

# Regression: soft drink demand



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## Estimation

Demand can be estimated with experimental data, time series data or cross section data. Sara Lee Corporation generates experimental data in test stores where the effect of an NFL-licensed Carolina Panthers logo on Champion sweatshirt sales can be carefully monitored. Demand forecasts usually rely on time series data. In contrast, cross-section data appear in Table 1. Soft drink consumption in cans per year is related to six pack price, income per capita, and mean temperature across the 48 contiguous states in the United States Question . Estimate the demand for soft drinks using a multiple regression program available on your computer. Interpret the coefficients and calculate the price elasticity of soft drink demand. Omit price from the regression equation and observe the bias introduced into the parameter estimate for income. Now omit both price and temperature from the regression equation. Should a marketing plan for soft drinks be designed that relocates most canned drink machines into low income neighborhoods?

Why or Why not? The data are the results of the following market research experiment by a large company. The company's total market area was divided into 40 equally populated market areas, and the price to be charged for the product was set to be the same in each area. Then, the weekly amount of advertising expenditure (\$) in each of these market areas was set as indicated in column B. The weekly sales (y units) in each market area was then recorded as shown in column C..

Use linear regression to estimate a linear equation describing how the value of sales (y) varies with the level of the fitted equation. Assess the validity of the fitted equation. If the product sells at a price of \$100 and costs \$70 per  
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unit to produce, estimate a linear equation for the company's weekly profit in terms of its advertising expenditure ( $x$ ). The Sales of Cycle City, a large motorcycle and moped distributor, grew significantly during the 1990s. This past history of sales growth is indicated in data set 3. What is the compound annual rate of growth in sales for Cycle City over this 10 year period? Based on your answer in part (1) what sales would you have forecasted for the next (2001)? Graph the growth in sales over the 10 years. What happened to the rate of growth over this period? Based on your answer to Part (3), what sales would you have forecasted for 2001. Pizza firm The manager of pizza firm collects data on the last 24 month of pizza sales from her own company records.

Where  $Q$  = sales of pizza at Checkers Pizza  $P$  = Price of a pizza at Checker Pizza  $M$  = Average annual household income in Westbury  $P_{al}$  = price of a pizza at Al's Pizza Oven  $P_{bmac}$  = price of Big Mac at McDonald's. Estimate the linear demand function for Checkers Pizza compare to nonlinear model. Estimate demand elasticities at values of  $P$ ,  $M$ ,  $P_{al}$ , and  $P_{bmac}$  at values  $P = 9.05$ ,  $M = 26614$ ,  $P_{al} = 10.12$  and  $P_{bmac} = 1.15$  (for either demand function) Forecast linear trend regression model to forecast income in month 30

The copper data consist of 25 annual observations on world consumption of copper, copper price and the exogenous variables required to estimate industry demand and supply equation Data presented are actually valued for 1950-1975  $Q_c$  = world consumption sales of copper in 1000 of metric tons  $P_c$  = price of copper in cents per pound (inflation adjusted)  $M$  = index of real per capita income 1970 = 100  $P_a$  = price of aluminum in cents per pound

(inflation adjusted)  $X$  = ratio of consumption in the previous year to production in the previous year ( $= Q_c/Q_p$ )  $T$  = technology (time period is a proxy).

Estimate the copper industry demand and supply equation. Locate copper demand and supply in year 26. Calculate the intersection of the demand and supply functions DATA Set 6 Given data set 6, the quantity demanded of a commodity ( $Y$ ), its price ( $X_1$ ) and consumer income ( $X_2$ ) from 1986-2005 1. Estimate the regression equation of  $Y$  on  $X_1$  and  $X_2$ . Assess the validity of the fitted equation. What is price elasticity at \$4 and income elasticity at level 3800? Explain what kind of commodity ( $Y$ ) is? Forecast linear trend regression model to forecast income in year 2006