Chapter 4
Ratios in the Social Sciences

4.1 Why Discuss Ratios?

Besides the proper tabulation of aggregates, ratios are simple yet powerful tools of interpretation.¹ The algebraic operation of division establishes a binary relationship between two numbers, to subdivide, but more importantly for statistics, to compare. The importance of ratios resides in the fact that a statistical aggregate is an artificial creation that has no counterpart in the perceptible world of human experience. Its informational content, the big picture of a socio-economic phenomenon can only be revealed through connecting a given statistical aggregate with other, similarly abstract creations, namely other statistical aggregates.

It should not surprise, then, that a great variety of ratio applications can be found in the Social Sciences. Many important ratios known as ‘rates,’ ‘percentages,’ prices, ‘index numbers,’ ‘GDP-per-capita,’ arithmetic, geometric or harmonic means, and probabilities, are ratios but are seldom recognized as such. Data users need guidance to interpret these ubiquitous statistical tools, because a statistical aggregate alone, by itself, cannot be interpreted – remember: ‘comparison is the soul of statistics.’ This important topic has received little attention² because statistical theory essentially deals with data that are the measurements in the natural sciences that do not need ratios for their interpretation. Ignoring the centrality of aggregates, and the fact, that events in society happen in historic time and actual geographic regions³ has made statistics as an academic discipline less relevant for the social sciences,⁴ gradually marginalizing it in academic curricula.

4.2 Classifications of Ratios

Ratios can be classified according to (1) the purpose for which a ratio is computed, and (2) the conceptual closeness between numerator and denominator.
4.2.1 Ratios Classified by Their Purpose

Every ratio is computed for a purpose. Even though there are always various reasons why a given ratio is computed, one usually stands out and prevails in any given application. The following purpose-categories are listed in the order of frequency of their use.

4.2.1.1 Reference Ratios use the figure in the denominator, (D) as a reference or standard for the figure in the numerator, (N). Though every ratio, regardless of its purpose, also serves as a reference, most ratios do so explicitly, like index numbers, demographic rates, and turnover rates.

4.2.1.2 Adjustment Ratios ‘adjust’ the (N) figure through division by the (D) figure. These are ratios that ‘deflate’ value aggregates, that ‘de-seasonalize’ or ‘de-trend’ a time series, purporting to eliminate the influence of inflation, of the recurring effects of the seasons of the year or the general trend of a series. Although computed for other reasons, density ratios and ‘per capita’ figures in a sense also implicitly intend to ‘adjust’ the (N) aggregate.

4.2.1.3 Causation Ratios, computed to reveal suspected cause-effect relationships between the (N) and (D) aggregates, are e.g. ‘input-output ratios’, the ‘productivity coefficient of labor’, the ‘productivity coefficient of capital’, the ‘birth rate’ of a human population.

4.2.1.4 Estimation Ratios serve to project on a ‘population’ the structures found in a sample, to interpolate missing data in a time series and to extrapolate – forecast – a time series into the future.

4.2.2 Ratios Classified by Closeness of (N) and (D)

Of particular importance for the interpretation of a ratio is the closeness of the data in (N) and (D). On one end of the spectrum are ratios in which two aggregates who’s subject-matter, geographic area and time period refer to the same subject-matter categories, time-period and geographic area, and were produced by the same survey methods, such a ratio obviously has the same definitions as the (N) or (D) aggregates.

On the other end of that spectrum is a ratio between aggregates whose definitions of subject-matter, time-period and geographic area are different, having none of these determinants in common. Such a ratio resists meaningful interpretation. Obviously, the more alike the definitions of (N) and (D) with regard to their three dimensions, and the methods by which these (N) and (D) figures were created, the more meaningfully can such a ratio be interpreted.

The following six categories classify ratios according to the closeness of the definitions of their (N) and (D) aggregates, beginning with ratios in which (N) and (D) have the greatest affinity, progressing towards those with the least affinity.