A Reformulation of the
Concept of Returns to Scale

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Abstract

We propose the *gh-returns to scale* concept which generalizes the traditional Returns to Scale (ROS) concept. This new concept takes into account variations of all the inputs in unspecified proportions, in the evolution of production, contrary to the ROS concept which takes into account, only equiproportionate variations of all the inputs which lead to the implementation of production. It will appear that, when characterizing (or determining) the ROS homogeneity of degree of a (production) function no longer plays the central role (except the traditional case where all the factors vary in the same proportions) it was once attributed as the nature of ROS can be evoked, with this new approach of unspecified variations of the proportions, whatever the degree of homogeneity of a (production) function. It will also appear that, if the producer wishes or is constrained to a specfic zone of gh-returns to scale, the change in size or scale in the long run should not be made in a hazardous manner.

I. Introduction

GENERALLY, THE NOTION of returns to scale is associated with the notion of a homogenous production function of degree α defined from a set of n—tuplestuples of real numbers into the set of real positive numbers.

When browsing the economic literature, the question which is very often put is that of knowing how production varies following a variation of all the factors of production in the same proportion (it is thus referred to as the equiproportionate changes of all the factors of production). The output can increase: a) more than the proportional increase of the inputs (increasing returns to scale), b) less than the proportional increase of the inputs (decreasing returns to scale), c) in the same proportion as the increase of the inputs (constant returns to scale).

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