

# PRODUCTION FUNCTION WITH A VARIABLE ELASTICITY OF SUBSTITUTION: ANALYSIS AND SOME EMPIRICAL RESULTS

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IN the past, many growth models have been developed and analysed with the help of a production function subject to certain restrictive features. For quite some time the Cobb-Douglas production function provided a simple maintained hypothesis with its input exponents adding up to unity and a unitary elasticity of substitution. But the discovery of theoretically and empirically better and more representative production functions embracing a wide variety of studies has resulted in greater information being obtained about the various established indices of technology in the production theory.

The most studied production function in recent times has been the constant elasticity of substitution production function [CES] which includes CD as well as Leontief production functions as special cases [1]. Nevertheless, the elasticity of substitution parameter in this production function is not variable along the isoquant though it can take different values for different industries, [7] and [10]. This constraint on the index of technology is inappropriate in that the available data must have wide choice so that the formulation of the structural hypothesis is plausible and relevant, [6]. The variable elasticity of substitution production function [VES] or homothetic production function overcomes this defect of the CES, [9]. The VES production function<sup>1</sup> explicitly permits the capital labour ratio to be an explanatory variable of productivity. The consequence is an upward specification bias in the estimates of the parameters of the CES production function.

Consider the usual CES hypothesis used in the estimation of the elasticity of substitution with variables  $Y$ ,  $W$ ,  $X$  representing productivity, wage rate and capital labour ratio respectively.

$$(1) Y = \beta_0 + \beta_1 W + \varepsilon \quad \text{where } \varepsilon \text{ is a random term}$$

If we insert a new variable  $X = \frac{K}{L}$  we have

$$(2) Y = \beta_0 + \beta W + \mu X + \varepsilon$$

<sup>1</sup> A comprehensive study by Hildebrand and Liu has shown the weakness of the CES production function in that it empirically does not explain the productivity variation in a majority of industries. See Hildebrand and Liu [6].