Let a function be defined with some parameters p1,p2,etc.

$$y = f(x, p_1, p_2, ..., p_n)$$

then

$$dy = \left(\frac{\partial}{\partial x} f\right) \cdot dx + \sum_{k=1}^{n} \left[\left(\frac{\partial}{\partial p_k} f\right) \cdot dp_k\right]$$

and can write

$$\frac{dy}{y} = \frac{x}{y} \cdot \left(\frac{\partial}{\partial x} f\right) \cdot \left(\frac{dx}{x}\right) + \sum_{k=1}^{n} \left[\frac{p_k}{y} \cdot \left(\frac{\partial}{\partial p_k} f\right) \cdot \frac{dp_k}{p_k}\right]$$

or

$$\frac{dy}{y} = S_x \cdot \left(\frac{dx}{x}\right) + \sum_{k=1}^{n} \left[S_{(p_k)} \cdot \frac{dp_k}{p_k}\right]$$

where the sensitivity S is defined as

$$S_{(p_k)} = \frac{p_k}{y} \cdot \left(\frac{\partial}{\partial p_k} f\right)$$

In general, the sensitivities are functions of x, and the various nominal values of the parameters, and are not constant. They relate the fractional change in f for a given fractional change in the corrersponding parameter, e.g., a sensitivity of 3 means that a 1% change in the parameter givesa a 3% change in the function.