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BUSINESS ADMINISTRATION CLASSICS

# 商务与经济统计学

## 英文版·精编版第5版


托马斯·威廉斯 (Thomas A. Williams)
丹尼斯·斯威尼 (Dennis J. Sweeney) 著
戴维·安德森 (David R. Anderson)
张建华 改编


ESSENTIALS OF BUSINESS STATISTICS

Fifth Edition


中国人民大学出版社


全新版

CENGAGE Learning 圣智学习

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托马斯·威廉斯

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# 总　序

随着我国加入WTO，越来越多的国内企业参与到国际竞争中来，用国际上通用的语言思考、工作、交流的能力也越来越受到重视。这样一种能力也成为我国各类人才参与竞争的一种有效工具。国家教育机构、各类院校以及一些主要的教材出版单位一直在思考，如何顺应这一发展潮流，推动各层次人员通过学习来获取这种能力。双语教学就是这种背景下的一种尝试。

双语教学在我国主要指汉语和国际通用的英语教学。事实上，双语教学在我国教育界已经不是一个陌生的词汇了，以双语教学为主的科研课题也已列入国家“十五”规划的重点课题。但从另一方面来看，双语教学从其诞生的那天起就被包围在人们的赞成与反对声中。如今，依然是有人赞成有人反对，但不论是赞成居多还是反对占上，双语教学的规模和影响都在原有的基础上不断扩大，且呈大发展之势。一些率先进行双语教学的院校在实践中积累了经验，不断加以改进；一些待进入者也在模仿中学习，并静待时机成熟时加入这一行列。由于我国长期缺乏讲第二语言（包括英语）的环境，开展双语教学面临特殊的困难，因此，选用合适的教材就成为双语教学成功与否的一个重要问题。我们认为，双语教学从一开始就应该使用原版的各类学科的教材，而不是由本土教师自编的教材，从而可以避免中国式英语问题，保证语言的原汁原味。各院校除应执行国家颁布的教学大纲和课程标准外，还应根据双语教学的特点和需要，适当调整教学课时的设置，合理选择优秀的、合适的双语教材。

顺应这样一种大的教育发展趋势，中国人民大学出版社同众多国际知名的大出版公司，如麦格劳-希尔出版公司、培生教育出版公司等合作，面向大学本科生层次，遴选了一批国外最优秀的管理类原版教材，涉及专业基础课，人力资源管理、市场营销及国际化管理等专业方向课，并广泛听取有着丰富的双语一线教学经验的教师的建议和意见，对原版教材进行了适当的改编，删减了一些不适合我国国情和不适合教学的内容；另一方面，根据教育部对双语教学教材篇幅合理、定价低的要求，我们更是努力区别于目前市场上形形色色的各类英文版、英文影印版的大部头，将目标受众锁定在大学本科生层次。本套教材尤其突出了以下一些特点：

● 保持英文原版教材的特色。本套双语教材根据国内教学实际需要，对原书进行了一定的改编，主要是删减了一些不适合教学以及不符合我国国情的内容，但在体系结构和内容特色方面都保持了原版教材的风貌。专家们的认真改编和审定，使本套教材既保持了学术上的完整性，又贴近中国实际；既方便教师教学，又方便学生理解和掌握。

● 突出管理类专业教材的实用性。本套教材既强调学术的基础性，又兼顾应用的广泛性；既侧重让学生掌握基本的理论知识、专业术语和专业表达方式，又考虑到教材和管理实践的紧密结合，有助于学生形成专业的思维能力，培养实际的管理技能。

● 体系经过精心组织。本套教材在体系架构上充分考虑到当前我国在本科教育阶段推广双语教学的进度安排，首先针对那些课程内容国际化程度较高的学科进行双语教材开发，在其专业模块内精心选择各专业教材。这种安排既有利于我国教师摸索双语教学的经验，使得双语教学贴近现实教学的需要；也有利于我们收集关于双语教学教材的建议，更好地推出后续的双语教材及教辅材料。

● 篇幅合理，价格相对较低。为适应国内双语教学内容和课时上的实际需要，本套教材进行了一定的删减和改编，使总体篇幅更为合理；而采取低定价，则充分考虑到了学生实际的购买能力，从而使本套教材得以真正走近广大读者。

● 提供强大的教学支持。依托国际大出版公司的力量，本套教材为教师提供了配套的教辅材料，如教师手册、PowerPoint 讲义、试题库等，并配有内容极为丰富的网络资源，从而使教学更为便利。

本套教材是在双语教学教材出版方面的一种尝试。我们在选书、改编及出版的过程中得到了国内许多高校的专家、教师的支持和指导，在此深表谢意。同时，为使我们后续推出的教材更适于教学，我们也真诚地期待广大读者提出宝贵的意见和建议。需要说明的是，尽管我们在改编的过程中已加以注意，但由于各教材的作者所处的政治、经济和文化背景不同，书中内容仍可能有不妥之处，望读者在阅读时注意比较和甄别。

**徐二明**
中国人民大学商学院

# 改编者的话

《商务与经济统计学》是美国统计学家托马斯·威廉斯、丹尼斯·斯威尼和戴维·安德森三位教授合著的一本优秀的统计学教材，书中介绍并总结了在商务与经济领域中如何应用统计学的概念、模型与方法来分析和处理各种问题，被中美许多著名大学选为包括统计专业在内的各领域的研究生和本科生的教学用书，被誉为最经典的商务统计教材之一，受到各方面的好评。

统计学中一些概念和复杂、纷繁的公式，常常让应用者望而却步，但阅读本书并不需要高深的数学知识，有基本的概率论知识和一些代数、微积分训练即可。三位作者以极其通俗的语言娓娓道来，运用大量的实例，深入浅出而又形象地阐明了统计分析方法的精髓，免去了过多数学公式推导证明的枯燥烦琐，使读者能够很快掌握实践的技巧。这对于不是专门从事统计分析理论研究的读者来说，实在是一件幸事。

全书内容丰富，结构简洁，正文部分侧重于对统计理论与方法的思想背景及其应用的阐述。全书着重应用的主题十分突出，统计应用的艺术也得以充分展现。全书共10章，内容包括描述统计学、抽样分布、区间估计、假设检验、均值比较、实验设计、方差分析以及回归分析等。书中配有大量实际数据的例子，使读者易于掌握所述方法，便于举一反三。本书不仅在阐述内容时注意运用实例，而且书后所配习题也侧重于培养学生的运用能力。章末的案例分析有助于读者加深对该章内容的理解，同时也是对该章内容的补充和推广。此外，商务和经济领域中的数据量往往很大，常要借助各种计算机软件来完成统计分析。鉴于Excel的广泛应用和实用性，本书专门介绍了Excel中各种统计方法的应用，并逐一列示，给出常用模板，方便读者快速上手。

本书阐述精练、简洁，也为教师讲授留下了很大的空间。作为一本英文影印版教材，本书非常适合统计学的双语教学。阅读中，读者会自然而然地体验到统计学理论和方法在中英文表述上的异同，为今后查询科技资料、阅读科技文献和进行国际学术交流等打下基础。

# Preface

The purpose of *Essentials of Contemporary Business Statistics* is to give students, primarily those in the fields of business administration and economics, a conceptual introduction to the field of statistics and its many applications. The text is applications oriented and written with the needs of the nonmathematician in mind; the mathematical prerequisite is knowledge of algebra.

Applications of data analysis and statistical methodology are an integral part of the organization and presentation of the text material. The discussion and development of each technique is presented in an applications setting, with the statistical results providing insights to decisions and solutions to problems.

Although the book is applications oriented, we have taken care to provide sound methodological development and to use notation that is generally accepted for the topic being covered. Hence, students will find that this text provides good preparation for the study of more advanced statistical material.

## Use of Microsoft Excel for Statistical Analysis

*Essentials of Contemporary Business Statistics* is first and foremost a statistics textbook that emphasizes statistical concepts and applications. But since most practical problems are too large to be solved using hand calculations, some type of statistical software package is required to solve these problems. There are several excellent statistical packages available today. However, because most students and potential employers value spreadsheet experience, many schools now use a spreadsheet package in their statistics courses. Microsoft Excel is the most widely used spreadsheet package in business as well as in colleges and universities. We have written *Essentials of Contemporary Business Statistics* especially for statistics courses in which Microsoft Excel is used as the software package.

Excel has been integrated within each of the chapters and plays an integral part in providing an application orientation. Although we assume that readers using this text are familiar with Excel basics such as selecting cells, entering formulas, copying, and so on, we do not assume that readers are familiar with Excel 2010. As a result, we have included Appendix C, which provides an introduction to Excel 2010 and tools for statistical analysis.

Throughout the text the discussion of using Excel to perform a statistical procedure appears in a subsection immediately following the discussion of the statistical procedure. We believe that this style enables us to fully integrate the use of Excel throughout the text, but still maintain the primary emphasis on the statistical methodology being discussed. In each of these subsections, we use a standard format for using Excel for statistical analysis. There are three primary tasks: Enter Data, Enter Functions and Formulas, and Apply Tools. We believe a consistent framework for applying Excel helps users to focus on the statistical methodology without getting bogged down in the details of using Excel.

In presenting worksheet figures we often use a nested approach in which the worksheet shown in the background of the figure displays the formulas and the worksheet shown in the foreground shows the values computed using the formulas. Different grey scales are used to differentiate worksheet cells containing data, highlight cells containing Excel functions and formulas, and highlight material printed by Excel as a result of using one or more data analysis tools.

## Use of StatTools

StatTools is a commercial Excel add-in which we and Palisade Corporation have made available to adopters of this text for free. StatTools extends the range of statistical and graphical options for Excel users. In an appendix to Chapter 1 we show how to download and install StatTools. Most chapters also include an appendix that shows the steps required to accomplish a statistical procedure using StatTools.

We have been very careful to make the use of StatTools completely optional. Users who want to teach using the standard tools available in Excel 2010 can continue to do so. But users who want additional statistical capabilities not available in Excel 2010 now have access to an industry standard statistics add-in that students will be able to continue to use in the workplace.

## Changes in the Fifth Edition

We appreciate the acceptance and positive response to the previous editions of *Essentials of Contemporary Business Statistics*. Accordingly, in making modifications for this new edition, we have maintained the presentation style and readability of those editions. The significant changes in the new edition are summarized here.

- **Microsoft Excel 2010.** Step-by-step instructions and screen captures show how to use the latest version of Excel to implement statistical procedures.
- **Introduction to Data Mining.** A new section in Chapter 1 introduces the field of data mining. We provide a brief overview of data mining and the concept of a data warehouse. We also describe how the fields of statistics and computer science join to make data mining operational and valuable.
- **Revised Chapter 2.** We have shortened the Excel coverage by moving the discussion of how to use Excel's PivotChart report to chapter appendixes. Appendix 2.1 shows how to use Excel's PivotChart report to summarize categorical data, and Appendix 2.2 shows how to use Excel's PivotChart report to summarize quantitative data.
- **Revised Sampling Material.** The introduction of Chapter 4 has been revised and now includes the concept of a sampled population and a frame. The distinction between sampling from a finite population and an infinite population has been clarified, with sampling from a process used to illustrate the selection of a random sample from an infinite population. A practical advice section stresses the importance of obtaining close correspondence between the sampled population and the target population.
- **Revised Introduction to Hypothesis Testing.** Section 6.1, Developing Null and Alternative Hypotheses, has been revised. A better set of guidelines has been developed for identifying the null and alternative hypotheses. The context of the situation and the purpose for taking the sample are key. In situations in which the focus is on finding evidence to support a research finding, the research hypothesis is the alternative hypothesis. In situations where the focus is on challenging an assumption, the assumption is the null hypothesis.
- **Section 10.8 – "Modeling Curvilinear Relationships."** This new section shows how curvilinear relationship can easily be handled using a multiple regression model. We illustrate the use of both Excel's Chart tools and Excel's Regression tool to fit a quadratic model.
- **New Examples and Exercises Based on Real Data.** We have added many new examples and exercises based on real data and recently referenced sources of statistical information. Using data obtained from various data collection organizations and

other sources, such as *The Wall Street Journal*, *USA Today*, *Fortune*, and *Barron's*, we have drawn upon actual studies to develop explanations and to create exercises that demonstrate many uses of statistics in business and economics. We believe the use of real data helps generate more student interest in the material and enables the student to learn about both the statistical methodology and its application.

- **New Case Problems.** We have added some new case problems to this edition. The new case problems appear in the chapters on descriptive statistics, hypothesis testing, and regression analysis. The case problems in the text provide students with the opportunity to analyze somewhat larger data sets and prepare managerial reports based on the results of their analysis.

# Features and Pedagogy

Authors Williams, Sweeney, and Anderson have continued many of the features that appeared in previous editions. Important ones for students are noted here.

## Statistics in Practice

Each chapter begins with a Statistics in Practice article that describes an application of the statistical methodology to be covered in the chapter.

## Methods Exercises and Applications Exercises

The end-of-section exercises are split into two parts, Methods and Applications. The Methods exercises require students to use the formulas and make the necessary computations. The Applications exercises require students to use the chapter material in real-world situations. Thus, students first focus on the computational "nuts and bolts" and then move on to the subtleties of statistical application and interpretation.

## Self-Test Exercises

Certain exercises are identified as self-test exercises. Completely worked-out solutions for those exercises are provided in Appendix B at the back of the book. Students can attempt the self-test exercises and immediately check the solution to evaluate their understanding of the concepts presented in the chapter.

## Margin Annotations and Notes and Comments

Margin annotations that highlight key points and provide additional insights for the students are a key feature of this text. These annotations are designed to provide emphasis and enhance understanding of the terms and concepts being presented in the text.

At the end of many sections, we provide Notes and Comments designed to give the student additional insights about the statistical methodology and its application. Notes and Comments include warnings about or limitations of the methodology, recommendations for application, brief descriptions of additional technical considerations, and other matters.

## Data Files Accompany the Text

Approximately 220 data files are available on the website that accompanies this text. The

data sets are available in Excel 2010 format. WEBfile logos are used in the text to identify the data sets that are available on the website. Data sets for all case problems as well as data sets for larger exercises are included.

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## Ancillary Learning Materials for Students

- Approximately 220 data sets are available on the website that accompanies this text. The webfiles are available in Excel 2010 format. WEBfile logos are used in the text to identify the data sets that are available on the website. Data sets for all case problems, as well as data sets for larger exercises, are included.
- **EasyStat Digital Tutor for Microsoft® Excel 2010.** These focused online tutorials will make it easier for students to learn how to use one of these well-known software products to perform statistical analysis. Each digital video demonstrates how the software can be used to perform a particular statistical procedure.

  The EasyStat videos for Excel 2010 will be available in early 2012. Students may purchase an online subscription for EasyStat Digital Tutor at www.cengagebrain.com.

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