

METU INSTITUTE OF APPLIED MATHEMATICS

Course Title:	Time Series Applied to Finance
Course Code:	IAM 526
Credit:	(3-0)3
Instructor's Name:	Dr. C. Coşkun Küçüközmen (kcoskun@metu.edu.tr ; coskun.kucukozmen@tcmb.gov.tr)
Prerequisites:	Introductory knowledge of calculus and statistics; basics of finance
Contents:	<p>Introduction What is econometrics? Is financial econometrics different from ‘economic econometrics’? Data. Returns in financial modeling. Formulating an econometric model. Reading articles in empirical finance.</p> <p>Econometric Packages for Modelling Financial Data Available packages. Choosing a package. WinRATS. EViews</p> <p>Regression Analysis (an overview) What is a regression model? Regression vs. correlation. Simple regression. Assumptions underlying the classical linear regression model. Properties of the OLS estimator. Precision and standard errors. Statistical inference. Multiple regression. The constant term. Calculation of parameters. <i>t</i>-ratio. Data mining and true size of the test.</p> <p>Further Issues with the Regression Analysis Goodness of fit statistics. Violations of the assumptions of the classical linear regression model. Multicollinearity. Diagnostic tests: DW and LM tests of residual serial correlation, Ramsey’s test of functional form misspecification, Jarque-Bera test of normality, and simple tests of heteroscedasticity.</p> <p>Univariate Time Series Modelling and Forecasting Notation and basic concepts. Moving average processes. Autoregressive processes. Partial Autocorrelation function. ARMA processes. Box-Jenkins approach.</p> <p>Multivariate Models Simultaneous equations bias. Exogeneity. Estimation. Vector autoregression models. Impulse response.</p> <p>Modelling Long-run Relationships in Finance Stationarity and unit root testing. Cointegration. Error correction models.</p> <p>Modelling Volatility and Correlation Non-linearity. Volatility models. Historical volatility. Implied volatility models. EWMA. AR volatility models. ARCH models. Generalised ARCH models (GARCH). Extension of various GARCH models. Stochastic volatility models.</p> <p>Simulation Methods Monte Carlo simulations. Variance reduction techniques. Bootstrapping. Random number generation.</p> <p>Conducting Empirical Research in Finance What is it for? Selecting a topic. Resources. Getting the data. Choice of software. Presentation.</p>
Aims:	This course is concerned with recent developments in the time series techniques for the analysis of financial markets. It provides a rigorous account of the time series techniques dealing with univariate and multivariate time series models. The techniques will be illustrated by a number of applications.
Suggested Textbooks:	<i>Introductory Econometrics for Finance</i> , by Chris Brooks, Cambridge University Press; first edition, 2002.
	Other Resources
Books	<p><i>The Econometric Modelling of Financial Time Series</i>, by Terence C. Mills, Cambridge University Press, second edition, 1999.</p> <p><i>Applied Econometric Time Series</i>, by Walter Enders, John Wiley & Sons, inc., 1995.</p> <p><i>The Econometrics of Financial Markets</i>, by John Y. Campbell, Andrew W. Lo and A. Craig Mackinlay, Princeton, 1997.</p> <p><i>ARCH Models and Financial Applications</i>, by Gouriéroux, C., Springer, 1997.</p> <p><i>An Introduction to High-Frequency Finance</i>, by Dacarogna, Gençay, Müller, Olsen and Pictet, Academic Press, 2001.</p> <p><i>Forecasting Volatility in the Financial Markets</i>, EDS. Knight, J.; Satchell, S, Butterworth Heinemann, 1998.</p> <p><i>Elements of Forecasting</i>, by. Francis X. Diebold, South Western, Thomson Learning, 2001.</p>

Articles	<p>Andersen, T.G., Bollerslev, T., 1998, “Answering the Skeptics: Yes, Standard Volatility Models Do Provide Accurate Forecasts”, <i>International Economic Review</i> 39, 885-905.</p> <p>Aydemir, A.B., 1998, “Volatility Modelling in Finance”, In: Knight, J., and Satchell, S. (Eds.), <i>Forecasting Volatility in the Financial Markets</i>, Butterworth Heinemann, 1-47.</p> <p>Bera, A.K., and Higgins, M.L., 1993, “ARCH Models: Properties, Estimation and Testing”, <i>Journal of Economic Surveys</i> 7, 305-366.</p> <p>Bollerslev, T., 1986, “Generalised Autoregressive Conditional Heteroscedasticity”, <i>Journal of Econometrics</i> 31, 307-327.</p> <p>Bollerslev, T., 2001, “Financial Econometrics: Past Developments and Future Challenges”, <i>Journal of Econometrics</i> 100, 41-51.</p> <p>Bollerslev, T., Chou, R.Y., Kroner, K.F. 1992, “ARCH Modelling in Finance, A Review of the Theory and Empirical Evidence”, <i>Journal of Econometrics</i> 52, 5-59.</p> <p>Bollerslev, T., Engle, R.F., Nelson, D.B., 1994, “ARCH Models” In: eds. Engle, R.F., McFadden, <i>Handbook of Econometrics</i>, Vol.4, 2959-3038, (North-Holland, Amsterdam).</p> <p>Brooks, C., Persaud, G., 2003, “Volatility Forecasting for Risk Management”, <i>Journal of Forecasting</i> 22, 1-22.</p> <p>Brooks, C., Burke, S., Persaud, G., 2003, “Multivariate GARCH Models: Software Choice and Estimation Issues”, <i>JISMA Centre</i>, April.</p> <p>Christoffersen, P.F., Diebold, X.F., 1997, “How Relevant is Volatility Forecasting for Financial Risk Management?”, <i>Wharton Financial Institutions Center</i>, 97-45.</p> <p>Cont, R., 2001, “Empirical Properties of Asset Returns: Stylised Facts and Statistical Issues”, <i>Quantitative Finance</i> 1, 223-236.</p> <p>Engle, R.F., 1982, “Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation”, <i>Econometrica</i> 50, 987-1007.</p> <p>Engle, R.F., 2002, “New Frontiers for ARCH Models”, <i>Journal of Applied Econometrics</i> 17, 425-446.</p> <p>Engle, R.F., and Mezrich, J., 1995, “Grappling with GARCH”, <i>Risk</i> 8, September, 112-117.</p> <p>Engle, R.F., and Ng, V.K., 1993, “Measuring and Testing the Impact of News on Volatility” <i>Journal of Finance</i> 48, 1749-1778.</p> <p>Engle, R.F., Rothschild, M., 1992, “ARCH Models in Finance”, <i>Journal of Econometrics</i> 52, 1-59.</p> <p>Figlewski, S., 1997, “Forecasting Volatility”, <i>Financial Markets, Institutions & Instruments</i> 6.</p> <p>Franses, P.H., McAleer M., 2002, “Financial Volatility: An Introduction” <i>Journal of Applied Econometrics</i> 17, 419-424.</p> <p>Hentschel, L., 1995, “All in the Family, Nesting Symmetric and Asymmetric GARCH Models”, <i>Journal of Financial Economics</i> 39, 71-104.</p> <p>Mitchell, H., McKenzie, M.D., 2003, “GARCH Model Selection Criteria”, <i>Quantitative Finance</i> 3, 262-284.</p> <p>Nelson, D.B., 1991, “Conditional Heteroscedasticity in Asset Returns: A New Approach”, <i>Econometrica</i> 59, 347-370.</p> <p>Palm, F.C., 1996, “GARCH Models of Volatility”, In: Maddala, G.S., Rao, C.R. (Eds.), <i>Handbook of Statistics</i>, Vol.14, 209-239.</p> <p>Poon, S-H., Granger, C.W.J., 2003, “Forecasting Volatility in Financial Markets: A Review”, <i>Journal of Economic Literature</i> V.XLI, 478-539.</p>
Journals	<p>Journal of financial econometrics, Econometrics journal, International journal of applied economics and econometrics, Journal of applied econometrics, Journal of econometrics, Studies in nonlinear dynamics and econometrics, Econometrica, Econometric Theory, Journal of Financial Markets Journal of Risk, Journal of Empirical Finance, Journal of Money and Banking, Journal of Computational Finance, Applied Mathematical Finance, Finance and Stochastics</p>
Other Supportive Materials	<p>Financial Times, Wall Street Journal Europe, Risk Magazine , The Banker, Euromoney, The Economist</p>
Software	<p>RATS http://www.estima.com</p> <p>Eviews http://www.eviews.com</p>