Forecasting – 7.3 Indicators

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Disaggregate elasticities

In econometrics, elasticity refers to the responsiveness of an explained variable when an explanatory variable is changed. In our context, how does the choice probability change with one of the variables in the model?

- A *direct* elasticity captures the change in the probability of alternative i, with respect to a variable of the same alternative.
- A *cross* elasticity captures the change in the probability of alternative i, with respect to a variable of another alternative.

The direct elasticity is defined as

$$E^{P_n(i)}_{x_{ink}} = \frac{\Delta P_n(i)}{\Delta x_{ink}} \frac{x_{ink}}{P_n(i)}, \tag{1}$$

where Δx_{ink} is the modification of variable x_{ink}. Note that the second factor is designed to obtain a unitless quantity.

The cross elasticity is defined as

$$E^{P_n(i)}_{x_{jnk}} = \frac{\Delta P_n(i)}{\Delta x_{jnk}} \frac{x_{jnk}}{P_n(i)}, \tag{2}$$

where Δx_{jnk} is the modification of variable x_{jnk}.

The above definitions are sometimes called *arc elasticities*, and are those that are the most useful in practice. When the variable is continuous, and its modification is infinitesimal, that is when

$$\Delta x_{ink} \to 0, \tag{3}$$

we obtain the point elasticities:

$$E_{x_{ink}}^{P_n(i)} = \frac{\partial P_n(i)}{\partial x_{ink}} \frac{x_{ink}}{P_n(i)}, \tag{4}$$

and

$$E_{x_{jnk}}^{P_n(i)} = \frac{\partial P_n(i)}{\partial x_{jnk}} \frac{x_{jnk}}{P_n(i)}. \tag{5}$$