Answer on Question #50660, Management, Other

Ratios like statistics have a set of principles and finality about them which at times may be misleading. Discuss with illustrations.

Explanation:

In practice, we often use the ratio to determine how they are relating to certain values, in order to be able to evaluate the conformity category set data information. This may be financial information, or industrial, medical. In other words, it all depends on what industry we need to be analyzed using the ratio, in our case it is necessary to consider Ratios like statistics.

So, we consider at an example of determining the coefficient of determination and the empirical correlation ratio. In order to study the closeness of the connection between the gross output at one plant (effective sign - y) and equipped plant basic production assets (factor variables - x) according to the task calculate the coefficient of determination and the empirical correlation ratio. Our objective is to explain their meaning. The information is provided in the Table 1.

Table 1 The financial information of assets and prices.

Group	Interval	The average annual value of fixed assets,$ mln. X	Gross output at constant prices, $ mln. Y
1	2,0 – 3,5	2,0	1,8
		3,0	3,8
		3,3	3,4
		3,3	3,3
		3,4	2,9
2	3,5 – 5,0	3,5	4,1
		3,9	5,4
		3,9	6,4
		4,0	4,2
		4,1	5,0
		4,5	4,6
		4,8	5,2
		4,9	5,3
3	5,0 – 6,5	5,1	5,8
		5,4	8,5
		5,6	4,6
		5,9	7,0
		5,9	9,0
		6,3	8,0
		6,4	7,9
4	6,5 – 8,0	6,6	11,2
		6,7	7,0
		7,2	8,6
		7,5	9,4
		8,0	10,4

The coefficient of determination is calculated as follows:

$$\eta = \frac{\sigma_{gr}^2}{\sigma_y^2}$$

Where

$\sigma_{gr}^2 = \frac{\sum_{i=1}^{L}(\bar{y}_i - \bar{y})^2 n_i}{n}$ is the intergroup variance;

$\sigma_y^2 = \frac{\sum_{i=1}^{n} y_i^2}{n} - (\bar{y})^2$ is the total variance.

Empirical correlation ratio is given by:

$$\eta = \sqrt{\frac{\sigma_{gr}^2}{\sigma_y^2}}$$

The average gross outputs were defined in comparable prices $\bar{y}_i$ of the consider plants and has been identified in the problem. The information is provided in the Table 2.

Table 2 Comparable prices and Number of plants in the group.

Group	Number of plants in the group	Average gross output of the comparable prices, $ mln.
1	5	3,0
2	8	5,0
3	7	7,3
4	5	9,3

Now we define the average value, the total variance, and intergroup dispersion of gross output in comparable prices.

$$\bar{y} = \frac{\sum_{i=1}^{2} y_i}{25} = \frac{1.8 + 3.8 + 3.4 + \cdots + 10.4}{25} = 6.112 \text{ \$ mln.}$$

Then we will determine the σ_y^2, which is equal

$$\sigma_y^2 = \frac{\sum_{i=1}^{25} y_i^2}{25} - (\bar{y})^2 = \frac{1.8^2 + 3.8^2 + 3.4^2 + \cdots + 10.4^2}{25} - (6.112)^2 = 43.3112 - 37.3565 = 5.955 \text{ \$ mln.}$$

Now we find the value of the intergroup variance.

$$\sigma_{gr}^2 = \frac{\sum_{i=1}^{4}(\bar{y}_i - \bar{y})^2 n_i}{25} = \frac{(3.0-6.112)^2 \cdot 5 + \cdots + (9.3-6.112)^2 \cdot 5}{25} = \frac{117.274}{25} = 4.69 \text{ \$ mln.}$$

The coefficient of determination is equal to:

$$\eta = \frac{\sigma_{gr}^2}{\sigma_y^2} = \frac{4.69}{5.955} = 0.788$$

As a result, the empirical correlation ratio will be equal to:

$$\eta = \sqrt{\frac{\sigma_{gr}^2}{\sigma_y^2}} = \sqrt{\frac{4.69}{5.955}} = \sqrt{0.788} = 0.887$$

The calculated value of the empirical correlation ratio indicates a sufficiently high statistical relationship between the gross output at constant prices, and the average annual value of fixed assets plants.

Weakness of this ratio is that its value does not decrease with increasing number of explanatory variables. This is because:

- Count in determining the optimization occurs on criteria differing from the coefficient;
- The ratio will be increased by the addition of one more variable and we can always get the value which is equal to one, that will not make economic sense.