

Statistics Applied to Business

Assignment Guidelines:

The purpose of the course is to study how statistical inference and econometric models can be applied to enable business decisions that are informed by data and that lead to business benefits in various industries. Students should be able to critically evaluate the behaviour of actual datasets, conduct appropriate quantitative analyses of these data, and interpret the results of empirical work in the context of managerial and economic applications. This project involves developing unbiased, data-driven insights leveraging SAS or Excel in the context of real-world business case studies.

Submission Format:

- Type: Practical analytical report
- Font/Spacing: Times New Roman, Size 12, Double Spaced
- Word Count: 1500 – 2500 words (excluding code, statistical outputs, and computational appendices)
- Submission Deadline: To be announced by the respective professors

Assessment Criteria:

- Application of statistical inference and estimation techniques – 20%
- Critical interpretation of econometric models and quantitative results – 25%
- Data manipulation, accuracy of software implementation, and evidence usage – 20%
- Strategic business insight and data-driven recommendations – 25%
- Structure, technical reporting clarity, presentation, and APA referencing – 10%

Mandatory Sections:

- Title Page
- Table of Contents
- Executive Summary
- Introduction
- Exploratory Data Analysis & Methodology
- Findings & Model Results
- Discussion & Business Implications
- Conclusion & Recommendations
- References
- Appendices (Raw Datasets & Software Outputs)

Assignment Task – Choose ONE of the following practical research projects:

Option 1: Empirical Analysis of Consumer Spending and Price Elasticity Using Regression Modelling

Study the quantitative interplay between enterprise pricing policies, macroeconomic indicators and the buying behaviour of their customers. Your paper is expected to:

- Identify and explain the relevant data sources, distributional properties, and sampling techniques relevant to retail demand estimation.
- Specify and implement a multiple linear regression model to test the relationship between consumer spending and income, price index, and promotional spend.
- Test model diagnostics for multicollinearity, heteroscedasticity, and autocorrelation in the dataset. Explain real-world applications (e.g., fast-moving consumer goods or retail chains) of how dynamic pricing and econometric estimation led to improved total revenue.
- Propose a data-driven pricing strategy framework informed by your empirical regression results.

Option 2: Hypothesis Testing and Quality Assurance in Operations Management

Investigate operational process variations and product quality benchmarks using parametric and non-parametric statistical inference. Your paper should:

- Evaluate the mechanics of hypothesis testing in operational defect and service delivery time monitoring.
- Compare classical null hypothesis significance testing (NHST) to Bayesian inference and confidence interval estimation in production settings.
- Analyse real-life quality control applications in manufacturing or logistics companies (e.g., Six Sigma programs at Toyota or General Electric).
- Recommend a practical, data-driven quality control procedure to reduce defect rates and variance.

Option 3: Time-Series Forecasting and Demand Volatility in Supply Chain Logistics

Evaluate time-series analysis and econometric forecasting tools to optimise inventory management under dynamic market conditions. Your paper should:

- Discuss structural components of business time-series data, including stationarity, seasonality, trends, and random fluctuations.
- Compare traditional moving average methods against autoregressive moving average (ARMA/ARIMA) models for demand forecasting.
- Evaluate forecast error metrics to balance safety stock costs against stockout risks.
- Analyse recent examples of data-intensive enterprises (e.g., Amazon, Zara, or Walmart) applying statistical forecasting engines to logistics.
- Provide an integrated inventory forecasting roadmap for mid-sized supply chain operations.

