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Teaching Case

Tax Time: An Interdisciplinary Accounting Analytics Experiential Learning Activity

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Abstract

Given the importance of interdisciplinary learning and the growth of data analytics skillsets within the accounting domain, this manuscript describes a teaching case for IRS tax filing statistics to develop students' knowledge of analytics and connect current events in business and accounting. The experiential learning activity is developed in the context of an undergraduate upper-level course on descriptive and predictive analytics. The contributions of this teaching case are an experiential learning activity applied to a real-world current event and an interdisciplinary learning activity that allows students to apply and develop their curricular knowledge. The overall case objectives are to estimate the total number of individual IRS tax returns processed and total refunds for the current tax season and offer additional insights and recommendations based on the analysis.

Keywords: Accounting Analytics, Data Analytics, Forecasting, Decision Making, IRS, Tax Returns, Tax Refunds, Experiential Learning, Teaching Case

1. INTRODUCTION AND OBJECTIVES

Tax season is often the busiest time of year for tax preparers, employers, financial custodians, businesses, and accounting professionals. Each year in the U.S. individual taxpayers prepare their financial statements from the previous year and submit tax returns to the Internal Revenue Service (IRS). Each year analysts, reporters, and subject matter experts try to review various factors such as tax law changes and offer tax season predictions. Various headlines such as "A new report predicts huge swaths of Americans should expect bigger tax refunds", "Report suggests more taxpayers will owe tax due to

insufficient withholding", "Refunds are higher this year", or "Americans are worried about smaller tax refunds this year" are commonplace every tax season (Phillips Erb, 2018; Kiersz 2018, Picchi 2022; Picchi, 2022b; Buchwald, 2022).

Tax season is the period of time during which taxes must be filed and paid, typically running from January 1st through April 15th of each year unless that day is a weekend or holiday. The IRS announced the tax season for 2022, which began on January 24th when returns started being accepted, through the April 18th tax filing deadline due to the Emancipation Day holiday. Taxpayers were also able to request an extension until

October 17th. The IRS selected January 24th to allow enough time to complete programming and testing of IRS systems to ensure proper tax returns such as the 2021 Child Tax Credit and Recovery Rebate Credit. Individuals who were not required to file in prior years were required to file in 2021 and 2022 to claim new credits (IRS, 2022; Kagan, 2022; Safane, 2022).

In 2022, IRS Commissioner Chuck Rettig posted that the tax season was unlike any other with challenges from the COVID-19 pandemic, staffing shortages, and efforts to distribute stimulus checks and advanced Child Tax Credits. The tax administration's effectiveness has further suffered from underinvestments in human capital and information technology. Over the last decade, the IRS' budget decreased by more than 15 percent, IRS enforcement personnel decreased by 30 percent, and the filing population increased by 14 percent. An estimated 16 million tax returns, transactions, and accounts management cases were backlogged at the end of 2021. To address these issues along with employee retirements, up to 10,000 employees were planned to be hired in 2022. An estimated 52,000 employees will need to be hired in the next six years for the IRS to maintain current service levels. The fiscal year 2023 provides \$14.1 billion to the IRS with plans to improve taxpayer service, ensure fairness in the tax system, and modernize systems (Cohn, 2022; Retting, 2022). In 2022, the average individual refund was \$3,176, an increase of nearly 14% over 2021. According to tax experts 2023 tax refunds are expected to decrease. While some enhanced tax credits remain, other tax changes including no stimulus checks to claim and expanded child tax credit which ended in 2021 are anticipated to have an effect on tax refunds (Keshner, 2023). Considering the unprecedented pressures and challenges that occurred during the prior tax seasons, the overall objectives for this case are to predict the total number of individual income tax returns and the total dollar amount of income tax refunds processed by the IRS filing deadline.

2. BACKGROUND

IRS

The IRS is a bureau of the Department of the Treasury and tax administrator. During the fiscal year 2020, the IRS collected nearly \$3.5 trillion in revenue and nearly 250 million tax returns. The mission of the IRS is to provide top-quality service to taxpayers by helping them to understand their tax responsibilities and enforcing the law. The U.S. Congress is

responsible for passing tax laws, and the taxpayer is responsible for understanding and meeting their tax obligations. The IRS carries out the responsibilities of the Secretary of the Treasury under section 7801 of the Internal Revenue Code, and section 7803 of the Internal Revenue Code provides the appointment of a commissioner to oversee and apply the laws (IRS, 2022b)

Tax Filings - PESTLE

Tax filings and the number of returns and refunds may vary by year. A secondary analysis review is provided below using a Political, Economic, Social, Technical, Legal, and Environmental business analysis framework (PESTLE) to examine factors related to tax filings. The PESTLE and similar methods can be utilized for strategic analysis and developing a theoretically-informed understanding of the business environment for strategic deployment (Downey, 2007; Woodside, Augustine, & Giberson, 2017).

Political

Taxes are often a common political platform. Tax policies including who pays taxes, their effects on the economy, and the amount of revenue raised have been part of political discussions across centuries. Tax policies and the resulting economic impacts are extremely complex, and even simple questions lead to debates, for example, a common debate for policymakers focuses on whether tax increases or decreases will impact jobs, economic growth, deficits, revenue, and/or fiscal positions (Moss, Nunn, & Shambaugh, 2020).

Economic

Economic conditions can also impact tax revenues and filings. Typically, income taxes are more volatile than consumption-based taxes, for example during the Great Recession period 2008-2010, income taxes decreased by 16 percent (Walczak, 2020). More recently, The Tax Policy Center estimated that in 2020 there was a 38% increase in households with no federal income tax liability (Tax Policy Center, 2021; Watson, 2021). However, 2020 was an unusual year due to economic impact payments and expanded tax credits. Government funding and support were provided to address the COVID-19 pandemic's economic effects (Watson, 2021).

Social

Often individuals compare tax refunds to the national average or prior tax year refunds, although a larger refund isn't always best, since this is usually a result of overpaying taxes in the prior year. In the fiscal year 2020, the IRS issued over \$736 billion in refunds, money that could

have been received earlier on regular paychecks. In 2020, the IRS redesigned the W-4 form used for withholdings and the estimated tax payments sent to the IRS from each paycheck (Mercado, 2017; Doyle, 2022). Tax refunds may also vary by state, owing primarily to differences in income and income taxes paid in the prior year. In 2019 Wyoming received the largest average tax refund, followed by Connecticut and New York with averages of \$5,207, \$4,461, and \$4,444 respectively. The average U.S. tax refund in 2019 was \$3,651 (Picchi, 2022).

Technical

The IRS is undergoing a multi-year modernization plan which includes technological improvements such as cybersecurity, cloud, robotic process automation, digitization, and application programming interfaces. The plan runs from the fiscal year 2019 to the fiscal year 2024 with an estimated \$2.3-2.7 billion in costs to implement. One goal is to reduce call wait times with customer callback technology, online notice, and live online customer support (IRS, 2019; IRS, 2022c). During the 2022 tax season, the understaffed IRS had 1 person for every 16,000 calls received (Kaplan & Zeballos-Roig, 2022).

Legal

Taxes have existed since the beginning of civilization, with the earliest known individual tax implemented in Mesopotamia over 4500 years ago. In the U.S., taxes can be traced to the 1700s in Colonial America. In 1913, power was granted through Congress to tax personal income, as ratified by the 16th amendment to the Constitution. In 1914, the first income tax form was available, Form 1040. This is the same primary income tax form today, though it has been continuously modified over the years. By 1915 Congress and the public voiced concerns about the complexity of the tax form and difficulty filing returns. In 1916, The Revenue Act created sliding tax rates by income similar to those in use today. There have been several major tax revisions, with the most recent being in 2017 with the Tax Cuts and Jobs Act scheduled to run through 2025. The U.S. tax code has increased in length and complexity since the beginning; in 1913 the tax code could fit on a single page, whereas the same today can require 174 pages. In only the past decade, the tax code has been updated over 4,000 times (eFile, 2022).

Environmental

While the tax deadline is typically April 15th each year, environmental factors can affect the results. On March 17, 2021, the 2020 tax year filing date was extended until May 17, 2021 (IRS, 2021) due

to the COVID-19 pandemic (IRS, 2021). The emergence of the novel coronavirus and the resulting pandemic changed many aspects of society and economies (Witman & Prior, 2021; Oum, Kates, & Wexler, 2022). Further, in 2021, extensions were made until June 15, 2021, in Texas, Oklahoma, and Louisiana as a result of winter storms that occurred in February 2021 (IRS, 2021).

3. IRS TAX ACCOUNTING ANALYTICS EXPERIENTIAL LEARNING ACTIVITY

Accountants may be seen as being at the forefront of analytics for their organizations, as their positions require providing management with information used in strategic data-driven decision-making. Therefore, analytics skills and competencies are critical prerequisites for accountants (Kokina, Pachamano, & Corbett, 2017; Woodside, et al., 2020). Nearly half of accounting firms are using or plan to use advanced and predictive analytics. Among data analytics and new technology adoption, only 25% have completed the implementation of predictive modeling as compared with 48% having implemented self-service reporting. Organizations are utilizing predictive models within the business processes that can be updated as new data sources are available continuously adapting and increasing accuracy based on market and customer changes (Maryville University, 2022).

While accounting is a vital and basic function of any organization, the role of accountants is transforming due to the increase in data and analytics. The American Institute of Certified Public Accountants and National Association of State Boards of Accountancy have identified the importance of integrating analytics within accounting core coursework (AICPA and NASBA, 2021; Losi, Isaacson, & Boyle, 2022). Organizations seek individuals that can leverage information and have a broad range of expertise, including knowledge of analytics such as data exploration, predictive modeling, and the use of analytical software tools (Woodside, Augustine, Chambers, & Mendoza, 2020). For example, in tax accounting, analytics can be utilized to review global compliance and transactional data in order to provide insights for reducing effective tax rates (Villanova, 2022).

In response to rapid technological transformation in the industry, university curricula must adapt to relevant and practical applications. The Association to Advance Collegiate Schools of Business (AACSB) Accounting Standards,

including Standard A5 (v. 2021), require real-world learning experiences and skills that integrate information technology in accounting and business. AACSB recommends an integrated, interdisciplinary curriculum in three primary areas of information systems, data analytics, and technology agility. These areas include data creation, data management, statistical techniques, data modeling, analysis, and predictive analytics (Woodside, et al., 2021).

Analytics Process

Your initial task is to follow a standard analytics process to generate a response for each step of the process. The CRoss Industry Standard Process for Data Mining (CRISP-DM) model is one of the most common standardized processes, and is a non-proprietary methodology intended to allow data mining projects to be more reliable, cost less, be repeatable, and improve management. The market benefits of a common model include customer satisfaction and establishing a specific data mining process (Wirth and Hippa, 2001). The CRISP-DM phases include business understanding, data understanding, data preparation, modeling, evaluation, and deployment. Business understanding concerns outlining project objectives, business requirements, problem definition, and initial project plan. Data understanding begins with data collection to familiarize oneself with the data, locate data quality issues, and form hypotheses. The two sections of business understanding and data understanding are closely linked. Data preparation covers table creation, record selection, cleansing, deriving attributes, and the transfer of data into modeling tools. In the modeling phase, different techniques are chosen and applied, and data preparation and modeling are closely linked. In the evaluation phase, models have been constructed, and verify the model meets business requirements. Deployment, while the final phase does not indicate the end of a project, and may require additional steps by the data analytics or customer, and care should be taken to clearly define the setup of the working model (Wirth and Hipp, 2001; Woodside, 2016; Woodside, 2018).

IRS Dataset

As part of the data understanding and data preparation series of steps, you will be required to compile a dataset with IRS tax filing data. The data and various tax statistics are available in the public US Domain through the IRS.gov websites at [IRS.gov/statistics](https://irs.gov/statistics) and [IRS.gov/newsroom/filing-season-statistics-by-year](https://irs.gov/newsroom/filing-season-statistics-by-year) (IRS, 2022d; IRS, 2022e). The IRS provides an individual income tax returns bulletin article

and related statistical tables on a sample of individual tax returns (e.g. Forms 1040, 1040A, and 1040EZ). Data includes two versions with preliminary data estimates January-September, and complete year data January-December (IRS, 2022d). Tax season filing statistics are also available by year and by week, with data fields including total returns received, total returns processed, e-filing receipts by tax professionals and self-prepared, web usage visits to IRS.gov, the total number of refunds, the total amount of refunds, average refund amount, and number and amount of direct deposit refunds. A sample IRS dataset with individual fields available on the IRS tax statistics website is shown in Table 1 (IRS, 2022e).

Table 1: IRS Dataset Fields

IRS Category	Field Name
Individual Income Tax Returns	Total Receipts
	Total Processed
E-filing Receipts	E-Filing Total
	E-Filing Tax Professionals
	E-Filing Self-Prepared
Web Usage	Visits to IRS.gov
Total Refunds	Number
	Amount (Billions)
	Average refund
Direct Deposit Refunds	Number
	Amount (Billions)
	Average refund

Analytics Platform

The experiential learning activity (ELA) can be completed through a data analytics modeling platform including Excel, Knime, R, RapidMiner, SAS, or any equivalent platform. An ELA template has been provided in the Appendix following the CRISP-DM repeatable analytics process. The steps and objectives are listed within the template including developing a dataset, exploring and modeling the data, providing an evaluation summary of findings, insights, and recommendations following the analysis.

Response Prompts

1. Business Understanding – Provide an Executive Summary of the problem/objective. In this case it would be to predict the total number of individual

income tax returns and the total dollar amount of income tax refunds processed by the IRS filing deadline. Similarly, a prediction can be made of the total dollar amount of income tax collected using available data.

2. Data Understanding / Data Preparation – Develop a dataset using the IRS page <https://www.irs.gov/newsroom/filing-season-statistics-by-year> and generate a data taxonomy for the final dataset. This data requires some preparation by combining several years of data for our modeling and basic data cleaning to remove headings, non-numerical data and other formatting issues that may arise.
3. Data Exploration – Generate descriptive analytics using a data analytics toolset. Describe the output and review the data quality metrics for the dataset.
4. Data Modeling – Use R (or similar data analytics tools) and time series analysis to generate a prediction for the total number of individual tax returns processed and the total amount of refunds issued by the tax filing deadline.
5. Evaluation and Deployment – Describe how this data-driven result and confidence compared with your original prediction and confidence at the beginning of the course. Provide a summary of insights and recommendations based on your analysis.
6. Integration of Learning / Ethics – Describe your existing knowledge connections that helped the most in solving this problem, and how was learning adjusted or adapted. Describe the ethical considerations of teamwork, and how teamwork contributed to the success of this activity.

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Appendix

Appendix A: Experiential Learning Activity Template

Experiential Learning Activity

Name

- ELA Aligned AAC&U Essential Learning Outcomes:

AAC&U Essential Learning Outcomes	
1. Inquiry and Analysis	✓
2. Critical and Creative Thinking	✓
3. Written and Oral Communication	✓
4. Quantitative Literacy	✓
5. Information Literacy	✓
6. Teamwork and Problem Solving	✓
7. Ethical Reasoning and Action	✓
8. Foundations and Skills for Lifelong Learning	✓
9. Integrative and Applied Learning: Synthesis Across General and Specialized Studies	✓

- Employer-Valued Knowledge, Skills, and Abilities (KSAs) Gained:
 - Knowledge of Data-driven Decision Making
 - Knowledge of Data Mining Techniques and Processes
 - Skilled in a Data Analytics Toolset (R or similar)
 - Ability to Extract and Develop Structured Data Sources
 - Ability to Apply Analytics to Various Industry Domains
- Description:
 - Describe your Process Steps and Methodology
 - Describe your Knowledge Resources
 - Paste Screenshots for the outputs (PrtScn -> Paste, Mac: Cmd+Shift+4)
 - Determine the total individual income tax filing results through the tax filing deadline
 - [Provide a Reflection](#)

Business Understanding
<i>Executive summary of the business problem/opportunity/objective:</i>
<i>Describe your project resources, requirements, and methodology.</i>
Data Understanding, Data Preparation, and Data Integration
<i>Generate a data taxonomy for the final dataset:</i>
<i>Prepare the source data in a spreadsheet for analysis (source hint: IRS Data):</i>
Data Exploration and Data Quality Review
<i>Generate descriptive analytics in a data analytics toolset. Describe the output and review the data quality metrics for the dataset (paste screenshots of each result):</i>
Data Modeling and Data Mining

Use the above descriptive analytics outputs, data analytics tools, and data mining method to generate a prediction, provide screenshots and a business description of the results:

January 1st - April 18th, 2022 (or tax filing deadline)

Total Individual Income Tax Returns Received:

Confidence (1-100%):

\$ Total Individual Income Tax Returns Refunds:

Confidence (1-100%):

Evaluation, Deployment, and Operationalization

How did this data-driven decision and confidence compare with your original prediction and confidence level from the beginning of the course?

Provide a summary of insights and recommendations based on your overall analysis.

Integration of Learning / Ethics Reflection

Describe Integration of Learning. What existing knowledge did you connect that helped the most in solving this problem? How did you adjust or adapt your learning for this objective?

What are the ethical considerations of professional teamwork, and how did your teamwork contribute to the success of the activity? Describe one thing you learned from your teammate on the activity, and describe one thing your teammate learned from you on the activity. As part of your continuous improvement efforts, recommend one specific change the team could make to further progress everyone's task performance and learning for next time.