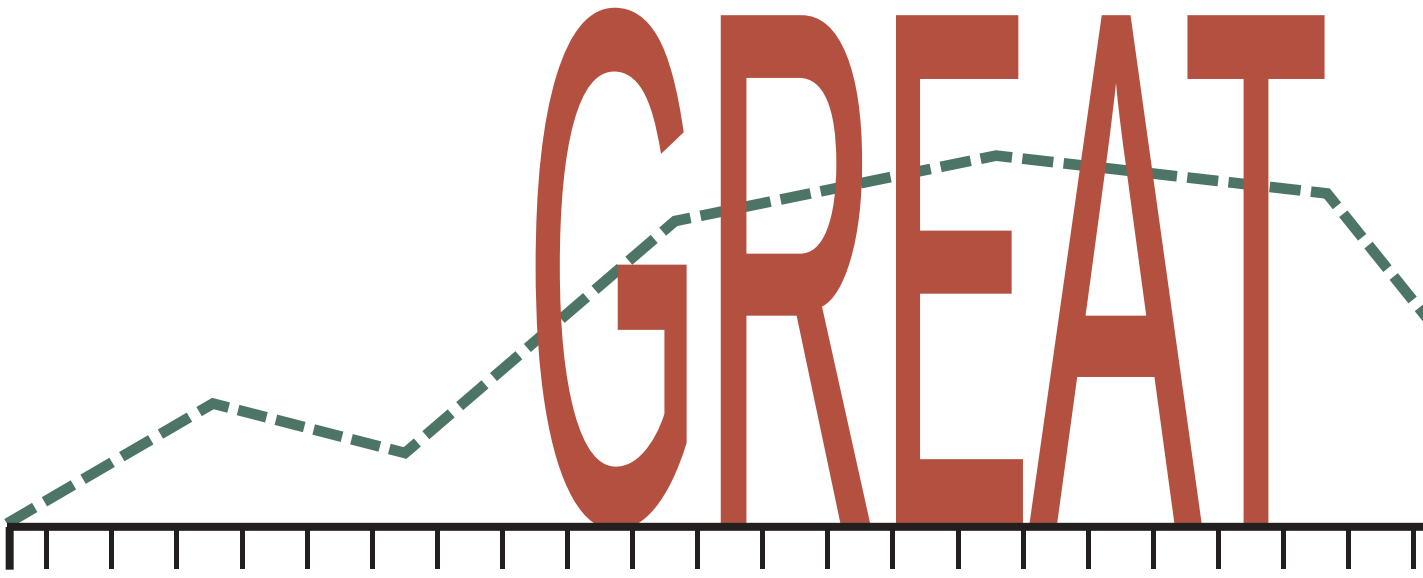


How to illustrate financial information the right way

By Kay Zekany, CMA, and Art Elsass

Graphs and charts have always provided support for sound business decision making. Yet in today's environment of rapid product innovations, transformations of business cycles through e-commerce, growing business complexity through mergers and acquisitions, shrinking margins, and economic fears, the need to make decisions based on carefully illustrated financial information is ever increasing.

With the proliferation of computer data banks and data warehousing, managers can become overwhelmed with the sheer volume of available business information. Making your graphics both accurate and understandable is more important than ever.

Whether you need a financial illustration in your written report or oral presentation, the same two basic rules apply. First, the *content* should be what we call decision useful. Second, the *presentation* should show the true substance of the data with clarity.

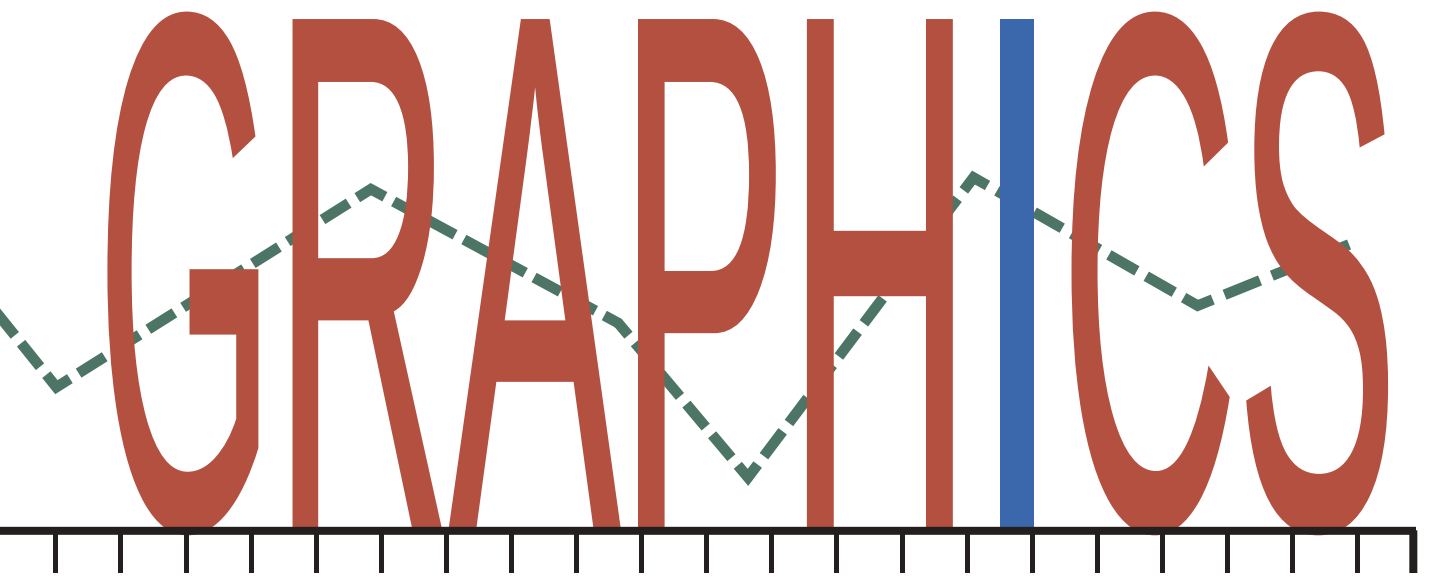
DECISION-USEFUL CONTENT

Before deciding how to set up your graphic, first consider the quality of your data. High-quality data is a prerequisite to producing a high-quality report. It needs to be relevant, reliable, and error free—that is, decision useful. Unfortunately, sometimes there can be a trade-off between relevance and reliability.

Reliable data can be verified either through auditing or independent measurement and should faithfully represent the underlying events without bias. Audited financial statements contain the most reliable information. Internal management decisions, though, typically involve subunits of the organizations, and external financial statements may not provide the level of detail needed.

Unaudited information is often assumed to be *less reliable* since it hasn't been scrutinized, but it may be *more relevant* and timely. Because most corporations have good internal accounting control systems, accounting data generally has very good reliability. Still, scrutinize the detailed entries, and look for obvious errors and missing items to ensure your database is complete.

High-quality data matches the pertinent time period and doesn't overlap with other periods. Accountants take great care at fiscal year-end to ensure a clean separation, or cut-off, between accounting periods. They may not



take this same degree of care at the end of each month, so you may need to adjust your data to ensure a clean match with specific time periods.

Unfortunately, all financial data sets potentially contain several unique problems:

◆ The change in financial results over time may be due, in part, to such explainable economic factors as inflation, changes in foreign exchange rates, seasonal effects, and business cycles.

◆ The changes in financial results may also be the result of mergers, acquisitions, expansions, divestitures, or downsizing.

These factors can't be ignored, even though they can often be difficult (if not impossible) to quantify. To compensate for the effects of inflation, for instance, you could restate the data in constant dollars. To compensate for changes in the size of the company, you could scale by either total assets (for balance sheet information) or net sales (for income statement information).

DATA SETS

Your data set may be relational, time-series, or cross-sectional.

A relational data set displays a plausible causal link between, or among, the independent variables (X_i) and the predictive variable of interest (Y_i) that is dependent on changes in the independent variables. Statistically, we can write the equation of this relationship as a linear equation:

$$Y_i = a + b\,X_i + e_i$$

where "a" represents the intercept, "b" the slope, and "e" the error.

A relational data set is ideal for graphing. For example, it could show the relationship of sales revenue to advertising expenditures. Certainly a successful advertising campaign should be measurable in terms of revenue generated. While sales are indeed driven by more factors than simply advertising dollars, some causality should exist.

A graphic depiction of your relational data set truly helps your audience see the substance of the data. With a relational data set, place the explanatory variable (X), such as advertising, along the horizontal axis and the predicted (Y), sales revenue, measured as a vertical measured distance.

A time-series data set measures variables at regular intervals: weekly, monthly, quarterly, yearly, etc. In the words of Edward Tufte, who wrote *The Visual Display of Quantitative Information* (Cheshire, Conn., Graphics Press), time-series data is shown "marching along to the regular rhythm of time." Quarterly sales results for past years would be one example. Beware, though, that the mere passage of time alone doesn't generally cause the observed pattern of changes. Socio-economic factors intervene. Incorporating such factors into your analysis

can help move you toward understanding the true causal explanation of the trends.

When presenting a time-series data set, indicate the individual time periods along the horizontal X-axis. Since time itself generally doesn't cause the change in Y, consider presenting a series of panels containing graphs of other contributing factors for this same time period. It's also useful to correct for factors such as inflation, exchange rates, etc.

A *cross-sectional* data set measures the same variables over the same period of time for two or more economic entities. Instead of examining the trends over time, cross-sectional data analysis may examine the differences across companies or organizational subunits. Examples include comparing net sales for firms in the same industry during the holiday shopping season or comparing net sales of last month's operations for each store in a retail chain.

Cross-sectional data may be most susceptible to distortion—probably because it lacks both causality and a natural sequencing of the data. For example, if you compare the annual cost of goods sold for several firms, simply seeing how much each spends has limited value for at least two reasons:

1. The larger the firm, the greater the amount spent on all expenses.

2. The smaller the markup, the greater the amount spent on goods.

Relating the cost of goods sold to the volume of sales revenue generated by each firm provides meaningful information about the amount spent on merchandise for each dollar generated in sales revenues.

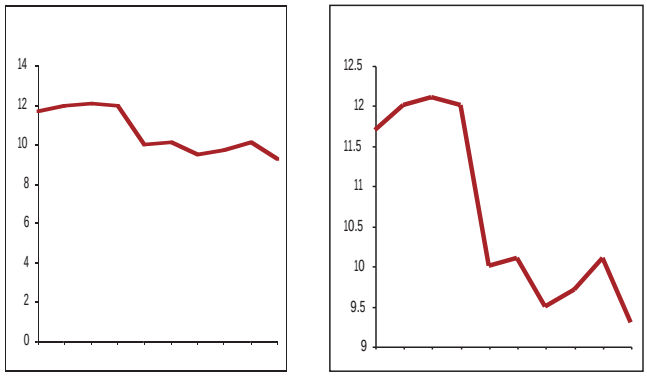
THE PRESENTATION

Once you have quality data and know the type of data set you are graphing, keep these guidelines in mind:

Show the substance of the data with clarity. Whether you are working with a relational, time-series, or cross-sectional data set, format your data for clarity. First and foremost, your presentation must show the data. Your objective is to determine the best way to do that so that your audience can focus on the data without distractions. Take special care to avoid illustrating data out of context or in a misleading or confusing manner. Adopt a clean, professional style, eliminating extraneous embellishments that add nothing to the content.

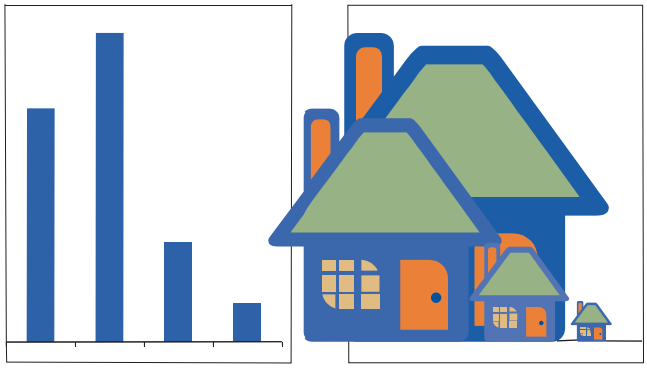
Make your graphic easy to read. A neat presentation improves the visual appearance of your report. Draw your audience's attention to the most important information while encouraging them to compare different pieces of data.

Figure 1: **Avoid a Disappearing Baseline**



Do Don't

Figure 2: **Avoid Using Pictographs**



Do Don't

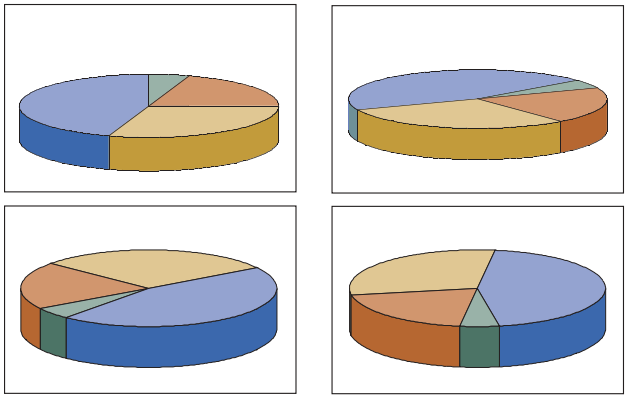
Indicate the unit of measure. If your data is in "dollars," then be sure to include the dollar sign. When presenting two or more graphics side-by-side for comparison, try to use the same scale and degree of precision. If one graphic reports in millions of dollars and the other in thousands, report both in either thousands or millions. If you prefer not to do so, tell your reader or viewer that you are using different units of measure.

Use a constant scale. Violating this principle distorts the true substance of the data in a manner comparable to the way an amusement park fun-house mirror distorts your true image.

Always indicate the source of your data. This not only gives credit where credit is due and adds credibility to your numbers, but it also allows an informed reader to evaluate the source of your data.

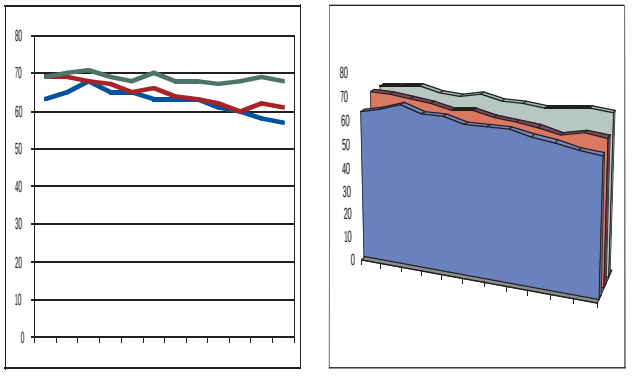
Your graphic should "stand alone." That is, your illustration should be clearly, completely, and accurately titled. If needed, use footnotes to provide details that are necessary to interpret the data without ambiguity. To

Figure 3: **Avoid a Skewed or Angled 3-D Pie Chart**



The position of each slice in the pie influences its perceived mass.

Figure 4: **Avoid Using Extra Presentation Dimensions**



Do Don't

avoid being misleading (by using a superscript number for footnoting, which can appear to represent an exponent), use the following sequence of symbols to indicate footnote order: an asterisk or star (*), a dagger (†), a double dagger (‡), a section mark (§), parallel lines (||), and a number sign (#).

Avoid distorting the data with a disappearing baseline. Graphs should start at the origin so that the full length of the actual data is represented. If not, distortions occur. It may be tempting to eliminate what looks like empty white space by compressing graph segments. Unfortunately, this can distort the baseline, and the truncated space is an important component of the data that shouldn't be omitted. See Figure 1 for an example.

Avoid representing two-dimensional data in three dimensions. A simple bar graph is two-dimensional. Adding depth to the height and width may create a false-dimensionality problem. While we are all well aware that the volume of a cube is much greater than the area of one of its side panels, some people tend to forget this simple reality when designing an eye-catching graph. The resulting graph can distort the underlying data structure by getting the reader's eye to focus on the volume of the three-dimensional object rather than the length of the bar.

A related false-dimensionality problem arises from the use of pictographs to represent the value of data points (see Figure 2). Here again we have a two- or three-dimensional representation attempting to convey a one-dimensional piece of data. For instance, a sketch of a house may be used to depict the dollar value of residential real-estate sales. Since the volume increases faster than either the height or the width, the viewer's eye is easily fooled. Most of us may try to compare the volume of the houses (with a high degree of error) to "see" the trend in housing sales. The result is highly biased data representation.

Avoid skewed or angled pie charts. False-dimensionality remains a problem when using a three-dimensional pie chart where the shape of the pie lacks symmetry and confuses the eye with a false sense of volume (see Figure 3). Because of the lack of symmetry, the location of the piece of the pie (top, bottom, left, or right) affects its visual mass, distorting the true substance of the data.

Avoid overall false-dimensionality. As a result of angling a graphic on a downward slant to imply the depth of three dimensions, a graphic designer may make it impossible for the eye to distinguish the extent to which the data is dropping relative to the built-in slant of the graphic itself. (See Figure 4 for an example.)

Finally, be aware that illustrating financial information for viewing from a projected image (as opposed to reading from the printed page) requires extra consideration to ensure that the visual can be seen clearly by the entire audience. Frequently, an effective projected graph is simpler, with fewer elements than a printed version since the audience needs to be able to absorb its content more quickly and from a greater distance.

Also, when you are the audience, be wary that entertaining tricks can divert your attention from the true substance of the data. ■

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