READING 7.1 ■ HOW TO CREATE CHARTS AND GRAPHS IN EXCEL

CREATING A BAR CHART IN EXCEL

1. Create a simple table in the spread sheet with two or more columns.

2. The information you want at the bottom of the graph (the "X" axis) should be in the first column, while the associated data should go in the other column or columns.

3. Highlight the data in the spread sheet. Be sure to include the column headings for the data.

4. Using the Chart Wizard, choose a "Column" graph in the Standard Types tab, then highlight the first sub-type, "Clustered Column". Click on "Next."

5. Using the Series tab, make sure that the chart looks roughly as you would like it to. You can change any of the data areas you are using by clicking on the little red arrows next to the Name, Values, or Category (X) axis label entries. Click "Next".

6. In the next step, enter the title of the graph, and name the X and Y axis if appropriate. (Recall that the X axis is the horizontal axis, while Y is the vertical axis.)

7. Use the Legend tab to select and format a legend for your chart if you need one, or de-select "Show legend" to make it disappear. Click "Next", then "Finish".

8. The final step is to format the chart.

CREATING A PIE CHART IN EXCEL

1. Create a simple table in the spread sheet with two columns, one for the category, the other for the budget figure.

2. Highlight the data in those two columns, both the budget category and the amount.

3. Click on the "Chart Wizard" icon in the standard toolbar.

4. Under Chart type, select "Pie", then select a sub-type and click "Next." The chart here uses a 3-D chart just to make it look somewhat more interesting to look at.

5. The program gives you the option of changing the data range for the pie chart. If you have already chosen the right cells, click "Next."

6. Add a title, place the legend where you want it, and identify the data labels you want to use, and click "Next." In this case, because the category name (along with the percentage value) is indicated next to each slice, there is no legend shown.

7. To display the pie chart in the Excel spread sheet you are working in, click "Finish."

8. Finally, the last steps are to format the pie chart in whatever way you would like; you start this process by right clicking anywhere in the graph.

CREATING A LINE GRAPH IN EXCEL

1. Create a simple table in the spread sheet with two columns.

2. The information you want at the bottom of the graph (the "X" axis) should be in the first column, while the related data should go in the other column or columns.

3. Highlight the data in the spread sheet you want to illustrate. Make sure you include the column headings for the data.

4. Using the Chart Wizard, indicate you want to draw a "Line" graph in the Standard Types tab, then highlight the first sub-type, "Simple Line". Click on "Next.".

5. Using the Series tab, make sure that the chart looks roughly as you would like it to. You can change any of the data areas you are using by clicking on the little red arrows next to the Name, Values, or Category (X) axis label entries. Click Next.

6. In the next step, enter the title of the graph, and name the X and Y axis, if appropriate. (Remember that the X axis is the horizontal axis, while Y is the vertical axis.)

7. In the Legend tab, you can place the legend — the part of the graph that identifies the various columns wherever you would like in the chart, or make it disappear if it is not needed. Click Next, then Finish.

9. Again, as with the pie chart, the final steps are to format the chart to make it look attractive.

READING 7.2 ■ RATIOS AND THE COMPOSITION OF A BUDGET

RATIOS

- Calculating a ratio means determining the relationship between two numbers. This is one of the central elements of quantitative analysis.

- Of course, we encounter ratios all the time, in areas that have nothing to do with budgets or budget analysis: "Seventy percent of those surveyed prefer Coca-Cola to Pepsi," claims the advertisement, while two out of three Americans are overweight, lament public health officials.

- The basic calculation is this:

Share = Section ÷ Total

- Ratios are often expressed in percentage terms. So if four out of 10 people support the Love Status Quo Party, instead of saying 0.4, we say 40 percent. If their support is only four out of 100 people, we say that only four percent support the LSQP (and that some other party must have a lot more support!).

- Keep in mind that ratios can exceed one hundred percent. If, for instance, military spending is slightly greater than education spending, we might say that military spending amounts to 110 percent of education spending.

COMPOSITION OF THE BUDGET

- Working with ratios is relevant in many different contexts, but it is especially useful for applied budget work. This is because calculating ratios allows us to analyze the overall composition of a national government's or a state's budget.

- For example, we may want to know what share of total spending is taken up by health or military spending, or how government spending in one sector compares to other parts of the economy.

READING 7.3 ■ INFLATION

- Just as inflation erodes the earnings of families – meaning that they need to make more and more money just to break even – so inflation erodes the buying power of governments.

- To determine the impact of inflation – which would allow you to see the "real" increase in government spending over specific periods – an analyst must adjust for inflation.

THE CONSUMER PRICE (OR INFLATION) INDEX

- To adjust figures for inflation, you need to know what the inflation rate was for each of the years during the period that you are analyzing.

- The most common tool for doing this, published by most governments or by academics, is typically called the *consumer price index (CPI)* or sometimes the *inflation index.*

- The CPI is a table that has an arbitrary starting point equal to 100 (the base year). If the following year inflation runs at five percent, the index rises to 105 (100 x 1.05). If inflation the next year rises to 10 percent, the inflation index would rise to 115.5 (105 x 1.10), and so on.

- Years prior to the base year (which remember, is an arbitrary point) will show up as numbers below 100 as long as inflation was positive. If inflation had been four percent the year prior to the base year, the index would have been 96.2 (100/1.04).

WHAT DOES IT MEAN TO ADJUST FOR INFLATION?

- When you adjust for inflation, what you are really trying to do is to ensure that the value of the money you are describing in any two years is the same. We know that a Dinar in 2008 doesn't buy as much as a Dinar did in 1998, so we want to equalize the purchasing power of the same unit of money over the two years.

- Note that we can accomplish that by inflating the *nominal* figure from 1998 so that it comes to equal the 2008 value of the Dinar, OR we could deflate the 2008 figure to equal the 1998 value of the Dinar. Alternatively, we could convert both figures to their value in some other year, for example, to 2003 values.

- Most of the time, it makes sense to inflate all nominal prior year figures to today's value of money, or to the most recent year for which the consumer price index exists. This is because people are most familiar with the value of money as they experience it in the present. So, for example in Polarus, people instinctively know what today's Dinar is worth. It would therefore be easier for them to relate to an analysis that presents figures converted to the value of today's Dinar.

HOW TO ADJUST BUDGET FIGURES FOR INFLATION

- The equation to *inflate* a prior year budget figure to today's value is as follows:

$$\frac{\textbf{Nominal value of prior year x CPI of most recent year}}{\textbf{CPI of prior year}} = \textbf{Adjusted "real" value} \text{ (in most recent year value)}$$

- It is usually important, in this and other calculations, to check that the result is logical, i.e., that it is – in rough terms – what one would expect. One of the simplest, yet most important, checks is to make sure that the new figure has moved in the direction that you expected it to (up or down).

- For example, it is easy to get confused and multiply the nominal value by the prior year's consumer price index (CPI), and then divide by the current year's CPI. If you do that, though, the nominal value will shrink in value. Except in the rare circumstance where an economy is marked by *deflation* – where prices fall and the value of money shrinks from year to year – adjusting for inflation should always make the earlier year's amount larger, or the current and future year amounts smaller.

HOW TO DEFLATE BUDGET FIGURES

- You can also calculate current or recent expenditure amounts in the value of a prior year. In this instance, you want to *deflate* a later year's amounts to an earlier year's value of money.

- The equation to *deflate* (just the opposite of the equation to *inflate*) to a past year's value is:

$$\frac{\text{Nominal value of most recent year x CPI of prior year}}{\text{CPI of most recent year}} = \begin{array}{c} \textbf{Adjusted ``real'' value} \\ \text{(in prior year value)} \end{array}$$

- Again, the quick common sense test is that when deflating current (or future) year spending amounts to the value of money in a past year, the value should shrink.

READING 7.4 ■ MEASURING BUDGET CHANGES OVER TIME

- One of the key analytic tools in budget work is to describe changes in variables over time. The raw numbers – "spending grew by D3 billion" – can seem meaningless given the magnitude of the amounts at issue. After all, D3 billion is a lot of money, even if it only showed a modest increase compared to a starting point of, say, D60 billion.

- Therefore, alongside reporting on changes in government spending in nominal terms, it is often useful to describe these changes in percentage terms. For many people, describing growth this way rather than in dollar (or Dinar) terms makes it easier to understand. Moreover, it allows a useful comparison between growth rates in programs of very different sizes.

- To determine the *rate of increase* in a program, department, or state budget, use this equation:

  Growth in budget   =   Amount in most recent year – Amount in prior year   x 100
  Amount in prior year

BE AWARE OF THE DIFFERENCE BETWEEN PERCENTAGE INCREASES AND INCREASES IN PERCENTAGE POINTS

- This is often one of the more difficult concepts for many people to grasp. For instance, imagine that in 1995 education made up 10 percent of a country's budget, but grew to comprise 12.5 percent of the budget in 2004. So what was the percentage increase?

- The answer is not 2.5 percent. While education spending grew by 2.5 percentage *points* during this period, to determine the percentage increase you need to use the equation (already introduced above) for calculating percentage changes. It is:

  (Later year % – Prior year %) ÷ Prior year % = Percentage increase
  So applied to the education example:
  (12.5% – 10%) ÷ 10% = .25 = 25%

- Clarity is extremely important when describing percentage changes. For example, if you say "Health spending as a share of total spending grew by 25 percent between 1995 and 2004," you will be precisely accurate. Unfortunately, many people will misunderstand you, assuming that

you meant that spending grew from 10 percent of total spending in 1995 to 35 percent in 2004. However, the latter interpretation would mean there was a 25 *percentage point* increase, not a 25 percent increase.

- Because these figures are so often misunderstood, some analysts avoid using this "percentage change of a percent" formulation.

- On the other hand, as an advocate, this can be an essential message to get across. For example, say that you found out that as a share of spending, housing programs dropped from 10 percent of the budget to 8 percent over five years. This could be presented as good evidence that government officials are not using maximum available resources to expand access to housing. Describing this change as "a 20 percent drop" is a lot more powerful – although technically identical to – "a two percentage point drop."

DESCRIBING PERCENTAGE CHANGES AS FRACTIONS

- While describing budget trends in percentage terms simplifies the data and puts changes in perspective, some percentages are more difficult to make sense of than others.

- This can be particularly true when dealing with changes greater than 100 percent. For instance, to most of us it is obvious and immediately clear that 25 percent is the same as one-quarter (1/4). However, while an increase of 100 percent doubles the original figure, an increase of 200 percent triples the original. This is not necessarily intuitive.

- A useful way to deal with this in a narrative text – and to avoid the tediousness of constantly repeating the word "percent" – is to convert the percentages into simple fractions. Thus:
    - A 23 percent change can be described as "nearly one-quarter."
    - An increase of 53 percent can be described as "just over half."
    - Figures around 33 percent become "one-third."
    - Figures around 20 percent are easy to understand as "one-fifth," etc.

When using these fractions as shorthand in a report, it is useful to also include the actual percentages in parentheses or in a figure or table.

READING 7.5 ■ PER CAPITA CALCULATIONS

- Analysts and advocates often calculate budget data to come up with "per person" or *per capita* allocations (or expenditures) to allow comparisons between countries, states, localities, or facilities.

- Calculating *per capita* allocation (or expenditure) is straightforward, as long as you know both the number of people in a population and the amount allocated (or the amount spent). The equation is:

$$\textbf{Per capita allocation} \quad = \quad \frac{\textbf{Allocation}}{\textbf{Population}}$$

- This same formula can be used to calculate *per capita* spending, with the expenditure figure used instead of the allocation.

- Note that when comparing allocation, spending, and population figures, it is important to pay attention to whether the budget figures are in terms of hundreds, thousands, millions, or billions. This is where a quick common sense check is useful. It is all too easy to make such a mistake unless you are being careful.

- It is also important to consider what population is relevant. In the education sector, for example, *per capita* calculations are best done using selected population data. While it is certainly possible to measure education spending on a general *per capita* basis, you will get a better sense of how much is being spent if you use the number of school-aged children, for example. This principle can hold any time a program is aimed at a particular population, rather than the population at large.

- While knowing how much is allocated or spent *per capita* on a particular service doesn't give you a definitive insight into the quality of services people receive, it does provide a useful piece of evidence.