



## Background Information

Every year, there is a growth in healthcare expenditures in the United States. In 2008, spending on healthcare amounted to 15.2% of the economy, the largest of any developed country. Bringing healthcare costs under control is a major concern for government and industry alike.



## Problem Statement

In this project, students will explore the change in national healthcare expenditures based on different growth rates. The generated values will be compared with statistics from U.S. Census Bureau.

## Instructions

**IMPORTANT:** This is not the actual Exam for your section. You will not receive any credit for completing this project.

**IMPORTANT:** Complete the steps below in the order they are given. Completing the steps out of order may complicate the assignment or result in an incorrect result.

1. Download and extract the provided Data Files ZIP file. It contains the following file for use in this assignment:
  - a. **expenditures.csv** – Information on healthcare expenditures in the United States from 1975 to 2015 [1], [2].

Column Name	Type	Description
<b>Year</b>	Number	Year for the statistics.
<b>Expenditures</b>	Currency	Total healthcare spending in the United States.
<b>7.0% Rate</b>	Currency	Healthcare expenditures with 7.0% annual growth.
<b>7.5% Rate</b>	Currency	Healthcare expenditures with 7.5% annual growth.
<b>8.0% Rate</b>	Currency	Healthcare expenditures with 8.0% annual growth.
<b>8.5% Rate</b>	Currency	Healthcare expenditures with 8.5% annual growth.
<b>9.0% Rate</b>	Currency	Healthcare expenditures with 9.0% annual growth.
<b>Average</b>	Currency	Empty column.
<b>Maximum</b>	Currency	Empty column.
<b>Minimum</b>	Currency	Empty column.
<b>Class</b>	Currency	Empty column.



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2. Begin by creating a new Microsoft Excel workbook named ***lastname\_firstname\_nhp.xlsx***.
3. We must adjust the sheets in our workbook.
  - a. Rename *Sheet1* to *Expenditures*.
  - b. Add a new sheet named *Analysis Questions*.
4. Import the following item into the workbook:
  - a. **expenditures.csv** file – Import starting in cell **A4** of the *Expenditures* sheet. The file is comma-delimited and has headers.
5. We wish to apply formatting to the *Expenditures* sheet.
  - a. Create a table based on cells **A4** through **K45** using a style of your choice. The table has headers.

The table will overlap external data ranges. Convert the selection to a table and remove all external connections.

- b. For the table, turn on the **Total Row** option.
  - c. Enter text in the cells as indicated below:
    - i. **A1**: Healthcare Expenditures
    - ii. **A3**: Annual Growth Rate:
    - iii. **C3**: 7.0%
    - iv. **D3**: 7.5%
    - v. **E3**: 8.0%
    - vi. **F3**: 8.5%
    - vii. **G3**: 9.0%
    - viii. **A46**: Average
  - d. Merge-and-center cells **A1** through **K1**.
  - e. Merge (but not center) cells **A3** through **B3**.
  - f. Apply the *Title* cell style to cell **A1**.
6. We need to perform calculations to analyze the *Expenditures* sheet.
    - a. We would like to summarize the expenditures and projections.
      - i. In the total row, individually average columns **B** through **G**.
      - ii. In the total row, do not display any statistics in columns **H** through **K**.



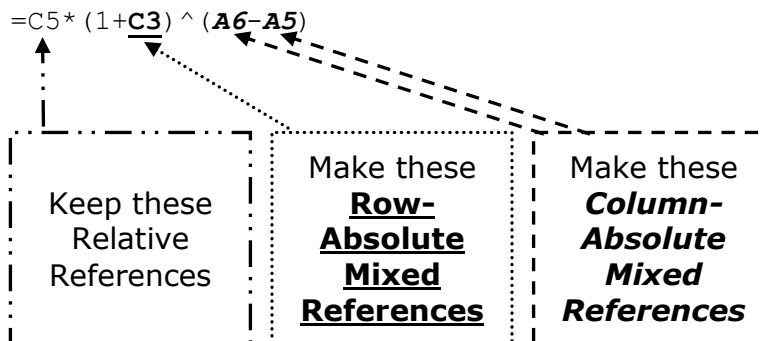
7. On the *Expenditures* sheet, we wish to calculate healthcare expenditure estimates with different assumptions about the carrying capacity and growth rate.
- a. We want to estimate future healthcare expenditure values.
- i. Enter the formula into the cell as indicated below.

**HINT:** To avoid errors, copy-and-paste the provided formula.

(1) **C6:**  $=C5 * (1+C3) ^ (A6-A5)$

- ii. We must adjust the future values formula so its cell references are correct when the formula is copied.

In cell **C6**, modify the cell references so they are column-absolute mixed, row-absolute mixed, or relative references as indicated:



- iii. We will now AutoFill the modified formula. Enter the formula into the cells as indicated below:
- (1) **C6** through **G45**: AutoFill the formula from cell **C6**.
- b. In column **H**, write a formula that, for each year, uses a function to find the average of the projected healthcare expenditures. Compare each year's projections from columns **C** through **G**.
- c. In column **I**, write a formula that, for each year, uses a function to find the highest of the projected healthcare expenditures. Compare each year's projections from columns **C** through **G**.
- d. In column **J**, write a formula that, for each year, uses a function to find the lowest of the projected healthcare expenditures. Compare each year's projections from columns **C** through **G**.



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- e. In column **K**, calculate the healthcare expenditures class by nesting `IF()` functions to display a class according to the following rules:
  - i. Class of **A** if the average of projected healthcare expenditures was more than \$2,000,000,000,000.
  - ii. Class of **B** if the average of projected healthcare expenditures was between \$1,000,000,000,000 and \$2,000,000,000,000.
  - iii. Class of **C** if the average of projected healthcare expenditures was less than \$1,000,000,000,000.
8. We must apply additional formatting to the *Expenditures* sheet.
  - a. Format the cells as indicated below:
    - i. **B5** through **J46**: currency with no decimal places
  - b. AutoFit the widths of columns **A** through **K**.
  - c. Apply the *Green-Yellow-Red* color scale conditional formatting option to cells **B5** through **G45**.
9. We would like to create a chart to plot the healthcare expenditure over time.
  - a. Create a 2-D line chart based on cells **A4** through **B45** of the *Expenditures* sheet. Move the chart to a new sheet named *Expenditures Chart*.

Ensure that the years are shown as labels for the horizontal (category) axis, not plotted as chart data. Specify appropriate chart and axis titles.
  - b. Add a trendline based on the average healthcare expenditures. Use the trendline type that best fits the data and project the values forward 20 periods (through the year 2035). Display the **R-squared** value on the chart.

**NOTE:** You cannot use the *Moving Average* type for your trendline.
10. To better understand our data, we wish to create a PivotTable.
  - a. Create a new PivotTable based on the data in cells **A4** through **K45** of the *Expenditures* sheet. Place the PivotTable on a new sheet named *Expenditures PivotTable*.
  - b. On the PivotTable do the following:
    - i. Add the year as a **Rows** field.
    - ii. Add the expenditures as a **Values** field.



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- c. We need to perform formatting on our PivotTable.
  - i. Group the years into sets of 10 starting at 1975.
  - ii. Summarize the expenditures by averaging them.
  - iii. Format the cells as indicated below:
    - (1) **Average of Expenditures** field: currency with no decimal places
11. We need to setup the *Analysis Questions* sheet so that it can store responses to the analysis questions.
  - a. Enter text in the cells as indicated below:
    - i. **A1**: Question Number
    - ii. **B1**: Response
  - b. Bold the contents of row **1**.
  - c. AutoFit the width of column **A**. Set the width of column **B** to 100 (8.39”).
  - d. Set the height for rows **2** through **5** to 110 (1.53”).
  - e. Change the vertical alignment setting for columns **A** and **B** so that the text is displayed at the top of each row.
  - f. Turn on text wrapping for column **B**.
12. Starting in row **2** of the *Analysis Questions* sheet, answer four of the five analysis questions below. Respond to one question per row.
  - a. Which trendline type did you use on *Expenditures Chart*? Why did you choose this type of trendline?
  - b. There is a continuous increase in annual healthcare expenditures. What do you think is the main reason behind this?
  - c. The annual growth rate for healthcare costs has slowed in recent years. The average annual increase from 1975 to 1985 was 12.8% but was only 5.0% from 2005 to 2015. Explain some potential reasons for this slowed growth rate.
  - d. Home healthcare experienced the greatest growth of all healthcare spending areas, with 2009 spending being almost 36 times the amount spent in 1979 [1]. What is a possible cause for this drastic upsurge?
  - e. In 2009, prescriptions accounted for 12% of total healthcare spending. This is more than double the 5.7% figure of 1979 [1]. What is a possible reason for this increase?



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### Grading Rubric

This is a practice assignment and is worth no points. A comparable Exam would be worth 100 points and graded using this rubric, with partial credit awarded as appropriate:

Steps 3a-b	3 points total	Steps 8a-c	6 points total
Step 4	5 points	Step 9a	6 points
Steps 5a-f	8 points total	Step 9b	4.5 points
Step 6a	5 points	Steps 10a-c	7.5 points total
Step 7a	15 points	Steps 11a-f	5 points total
Steps 7b-e	15 points total	Steps 12a-e (pick 4 of 5)	5 points each

The analysis questions in Steps 12a-e can be evaluated using this rubric:

Standard	Meets Requirements (2.5 points)	Does Not Meet Requirements (0 points)
Answer is reasonable.	Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.	Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.
Answer is supported.	Logical rationale is provided to support the given answer.	Logical rationale is not provided to support the given answer.

### Acknowledgments

The image in the introduction appears courtesy of TopNews [3].

### References

- [1] "National Health Expenditures - Summary: 1960 to 2009," U.S. Census Bureau, 2012. Available: <http://www.census.gov/compendia/statab/2012/tables/12s0134.pdf>.
- [2] "National Health Expenditure Data," Centers for Medicare & Medicaid Services, May 05, 2014. Available: <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html>.
- [3] *Stethoscope and Money*. 2011. Available: [http://topnews.us/images/imagecache/main\\_image/Health-Care-Spending.jpg](http://topnews.us/images/imagecache/main_image/Health-Care-Spending.jpg).