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Enhancing Empirical Analysis Skills in a DBA Course Using SPSS

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ABSTRACT

This paper aims to develop a pedagogical research project for Doctor of Business Administration (DBA) students in a DBA accounting course. The project will enhance students' empirical research skills by guiding them through developing research methods, collecting data, testing hypotheses, and drawing conclusions using SPSS. Students will learn how to download required financial statement data and perform statistical analyses by replicating the research methods of a prior study. This semester-long empirical research experience lays the groundwork for students to initiate their dissertation projects upon completing their DBA coursework.

Keywords: Stock valuation models, empirical analysis, DBA, SPSS

INTRODUCTION

In an executive format, the Doctor of Business Administration (DBA) program offers mid-career professionals the opportunity to earn a doctoral degree in business while studying part-time. Although DBA curricula vary across programs, they generally have three main components: discipline-specific research courses, research methodology courses, and dissertation work.

Upon the completion of the three-year program, DBA graduates become scholarly practitioners. They conduct applied research within their organization alongside academic researchers. These partnerships aim to promote new knowledge that addresses industry issues and concerns. Such collaborative research efforts between practitioners and scholars can generate relevant and rigorous research outputs similar to those in other practice-oriented fields such as engineering, medicine, nursing, social work, education, and law (Van De Ven and Johnson, 2006). Thus, DBA programs are designed to equip graduates with the skills and abilities needed to contribute to the knowledge creation in management to benefit their business operations.

Typical DBA students hold a master's degree, often an MBA, and have extensive industry experience. Since the DBA program emphasizes practical expertise, many programs do not require academic degrees specifically in business or related fields. Instead, the program addresses complex management issues that often require collaborative efforts between practitioners and academic researchers. These collaborations benefit from diverse professional perspectives and the application of pluralistic research methodologies over time. Van De Ven and Johnson (2006) propose the strategy of intellectual arbitrage as a method of leveraging the different skill sets of practitioners and academicians to tackle unstructured management problems in the real

world. Accordingly, the DBA program aims to generate scholarly practitioners capable of identifying issues relevant to their day-to-day operations and cooperating with academics to produce research-informed solutions.

Transforming students into scholarly practitioners capable of enhancing their management practice can be challenging. These students typically maintain full-time employment throughout the three-year program. Nevertheless, it is crucial to develop adequate analytical skills for these professionals through a rigorous program since such skills enable them to collect and analyze data from daily operations more effectively and identify opportunities for improvement.

This paper reviews typical DBA curricula in the United States and proposes a pedagogical research project within the DBA accounting course. The objective is to equip students with the necessary research competencies to perform statistical analyses, test hypotheses, and develop a research paper with empirical findings by the end of the semester. The use of SPSS, as outlined throughout this project, is particularly valuable for DBA students with an accounting focus, providing them with hands-on experience in generating empirical results using financial statement data.

The semester-long initiative is a foundational step toward students' dissertations, fostering familiarity with SPSS and helping develop data-driven solutions to academic and practical challenges. Furthermore, students can continue conducting future research by leveraging the improved ability to collect and analyze data, draw statistical inferences, and address meaningful managerial questions beyond the DBA program.

DBA PROGRAMS

A typical executive DBA program in the United States spans three years, while programs in other countries may extend up to eight years, depending on institutional structure and individual circumstances (Hay & Samra-Fredericks, 2019). The three-year program is typically divided into two years of coursework followed by a final year dedicated to dissertation research and writing, culminating in the successful defense of a dissertation.

DBA programs are generally structured to address interdisciplinary topics, with students enrolling in courses across various business disciplines, such as accounting, finance, management, and marketing, throughout their coursework. In contrast, Ph.D. programs in business are designed to develop deep specialization within a single discipline. For example, a Ph.D. student in accounting will select a dissertation topic within that particular field and typically pursue an academic career as faculty in an accounting department. On the other hand, DBA students are generally expected to return to their industry as scholarly practitioners rather than pursuing academic appointments. Consequently, this project is designed for DBA students to conduct applied research using SPSS. While Ph.D. students may also use SPSS in disciplines such as management or marketing, most tend to prefer code-based statistical software like SAS or STATA, which requires a steeper learning curve and allows more advanced capabilities for analyzing large, complex datasets. SPSS, with its point-and-click

interface, remains a more convenient and accessible tool for students with limited programming experience.

During the coursework phase, DBA students typically enroll in three courses per regular semester, which may include research methodology courses or discipline-based research topic courses. Research methodology courses, generally completed in a single semester, cover foundational topics such as quantitative and qualitative research methods. The structure and content of discipline-based research topic courses vary across programs but generally address broad business areas. These courses help students develop interdisciplinary research topics that can serve as the foundation for their future dissertation work, as illustrated in Exhibit 1.

EXHIBIT 1. Selected Discipline-based or Project-based DBA Courses

University	Courses	Remarks
University of Wisconsin-Whitewater	Micro Issues in Business; Macro Issues in Business	Discipline-based topics
University of Dallas	Applied Marketing Research	
Georgia State University	Theory and Practice of Managing Organizations	
Prairie View A&M University	Applied Research in Accounting	
University of Missouri-SL	Role of Accounting Information in Firms and Markets	
University of Houston	Three Directed Studies I, II, and III	Research project courses in regular or summer semesters
University of Texas at Dallas	Research Projects I and II	
University of Missouri-SL	Development and defense of a proposal for dissertation research	Research project courses at the end of the coursework
Marshall University	Dissertation Designs I, II, and III	
Prairie View A&M University	Mini-Dissertation Proposals I and II	

Some DBA programs offer project-based courses during the summer sessions, allowing students to develop research papers, for example, at the University of Houston and the University of Texas at Dallas. In contrast, other programs, such as those at the University of Missouri–St. Louis, Marshall University, and Prairie View A&M University require students to develop their research projects at the end of the coursework as a transitional step toward the dissertation phase.

This latter structure is particularly beneficial for students who hold non-business academic degrees or need a refresher in core business subjects, as it enables them to

build interdisciplinary research skills by taking courses across various business disciplines. However, students generally do not have the opportunity to complete full research projects with empirical results during a single semester. A one-semester course typically does not provide sufficient time to formulate research questions, develop appropriate methodologies, collect data, and conduct statistical analyses. As a result, most DBA courses focus on helping students identify research topics, review relevant literature, and develop methodological frameworks. The actual execution of empirical analysis is often deferred until the designated research project course at the end of the coursework phase.

A challenge for DBA programs is enabling students to complete a research paper that includes empirical results within the constraints of a single semester. This involves guiding students through the research process: identifying a research topic, selecting appropriate methodologies, collecting data, and producing empirical evidence to address the proposed research questions. This is an ambitious undertaking for DBA students with limited prior research experience.

To make this process more feasible, we propose three essential preconditions:

1. Selection of a published research paper that presents clearly defined research questions that are supported by conceptual justifications and accessible to DBA students,
2. Availability of research methodologies that are understandable and executable within the students' skill levels, and
3. Access to appropriate and manageable datasets for empirical analysis.

PEDAGOGICAL RESEARCH PROJECT IN THE DBA ACCOUNTING COURSE

This paper presents the design of an empirical research project intended to help DBA students collect data, conduct statistical analysis, test hypotheses, and present findings as part of the learning objectives in the DBA accounting course. Students in our DBA program complete one course in each major business discipline, such as accounting, finance, economics, marketing, and management information systems, alongside three courses in management and four in research methods before beginning their dissertation.

While accounting and finance are core components of business administration, DBA students often shy away from these areas due to the quantitative rigor they entail. Instead, many students gravitate toward management and marketing topics aligned with their professional backgrounds, often relying on the data collected primarily through interviews and surveys. Nonetheless, accounting frequently serves as a supporting element in research papers, such as documenting cost justification.

For several reasons, the accounting course may provide an ideal setting for DBA students to undertake a complete research project within a single semester. First, widely used secondary financial data sources, such as Compustat, are readily

accessible. Second, students benefit from learning to process raw financial data into formats suitable for statistical analysis, enhancing their proficiency with statistical software. Third, high-quality, practice-oriented research papers are available in accounting and finance journals, offering accessible models that present academic concepts in a practitioner-friendly format. Finally, the accounting course is provided in the second semester of the first year of our DBA program, allowing students to apply and refine the research skills developed in this course throughout the remainder of their studies.

In this pedagogical research project, we adopt Jenkins (2006) (hereafter, JENKINS) as the foundational framework for model development. JENKINS proposes a hybrid valuation model combining earnings and book value to predict stock prices. This integrated approach offers superior predictive power compared to models relying on either metric alone. This view aligns with the broader accounting literature, which frequently employs accounting data to explain market valuations. For example, Ball and Brown (1968) empirically demonstrated the relationship between earnings and stock prices. Ohlson (1995) introduced a model that expresses firm value as a linear function of book value and earnings, while Feltham and Ohlson (1995) extended this framework by incorporating clean surplus accounting adjustments.

JENKINS presents a simplified version of accounting valuation models, making them more accessible to practitioners in accounting and finance. The model clearly illustrates the close association between the key accounting variables (earnings and book value) and stock prices. By integrating the two accounting variables simultaneously, the hybrid approach provides a more robust valuation model than those based on either variable alone. This framework is especially advantageous for DBA students with no or little background in accounting and finance, as it offers clear, practical guidance for exploring valuation techniques using financial statement data.

The project follows JENKINS' conceptual framework, which allows DBA students to perform empirical analysis, from hypotheses, methodology, and data collection to statistical analysis and conclusions.

A typical dissertation includes five chapters:

1. Introduction
2. Literature Review
3. Research Questions, Hypotheses, Methodology, and Data
4. Results from Statistical Analysis of Data
5. Conclusions

As JENKINS discusses the first two chapters before proceeding with research questions, this project does not need to repeat them. Instead, students can download financial statement variables from Compustat via Wharton Research Data Services (WRDS) and compute the necessary variables as JENKINS guides. Faculty and DBA students at our institution have free access to Compustat through the WRDS platform, a

widely used academic data source. WRDS/Compustat offers preprocessed, reliable, and consistent research-ready data, particularly suitable for one-semester projects and training DBA students in empirical analysis. They analyze data for statistical results, discuss the findings to answer the research questions, and conclude the project by following JENKINS' guidance.

STATISTICS SOFTWARE - SPSS

The primary objective of this paper is to assist DBA students in analyzing collected data by applying the research methodology outlined in JENKINS. Students must select appropriate statistical software to complete this task over a semester. For the JENKINS project, we evaluated two commonly available options, SPSS and STATA, accessible to DBA students on campus.

DBA students often have limited experience with statistical software unless their professional background involves data analysis. SPSS is particularly well-suited for this audience for several reasons. First, its interface resembles Excel, a program with which most DBA students are familiar, making the transition less intimidating. The menu-driven, point-and-click design of SPSS eliminates the need for extensive programming knowledge, thereby reducing the learning curve.

In addition, SPSS can efficiently handle large datasets, allowing users to easily modify and generate variables, perform statistical procedures, and view outputs through intuitive interfaces and operations. Its compatibility with Excel further enhances usability by enabling seamless data integration and additional processing. Finally, as described in the following section, DBA students must complete the JENKINS project over a semester by submitting their intermediate outputs monthly. This structure allows students to track their progress regularly and expand their SPSS datasets incrementally as they proceed with new variables and analyses.

PROGRESS DURING THE SEMESTER

The five-hour DBA accounting course meets five times over the semester. The syllabus provides step-by-step guidance to help students progress through each stage of the JENKINS project.

Residency I

The instructor begins by reviewing the topic of Common Stock Valuation (Jordan, Miller, and Dovin, 2024) and introducing some of the popular valuation models, including residual income, dividend discount, and free cash flow models. The session also covers the income-based and book value-based valuation models as well as the hybrid model proposed in JENKINS, drawing on the foundational works by Ball and Brown (1968), Ohlson (1995), and Feltham and Ohlson (1995).

Students are then required to create an account on the WRDS platform and download the following research variables from Compustat, covering at least 24 months (approximately two years) in both .csv and .xlsx formats:

- FYEAR (Data Year – Fiscal)

- CEQ (Common Equity – Total)
- CSHO (Common Shares Outstanding)
- EPSPI (Earnings Per Share – Basic)
- NI (Net Income (Loss))
- PRCC_F (Price Close - Annual – Fiscal)
- SIC (Standard Industry Classification Code)

- Generating Required Variables for Research as Proposed in JENKINS

Investors typically rely on two accounting measures: income and book value, to explain stock prices. These form the basis for two valuation models: the income valuation model (the income-based approach) and the book valuation model (the asset-based approach). The income valuation model assesses a firm's ability to generate earnings by calculating the ratio of stock price to earnings per share (EPS), commonly referred to as the price-to-earnings (P/E) ratio. In contrast, the book valuation model evaluates a firm's liquidation value by dividing the stock price by book value per share (BPS), yielding the price-to-book (P/B) ratio.

BPS is calculated by dividing common equity (CEQ) by the weighted average number of common shares outstanding (CSHO_W), which is the average of the beginning (CSHO_B) and ending (CSHO_E) share counts for the year. Both P/E and P/B ratios are often considered stable within the same industry. Using industry average P/E and P/B ratios, one can estimate a specific firm's stock price based on its income or book value.

JENKINS defines the difference between the actual stock price and the price these models estimate as the prediction error. Firms are grouped by industry using the Standard Industrial Classification (SIC) 2-digit code to facilitate industry-specific analysis. Appendix I provides detailed SPSS instructions on how to compute the P/E and P/B ratios.

- Submitting Assignment (Jenkins1): Descriptive statistics for yearly and total samples for the discussion during Residency II.
  - Variables: P/E ratio (PE) and P/B ratio (PB)
  - Statistics: Number of observations (NOBS), mean, median, minimum, and maximum
  - See Step 2 in Appendix IV (Residency IV) for the SPSS procedures to generate descriptive statistics.

Residency II

- Cleaning/Organizing the Database and Generating New Variables

Students must begin by cleaning the dataset and removing any observations with missing values for key research variables such as PE and PB. Once the data is cleaned, it should be sorted by industry using the two-digit SIC code (SIC2). Students then compute PE_mean and PB_mean, representing the industry average PE and PB.

Based on these industry averages, students can now estimate the stock price for each firm using both valuation approaches. For example, suppose that Firm A reports EPS of $5 and BPS of $100 in an industry where PE_mean is 25 and PB_mean is 2. In this particular case, the estimated stock price using the income valuation model (PRICE_I) would be $125 (5 × 25), whereas the estimated stock price using the book valuation model (PRICE_B) would be $200 (2 × 100).

Appendix II provides detailed SPSS instructions for the following tasks:

1. Removing observations with missing PE or PB values
2. Sorting the dataset by SIC2
3. Calculating industry averages for PE and PB
4. Creating new variables:
   - PRICE_I (estimated stock price based on EPSPI and PE_mean)
   - PRICE_B (estimated stock price based on BPS and PB_mean)

- Submitting Assignment (Jenkins2): Descriptive statistics for yearly and total sample for the discussion during Residency III.
  - Variables: PE, PB, PE_mean, PB_mean, PRICE_I, and PRICE_B
  - Statistics: NOBS, mean, median, minimum, and maximum

Residency III

- Generating New Variables

Students calculate the prediction errors for the income and book valuation models by comparing each firm's actual stock price (PRCC_F) to the estimated prices derived from these models. They then construct a hybrid valuation model by regressing PRCC_F on EPSPI and BPS. The residuals from this regression represent the prediction errors of the hybrid model.

Appendix III provides detailed SPSS instructions for the following tasks:

1. Computing new variables:
   - ERR_I: Prediction error based on the income valuation model
   - ERR_B: Prediction error based on the book valuation model
2. Sorting the dataset by SIC2

3. Running a regression of PRCC_F on EPSPI and BPS to obtain residuals as the hybrid model's prediction error
4. Removing observations with missing residual values from the dataset
    - Submitting Assignment (Jenkins3): Descriptive statistics for yearly and total samples.
        - Variables: PE, PB, PRCC_F, RES_1, PRE_1, ERR_I, ERR_B, and RES_A
        - Statistics: NOBS, mean, median, minimum, and maximum
        - Notes: RES_1 and PRE_1 represent the residual and predicted values from the regression model, respectively. RES_A indicates the absolute value of RES_1.

Residency IV

After generating all the necessary variables, students assess whether the hybrid model yields lower prediction errors than the income or book valuation models. To do so, they compile and analyze the relevant statistics listed below as assignments. Appendix IV provides SPSS instructions.

- Submitting Assignment (Jenkins4)
    1. Correlation matrix among three variables: PRCC_F, BPS, and EPSPI.
    2. Descriptive statistics (yearly and total) for three variables:
        a. ERR_I
        b. ERR_B and
        c. RES_A

3. Paired t-test results to show whether the hybrid model outperforms either the income statement or balance sheet model in predicting stock prices.

Residency V

- Submitting Assignment (Jenkins5): a complete research paper

Research Paper with Five Chapters:

- Introduction: (Blank)
- Literature Review: (Blank)
- Hypotheses, Methodology, and Data: (To be completed)
- Results from Statistical Analysis of Data and Discussions: (To be completed)
- Conclusions and Limitations: (To be completed)

Three Tables:

- Correlation matrix

- Descriptive statistics
- Mean comparison of two variables

DISCUSSION

The JENKINS project is designed for DBA students in the accounting course during the second semester of their first year in the DBA program. The project assumes that students enter this course with minimal exposure to data collection, statistical analysis, and the writing of empirical findings. To support their learning process, each residency module of the project provides step-by-step instructions for processing data using SPSS. In addition, optional weekly virtual meetings are available throughout the online learning period, allowing students to seek clarification from the instructor regarding the assignment.

The JENKINS project accounts for approximately 25% of the overall course grade. Additionally, DBA students must develop a research paper on their interest, including the first two chapters: 1. Introduction, and 2. Literature Review, which includes the formulation of research questions or testable hypotheses. These two assignments (the JENKINS project and a term paper) prepare students for the core components of a five-chapter research paper. These assignments also serve as practical guidelines, helping students build momentum and structure as they progress toward their dissertation research.

The project described here focuses on fundamental statistical skills, such as descriptive statistics, correlations, regression analyses to obtain residuals, and a paired-sample t-test, because of the limited time allocated in the class. Accordingly, this project alone may not adequately equip DBA students with all the necessary statistical skills for their dissertation research. Instead, this project is one of the sequential steps of research practice embedded in the DBA program. DBA students in the program will take two more courses in research methods in the subsequent two semesters. As students progress in the DBA program, they can narrow down the research topics they desire to pursue in their dissertation courses. Then, they can identify appropriate statistical methods related to their chosen research topics while taking the following research method courses. As a result, their research capacity continues to grow and improve throughout the DBA program.

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Appendix I (Residency I)

- SPSS Practice

Upload the .csv file into SPSS and compute new variables:

- SIC2 (SIC 2-digit code): Industry
- Procedure: Transform > Compute Variable
- Formula: SIC2 = Trunc (SIC / 100)
- P/E Ratio (PE):
- Procedure: Transform > Compute Variable
- Formula: PE = PRCC_F / EPSPI
- Book Value per Share (BPS):
- Procedure: Transform > Compute Variable
- Formula: CSHO_W = (CSHO_B + CSHO_E)/2
- Formula: BPS = CEQ / CSHO_W
- P/B Ratio (PB):
- Procedure: Transform > Compute Variable
- Formula: PB = PRCC_F / BPS

Appendix II (Residency II)

- SPSS Practice

Step 1: Remove observations with missing variables (PE and PB):

- Procedure: Data > Select Cases
- Action: Select “If condition is satisfied” and Click “If…"
- Function group: Select “Missing Values”
- Function and Special Variables: Click “Nmiss” twice to move “NMISS(?)” to the box
- Formula: Nmiss (PE, PB) < 1 and Select “Continue”
- Action: Select “Filter out unselected cases” under Output and Click OK
- A new variable, filter_$, will be created

Note: Save the file using a different name. Sometimes, it takes time to update the file on the screen. If a new file is created, open it to review Filter_S, which should have a value of 1 or 0. The latter indicates an observation with a missing value.

- Procedure: Data > Select Cases and ensure “If condition is satisfied with the formula” is still selected.
- Action: Select “Delete unselected cases” under Output and Click OK.
- Check the number of observations in the data file.

Step 2: Sort the data file by SIC2:

- Procedure: Data > Sort Cases
- Action: Select SIC2 and Click OK

Step 3: Compute industry means of PE and PB:

- Procedure: Data > Aggregate
- Action:
  - Move SIC2 to the box for Break Variable(s)
  - Move PE and PB to the box for Aggregated Variable(s)

Aggregated Variables should show:

- PE_mean = mean(PE)
- PB_mean = mean(PB)
- Click OK

Step 4: Create the following variables:

- PRICE_I: Stock price estimated based on EPSPI
- Procedure: Transform > Compute Variable
- Formula: PRICE_I = EPSPI * PE_mean
- PRICE_B: Stock price estimated based on book value per share (BPS)
- Procedure: Transform > Compute Variable
- Formula: PRICE_B = BPS * PB_mean

Appendix III (Residency III)

- SPSS Practice

Step 1: Compute New Variables

- ERR_I: Estimate the stock price prediction error (ERR) by the income valuation model.
- Procedure: Transform > Compute Variable > Arithmetic > abs
- Formula: ERR_I = abs (PRCC_F – PRICE_I)
- ERR_B: Estimate the stock price prediction error by the book valuation model.
- Procedure: Transform > Compute Variable > Arithmetic > abs
- Formula: ERR_B = abs (PRCC_F – PRICE_B)

Step 2: Sort the Data by SIC2

- Procedure: Data > Split File
- Action: Select "Organize output by groups" and Move SIC2 to “Groups Based on”
- Click OK

Step 3: Compute Residuals: PRCC_F = f (BPS and EPSPI)

- Procedure: Analyze > Regression > Linear
- Dependent Variable: PRCC_F
- Independent Variables: BPS and EPSPI
- Save: Mark on predicted values (PRE) and residuals (RES) (Unstandardized) > Continue > OK
- Output: New variables PRE_1 and RES_1
- PRCC_F should be equal to the sum of PRE_1 and RES_1.

Sept 4: Generate the absolute value of RES_1

- Procedure: Transform > Compute Variable
- Action: Mark Arithmetic in Function Group and Abs in Functions and Special Variable
- Formula: RES_A = abs (RES_1)

Step 5: Remove Observations with Missing Values for RES_A

- Procedure: Data > Select Cases
- Condition: Nmiss(RES_A) < 1
- Action: Delete unselected cases

Note: See Step 1 in Residency II.

Appendix IV (Residency IV)

- SPSS Practice

Step 1: Compute Correlations

- Procedure: Analyze > Correlate > Bivariate
- Variables: PRCC_F, BPS, and EPSPI
- Action: Click OK

Step 2: Descriptive Statistics (Yearly and Total)

- Yearly Statistics:
  - Procedure 1: Data > Sort Cases
  - Action: Select FYEAR and click OK
  - Procedure 2: Analyze > Descriptive Statistics > Explore
  - Dependent List: ERR_I, ERR_B, and RES_A
  - Factor List: FYEAR
  - Action: Click OK
- Total Statistics:
  - Procedure: Analyze > Descriptive Statistics > Descriptive
  - Variables: ERR_I, ERR_B and RES_A
  - Action: Click OK

Step 3: Paired Sample T-Test

- Procedure: Analyze > Compare Means > Paired Samples T Test
- Paired Variables:
- ERR_I vs. RES_A
- ERR_B vs. RES_A