^2	0.5035
F_C	241.3363 (0.0000)
Notes: p-value in parenthese; *=significant	

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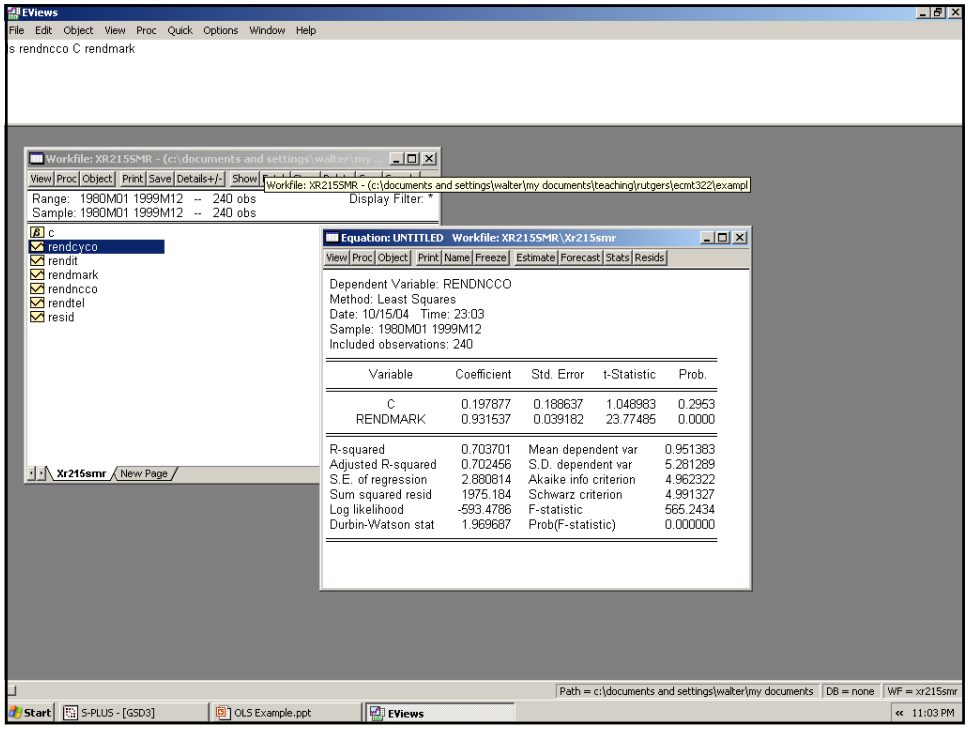
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Sample: 1980M01 1999M12 -- 240 obs
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Equation: UNTITLED Workfile: XR2155MR\Xr215smr
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Dependent Variable: RENDNCCO
Method: Least Squares
Date: 10/15/04 Time: 23:03
Sample: 1980M01 1999M12
Included observations: 240
Variable Coefficient Std. Error t-Statistic Prob.
C 0.197877 0.188637 1.048983 0.2953
RENDMARK 0.931537 0.039182 23.77485 0.0000
R-squared 0.703701 Mean dependent var 0.951383
Adjusted R-squared 0.702456 S.D. dependent var 5.281289
S.E. of regression 2.880814 Akaike info criterion 4.962322
Sum squared resid 1975.184 Schwarz criterion 4.991327
Log likelihood -593.4786 F-statistic 565.2434
Durbin-Watson stat 1.969687 Prob(F-statistic) 0.000000
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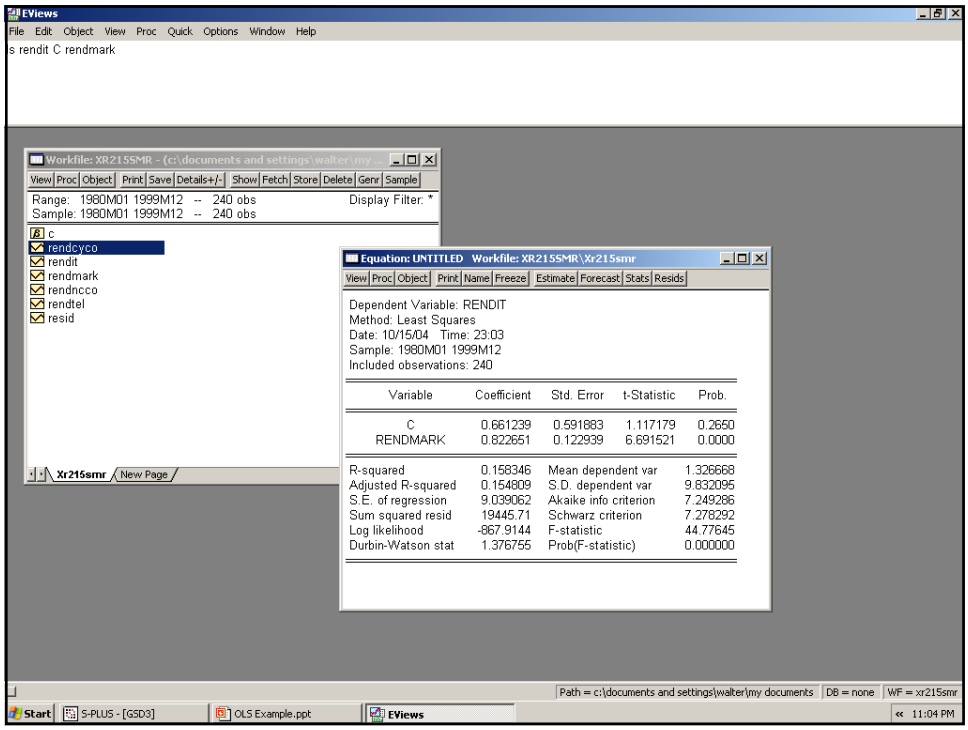
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Equation: UNTITLED Workfile: XR2155MR\Xr215smr
View Proc Object Print Name Freeze Estimate Forecast Stats Resids
Dependent Variable: RENDIT
Method: Least Squares
Date: 10/15/04 Time: 23:03
Sample: 1980M01 1999M12
Included observations: 240
Variable Coefficient Std. Error t-Statistic Prob.
C 0.661239 0.591883 1.117179 0.2650
RENDMARK 0.822651 0.122939 6.691521 0.0000
R-squared 0.158346 Mean dependent var 1.326668
Adjusted R-squared 0.154809 S.D. dependent var 9.832095
S.E. of regression 9.039062 Akaike info criterion 7.249286
Sum squared resid 19445.71 Schwarz criterion 7.278292
Log likelihood -867.9144 F-statistic 44.77645
Durbin-Watson stat 1.376755 Prob(F-statistic) 0.000000
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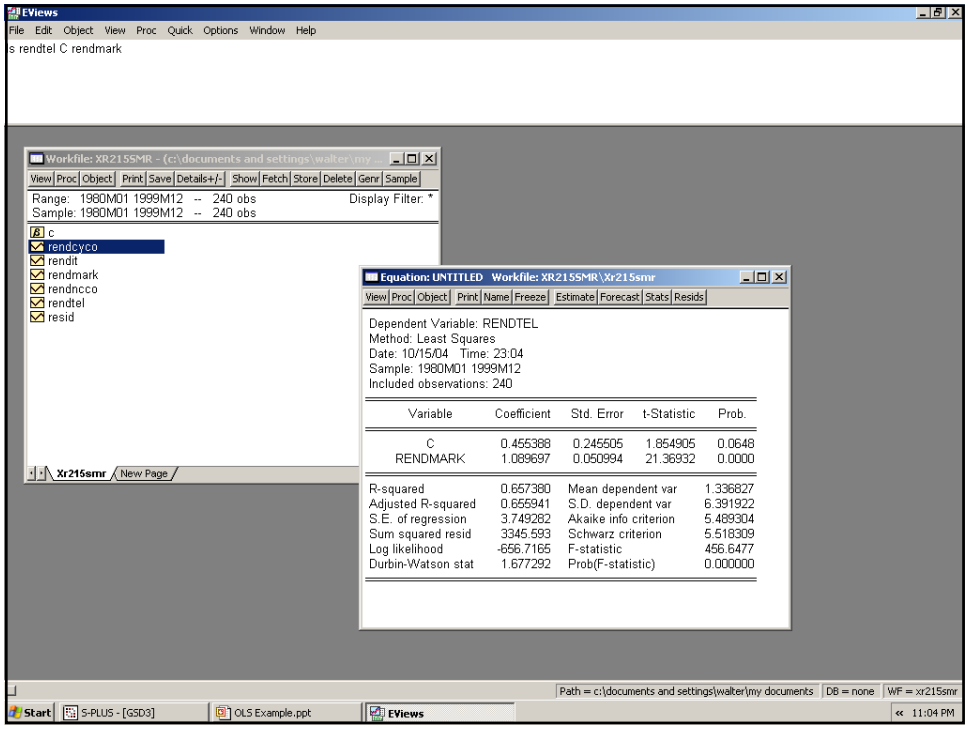
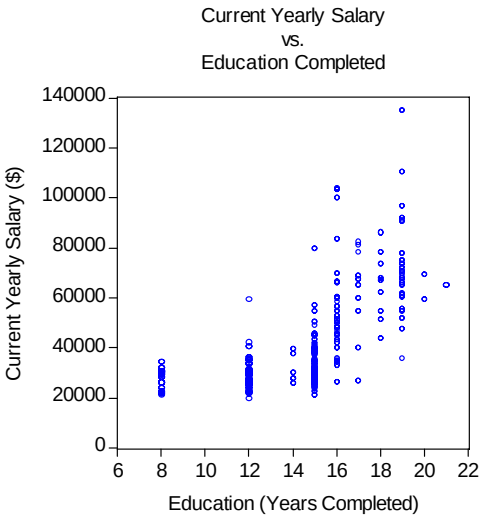


Other Examples
Problem 2: Bank Wages

Problem 2: Bank Wages

- Problem
  - Find the relationship between the salary of employees at a major US bank and their years of education completed

Coding Sheet for Bank Salary Data			
Variable	**Possible Values**	**Source**	**Mnemonic**
Current yearly salary of bank employees in US	Nominal dollars	SPSS, version 10 (2000)	salary
Number of years of education completed	Years	IBID.	educ
Natural log of salary	logs	Calculated as natural log of salary	logsalary



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EViews - [Group: UNTITLED Workfile: XM604BWA\Xm604bwa]

File Edit Object View Proc Quick Options Window Help

View Proc Object Print Name Freeze Sample Sheet Stats Spec

	EDUC	SALARY
Mean	14.43023	41441.78
Median	15.00000	32850.00
Maximum	21.00000	135000.0
Minimum	8.000000	19650.00
Std. Dev.	2.979335	19499.21
Skewness	-0.452567	1.629931
Kurtosis	2.933234	5.702920
Jarque-Bera	8.855030	192.7741
Probability	0.011944	0.000000
Sum	3723.000	10691980
Sum Sq. Dev.	2281.244	9.77E+10
Observations	258	258

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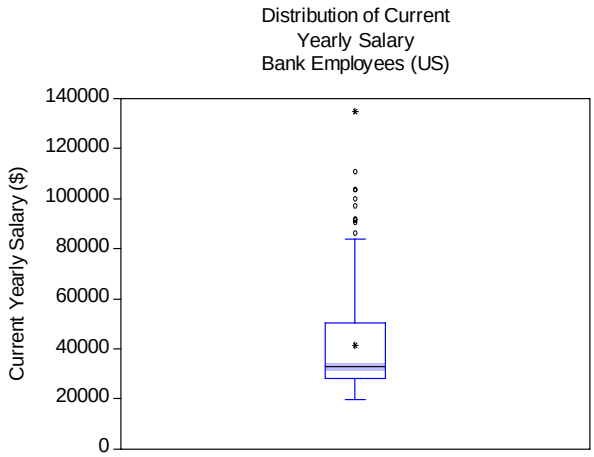

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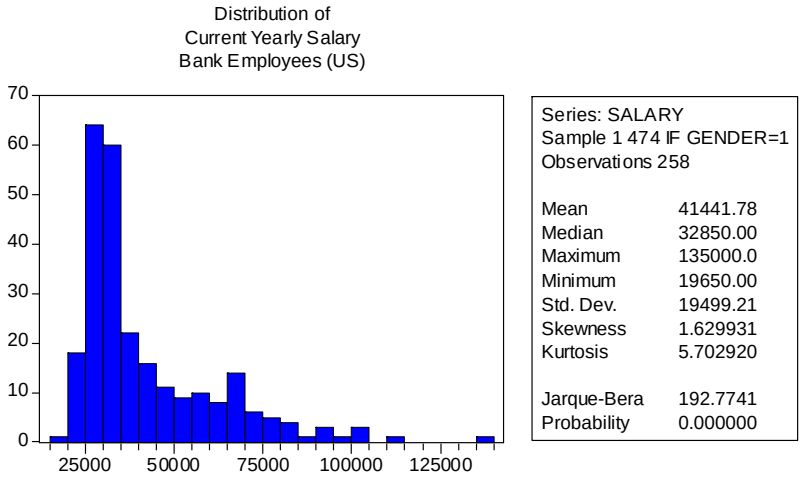

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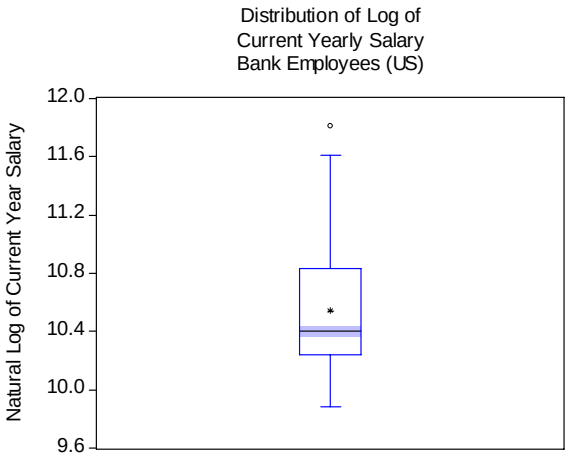

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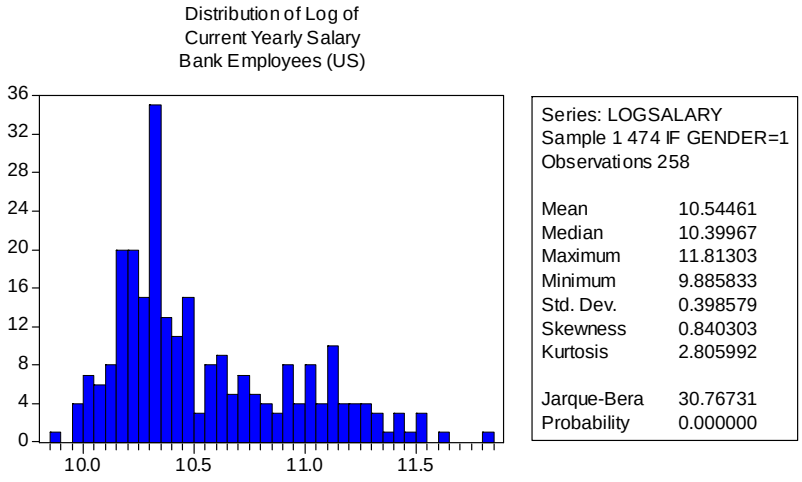

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Problem 2: Bank Wages

- Our model is

$$\text{Salary}_i = Ae^{\beta_1 \text{Educ}_i} e^{\varepsilon_i}$$

or

$$\ln(\text{SALARY}_i) = \beta_0 + \beta_1 \text{EDUC}_i + \varepsilon_i$$

- Interpret the slope parameter as the percentage increase in salary (S) due to one additional year of education

$$\frac{d\ln(S)}{dx} = \frac{dS/S}{dx}$$

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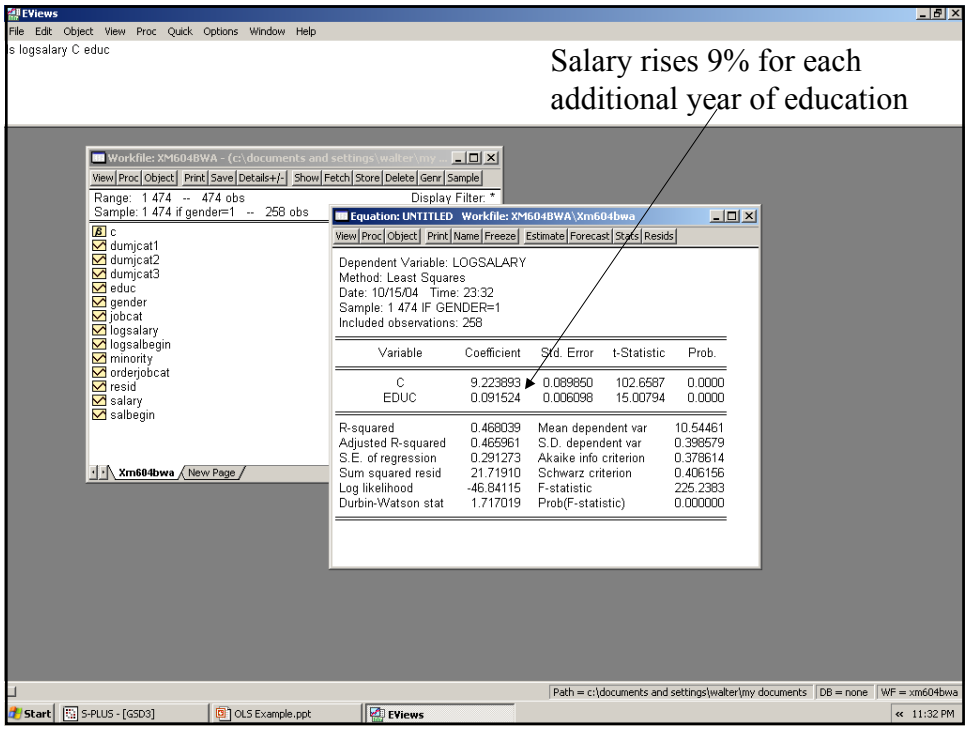

Problem 2: Bank Wages

- Interpretation
  - The intercept and slope parameters are highly significant at the 0.0 level
    - This indicates that education has a significant, positive effect on salary
      - The higher the level of education, the higher the salary
    - For each extra 1 year of education, salary rises 9%
  - Almost 49% of the variation in (log) salary is accounted for by education
  - The model is significantly different from the naïve model as indicated by the p-value for F

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Problem 2: Bank Wages

Model Portfolio

	Model
Intercept	9.22* (0.0000)
Educ	0.092* (0.0000)
R^2	0.4680
F_C	225.2383 (0.0000)
Notes: p-value in parenthese; *=significant	

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Other Examples
Problem 3:
Population and Economic Growth

Page 57

Problem 3:Population and Economic Growth

- Population growth is an important factor for long-term economic growth
  - Malthus assumed (correctly) that population will grow geometrically (e.g., 1, 3, 9, 27, 81,…) while the food supply will increase arithmetically (e.g., 10, 10, 30, 40 …)
    - Population would double every 24 years
  - As a result of the faster growth of population, population growth would overtake food supply growth – but he didn't specify when

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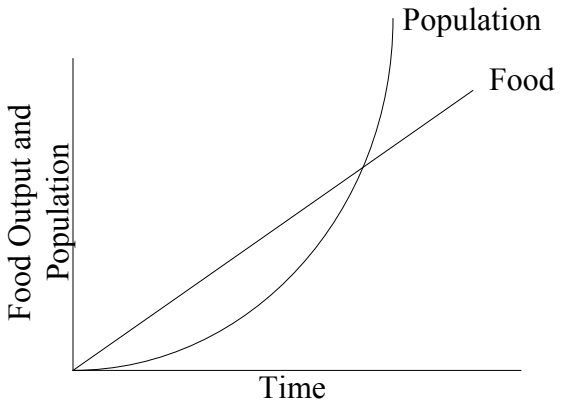
Problem 3:Population and Economic Growth



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Problem 3:Population and Economic Growth

- Digression on compound growth
  - Compounding

$$FV_t = PV_0(1+g)^t$$

  - Time to double
    - What is the implied population growth rate, g, for Malthus?
    - How long to double at 1.9%?

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Problem 3:Population and Economic Growth

- Curent population projections
  - The Year 2000 population growth rate, *g*, was about 1.4%
    - World population in 2000 was about 6.1Billion people
    - Absolute growth: 85.4 Million in one year

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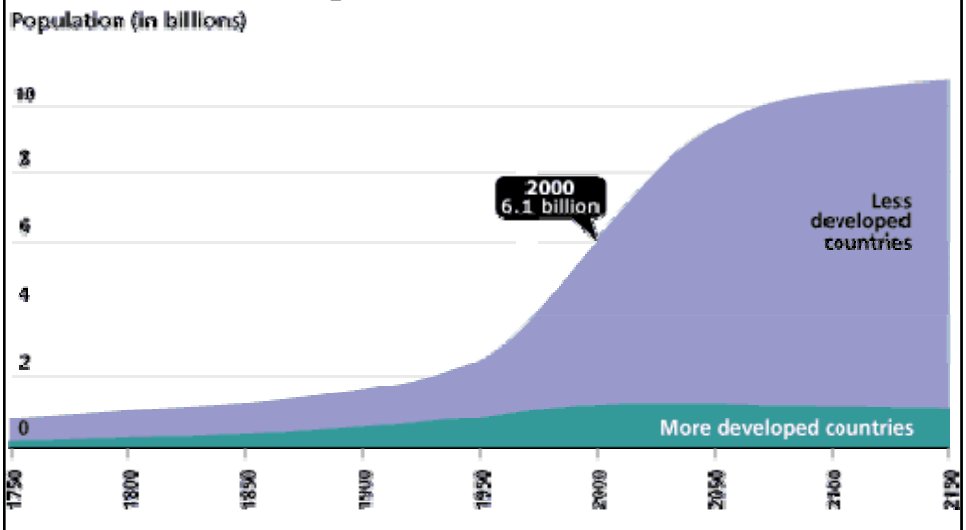
Problem 3:Population and Economic Growth



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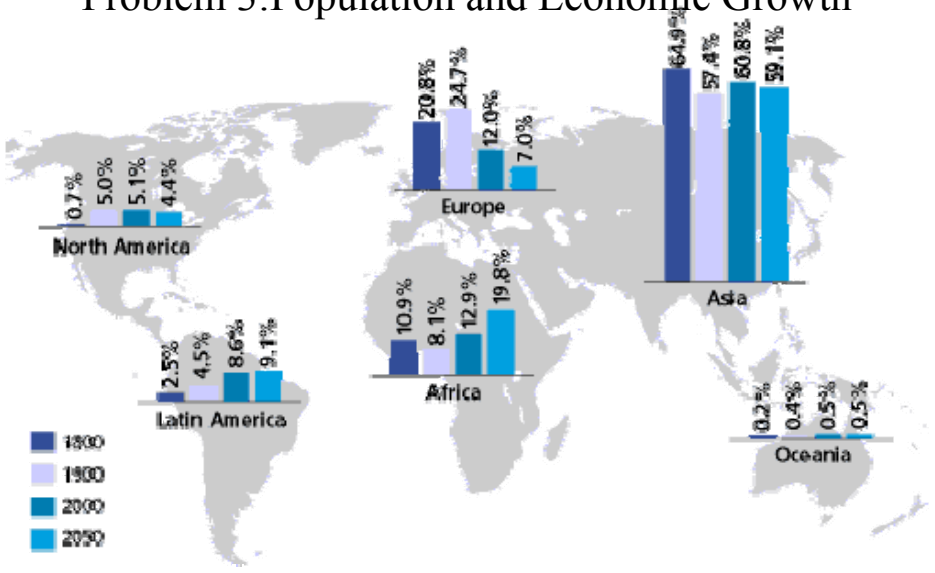
Problem 3:Population and Economic Growth



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Problem 3:Population and Economic Growth

- The future
  - There is some hope ahead
    - The UN forecasts a drop in fertility in developing countries
    - Developed countries will grow by less than 1% annually
    - Predicted world's population in 2300
      - Old: 12 Billion
      - New: 9 Billion

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Problem 3:Population and Economic Growth

- Malthus had checks on population growth
  - Contraceptives
  - Abortion
  - Self-restraint
  - Wars
- Malthus wrote right at the time of the Industrial and Green Revolutions, so he could not see their implications

Problem 3:Population and Economic Growth

- Data from the World Development Indicators, World Bank (2004)
  - Calculated average annual growth for GDP and population

$$g_i = \left(\frac{\text{Value in } 2003_i}{\text{Value in } 1963_i} \right)^{\frac{1}{40}} - 1, i = 1, ..., 107 \text{ countries}$$

Coding Sheet for Growth Data			
Variable	**Possible Values**	**Source**	**Mnemonic**
Real GDP in country (1995 $US), 1963 and 2003	Real dollars	World Development Indicators (World Bank, 2004)	gdp63, gdp03
Average annual growth in GDP	Decimal values	Calculated	g
Population in country, 1963 and 2003	Count	World Development Indicators (World Bank, 2004)	pop63, pop03
Average annual growth in population	Decimal values	Calculated	p

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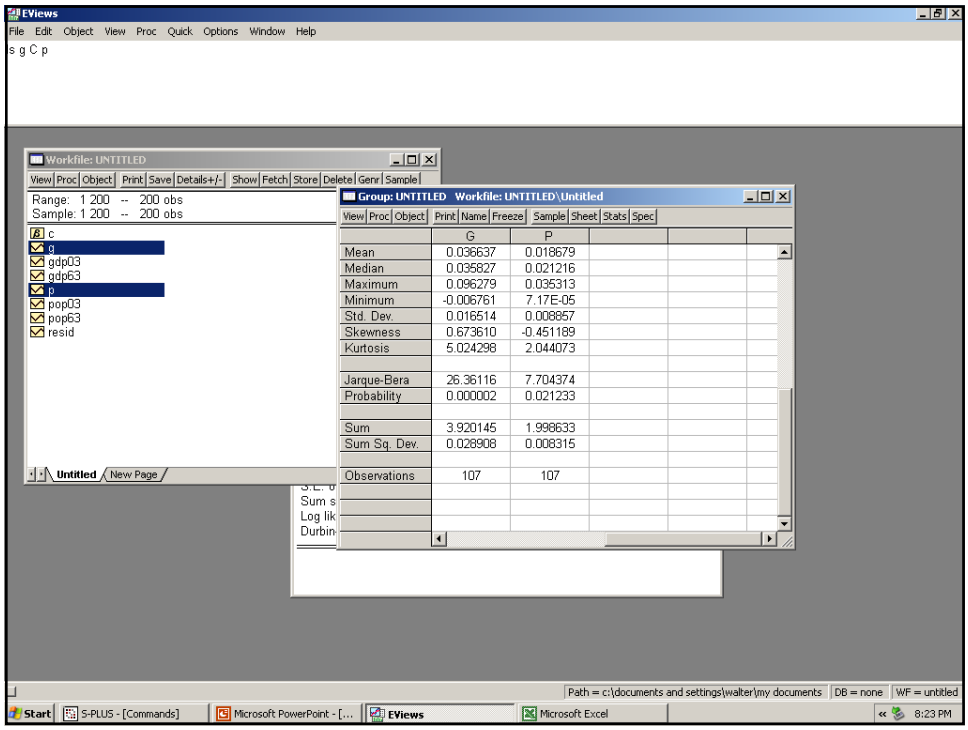

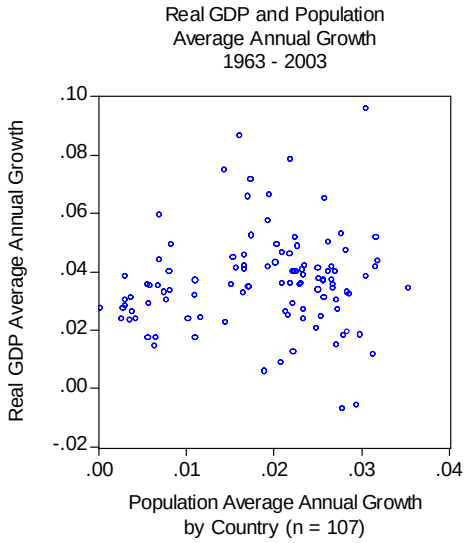
Real GDP and Population
Average Annual Growth
1963 - 2003
Real GDP Average Annual Growth
.10
.08
.06
.04
.02
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.00
.01
.02
.03
.04
Population Average Annual Growth
by Country (n = 107)

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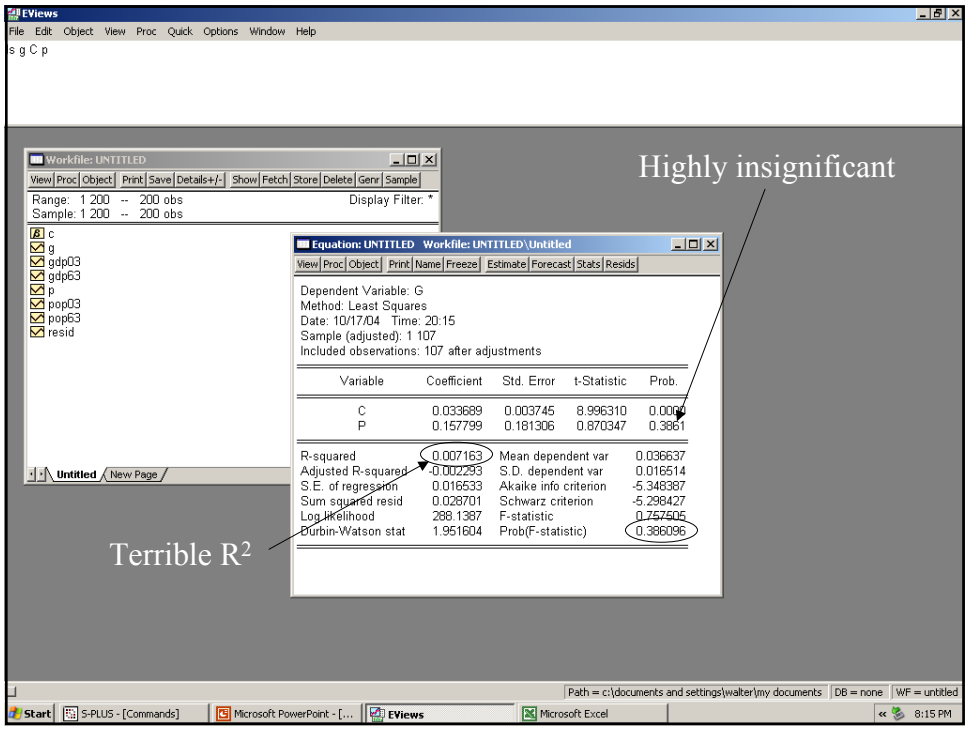
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Dependent Variable: G
Method: Least Squares
Date: 10/17/04 Time: 20:15
Sample (adjusted): 1 107
Included observations: 107 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
C 0.033689 0.003745 8.996310 0.000
P 0.157799 0.181306 0.870347 0.3861
R-squared 0.007163 Mean dependent var 0.036637
Adjusted R-squared -0.002293 S.D. dependent var 0.016514
S.E. of regression 0.016533 Akaike info criterion -5.348387
Sum squared resid 0.028701 Schwarz criterion -5.298427
Log likelihood 288.1387 F-statistic 0.757505
Durbin-Watson stat 1.951604 Prob(F-statistic) 0.386096
Highly insignificant
Terrible R2
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Microsoft Excel
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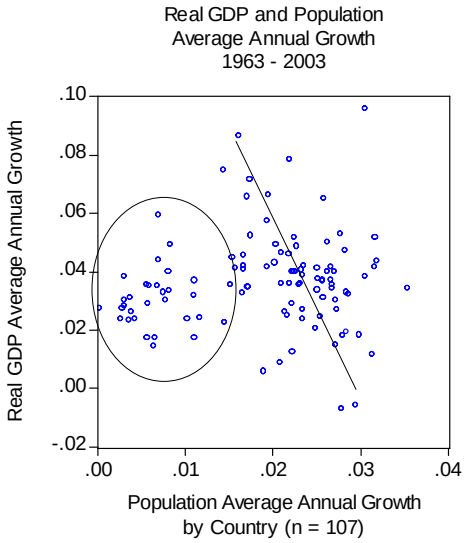
Real GDP and Population
Average Annual Growth
1963 - 2003
Real GDP Average Annual Growth
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.01
.02
.03
.04
Population Average Annual Growth
by Country (n = 107)

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