RESEARCH QUESTIONS THAT CAN BE ADDRESSED WITH COEFFICIENT OF DETERMINATION

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Regression analysis also generates the so called "***coefficient of determination***" with common symbol $\mathbf{R^2}$. We know that the following formula hold for regression:

$$\sum_{i=1}^{n}(Y-\bar{Y})^2 = \sum_{i=1}^{n}\left(Y-\hat{Y}\right)^2 + \sum_{i=1}^{n}\left(\hat{Y}-\bar{Y}\right)^2 \quad \text{..... (4)}$$

Where the term in the left hand side of the equation is the "total sum of squares of deviation of observations Y_i around Y average" with symbol SST; the first term on the right side of equation (4) is "the sum of squares of the deviation of observations Y_i from the regression estimates" = SSR; and the second term in the right side of equation (4) is " the sum of squares of deviation of the regression estimates and the average of Y" = SSE. Equation (4) then can be rewritten as follows:

$$SST = SSR + SSE \quad \text{..... (5)}$$

and R^2 is now defined as:

$$\mathbf{R^2} = \frac{SSR}{SST} \quad \text{..... (6)}$$

That is, that $\mathbf{R^2}$ provide measurement of the variation in Y, the dependent variable, explained by the regression. Or in other words, $\mathbf{R^2}$ reflects the ability of the regression to explain Y, the dependent variable.

Now, with the explanation above, $\mathbf{R^2}$ can be used to answer research question such as reliability of using β-coefficient for example as a measurement of systematic risk in finance. For example, $\mathbf{R^2}$ = 0.8 can be interpreted that we can rely 80% upon the β as measurement of the change in our stock price as a result of a 1% change in IHSG or S&P 500 index.

Another research question that can be addressed using $\mathbf{R^2}$ is when we want to know the contribution of independent variable(s) in trying to explain the variation in the dependent variable. For instance, suppose competitiveness can be measured, may be in terms of financial measures, or any of those competitiveness measurement based on Norton's balanced score card for that matter; and we want to know to what extend does IS/IT strategy (a variable or variables that also can be measured or observed) contributes to competitiveness of the company. This extend then can be derived from R^2 by regressing competitiveness (Y) against IS/IT strategy (X) dependent of which measures are being used to represent Y. It is possible for example that for Restaurant and Hotels industries the R^2 with respect to "financial" measure as our Y is small but for "customer relation" as our Y might be a lot bigger.