**Measuring Subvector Efficiency in the Stochastic Frontier Framework**

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In Data Envelopment Analysis the subvector efficiency of an input can be measured by minimizing the input in the space of that input holding outputs and other inputs constant. Since DEA frontier is deterministic, the subvector efficiency measure suffers from the well-known drawback of confounding noise with inefficiency. In the stochastic frontier framework, input distance function has been used to measure efficiency in input space. However, input distance function method contracts all inputs proportionally (radially), assuming the inefficiency of each input is the same, which is a strong assumption. To estimate the input distance function, linear homogeneity must be imposed.

In this study we propose an approach to measuring the subvector efficiency of individual inputs in the stochastic frontier framework which avoids the drawbacks of both the DEA and the input distance function approaches. We focus on the capital use in agricultural production. We specify capital requirement as a function of output and other inputs used in production, and estimate a capital frontier to measure the efficiency of capital use.

However, the endogeneity of output in the capital requirement model poses an estimation problem, which actually points to a general problem that faces the stochastic frontier analysis (SFA): In the presence of endogenous regressors, maximum likelihood estimation, the foundation of stochastic frontier analysis, would produce inconsistent parameter estimates and efficiency measure in the single-equation stochastic frontier model. To address this fundamental issue, we use a two-step method that allows endogenous regressors in stochastic frontier functions. The first step uses generalized method of moments (GMM) estimator to solve the endogeneity problem, and the second step uses the maximum likelihood estimator to derive efficiency estimates. The methodology is then used to measure the subvector efficiency of capital. The application uses panel data from the cash crop farms in the Netherlands in the period 1990-1999. The results confirmed the existence of endogenous regressors in the frontier model, and the Hansen test based on the GMM estimation shows that the proposed approach successfully addressed the endogeneity. Empirical results show that excess capital widely exists on the farms in the sample.

**Measuring of Consumption Efficiency in Price-Quantity Space; A Distance Function Approach**

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Measurement of consumption efficiency in price-quantity space has been based on revealed preference relations and the focus is on the examination of the goodness-of-fit of optimising models to actual data by measuring the departure from optimisation. In particular, using revealed preference arguments, Afriat (1967) developed a non-parametric *cost efficiency index*, which measures the overall efficiency of a given set of consumption data. Generalising Afriat's (1967) index, Varian (1990) suggested a non-parametric goodness-of-fit measure which applies to each observation in a set of data and can be parameterised with the use of a money-metric utility function. With the exception of Varian's (1990) money-metric measure, parametric methods for measurement of consumption efficiency have been limited only to the measurement of the latter in price-quality space. The latest and more complete advancement in this field is found in the paper of Lee *et al.* (2005), who developed a theoretical and empirical framework for measuring the degree of consumption efficiency in a multidimensional price-quality space. Their model, however, employs theoretical tools found in consumer demand theory (*i.e.*, consumption analysis in price-quality space) in order to measure product efficiency and firm market performance, rather than analyse consumer behaviour. In addition, the models for measuring consumption efficiency, either in price-quantity space or in price-quality space, measure what they call *overall consumption efficiency*.

The aim of this paper is to extend the existing literature through the development of a theoretical framework for the decomposition of a true consumption efficiency index in price-quantity space. The analysis is carried out under the consumer's expenditure-minimisation framework, and three types of efficiency in consumption are defined, namely, *utility efficiency*, *expenditure efficiency* or *overall efficiency*, and *allocative efficiency*. The assumption underlying the proposed theoretical framework is that purchased and consumed commodity quantities are not the same, and consumers are free to dispose of any unwanted quantities of the commodities they have already purchased. On the contrary, the measures of