

# Index

<b>Applied Econometrics. An Introduction</b>	<b>1</b>
<b>1. Introduction</b>	<b>5</b>
1.1 What is econometrics?	5
1.2 Elements of an econometric study	5
1.3 Data	9
1.4 The descriptive analysis	10
1.5 Some examples	11
The main concepts of this chapter	20
<b>2. The Linear Regression Model</b>	<b>23</b>
2.1 Definitions and notation	23
2.2 The assumptions of the linear regression model	27
2.3 The role of the error term	29
2.4 OLS estimators of the regression function parameters	30
2.5 The linear model and the OLS estimators in vector notation	33
2.6 Properties of OLS estimators	36
2.6.1. <i>Unbiasedness</i>	36
2.6.2 <i>The variance of the OLS estimators</i>	37
2.6.3 <i>Consistency</i>	39
2.6.4 <i>Efficiency of OLS estimators</i>	39
2.6.5 <i>The distribution of the OLS estimators</i>	41
2.6.6. <i>Orthogonality between OLS fitted values and residuals</i>	42
2.7 An estimator of the error variance	43
2.8 Maximum Likelihood Estimators for the linear model	47
2.9 The coefficient of determination	50
2.10 Linear transformations of variables and their effects	52
2.11 The multiple regression model	54

2.12 Multicollinearity	59
2.13 An empirical analysis with simulated data	60
2.14 An empirical analysis of aggregate consumption	70
2.15 An empirical analysis of aggregate investment	74
2.16 An empirical analysis of labor productivity	76
The main concepts of this chapter	77
Exercises	80
<b>3. Inference in the Linear Regression Model</b>	<b>83</b>
3.1 Interval estimators	83
3.2 Testing hypothesis on the parameters of the linear regression model	87
3.3 Type I and type II errors	94
3.4 The concept of p-value	96
3.5 Significance testing	98
3.6 The relationship between confidence intervals and hypothesis testing	99
3.7 One-way tests	100
3.8 The F-test	101
3.9 Restricted OLS estimators	108
3.10 Omitted variables and irrelevant variables	110
3.11 An empirical analysis with artificial data	112
3.12 An empirical analysis of the determinants of aggregate consumption	119
3.13 An empirical analysis of the determinants of aggregate investment	122
3.14 An empirical analysis of the determinants of labor productivity	126
3.15 An empirical analysis of the CAPM	127
The main concepts of this chapter	130
Exercises	134
<b>4. The Generalized Linear Regression Model</b>	<b>137</b>
4.1 Heteroscedasticity and serial correlation of the errors	137
4.2 The Generalized Least Squares estimators (GLS and FGLS)	140
4.3 Tests for homoscedasticity	144
4.4 Tests for no correlation	146
4.5 The assumptions of Normality of the errors	147
4.6 The hypothesis of linearity in the parameters	149
4.7 Nonlinear transformations of the variables	150

4.8 An empirical analysis with simulated data	154
4.9 An empirical analysis of the determinants of aggregate consumption	167
The main concepts of this chapter	169
Exercises	171
<b>5. Parameter Instability in the Linear Regression Model</b>	<b>173</b>
5.1 Structural breaks and tests for parameter stability	173
5.2 Recursive estimation methods	177
5.3 Remedies for parameter instability	179
5.4 Forecasting with the linear regression model	183
5.5 Forecasting with unknown parameters	186
5.6 Multi-step ahead forecasting	189
5.7 An empirical analysis with simulated data	191
5.8 An empirical analysis of the determinants of aggregate consumption	203
The main concepts of this Chapter	211
Exercises	215
<b>6. Stochastic Regressors</b>	<b>219</b>
6.1 Stochastic regressors, independent of the error term	219
6.2 Stochastic regressors, asymptotically uncorrelated with the error term	221
6.3 Stochastic regressors, correlated with the error term	223
6.4 Instrumental Variables (IV) and IV estimator	225
6.5 Two-Stage Least Squares (TSLS) estimator and the over-identification test	228
6.6 The Hausman Test	232
6.7 An empirical analysis based on simulated data	235
6.8 An empirical analysis of aggregate consumption	239
The main concepts of this chapter	243
Exercises	246
<b>7. Dynamic Models</b>	<b>249</b>
7.1 Dynamic models: a classification	218
7.2 Dynamic models: specification, estimation, inference and diagnostic control	254

7.3 An empirical analysis with stationary simulated data	257
7.4 An empirical analysis of the determinants of the FED decisions	262
7.5 Unit roots and stochastic trends	269
7.6 Implications for estimation and inference	272
7.7 Cointegration: basics	277
7.8 An empirical analysis with integrated simulated data	283
7.9 An empirical analysis of the determinants of aggregate consumption	293
7.10 An empirical analysis of short-term interest rates	299
The main concepts of this chapter	302
Exercises	307
<b>8. Models for Panel Data</b>	<b>309</b>
8.1 The Seemingly Unrelated Regression (SUR) model	309
8.2 The Fixed Effects model	314
8.3 The Random Effects (RE) model	317
8.4 Some additional considerations on fixed and random effects	322
8.5 An empirical analysis with simulated data	324
8.6 An empirical analysis with simulated data on the use of fixed and random effects methods	333
8.7 An empirical analysis with simulated data when $N > T$ .	338
8.8 An empirical analysis of the effects of public capital in the Italian regions	345
The main concepts of this chapter	356
Exercises	359
<b>9. Models for Qualitative Data</b>	<b>361</b>
9.1 The linear regression model with a binary dependent variable	361
9.2 The LOGIT and PROBIT models: specification	363
9.3 The LOGIT and PROBIT models: estimation and interpretation of estimated coefficients	365
9.4 Model evaluation	368
9.5 An empirical analysis with simulated data	369
9.6 Leading indicators for GDP growth	373
9.7 An empirical analysis of the sign of stock returns	378
The main concepts of this chapter	383
Exercises	386