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Chuo ng trnh gi.ng d. y kinh t. Fulbright
Nin kha 2005-2006

Cc phuong php phn tch

Mini case

Mini case

Model 1

Dependent Variable: VA

Method: Least Squares

Date: 09/29/05 Time: 09:30

Sample: 1 27

Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	114.3376	173.4314	0.659267	0.5160
K	0.471043	0.112439	4.189327	0.0003
L	2.338136	1.038966	2.250445	0.0339
R-squared	0.959805	Mean dependent var		2340.201
Adjusted R-squared	0.956455	S.D. dependent var		2251.659
S.E. of regression	469.8642	Akaike info criterion		15.24720
Sum squared resid	5298536.	Schwarz criterion		15.39119
Log likelihood	-202.8372	F-statistic		286.5410
Durbin-Watson stat	2.060297	Prob(F-statistic)		0.000000

Model

Dependent Variable: LOG(VA)

Method: Least Squares

Date: 09/29/05 Time: 09:33

Sample: 1 27

Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.170644	0.326782	3.582339	0.0015
LOG(K)	0.375710	0.085346	4.402204	0.0002
LOG(L)	0.602999	0.125954	4.787457	0.0001
R-squared	0.943463	Mean dependent var		7.443631
Adjusted R-squared	0.938751	S.D. dependent var		0.761153
S.E. of regression	0.188374	Akaike info criterion		-0.396336
Sum squared resid	0.851634	Schwarz criterion		-0.252355
Log likelihood	8.350541	F-statistic		200.2489
Durbin-Watson stat	1.885989	Prob(F-statistic)		0.000000

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Nin kha 2005-2006

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Mini case

Model 3

Dependent Variable: VA

Method: Least Squares

Date: 09/29/05 Time: 09:34

Sample: 1 27

Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.618461	456.2989	-0.021079	0.9834
K	0.467128	0.185701	2.515487	0.0197
L	2.364211	1.539140	1.536059	0.1388
FIRM	12.45216	12.65737	0.983787	0.3359
K/L	-8.416909	63.36701	-0.132828	0.8955
R-squared	0.961530	Mean dependent var		2340.201
Adjusted R-squared	0.954536	S.D. dependent var		2251.659
S.E. of regression	480.1070	Akaike info criterion		15.35147
Sum squared resid	5071060.	Schwarz criterion		15.59144
Log likelihood	-202.2449	F-statistic		137.4692
Durbin-Watson stat	2.162249	Prob(F-statistic)		0.000000

Model

Dependent Variable: GDP_EMPLOYMENT

Method: Least Squares

Date: 09/20/04 Time: 15:26

Sample: 1955 1974

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.306445	0.695490	0.440617	0.6647
CAPITAL_EMPLOYMEN	0.631982	0.023129	27.32385	0.0000
T				
R-squared	0.976458	Mean dependent var		18.96036
Adjusted R-squared	0.975150	S.D. dependent var		3.766992
S.E. of regression	0.593822	Akaike info criterion		1.890166
Sum squared resid	6.347245	Schwarz criterion		1.989739
Log likelihood	-16.90166	F-statistic		746.5929
Durbin-Watson stat	0.299918	Prob(F-statistic)		0.000000

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Mini case

Model 5

Dependent Variable: LOG(GDP)

Method: Least Squares

Date: 09/20/04 Time: 15:29

Sample: 1955 1974

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.652419	0.606198	-2.725873	0.0144
LOG(CAPITAL)	0.845997	0.093352	9.062488	0.0000
LOG(EMPLOYMENT)	0.339732	0.185692	1.829548	0.0849
R-squared	0.995080	Mean dependent var		12.22605
Adjusted R-squared	0.994501	S.D. dependent var		0.381497
S.E. of regression	0.028289	Akaike info criterion		-4.155221
Sum squared resid	0.013604	Schwarz criterion		-4.005861
Log likelihood	44.55221	F-statistic		1719.231
Durbin-Watson stat	0.425667	Prob(F-statistic)		0.000000

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Fulbright Economics Teaching Program
Academic year 2005-2006

Analytical Methods

Problem set 1

**Fulbright Economics
Teaching Program, HCMC, Vietnam**

Fall Semester 2005
September 5, 2005 - December 23, 2005

Analytical Methods

Problem Set 1
Statistics Review

(Due: 8:20 AM, 12/09/2005)

Question 1:

Prove the following properties of expectations and variances, where X is a random variable, and a and b are constants

- (a) $E[a] = a$
- (b) E

- (c) $E[a + bX] = a + bE[X]$
- (d) $VAR[a] = 0$
- (e) $VAR[bX] = b^2 VAR[X]$
- (f) $VAR[a + bX] = b^2 VAR[X]$
- (g) $VAR[X] = E[X^2] - (E[X])^2$

Question 2:

Extend the properties of expectations and variances to cases where there are two variables by proving the following properties:

- (a) Prove that $E[X + Y] = E[X] + E[Y]$.
- (b) Let $Z = aX + bY$, derive $E[Z]$ and $VAR[Z]$.
- (c) Prove that if X and Y are statistically independent, then $E[XY] = E[X]E[Y]$.
- (d) Prove that $COV[X, Y] = E[XY] - E[X]E[Y]$.
- (e) Prove that $COV[X, Y] = 0$ if X and Y are statistically independent.

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Fulbright Economics Teaching Program
Academic year 2005-2006

Analytical Methods

Problem set 1

Question 3:

We define $Z = (X - \mu) / \sigma$ as a standardized random variable. Prove that $E[Z] = 0$ and $\text{VAR}[Z] = 1$.

Question 4:

A hypothesis says that the grade point average (GPA) of a student can be explained by his parents annual average income. To test this hypothesis, a class 11 Fulbright student has collected data from a sample of 8 students from the University of Economics obtaining results as follows:

No.	GPA	Annual Average Income (Million VND)
1	10.00	105
2	7.50	75
3	8.75	45
4	5.00	45
5	7.50	60
6	8.75	90
7	6.25	30
8	6.25	30



- (a) Calculate the summary statistics for the variables Annual Average Income and GPA and fill out the table below:

Summary statistics	GPA Annual	Average Income
Number of times observed		
Average		
Mean		
Mode		
Max		
Min		
Range		
Variance		
Standard deviation		
Coefficient of variation		
Covariance		

- (b) Draw a scatter plot for the above data set. Use the vertical axis to show variable Annual Average Income and the horizontal axis to show variable GPA. Give brief

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Fulbright Economics Teaching Program
Academic year 2005-2006

Analytical Methods

Problem set 1

comments on your scatter plot.

- (c) In your opinion, is the hypothesis that students GPA can be explained by their parents annual average income correct. Give a brief explanation for your answer.

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Fulbright Economics Teaching Program
Academic year 2005-2006

Analytical Methods

Problem set 2

**Fulbright Economics
Teaching Program, HCMC, Vietnam**

Fall Semester 2005
September 5, 2005 - December 23, 2005

Analytical Methods

Problem Set 2
Statistics Review

(Due: 8:20 AM, 19/09/2005)

Regression models

Question 1:

A class 11 Fulbright student has been conducting research on the relationship between parental annual average income and students grade point averages (GPA). The student collected data from a sample of 8 students from the University of Economics. The results are shown in the table below:

Observation	Variable Y GPA	Variable X Annual Average Income (Million VND)
1	10,00	105
2	7,50	75
3	8,75	45
4	5,00	45
5	7,50	60
6	8,75	90
7	6,25	30
8	6,25	60

New variables are defined as follows:

$$\mathbf{Y_{tb} = \text{Mean } Y}$$

$$\mathbf{X_{tb} = \text{Mean } X}$$

$$\mathbf{DelY = Y - Y_{tb}}$$

$$\mathbf{DelX = X - X_{tb}}$$

$$\mathbf{DelXY = DelX * DelY}$$

$$\mathbf{DelYY = DelY * DelY}$$

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Fulbright Economics Teaching Program
Academic year 2005-2006

Analytical Methods

Problem set 2

DelXX = DelX*DelX

- Using an EXCEL worksheet, calculate the variables defined above. Based on the results of your calculations for the 8 observations in the table, estimate the slope and intercept of the line which best fits the data.
- Create a scatter plot from the data set. Use the vertical axis to show variable Annual Average Income and the horizontal axis for variable GPA. On this scatter plot, draw a line of best fit and briefly explain the meaning of "best fit".
- Using the results in (b), predict the value of GPA with the corresponding value of income as shown in the table below:

X = INCOME	Y = GPA
$T_N + \sigma_{TN}$.
T_N	.
$T_N - \sigma_{TN}$.

where T_N is the expected value of Income and σ_{TN} is the standard deviation of Income.

Question 2:

Ms. Quynh Giang, an analyst from the English

Ms. Quynh Giang, an analyst from the English Language Research Institute, has collected data from 8 students in a class. The original data is shown in the table below:

Student	Math	Science	English
1	13.5	9.9	13.3
2	13.7	6.8	10.0
3	7.0	5.5	8.9
4	7.4	5.7	2.4
5	13.2	10.3	8.2
6	7.3	1.8	6.3
7	5.2	5.2	7.7
8	8.4	6.9	2.9

The analyst wants to examine if there is any relationship between the students GPA for English Language and Math or between the GPA for English Language and Science. Namely, she wants to learn whether or not she can estimate their GPA in English Language based on their GPA for Math or Science.

- a. Using the command CORREL in EXCEL, determine the linear correlation coefficient between the students GPA in English language and Math, as well as between the GPA for English Language and Science; and the linear correlation coefficient for the Math and Science GPAs. Explain the meaning of the

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Fulbright Economics Teaching Program
Academic year 2005-2006

Analytical Methods

Problem set 2

correlation coefficients.

- b. Using the commands SLOPE and INTERCEPT in Excel, define a linear regression function for the students GPA in English Language and Math as well as for the GPA in English Language and Science. Explain the meaning of the slope and the intercept of the regression lines.
- c. Use the command TOOLS / DATA ANALYSIS / REGRESSION in Excel to determine if there is a statistically significant linear relationship at 5% confidence level between the students GPA in English Language and Math as well as between the GPA in English Language and Science.
- d. According to you, should we base our estimate of the students GPA in English on their GPA in Math or in Science. Briefly explain your answer.

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Academic Year 2005 - 2006

Analytical Methods

Problem Set 3

Fulbright Economics Teaching Program

Fall Term 2005
05/9/2005 23/12/2005

Analytical Methods

Problem Set 3

SIMPLE LINEAR REGRESSION BY EVIEWS

Distributed: Monday, 12 September, 2005
Due date: Monday, 19 September, 2005

Question 1:

Use EVIEWS to perform a regression analysis on students scores in English and Math and their scores in English and Science from Problem Set 2, Question 2. Determine whether, at a statistical significance level of 5%, there is a statistically significant linear relationship between their scores in English and Math or between their scores in English and Science. Compare the results with

and science. Compare the results with those obtained using EXCEL.

Question 2:

An American researcher is studying two variables, namely PATENTS and R&D, to see whether there is a relationship between them:

PATENTS: The number of patents registered (in thousands)

R&D: Research & Development Expenditure (in billion USD), determined by the ratio between the cost in dollars at current prices and the GDP deflator at 1992 prices.

He collects 34 observations for a regression between PATENTS and R&D (Data 3.3 from Ramanathan data set available in the computer lab).

- a. Without running a regression, what do you expect the sign of the slope of the regression function to be. Give an explanation for your expectations.
- b. Use EIEWS to find the regression function. Are the results the same as your expectations in Question a.
- c. Based on a t-test, determine whether there is a linear relationship which is statistically significant at a level of 5% between PATENTS and R&D.

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Academic Year 2005 - 2006

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Problem Set 3

- d. Based on the confidence interval for the slope b of the population regression function, determine whether there is a linear relationship which is statistically significant at a level of 5% between the two variables PATENTS and R&D. Compare with the results from question c.
- e. Based on a p-value, determine whether there is a linear relationship which is statistically significant at 5% and 1% between the two variables PATENTS and R&D. Explain the meaning of p-value.
- f. Estimate and explain the meaning of adjusted R^2 .
- g. Suppose R&D is recorded in million USD instead of billion USD. In your opinion, does this change affect the slope and intercept which you estimated in question b.

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Fulbright Economics Teaching Program
Academic Year 2005 - 2006

Analytical Methods

Problem Set 4

Fulbright Economics Teaching Program

Fall Term 2005
05/9/2005 23/12/2005

Analytical Methods

Problem Set 4

Distributed: Monday, 26 September, 2005
Due date: Monday, 03 October, 2005

Question 1:

Estimate the parameters of the multiple regression model as well as R^2 and adjusted R^2 .

$$\bar{Y} = 9209.675$$

$$\bar{X}_2 = 10.6$$

$$\bar{X}_3 = 8.56675$$

$$\cdot \sum (\bar{Y} - X_{3i})^2 = 30196652.78$$

$$\cdot \sum (\bar{Y} - X_{3i} - \bar{X}_3) = 92281.9478$$

$$\cdot \sum (\bar{Y} - X_{2i} - \bar{X}_2) = 48358.80$$

$$\cdot \sum (X_{3i} - \bar{X}_3)^2 = 1147.09208$$

$$\cdot \sum (X_{2i} - \bar{X}_2)^2 = 625.60$$

$$\cdot \sum (X_{2i} - \bar{X}_2)(X_{3i} - \bar{X}_3) = 269.088$$

$$n = 40$$

Note: To solve this question, please read Chapter 7 (Gujarati), formulas 7.4.6, 7.4.7, 7.4.8, and 7.5.5.

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Academic Year 2005 - 2006

Analytical Methods

Problem Set 4

- e. Supposing (5) is the correct function and appropriate to the available data, estimate the parameters of this model, R^2 and adjusted R^2 . Explain the results carefully.

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Fulbright Economics Teaching Program
Academic Year 2005 - 2006

Analytical Methods

Problem Set 4

Question 2:

A households consumption function is specified as follows:

$$Y_i = a_1 + a_2 X_i + u_{1i}$$

and a households savings function as follows:

$$Z_i = \alpha_1 + \alpha_2 X_i + u_{2i}$$

Where X is the households income, $X = Y + Z$, meaning that income is equal to consumption plus savings.

- Is there a relationship between α_2 and a_2 . If there is, prove that relationship
- Are the residual sums of squares for the two models the same. Explain.
- Can you compare R^2 between two models. Why or why not.

Question 3:

Data for chicken consumption in the US for the period 1960-1982 is available in file Table 7.9.txt, data Gujarati4

(L:/course05-06/AnalyticalmethodI&II/Datasets/Gujarati4/Table 7.9)

where:

..

Y = quantity of chicken

X₁ = disposable income per capita (USD)

X₂ = retail price of chicken (cent/pound)

X₄ = retail price of beef (cent/pound)

X₅ = retail price of pork (cent/pound)

X₆ = weighted retail price between beef and pork (cent/pound)

Note: Inflation has been eliminated from disposable income and price.

Here are the demand functions:

$$\ln Y_t = \alpha_1 + \alpha_2 \ln X_{2t} + \alpha_3 \ln X_{3t} + u_t \quad (1)$$

$$\ln Y_t = .1 + .2 \ln X_{2t} + .3 \ln X_{3t} + .4 \ln X_{4t} + u_t \quad (2)$$

$$\ln Y_t = .1 + .2 \ln X_{2t} + .3 \ln X_{3t} + .4 \ln X_{5t} + u_t \quad (3)$$

$$\ln Y_t = .1 + .2 \ln X_{2t} + .3 \ln X_{3t} + .4 \ln X_{4t} + .5 \ln X_{5t} + u_t \quad (4)$$

$$\ln Y_t = .1 + .2 \ln X_{2t} + .3 \ln X_{3t} + .4 \ln X_{6t} + u_t \quad (5)$$

- Suppose the determinants of demand for chicken are X₂, X₃ and X₆ only, which function would you select from the five functions above. Why.
- Explain the coefficients of $\ln X_{2t}$ and $\ln X_{3t}$ in these models.
- Explain the differences between functions (2) and (4).
- Are pork and beef substitutes or complements for chicken. How can you recognize this from the regression functions.

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Fulbright Economics Teaching Program Analytical Methods
Academic Year 2005-2006

Problem set 5

Fulbright Economics Teaching Program

Fall Term, 2005
05/9/2005 23/12/2005

Analytical Methods

Problem Set 5

Delivery date: Monday, 03 October 2005

Due date: Monday, 10 October 2005

Question 1: A Cobb-Douglas model in log form is as follows:

$$\ln \hat{Y} = \beta_1 + \beta_2 \ln K + \beta_3 \ln L$$

- Explain the meaning of the parameters standing before $\ln K$ and $\ln L$.
- Explain as far as possible the information you can get from a Cobb-Douglas model as follows:

Model for Taiwan Agriculture in the period 1957-72:

$$\ln Y = -3.34 + 0.49 \ln K + 1.50 \ln L$$

- If β_1 in the model in question b is not statistically significant, can we conclude that there are no other factors affecting the

there are no other factors affecting the
agricultural production of Taiwan besides

Question 2:

Using the file named pm that you received when practicing Eviews in the computer lab for the first time and in which are contained the variables as firm, k and l.

- a. Estimate the linear model (1) $va = f(k, l)$ and model (2) $\log(va) = g[\log(k), \log(l)]$ by using Eviews.
- b. Explain the difference in the regression results for the parameters of k and l together with those of $\log(k)$ and $\log(l)$.
- c. On which criteria do you base a decision to choose one of the above two models. Show the steps for choosing the two models using Eviews in detail as well as the results.
- d. Estimate the linear model (3) $va = h(k, l, firm, k/l)$. Using the Wald test for the estimated model (1) and (3) by the two methods:
 - a) following the steps for the Wald test as usual; and
 - b) by using the Eviews command VIEW/COEFFICIENT-WALD TESTand then show your conclusion.

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Fulbright Economics Teaching Program Analytical Methods
Academic Year 2005-2006

Problem set 5

Question 3:

Using the data for real GDP, capital, and labor for Mexico for the period 1955-1972 (found in file Table 8.8.txt, data for Gujarati4, by following the filepath `L:/course05-06/AnalyticalmethodI&II/Datasets/Gujarati4/Table 8.8`), where: **GDP = annual gross domestic product**; **Employment = annual labor force**; **Capital = annual volume of capital invested**.

- a. Based on the symbols in the file, write a model of Cobb-Douglas for the Mexico economy.
- b. Estimate the above Cobb-Douglas model and give remarks for the parameters according to statistics and economics.
- c. Economists say: in the period 1955-1972, the Mexico economy was growing under the condition of constant returns to scale. Test this statement by using the Wald test.

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Fulbright Economics Teaching Program Analytical Methods
Academic Year 2005-2006

Problem set 6

Fulbright Economics Teaching Program

Fall Term, 2005
05/9/2005 23/12/2005

Analytical Methods

Problem Set 6

Delivery date: Monday, 17 October 2005

Due date: Monday, 24 October 2005

Question 1:

Suppose the correct model is as follows:

$$\hat{Y} = \beta_1 + \beta_2 X_2 + \beta_3 X_3$$

However, after regression, we use the following real model:

$$\hat{Y} = \beta_1 + \beta_2 X_2$$

- Demonstrate that the estimated parameters of the real model are biased.
- Demonstrate that the estimated parameters of the real model no longer reflect the marginal effect (direct effect) of X_2 on Y correctly.

- c. Why do econometricians, with experience, often consider it better to include all available data to explain a particular economic variable when estimating a model.

Question 2:

There may often be multicollinearity in the estimated regression function when one tries to explain the correlation between an economic variable (Y) and a set of determinants.

- a. Distinguish between multicollinearity and perfect multicollinearity.
 b. Which type of multicollinearity exists in the data for Y which is explained by X.

X2	X3	Y
10	50	20
15	75	30
18	90	60
24	120	100

- c. Demonstrate that we cannot find a unique solution for the parameters of X2 and X2 (using data in question b).
 d. Show a method to tackle the multicollinearity problem by transforming the normal regression function into a distributed lag function.

$$Y = \beta_1 + \beta_2 X_2 + \beta_3 X_3$$

- e. Why can the distributed lag function treat the possibility of multicollinearity better than the normal regression function in question d.

Question 3:

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Fulbright Economics Teaching Program Analytical Methods
Academic Year 2005-2006

Problem set 6

The model for imports to the US in the period 1970-1998 is as follows:

(data at: L/course04-05/AnalyticalmethodI&II/Datasets/Gujarati4/T10-12.txt)

$$\ln \text{Imports}_t = 1 + 2 \ln \text{GDP}_t + 3 \ln \text{CPI}_t + u_t \quad (1)$$

in which:

Imports: value of imports to the US.

GDP: Gross Domestic Product of the US.

CPI: Consumers Price Index of the US.

- a. Before running a regression, predict the signs of β_2 and β_3 . Justify your selection.
- b. Estimate the parameters in model (1).
- c. Do you suspect a presence of the multicollinearity problem based on the regression results. Why.
- d. Continue the following regressions:
 - (d1) $\ln \text{Imports}_t = A_1 + A_2 \ln \text{GDP}_t$
 - (d2) $\ln \text{Imports}_t = B_1 + B_3 \ln \text{CPI}_t$
 - (d3) $\ln \text{GDP}_t = C_1 + C_2 \ln \text{CPI}_t$

What can you say about the degree of multicollinearity in the dataset based on the regression results. Justify your comments.

- e. Suppose there is multicollinearity in model (1), but β_2 and β_3 are statistically significant at 5% and the same applies for the

significant at 5%, and the same applies for the
F-test. Should we worry about the
multicollinearity problem in this case.

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Fulbright Economics Teaching Program
Academic year 2005-2006

Analytical Methods

Term Project Guidelines

Fulbright Economics Teaching Program

First Semester 2005
05/9/2005 23/12/2005

Analytical Methods

Term Project Guidelines

Term projects will be done by teams. Each team will have three members selected by the teaching team. We will announce the teams shortly.

A. General Guidelines

The first step in undertaking an empirical investigation is to come up with an interesting economic problem or question. Based on economic theory, previous empirical studies, and your own experience and interests, you should come up with a core or central economic question.

Based on the above, you should then formulate a model that can be estimated using the methods that we have discussed in our

using the methods that we have discussed in our course (or any other econometric methods that you wish to use).

You should then collect the necessary data from reliable sources. You should have a sufficiently large number of observations so that you can get reasonably precise parameter estimates and greater power for hypothesis tests. A common rule of thumb is to try to have at least thirty degrees of freedom. Also, if your project involves international comparisons, make sure that your data are comparable for different countries. For example, data for Viet Nam on a particular variable may or may not be comparable with data on the same variable for Japan.

Estimate the model, and discuss the econometric issues involved. Perform all the necessary tests of hypothesis. Make any necessary changes in the model as indicated by your tests.

Discuss your results in economic terms and connect with and revisit the central question with which you began your project. That is, make sure that you are not applying the various tools available in EViews merely in a mechanical way.

You will do the project in four steps:

¹A good reference on doing a project of this type is Ramu Ramanatha, *Introductory Econometrics with Applications, fifth edition, Southwestern, 2002. Make sure to read chapter 14 on Carrying Out an Empirical Project.*

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Term Project Guidelines

1. *Proposal. By October 17 submit a one-page proposal about the project that you plan to do. This should include a working title for the project, a brief description of the subject to be studied, and a list of data sources (indicate whether or not you have the data in hand). The teaching team will review your proposal and give you feedback.*
2. *Preliminary Report. By November 10 submit a preliminary report on your project. This should include a description of the data and their summary statistics. Also, include a report on your initial estimation results, and a description of the work to be done to complete the project. Include a discussion of how you are going to tackle potential problems such as heteroscedasticity, serial correlation, and/or multicollinearity issues. Discuss any planned model selection strategies and/or the use of any estimations methods other than OLS. (The report should be approximately five pages of text, double-spaced.)*
3. *Completed Paper. The completed paper is due on December 12. (See below for information on format.)*
4. *Interviews. December 15, we will conduct brief (ten-minute) interviews with each team. Each team member will be asked questions about the project. We expect that each team member should be able to answer questions about all aspects of the project.*

B. Format for the Term Paper*Title Page*

This should include the title, the names of the authors and their affiliations, and the completion date.

Text of the Paper

The paper should begin with a brief theoretical description of the problem and a careful statement of the economic hypotheses to be tested. Be sure to argue clearly how your hypotheses are deduced from economic theory. Having stated the problem and hypotheses, you should describe how your econometric model reflects the economic theory and permits the economic hypotheses to be stated as hypotheses about the parameters of the model. State your assumptions clearly. Discuss the data requirements of your econometric model. Estimate the parameters of the econometric model and compute appropriate test statistics for the hypotheses. Test for common problems such as heteroscedasticity and serial correlation. End with a clearly stated conclusion which includes the extent to which econometric techniques helped shed additional light on the particular economic problem that you studied.

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This section should be five pages long, double-spaced, for the text itself. If you need more space to present the mathematical form of your model, your estimation results, and a brief table and/or graph, then you may use additional space (however, see Appendices below).

Appendices

- A list of variables used in your paper and their full definitions (including their units of measurement).
- Sources of Data.
- Any tables, graphs, printouts, etc., that you think are appropriate. Make sure that all of your appendices have appropriate descriptive titles.

Endnotes

This is optional. If you think there is additional explanatory material that may not exactly belong in the body of the text, but may help the reader and/or shed additional light on your argument, include it as an endnote. You may include as many endnotes as you think is appropriate.

References

If you have used any books, articles, reports

If you have used any books, articles, reports, etc. in the preparation of your paper, it is important to give credit to those sources. List them here, alphabetically by author.

C. Other Matters

Quality of writing counts. Your sentences should be clear and concise. Adherence to commonly accepted rules of grammar and style is essential. The paper should be well-organized. Check for spelling and/or typographical errors. Make sure the paper is paginated throughout.

Presentation of material (equations, tables, graphs, etc.) should be in a neat and professional manner.

When you submit your completed paper, include a note indicating the actual contribution of each author (in percentages) to the project.

D. Time-Table and Grading Structure

All members of each team are equally responsible for the project. We expect that each member of the team will be completely familiar with all aspects of the project. The following table summarizes various deadlines, and the grading structure. Recall that the project contributes 20% to the course grade.

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Term Project Guidelines

<i>Task</i>	<i>Due Date</i>	<i>Percent Contribution to the Project</i>
One-page Proposal	October 17	5
Preliminary Report	November 10	20
Completed Paper	December 12	50
Team Interviews	December 15	25

A. *Potentially Useful Websites*

Here are some web pages that you may explore in order to find some information that may be useful for your term project. Most of them are the web pages of international organizations and NGOs, though a few are directly related to Viet Nam.

If you find a web page that is particularly interesting or useful, please send it to the teaching team so that we may add it to the list.

<http://rfe.wustl.edu/> (Resources for Economists on the Internet)

This is a very broad and useful resource. Spend some time looking though it.

<http://www.apecsec.org.sg/> (Asia-Pacific Economic Cooperation)

Select Databases and explore.

<http://www.adb.org/> (Asian Development Bank)

<http://www.asia-pacific.org/> (Asia Pacific Council)

Select Economics and Statistics, then Statistics
**of Key Indicators of Asian and
Pacific Countries, and explore on your own.**

<http://www.aseansec.org/> (ASEAN)

Select ASEAN Statistics, and explore.

<http://www.imf.org/> (International Monetary Fund)

Select Country Information, and explore.

<http://www.worldbank.org/> (World Bank)

Select Data & Statistics and explore on your own.

<http://www.undp.org.vn/> (United Nations Development Programme)

Look at Facts and Publications.

<http://pwt.econ.upenn.edu/> (Penn World Tables. A very useful dataset for international comparisons.)

<http://www.dei.gov.vn/Default.htm>

<http://www.arts.uwaterloo.ca/~vecon/index.html>

<http://www.idrc.org.sg/>

<http://www.stern.nyu.edu/globalmacro/>

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ANALYTICAL METHODS

Fall 2005

(05/9/2005 - 23/12/2005)

Teaching Team

Instructor Cao Hao Thi
Co-Instructors Nguyen Trong Hoai
Tutor Luong Vinh Quoc Duy
Hoang Thi Hong Van
Translator Tu Nguyen Vu

Class Meeting Times

Mondays: 14:00-16:30
Wednesdays 14:00-16:30
Friday Review Sessions: 13:30-15:00

Office Hours

Office hours is for groups or individual to exchange ideas and discuss the course material or to need more help. The timings of the office hours are sometimes changed to help the participants before the exams and before the assignments due date.

Office hours for the members of the Teaching Team will be announced later. If the timings of the office hours are not convenient, please feel free to make appointments at other times during the week to meet with members of the Teaching Team. The participants can also contact the teaching team by email for this.

Course Description

In this course we study how economists use models, data, and analysis to describe the real world and to contribute to policy discussions. Econometric techniques allow us to test the implications of economic theory. This course introduces the standard methods for estimating relationships among observed variables and for testing hypotheses about those relationships.

Analytical methods is a challenging subject. It is absolutely critical that you maintain a steady pace of study. Simple memorization, and last-minute studying will not help. Therefore, if you encounter any problems or have any questions, make sure to seek help from the teaching team as early as possible. It is important to understand concepts and

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develop the ability to apply them to the solutions of various problems. This takes practice. The lectures, textbooks, handouts, problem sets, and the term project are all designed to help you develop this skill.

The objective of the course is to introduce participants to the power of econometric methods while also noting the limitations of those methods. The focus will be on formulation, estimation, and testing of econometric models. However, participants will also learn how to critique empirical work. This is because the availability of sophisticated software and powerful computers can easily lead to a lot of sloppy econometric work.

Summary of the Grading Structure:

Problem Sets: 20%
Term Project: 20%
Mid term exam: 30%
Final Exam: 30%

Required Readings

Main Textbooks. Lectures will be drawn mostly from two textbooks, both of which are available in English and Vietnamese. Specific chapter references are given in the course outline. Additional material will

given in the course outline. Additional material will be distributed at appropriate times. This text is distributed at appropriate times to be part of required readings.

1. *Introductory Econometrics with Applications*, 5th edition, by Ramu Ramanathan, Harcourt College Publishers, 2003. This textbook has been selected because it has a strong orientation towards applications and a clear exposition of modern econometric practice. The textbook has a good website at: <http://econ.ucsd.edu/~rramanat/embook5.htm>
2. *Basic Econometrics*, 3rd edition, by Damodar Gujarati, McGraw-Hill, 1995. This book also has a useful website at: <http://www.mhhe.com/econometrics/gujarati4> (Please note that this website is associated with the 4th edition of the book.)

Exercises. Several exercises and illustrative examples will be assigned and/or discussed in class at appropriate times. The purpose is to familiarize you with the various ways in which econometric techniques have been used to investigate real world problems and policy issues. These exercises will be drawn from the two main textbooks plus from a variety of other sources including (but not limited to): Damodar N. Gujarati, *Basic Econometrics*, 4th edition, McGraw-Hill, 2003; Pierre-Richard Agnor and Peter J. Montiel, *Development Macroeconomics*, 2nd edition, Princeton University Press, 1999; Dennis R. Appleyard and Alfred J. Field, Jr., *International Economics*, 4th edition, McGraw-Hill, 2001.

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Optional Readings

The following optional readings are available in the FETP library.

Econometrics and Data Analysis for Developing Countries by Chandan Mukherjee, Howard White, and Marc Wuyts. This is very basic and applied.

Econometric Models and Economic Forecasts, third edition, by Robert S. Pindyck and Daniel L. Rubinfeld. This is somewhat out of date but the level is accessible. It is available in English and Vietnamese.

Econometric Methods, third edition, by J. Johnston. This is one of the classic texts for advanced undergraduates and beginning graduate students.

Software

EViews by Quantitative Micro Systems. *EViews Learning Scripts* will be distributed.

SPSS (Statistical Package for Social Sciences) for Windows by Dr. Vo Van Huy, Vo Thi Lan, and Hoang Trong. The instruction of how to use SPSS will be on every Friday, in the Review session.

Course Requirements

There will be two midterms and one final exam. Also, nine problem sets will be distributed throughout the semester. There will be one Empirical Term Project. This assignment will be completed in three steps. Early in the semester, each participant will submit a proposal for the teaching team to review. A draft report is due on November 5. The teaching team will review the draft, with comments for the participant. The final report (five pages maximum) is due on December 10. More specific guidelines for the term project will be given early in the semester.

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Course Outline for Analytical Methods, Fall 2005

Notation: RR5 Ramu Ramanathan, 5
DG3 Damodar Gujarati, 3

thedition, English and Vietnamese.
rdedition, English and Vietnamese.

Week 1

Monday 05/9/2005

Thi

Introduction and Statistical Review

RR5 Chapters 1 and 2

DG3 Chapter 1

Problem Set 1 distributed; due Sep 12

Thursday 08/9/2005

Thi

Review of Probability and Statistics

RR5 Chapter 2

DG3 Annex A

Friday 09/9/2005

Review

Week 2

Monday 12/9/2005

Thi

Simple Regression: The Basic Model and OLS

RR5 Chap 3, Sections 3.1 and 3.2; 3.A.3

DG3 Chap 2 and Chap 3, Sections 3.1 and 3.2

Problem Set 2 distributed; due Sep 19

Thursday 15/9/2005

Thi

Simple Regression: Properties of Estimators and Fitted Values

RR5 Chap 3, Sections 3.3 and 3.4; 3.A.4, 3.A.6

Friday 16/9/2005

Review

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Week 3

Monday 19/9/2005

Thi

Simple Regression: Hypothesis Tests & Confidence Intervals, etc.

RR5 Chap 3, Sections 3.5, 3.6, 3.8, 3.9, 3.10;
DG3 Chap 3, Section 3.5. Sections 3.6 - 3.8 optional.
DG3 Chap 5, Sections 5.1 - 5.8

Problem Set 3 distributed; due Sep 26

Thursday 22/9/2005

Hoi

Eviews lesson
Handout

Friday 23/9/2005

Review

Week 4**Monday 26/9/2005****Hoi***Multiple Regression: Introduction & Estimation*

RR5 Chap 4, Sections 4.1 and 4.2

DG3 Chap 7, Sections 7.1 - 7.5

Problem Set 4 distributed; due Oct 3

Thursday 29/9/2005**Hoi***Multiple Regression: Model Selection and Hypothesis Testing*

RR Chap 4, Sections 4.3 and 4.4

DG3 Chap 8, Sections 8.1 - 8.5

Friday 30/9/2005**Review**

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Week 5

Monday 03/10/2005

Hoi

Specification Error: Omission of Relevant Variables and Inclusion of Irrelevant Ones

RR5, Section 4.5

Problem Set 5 distributed; due Oct 17

Thursday 06/10/2005

Hoi

Multicollinearity

RR5, Chapter 5

Friday 07/10/2005

Review/

**Exercise
analysis.****Week 6****Monday 10/10/2005****Hoi***Functional Form*

RR5, Sections 6.1 - 6.12

Handout

DG3, Sections 6.3, 7.10, 7.11

Thursday 13/10/2005**Hoi***Modeling Strategy: General to Simple*

RR5, Sections 6.14 and 6.15

Friday 14/10/2005**Review/ Exercise analysis.**

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Week 7

Monday 17/10/2005

Hoi

Qualitative Independent Variables (Dummy Variables)

RR5, Chap 7

Problem Set 6 distributed; due Nov 7

Thursday 20/10/2005

Thi

Catch up and Review for the Second Examination

Friday 21/10/2005

Review

Week 8

week**8****Tuesday 25/10/2005****Office hour**

Wednesday morning 26/10/2005**Midterm exam**

Friday 28/10/2005**Self review (No class)***Poverty (Exercise) distributed***Week 9****Monday 31/10/2005****Thi**

Heteroskedasticity

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RR5, Chuong 8

Thursday 03/11/2005

Hoi

Basic steps of a research

Friday 04/11/2005

Review

Week 10

Monday 07/11/2005

Thi

Serial Correlation

RR5, Chapter 9

Problem Set 7 distributed; due Nov 21

Thursday 10/11/2005

Hoi

Limited Dependent Variables

RR5, Chapter 12

Term Project Preliminary Report Due

Friday 11/11/2005

Hoi

Exercise analysis: Poverty

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Week 11

Monday 14/11/2005

Thi

Simultaneous Equations Models I

RR5, Chapter 13

Thursday 17/11/2005

Thi

Simultaneous Equations Models II

RR5, Chapter 13

Friday 18/11/2005

Hoi

Review

Preparation for next week exercise.

The social economic difference between the provinces (Exercise) distributed.

Week 12

Monday 21/11/2005**Hoi****Panel Data**

Lecture notes

Problem Set 8 distributed; due Nov 28

Thursday 24/11/2005**Thi**

Distributed Lag Models

RR5, Chapter 10

Friday 25/11/2005**Hoi****Exercise analysis: The social economic difference between the provinces**

Preparation for next week exercise

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Gold Price Forecast (exercise) distributed

Week 13

Monday 28/11/2005

Thi

Forecasting I

RR5, Chapter 11

Problem Set 9 distributed; due Dec. 5

Thursday 01/12/2005

Thi

Forecasting II

RR5, Chapter 11

Friday 02/12/2005

Hoi

Review

Exercise analysis: Gold price forecast

Week 14

Monday 05/12/2005**Thi***Forecasting from Econometric Models**Time Series Analysis I*

DG3, Chap 21

Lecture Notes

Thursday 08/12/2005**Thi**

Time Series Analysis II

DG3, Chapter 22

Lecture notes

Friday 09/12/2005**Review**

Cao Hao Thi

10

Kim Chau updated in English version

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Week 15

Monday 12/12/2005

Hoi

Catch Up and Review for the Final Examination

Term Project Final Report Due

Thursday 15/12/2005

Thi, Hoi

Presentation of the Term Project

Friday 16/12/2005

Review

Week 16

Tuesday 20/12/2005

Office hour

Wednesday morning 21/12/2005

Final exam
