Answer on Question #67009 – Economics - Microeconomics

Question

Envelope theorem

Answer

The envelope theorem concerns how the maximal value of a particular function depends on the changes of some parameter of the function. It states that the change in the optimal value of a function, depending on a parameter of that function, can be found if differentiate the Lagrangian function holding x (or several x's) at its optimal value.

If we have function $\max_x f(x)$ s.t. g(x, a) = 0
x – vector of n endogenous variables
Value function

$$V(a) = \max_{x,\lambda} L = f(x,a) - \lambda(g(x,a))$$

The envelope theorem says:

$$\frac{\partial V}{\partial a} = \frac{\partial L(x,\lambda,a)}{\partial a}\Big|_{\substack{x(a)\\ \lambda(a)}} = \frac{\partial L(x(a),\lambda(a),a)}{\partial a}$$