Final Project

Purpose

- To put to work the tools and knowledge that you gain throughout this course.
- Benefits:
  - More experience with data
  - Self directed learner
  - Working with others
  - Building data science portfolio

Project Goal

- The principal goal of this project is to:
  - Import a real-life data set,
  - Clean and tidy the data
  - Perform basic exploratory data analysis

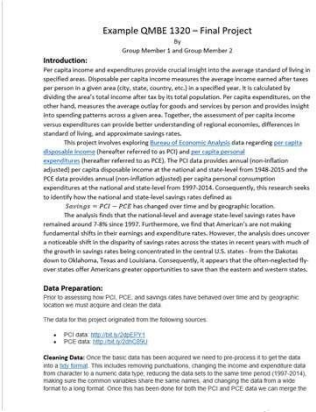
  All while using Excel and Word to create a report that is clean and professional

Project Data

- Select 1 Data Set
  - Dog Data (Petfinder.com)
  - Hotel Data (Bookings.com)
  - NFL Data
  - Spotify Data
- NOTE:
  - There are a lot of variables!
  - Do not get overwhelmed!
  - Look them over and select which ones you want/need
  - Think about how you can use some to create new variables

What is it?

- A Report! - An analysis on real-life data
  - Conducted **individually** or with a **partner**
- Expectations
  - Neat
  - Well-written (Grammar, punctuation etc.)
  - Professional
  - Tables and Graphs meet class tips and expectations



Example QMBE 1320 – Final Project

By

Group Member 1 and Group Member 2

Introduction:

Per capita income and expenditures provide crucial insight into the average standard of living in specified areas. Disposable per capita income measures the average income earned after taxes per person in a given area (city, state, country, etc.) in a specified year. It is calculated by dividing the area's total income after tax by its total population. Per capita expenditures, on the other hand, measures the average outlay for goods and services by person and provides insight into spending patterns across a given area. Together, the assessment of per capita income versus expenditures can provide better understanding of regional economies, differences in standard of living, and approximate savings rates.

This project involves exploring Bureau of Economic Analysis data regarding per capita disposable income (hereafter referred to as PCI) and per capita personal expenditures (hereafter referred to as PCE). The PCI data provides annual (non-inflation adjusted) per capita disposable income at the national and state-level from 1948-2015 and the PCE data provides annual (non-inflation adjusted) per capita personal consumption expenditures at the national and state-level from 1997-2014. Consequently, this research seeks to identify how the national and state-level savings rates defined as

$Savings = PCI - PCE$ has changed over time and by geographic location.

The analysis finds that the national-level and average state-level savings rates have remained around 7-8% since 1997. Furthermore, we find that American's are not making fundamental shifts in their earnings and expenditure rates. However, the analysis does uncover a noticeable shift in the disparity of savings rates across the states in recent years with much of the growth in savings rates being concentrated in the central U.S. states - from the Dakotas down to Oklahoma, Texas and Louisiana. Consequently, it appears that the often-neglected fly-over states offer Americans greater opportunities to save than the eastern and western states.

Data Preparation:

Prior to assessing how PCI, PCE, and savings rates have behaved over time and by geographic location we must acquire and clean the data.

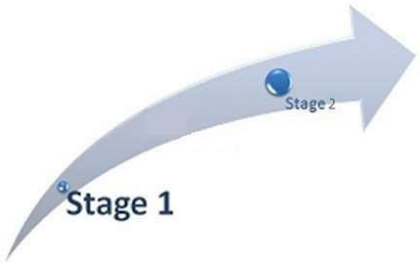
The data for this project originated from the following sources:

- PCI data: http://bit.ly/2dbEFY1
- PCE data: http://bit.ly/2dhCD5U

Cleaning Data: Once the basic data has been acquired we need to pre-process it to get the data into a tidy format. This includes removing punctuations, changing the income and expenditure data from character to a numeric data type, reducing the data sets to the same time period (1997-2014), making sure the common variables share the same names, and changing the data from a wide format to a long format. Once this has been done for both the PCI and PCE data we can merge the

Stages ("Exam 3" and "Final Exam")

- Stage1(Exam 3):
  - Why you chose certain data
  - What problem statement do you want to solve or investigate?
  - Clean Data
  - Visualize Data
- Stage 2(Exam 4):
  - Stage 1 + Data Analysis and Summary
- Full outline and rubrics are posted for the assignment on Canvas



You Decide What You Want to Study!

- Problem Statements:
  - 1. Identify the Problem
    - Specific
    - Relevant
    - Actionable
  - Bad Example:
    - I want to analyze customer satisfaction
  - Good Example:
    - I want to find out how customer satisfaction affects retention and revenue for our online store.
    - I want to increase sales by identifying the factors that influence customer behavior.
    - I want to understand the relationship between air pollution and respiratory diseases.

You Decide What You Want to Study!

- Problem Statements:
  - 2. State the Objective (SMART)
    - Specific
    - Measurable
    - Achievable
    - Relevant
    - Time-Bound
  - What do you want to achieve or learn from this analysis?
  - Good Example:
    - I want to determine how customer satisfaction influences retention and revenue, and identify the factors that affect customer satisfaction

You Decide What You Want to Study!

- Problem Statements:
  - 3. Define the Scope
    - Narrow your:
      - Sources
      - Time Period
      - Target Population
      - Variables
      - Assumptions
  - Good Example:
    - I will use survey data from the past six months, segment customers by purchase frequency and amount, and assume that satisfaction is measured by the Net Promoter Score
    - I will use Minnesota state respiratory and pollution data from the past six months to study the relationship between air pollution and disease.

You Decide What You Want to Study!

- Problem Statements:
  - 4. Formulate the Question
    - Convert your objective to a specific, measurable, and testable question.
  - Good Example:
    - How does customer satisfaction impact retention and revenue for our online store, and what are the main drivers of customer satisfaction?

You Decide What You Want to Study!

HOW TO WRITE A PROBLEM STATEMENT

- Problem Statements:
  - 5. Choose data and Tools
    - Which variables are you going to use?
      - Can you or do you need to create more variables
    - Good Example:
      - Increase sales: use sales data, customer data, marketing data
    - Which methods are you going to use?
      - Correlation, regression, time series, prediction and forecasting?
    - Good Example:
      - Air pollution and disease: correlation plots, regression etc.

You Decide What You Want to Study!

HOW TO WRITE A PROBLEM STATEMENT

- Problem Statements:
  - 6. Review and Refine
    - Check your problem statement for:
      - Clarity
      - Conciseness
      - Completeness
    - Make necessary adjustments or improvements
  - Helpful Hints
    - You could ask others for feedback
    - Test your assumptions
    - Compare

Other Helpful Things

- Create a Story!
  - Logical, cohesive (Not just a bunch of graphs) – Connect the dots!
  - Data -> Insights -> Actions
- Spend time and effort studying descriptive statistics and visualization
  - Understand the data to help give you insights and the path forward
- Questions to ask your self
  - Do sub groups matter?
  - Why are data missing?
  - Are there trends, patters, seasonality, other noticeable things

Today

- 1. Find a partner or decide to work individually!
- 2. Go through the data files and determine what data you think you want to analyze
- 3. Sign-up at the front
  - You and your partner's name and which data set you are planning to use
- 4. Begin the analysis
  - Based on the variables you have – what are some problem statements/questions you can answer (2-3)