Lecture Note for East Asian Economic Growth :

5. Regression Analysis

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The Population Regression Line

Suppose that we are interested in the relation of a dependent variable Y to an independent variable X. If the random variable X takes specific values x_i, the **population regression line** expresses the corresponding values Y_i as

$$Y_i = \alpha + \beta x_i + \epsilon_i$$

where α and β are constants and ϵ_i is a random variable with mean 0.

FIGURE 12.5 Illustration of the population regression model; shown are probability density functions of the dependent variable for given values x of the independent variable.
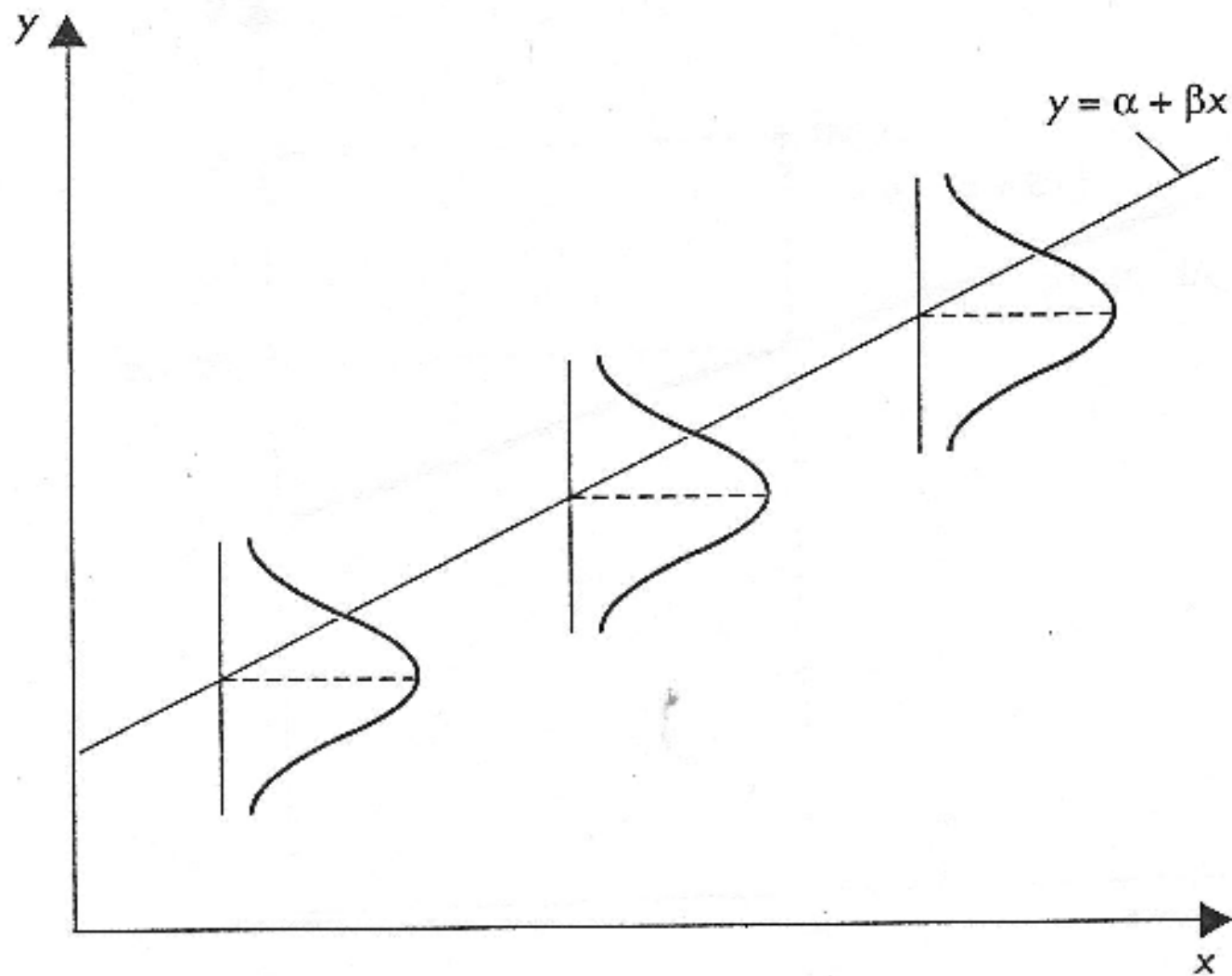
TABLE 12.6 Calculations for the sample regression of retail sales per household on disposable income per household (x_iy_i and x_i^2 rounded to nearest thousand)

x_i	y_i	x_iy_i	x_i^2
9,098	5,492	49,966,000	82,774,000
9,138	5,540	50,625,000	85,503,000
9,094	5,305	48,244,000	82,701,000
9,282	5,507	51,116,000	86,156,000
9,229	5,418	50,003,000	85,174,000
9,347	5,320	49,726,000	87,366,000
9,525	5,538	52,749,000	90,726,000
9,756	5,692	55,531,000	95,180,000
10,282	5,871	60,366,000	105,720,000
10,662	6,157	65,646,000	113,678,000
11,019	6,342	69,882,000	121,418,000
11,307	5,907	66,790,000	127,848,000
11,432	6,124	70,010,000	130,691,000
11,449	6,186	70,824,000	131,080,000
11,697	6,224	72,802,000	136,820,000
11,871	6,496	77,114,000	140,921,000
12,018	6,718	80,737,000	144,432,000
12,523	6,921	86,672,000	156,826,000
12,053	6,471	77,995,000	145,275,000
12,088	6,394	77,291,000	146,120,000
12,215	6,555	80,069,000	149,206,000
12,494	6,755	84,397,000	156,100,000
Sums 237,579	132,933	1,448,555,000	2,599,715,000

FIGURE 12.7 Disposable income-retail sales data and least squares estimated regression line, $y = 1,923 + .3815x$
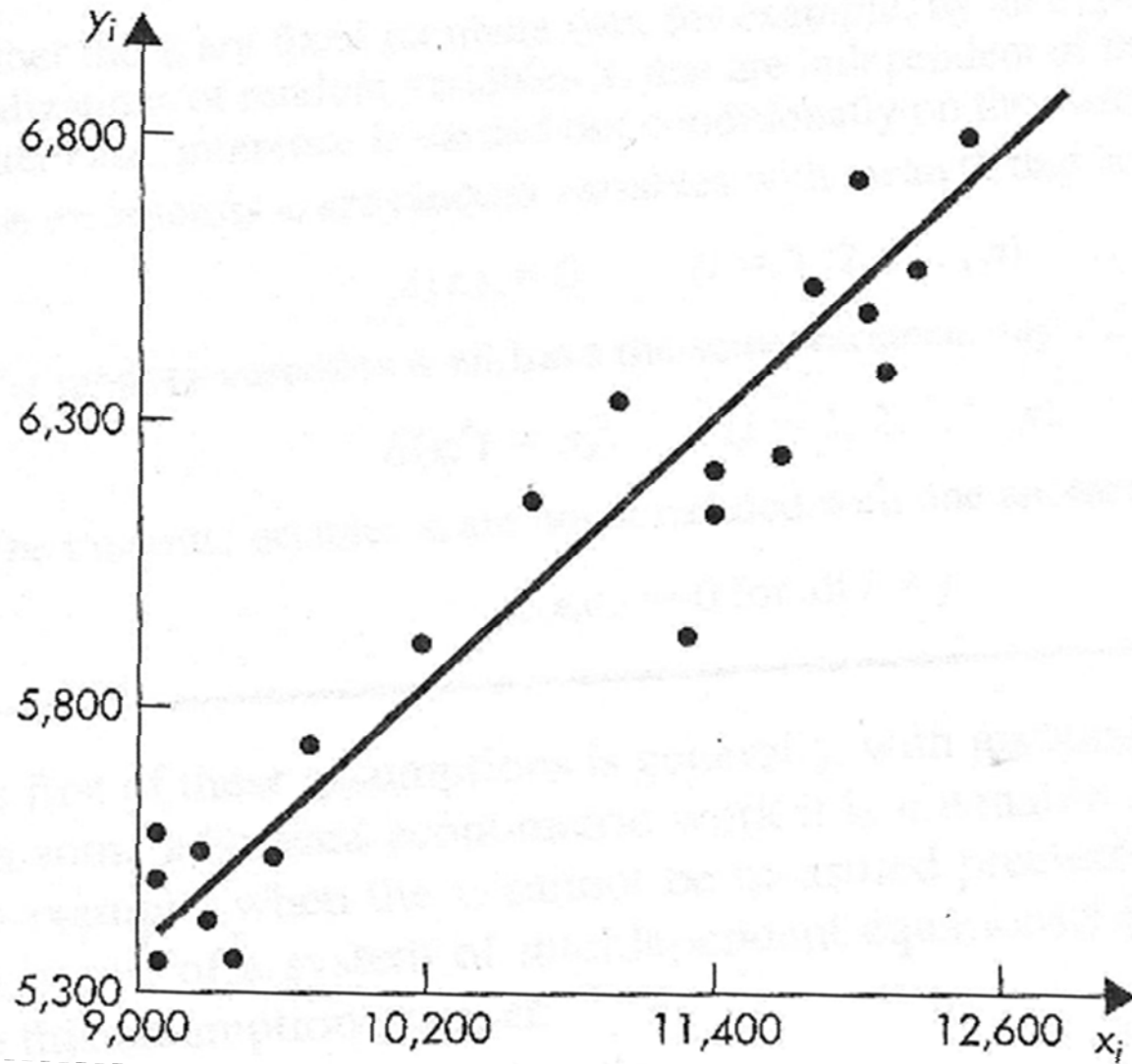
Example

- Regression of sales of large discount stores on characteristics of the market area and the store itself.