

Stats 06: Age-Period-Cohort Models in Social Sciences

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Course Description:

This course provides an in-depth exploration of Age-Period-Cohort (APC) models, which are widely used in social sciences to analyze and understand the complex interplay between age, time period, and birth cohort effects on various social phenomena. Students will gain a comprehensive understanding of the theoretical foundations, statistical techniques, and practical applications of APC models. The course will emphasize the role of APC models in addressing research questions related to demographic, sociological, and epidemiological phenomena.

Prerequisites:

- Basic knowledge of statistics
- Familiarity with regression analysis
- Familiarity with the statistical software R.

Course Objectives:

By the end of this course, students should be able to:

- Understand the fundamental concepts of age, period, and cohort effects in social science research.
- Critically evaluate and discuss the strengths and limitations of APC models.
- Apply various statistical techniques for modeling and analyzing age-period-cohort data.
- Interpret and communicate the results of APC models effectively.
- Design and conduct research projects that incorporate APC modeling to address specific research questions.
- Identify real-world applications of APC models in areas such as public health, sociology, and demography.

Course Outline:

Module 1: Introduction to Age-Period-Cohort Models.

- Definition and conceptual framework of APC models.
- Historical development and significance of APC models in social sciences
- Terminology and key concepts.

Module 2: Data Sources and Data Preparation

- Sources of age-period-cohort data.
- Data cleaning and preparation.
- Challenges and issues in handling age-period-cohort data.

Module 3: Descriptive Analysis of Age-Period-Cohort Data

- Visualizing age, period, and cohort effects.
- Constructing age-period-cohort tables.
- Identifying patterns and trends.

Module 4: Cross-Sectional and Longitudinal Analysis

- Cross-sectional versus longitudinal data
- Basic cross-sectional APC models
- Longitudinal APC models and their advantages

Module 5: Statistical Models for APC Analysis

- Introduction to generalized linear models (GLMs).
- The intrinsic estimator method.
- Quasi-Poisson and Poisson regression for APC modeling.

Module 6: Interpretation of APC Models

- Interpreting coefficients and parameters.
- Separating age, period, and cohort effects.
- Identifying period and cohort effects in the presence of the age effect.

Module 7: Projections of future rates using the APC models

- Challenges of APC model projections.
- Projection scenarios for incidence rates.
- Projection scenarios for mortality rates.
- Methodological points and discussion.

Module 8: Real-World Applications

- Public health applications.
- Social sciences applications.
- Cancer Research applications

Assessment Methods:

1. Quizzes and Homework Assignments: Assessing understanding of theoretical concepts.
2. Final Exam: Covering material from the entire course.
3. Group Projects: Applying hypothesis testing to real-world data analysis.
4. Class Participation: Active engagement in discussions and activities.

Grading:

- Quizzes and Homework Assignments: 30%
- Final Exam: 30%
- Group Projects: 30%
- Class Participation: 10%

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Textbook:

- Robert O'Brien. Age-Period-Cohort Models (Chapman & Hall/CRC Statistics in the Social and Behavioral Sciences)
- Yang, Yang; Land, Kenneth C. Age-Period-Cohort Analysis: New Models, Methods, and Empirical Applications (Chapman & Hall/CRC Interdisciplinary Statistics)