《金融计量学》教学大纲

“Financial Econometrics” Course Outline

课程编号：151163A

课程类型：专业选修课

总 学 时：48 讲课学时：32 实验（上机）学时：16

学　　分：3

适用对象：金融学（数据与计量分析）

先修课程：微观经济学、宏观经济学、概率论与数理统计、线性代数、微积分

**Course Code:** 151163A

**Periods:** 48  **Lecture:** 32 **Experiment (Computer):** 16

**Credits:** 3

**Applicable Subjects:**：Finance

**Preparatory Courses:** Microeconomics, Macroeconomics, Probability and Mathematical Statistics, Linear Algebra, Mathematical Analysis

**一、课程的教学目标**

这是一门向金融学、经济学和管理学相关专业的高年级本科生开设的学科基础课程。这门课程在学生的知识结构中占有重要位置，是训练学生研究能力和分析能力的重要课程之一。旨在引领学生从政治认同、国家意识、文化自信等方面提升金融素养，发挥金融专业的引航作用。

在这门课中，我们主要介绍应用于金融经济学中各种经典计量分析方法，包括以下教学目标：（1）为金融计量分析中其它相关课程提供所需要的基本概率知识；（2）着重于现代金融理论进行实证分析所需要的估计和检验方法；（3）学生能运用所学的金融计量理论分析和解释实际金融数据；（4）学生能在计算机上用计量软件EViews或STATA实践计量方法。学完这门课程后，学生能熟练运用各种经典的金融计量分析方法和软件来分析金融数据，包括金融变量间的建模，运用计量软件来检验、预测、理解和模拟金融数据，并拥有了解新的分析方法的工具。最后，通过金融计量学理论加实践的学习，培养学生金融分析能力，树立正确的世界观和社会主义价值观。

Financial Econometrics is a basic major course for advanced undergraduate students majoring in finance, economics and management. This course plays a vital role in students’ structure of knowledge, and is an important training course for developing students’ research and analysis skills. This course aims to lead students to improve their financial literacy in terms of political identity, national awareness, and cultural self-confidence, taking as a leading role in the area of finance. Through the systematic study of financial econometrics, students will cultivate their financial analysis ability and establish a correct world outlook and socialist valuation.

In this course, we introduce basic econometric methods applied in financial economics, including the following aims: (1) provides background in probability theory for other courses in the Financial Econometrics; (2) focuses on the estimation and inferential methods used in empirical analysis of modern finance theory; (3) students are able to apply the methods taught in Financial Econometrics to analyze and explain the financial data; (4) students are able to implement these techniques using econometric software packages EViews or STATA. With successful completion of this course, students should be able to apply all sorts of empirical methods in Financial Econometrics to quantitatively analyze and interpret the financial data, including modelling the relationship between multivariate variables, using econometric software to test, predict, understand and simulate the financial data, and having the tools to read texts which introduce new methods.

**二、教学基本要求**

这门课程主要阐述的是关于金融理论的实证分析，以及如何分析实际金融数据所需要的计量理论和实证技术。因此，在教学内容的讲授过程中，授课老师需要做到理论与实践并重。这门课从金融数据的概述开始，包括一些基本的分析统计量，分位数相关的分析比如风险的计算以及有效市场的检验。之后，我们开始分析数据的平稳性与非平稳性。 基于此基本性质，我们进而分析股票票回报率、金融市场泡沫的存在性。于此同时，我们用ARCH和GARCH模型分析市场的波动效应。我们还特别关注多维变量的建模和分析。基于多维向量自回归模型，我们继而学习协整模型和向量误差修正模型。于此同时，我们对相关的脉冲响应函数以及预测方差分解给予详细介绍。对于上述所有的模型的分析，该课程都提供相应的实证数据例子以及标准的计量分析程序。

由于教学理论与实践并重，授课老师应采取理论教授与上机实践紧密结合的教学方法。鼓励学生课前预习；课上安排课堂讨论，提高学生的课堂参与积极性，以便学生能够深入理解知识要点；课后指定学生进行经典论文的选读，指导学生撰写小论文并组织课堂宣讲。

课程的考核方式及其所占权重如下：

|  |  |
| --- | --- |
| 出勤 | 10% |
| 作业 | 30% |
| 期末闭卷考试 | 30% |
| 课程论文 | 30% |

在上述考核方式中，作业来自于授课相关知识的理论和实践习题；期末闭卷考试考查计量理论知识；课程论文考查计量应用实践。

The main content of this course is elaborating the econometric theory and empirical techniques which are mostly used in the empirical analysis of financial theory and how they are applied to actual financial data. Therefore, in this course, the instructor should equal weights on both theory and application. The course starts with the overview of financial data. It covers some statistics, percentile related analysis such as risk computation, and continues with testing efficient market models. We then proceed to analyzing the stationarity and non-stationarity of data, with application on return predictability and bubble existence. We continue with volatility effects of the market data using ARCH and GARCH models. A special attention is paid to multivariate models. Based on basic Vector Autoregressive models, we cover cointegration and VECM model, other more advanced techniques like impulse response analysis and forecast error decomposition are included as well. All the models are accompanied with real-data examples in standard computer packages.

Because of the equal importance of theory and application, instructor should adopt the teaching strategy of close integration of lecturing in theory and practicing on computer. Encourage student to preview course materials before class, arrange discussions during class, enhance student’s enthusiasm and initiative in class participation so that student can understand those key points of knowledge deeply; assign student to read classical academic papers selectively, guide student to write term paper and organize presentations in class.

The methods of evaluation of this course and their weights are as follows:

|  |  |
| --- | --- |
| Attendance | 10% |
| Assignments | 30% |
| Final Exam (closed) | 30% |
| Term paper | 30% |
|  |  |

In the methods of evaluation above, the assignments come from the theoretical and application exercises from course related material; the closed form final exam focuses on the examination of knowledge in theory; and the term paper focuses on the examination of application.

**三、各教学环节学时分配**

**教学课时分配 (Class Schedule)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 序号 | 章节内容 | 讲课 | 实验 | 其他 | 合计 |
|  | 金融数据概述  The Characteristics of Financial Market Data | 4 |  |  | 4 |
|  | 平稳时间序列  Stationary Time Series | 6 | 2 |  | 8 |
|  | 非平稳时间序列  Nonstationary Time Series | 6 | 2 |  | 8 |
|  | 股票回报率预测  Stock Return Predictability | 4 | 2 |  | 6 |
|  | 多元时间序列建模Multivariate Time Series | 10 | 4 |  | 14 |
|  | 波动率  Volatility | 6 | 2 |  | 8 |
|  |  |  |  |  |  |
| **合计** |  | **36** | **12** |  | **48** |

**四、教学内容**

**第一章 金融市场数据的特征**

1. 数据：金融数据的实证特征对金融建模很重要
2. 概括性的统计量
3. 分位数相关的分析
4. 在险价值
5. 期望损失
6. 密度预测
7. 实证分析
8. 有效市场假说
9. 方差比检验

**教学重点、难点**：在险价值和期望损失的计算

**课程的考核要求：**计算在险价值和期望损失，用计量软件检验有效市场假说

**第二章 平稳时间序列**

1. ARMA过程
2. 数据
3. 模型性质
4. 估计，检验和模型选择
5. MLE估计方法
6. 统计量
7. ARMA模型选择
8. 预测
9. 预测过程
10. 预测评估
11. 实证分析

**教学重点、难点**：ARMA过程模型性质和预测

**课程的考核要求**：分析ARMA过程模型性质和预测，用计量软件预测ARMA过程

**第三章 非平稳时间序列**

1. 单位根过程和确定性时间序列
2. 数据
3. 单位根过程的模型性质
4. 含有确定性时间序列模型的性质
5. 估计，检验和模型选择
6. MLE估计方法
7. 单位根检验
8. 滞后阶数的选择
9. 预测
10. 预测过程
11. 预测评估
12. 实证分析
13. 泡沫检验
14. 泡沫起始时间的估计

**教学重点、难点**：单位根检验和泡沫检验

**课程的考核要求**：分析单位根过程的模型性质，用计量软件进行单位根检验

**第四章 多元时间序列建模**

1. 向量自回归过程
2. 数据
3. 向量自回归过程的模型性质
4. 估计，检验和模型选择
5. 脉冲响应函数分析
6. 预测方差分解
7. 伪回归和协整模型
8. 伪回归模型
9. 协整模型
10. 向量误差修正模型
11. 模型性质
12. 模型估计
13. 预测
14. 预测过程
15. 预测评估
16. 实证分析
17. 泡沫检验
18. 泡沫起始时间的估计

**教学重点、难点**：向量自回归过程的模型性质和协整关系检验

**课程的考核要求**：分析向量自回归过程的模型性质，用计量软件进行协整关系检验

**第五章 股票回报率预测**

1. 股票回报率预测（i）
2. 预测回归
3. 长期预测回归
4. 股票回报率预测（ii）
5. 资本资产定价模型
6. 多因子模型
7. 实证分析

**教学重点、难点**：预测回归和多因子模型

**课程的考核要求**：用计量软件检验股票收益的可预测性

**第六章 波动率**

1. 资产价格过程的波动聚类
2. 自回归条件异方差模型（ARCH）
3. 模型性质
4. 估计方法
5. 模型选择
6. 广义自回归条件异方差模型（GARCH）
7. 模型性质
8. 估计方法
9. 模型选择
10. 实证分析

教学重点、难点：ARCH和GARCH模型的估计

课程的考核要求：用ARCH和GARCH模型来分析现实金融数据的波动性

**Chapter** 1 **The Characteristics of Financial Market Data**

Section 1 The Data: The empirical characteristics of financial data are important for building financial models.

Section 2 Summary Statistics

Section 3 Percentiles related statistics

1. Value-at-Risk
2. Expected Shortfall
3. Density Forecasting Estimation

Section 4 Empirical Analysis

1. Effcient Market Hypothesis
2. Variance Ratio Tests

**Key and Difficult Points:** calculation of Value-at-Risk and Expected Shortfall

**Evaluation Requirements:** calculation of Value-at-Risk and Expected Shortfall, and testing the Effcient Market Hypothesis by econometric software

**Chapter 2 Stationary Time Series**

Section 1 ARMA processes

1. Data
2. Properties

Section 2 Estimation, Inference and Model Selection

1. Estimation by MLE
2. Test Statistics
3. ARMA Model Selection

Section 3 Forecasting

1. Forecasting Procedure
2. Forecasting Evaluation

Section 4 Empirical Analysis

**Key and Difficult Points:** the properties of ARMA process and forecasting using ARMA model

**Evaluation Requirements:** the properties ofARMA process, and forecasting using ARMA model by econometric software

**Chapter 3 Nonstationary Time Series**

Section 1 Unit Root and Deterministic Trends

1. Data
2. Properties of Unit Root Model
3. Properties of Model with Deterministic Trends

Section 2 Estimation, Inference and Model Selection

1. Estimation by MLE
2. Unit Root Test
3. Lag-length Model Selection

Section 3 Forecasting

1. Forecasting Procedure
2. Forecasting Evaluation

Section 4 Empirical Analysis

1. Bubble Test
2. Data Stamping of Bubbles

**Key and Difficult Points:** Unit root test and Data Stamping of Bubbles

**Evaluation Requirements:** Properties of Unit Root Model, and test unit root by econometric software

**Chapter 4 Multivariate Time Series**

Section 1 Vector Autoregressive Models

1. Data
2. Properties of Vector Autoregressive Models
3. Estimation, Inference and Model Selection
4. Impulse Response Analysis
5. Forecast error variance decompositions

Section 2 Spurious Regression and Cointegration

1. Spurious Regression
2. Cointegration

Section 3 Vector Error Correction Model

1. Properties
2. Estimation

Section 4 Forecasting

1. Forecasting Procedure
2. Forecasting Evaluation

Section 5 Empirical Analysis

**Key and Difficult Points:** Vector Autoregressive Models and Cointegration

**Evaluation Requirements:** Properties of Vector Autoregressive Models and Cointegration test by econometric software

**Chapter 5 Stock Return Predictability**

Section 1 Stock Return Predictability (i)

1. Predictive Regression
2. Long-horizon Predictive Regression

Section 2 Stock Return Predictability (ii)

1. Capital Asset Pricing Model (CAPM)
2. Multifactor Models

Section 3 Empirical Analysis

**Key and Difficult Points:** Predictive Regression and Multifactor Models

**Evaluation Requirements:** Test stock return predictability by Predictive

Regression using econometric software

**Chapter 6 Volatility**

Section 1 Volatility Clustering of Asset Price Processes

Section 2 Autoregressive Conditional Heteroscedasticity Model（ARCH）

1. Properties
2. Estimation
3. Model Selection

Section 3 Generalized Autoregressive Conditional Heteroscedasticity Model（GARCH）

1. Properties
2. Estimation
3. Model Selection

Section 4 Empirical Analysis

**Key and Difficult Points:** estimation of ARCH and GARCH models

**Evaluation Requirements:** apply ARCH and GARCH models to real data in finance

**五、其它**

授课老师应根据学生的能力适当调节课程进度和内容

Instructor should adjust the course schedule and content according to the capability of students.

**六、主要参考书**

[1] Campbell, J. Y., Lo, A. W. C., & MacKinlay, A. C. (1997). The econometrics of financial markets (Vol. 2, pp. 149-180). Princeton, NJ: princeton University press.

[2] Tsay, R. S. (2005). Analysis of \_nancial time series (Vol. 543). John Wiley & Sons.

[3] Hamilton, J. D. (1994). Time series analysis (Vol. 2). Princeton: Princeton university press.

[4] Diebold, F. X. (1998). Elements of forecasting. South-Western College Publication.