

Business Administration - 301
Managerial Statistics I

1 Data and Statistics

1.1 Applications in Business and Economics

- Accounting: select a subset of the accounts receivables called sample
- Finance: use P/E ratios, dividend yields, expected return to rank stocks
- Economics: forecast data; use variables like the PPI, unemployment rate etc.

1.2 Data

See Table 1.1 for details. Elements are the entities that are collected. In Table 1.1 each individual company's stock is an **element**. There are 25 stocks which amount to 25 elements.

Company	Exchange	Ticker	BusinessWeek Rank	Share Price (\$)	Earnings per Share (\$)
Abbott Laboratories	N	ABT	90	46	2.02
Altria Group	N	MO	148	66	4.57
Apollo Group	NQ	APOL	174	74	0.90
Bank of New York	N	BK	305	30	1.85
Bristol-Myers Squibb	N	BMY	346	26	1.21
Cincinnati Financial	NQ	CINF	161	45	2.73
Comcast	NQ	CMCSA	296	32	0.43
Deere	N	DE	36	71	5.77
eBay	NQ	EBAY	19	43	0.57
Federated Dept. Stores	N	FD	353	56	3.86
Hasbro	N	HAS	373	21	0.96
IBM	N	IBM	216	93	4.94
International Paper	N	IP	370	37	0.98
Knight-Ridder	N	KRI	397	66	4.13
Manor Care	N	HCR	285	34	1.90
Medtronic	N	MDT	53	52	1.79
National Semiconductor	N	NSM	155	20	1.03
Novellus Systems	NQ	NVLS	386	30	1.06
Pitney Bowes	N	PBI	339	46	2.05
Pulte Homes	N	PHM	12	78	7.67
SBC Communications	N	SBC	371	24	1.52
St. Paul Travelers	N	STA	264	38	1.53
Teradyne	N	TER	412	15	0.84
UnitedHealth Group	N	UNH	5	91	3.94
Wells Fargo	N	WFC	159	59	4.09

A **variable** is a characteristic of interest for the elements. One can note the following variables:
Exchange, Ticker Symbol, Share Price, Earnings per Share.

The set of measurements obtained for a particular element is called an **observation**. Example: first observation (Abbott Laboratories) contains the following set of measurements - N, ABT, 90, 46,

and 2.02.

Scales of measurement:

- nominal scale: *Exchange*: N (or 1) and NQ (or 2)
- ordinal scale: e.g. rating of a service: excellent, good, poor.
- interval scale: e.g. difference between SAT scores is meaningful - $620-550 = 70 > 550-470=80$.
- ratio scale: e.g. variables like distance, height, weight, and time use the ratio scale of measurement.

Qualitative and Quantitative Data:

- Qualitative data: include labels or names used to identify an attribute of each element; use either the nominal or ordinal scale of measurement and may be nonnumeric or numeric.
- Quantitative data: require numeric values that indicate how much (i.e., continuous data) or how many (i.e. discrete data).

Cross-Sectional and Time Series Data:

- Cross-sectional data: collected at the same or approximately the same point in time. Example: data in Table 1.1.
- Time Series data: collected over several time periods.

1.3 Data Sources

Existing sources: employee records, production records, inventory records, sales records etc.

Statistical Studies: experimental (analyze a variable of interest - e.g., determinants of blood pressure) or observational (e.g. survey).

1.4 Descriptive Statistics

Present data in an accessible way: e.g., summarize data in a tabular, graphical, or numerical way.

Exchange	Frequency	Percent Freq.
NYSE	20	80
NASDAQ	5	20
Totals	25	100

1.5 Statistical Inference

- Population: set of all elements of interest in a particular study.
- Sample: subset of the population.

The process of conducting a survey to collect data for the entire population is called **census**. The process of conducting a survey to collect data for a sample is called **survey**. Statisticians use sample data to make estimates and test hypotheses about the population using **statistical inference**.