Business Analytics with Data for Non-Coders

BEPP 8930

*January 9 – 12/13, 2023, location Philadelphia Campus*

Professor Kent Smetters
Email: smetters@wharton.upenn.edu

**Course overview.** This 0.5 CU course merges the instruction offered in Managerial Economics 6110 and 6120 ("MGEC") with data to flesh out related concepts with practical business applications. The purpose of the course is to close the gap between the theory of business analytics and its actual practice, i.e., how you can really use it in your practice.

More than ever, there is a need for business leaders to become more data literate:

> "Business leaders at every level need to become data literate and be able to understand data and analytical concepts that may have previously seemed out of reach, including statistical methods, machine learning, and data manipulation. With this spread of data literacy comes the powerful ability to make educated business decisions that rely on the smart use of data, rather than on an individual's opinions. In the past, these tasks were extremely complex and would be handed off to engineers. With the tools that exist today, business leaders are able to dive into their own analytics and uncover powerful insights." (Microsoft, 2022)

Normally, this type of comprehensive problem solving would require using coding languages like Python or R. However, the instructor for this course has developed a plugin no-code toolbox for Microsoft Excel that allows for end-to-end analytics, making data analytics accessible to a much wider audience. This software plugin will be provided for free to you.

You will learn how to conduct in-depth business analytics based on sensible economics reasoning. As the main project, you will build an end-to-end business workflow. The problem and data can come from a current employer, from your own startup idea, or, if needed, from the instructor to represent a hypothetical setting. In the tradition of MGEC, the course will also motivate future electives to refine components of your analysis. Ultimately, you will walk away from the course with a fuller understanding of how different business and economics concepts "fit together" to answer big, relevant questions. The hands-on experience does not require in-depth software coding, and your new skillset is repeatable for your future projects.

**Readings.** Readings from a draft video book being created by the instructor, selected articles, and textbook already used in Managerial Economics 6110 and 6120. Pre-readings will be made available one week before the course begins.

**Prerequisites.** Managerial Economics 6110 and 6120. Non-Wharton students should contact the instructor.

**Course format.** This is an experimental 0.5cu course, initial taught in compressed format as part of Wharton Opportunity Week. The course might have one or two guest lectures by external experts and/or Wharton faculty. Attendance is mandatory.

**Assignments and grading.** One short group project due one week after the Opportunity Week concludes (30%), class participation and peer-group grading (20%), and an individual project due within a month after Opportunity Week (50%).

**Note to Apple OS users.** Like Oracle Crystal Ball used in some Wharton courses, the no-code toolbox for Microsoft Excel developed by the instructor requires the use of Microsoft Windows and Excel. (The restriction is due to some limitations imposed by Microsoft Add-In technology versus the standard VSTO, which is being solved by Microsoft over time.) However, several Windows emulators appear to work fine, including VMWare Fusion (free) and Parallel Windows. Moreover, you can also remotely connect to a Windows machine with the toolbox installed. Finally, the instructor is also discussing with IT to have some online virtual machines set-up for remote connection. More information will be provided as the class approaches.

**Class Schedule [Tentative]**

*Note: Please keep two hours in the afternoon open for office hours and problem solving (group and/or individual). The professor will be around most of each afternoon to be flexible around your schedule. Also, if there is enough interest from WEMBA students who have a session on Jan 13, 2023, material on that day will be delivered in an extra session on Jan 12, 2023.*

Terminology used below: "Use case" solves a common business economics problem. A "case study" is an expanded "use case" that is embedded in a total end-to-end workflow.

**Day 1**

- *Morning Lecture (3 hours):* ***Data, data, and more data. Gathering data through a business economics lens. Start of Day 2 materials.***
- *Topics*: Data is everywhere. But "big data" is not magic and is often worse than the best data. The best data is relevant and representative. Detecting and avoiding adverse selection in data is especially important for using representative, meaningful data.
- *Use Case: Downloading data from BEA, Census, FRED, Yahoo!, Github, WHO and more. Over 90 million data series available.*
- *Readings: TBD*
- *Afternoon (1 - 3 hours as needed): office hours, group learning*

**Day 2**

- *Morning Lecture (3 hours):* ***Wrangling, summarizing, analytics and visualizing data through a business economics lens.***
- *Topics*: Wrangling, cleaning, merging, summarizing, and visualizing data is often a big chore. The Excel plugin makes this part easy so that you can focus on the real work:

making sure that you are prepping data through a business lens that avoids confirmation bias and standard mistakes like incorrect use of dropping missing data or interpolation.
- *Use Case: Merging economics and stock market data*
- *Use Case: WHO Panel Life Expectancy with hot encoding, groupby interpolation, more*
- *Use Case(s): Simulation of hospital demand, forecasting of several types, optimization*
- *Afternoon (1 - 3 hours as needed): office hours, group learning*

**Day 3**

- *Morning Lecture (3 hours):* ***Data Analytics through a business economics lens: Part I.***
- *Topics:* Solving specific business problems within critical economics thinking. Problems include those related to price discovery, price differentiation, total market forecasting, efficient cost reduction, and the distribution of those costs across factors of production.
- *Use Cases: Competition with and without first mover advantage*
- *Use Cases: Estimating Supply and Demand*
- *Use Cases: Solving complex multi-stage games using cross-product merges*
- *Use Cases: Pricing bonanza: bulk pricing, bundling, skimming, and two-part tariff*
- *Use Cases: Public freeriding, e.g., why private markets alone can't reduce carbon*
- *Use Cases: Calculating risk premiums and related problems*
- *Afternoon (1 - 3 hours as needed): office hours, group learning*

**Day 4**

- *Morning Lecture (3 hours):* ***Data Analytics with a business economics lens: Part II.***
- *Topics:* Continuation of Day 3 and start of end-to-end Case studies.
- *Case Study:* Buy vs renting using Zillow data
- Case study: Price discrimination
- *Case Study:* Profit maximization in a complex environment with segmented audiences, consumption externalities and limited supplier capacity.
- *Case Study:* Optimizing oil delivery across a complex pipeline to minimize cost with various constraints
- *Afternoon (1 - 3 hours as needed): office hours, group learning*

**Day 5**

- *Morning Lecture (3 hours):* ***Putting the pieces together. Creating a workflow to solve a comprehensive business solution.***
- *Topics:* Continuation of Day 4 and how to create packages to make your creations portable.
- *Use Cases: The Package Manager*, user-defined functions (inline and external),
- Wrap-up, including discussion of other classes at Wharton to consider
- *Afternoon (1 - 3 hours as needed): office hours, group learning*