

Chapter 4

Simple random samples and their properties

4.1 INTRODUCTION

A sample is a part drawn from a larger whole. Rarely is there any interest in the sample *per se*; a sample is taken in order to learn something about the whole (the “population”) from which it is drawn.

In an opinion poll, for example, a number of persons are interviewed and their opinions on an issue or issues are solicited in order to discover the attitude of the community as a whole, of which the polled persons are usually a small part. The viewing and listening habits of a relatively small number of persons are regularly monitored by ratings services, and, from these observations, projections are made about the preferences of the entire population for available television and radio programs. Large lots of manufactured products are accepted or rejected by purchasing departments in business or government following inspection of a relatively small number of items drawn from these lots. At border stations, customs officers enforce the laws by checking the effects of only a small number of travellers crossing the border. Auditors judge the extent to which the proper accounting procedures have been followed by examining a relatively small number of transactions, selected from a larger number taking place within a period of time. Industrial engineers often check the quality of manufacturing processes not by inspecting every single item produced but through samples selected from these processes. Countless surveys are carried out, regularly or otherwise, by marketing and advertising agencies to determine consumers’ expectations, buying intentions, or shopping patterns.

Some of the best known measurements of the economy rely on samples, not on complete enumerations. The weights used in consumer price indexes, for example, are based on the purchases of a sample of urban families as ascertained by family expenditure surveys; the prices of the individual items are averages established through national samples of retail outlets. Unemployment statistics are based on monthly national samples of households. Similar samples regularly survey retail trade, personal incomes, inventories, shipments and outstanding orders of firms, exports, and imports.