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To Whom It May Concern

Report on the Ph.D. thesis "Essays on Efficiency Measurements"
by Mr. Viliam Druska

Unifying theme of the dissertation is the measurement of the production efficiency. It covers both parametric and non-parametric approaches. The dissertation has three chapters which are essentially three separate papers. Two of these papers are coauthored. There is no introduction and conclusion linking the chapters.

The first paper (Generalized Moments Estimation of a Spatially Correlated Panel Data Model) is coauthored with William Horrace. It models inefficiency in a spatially correlated model. The paper considers estimation of a fixed effects panel data model with disturbances that are auto-correlated across cross sectional units, i.e., the disturbances are *spatially correlated* based on some geographic or economic proximity measure. The paper uses a generalized method of moments (GMM) estimation approach, which is a generalization of the cross sectional model due to Kelejian and Prucha (1999). A panel data on Indonesian rice farming is used as an empirical exercise. The data is not new and has been used by others before.

The contribution of the paper is in the panel extension of the Kelejian and Prucha model in which fixed firm-effects are introduced. These fixed effects are uniquely related inefficiency, especially when inefficiency is viewed as time-invariant. This notion is used in the paper to estimate inefficiency. The model is applied to a panel of Indonesian rice farms where spatial correlations are based on geographic proximity, altitude and weather. The correlations represent productivity shock spillovers across the rice farms in different villages on the island of Java. Moran I test statistic is used to demonstrate empirically that

productivity shock spillovers were present in the data, and that these spillovers have effects on technical efficiency.

Critique: Although this paper is published (I have not checked whether this is identical to the published version in American Journal of Agricultural Economics (2004) or the working paper version), I failed to see any mention of the published paper in this essay. What is more surprising is the fact that it cites papers as forthcoming (1999) which has been published more than a decade ago. This gives me the impression that Mr. Duska has not even bothered to revise/update the text which was perhaps written more than a decade ago, although he is submitting this paper as a part of his dissertation in 2012. I have no problem in including published paper as a dissertation chapter. In fact I encourage PhD students to publish even before submitting their dissertations. The problem I have is that the published paper is not even cited!

Question on modeling inefficiency: Time-invariant inefficiency was popular in the late 80s and early 90s. From that perspective it was okay to use a time-invariant specification. But the literature has since advanced to accommodate time-varying inefficiency. I was hoping that some attempts would be made to address this issue, perhaps in a separate chapter. There are also alternatives to GMM (maximum likelihood) to estimate spatial models with inefficiency. It would be nice to consider some of these models.

It would be nice to see (at least in a dissertation) some efficiency results from a model in which spatial correlation is ignored. That is, efficiency results from the standard FE model.

One question that is relevant to ask, at least from an empirical point of view, is how sensitive some economic measures like returns to scale are due to different model specifications.

The second paper "Random Effect Model with Spatial Dependence in Error Term" is a random effects (RE) version of model used in the first paper. That is, the individual (farm) specific intercept terms are now assumed to be random and uncorrelated with the regressors and the noise term. The exact same Indonesian rice farming panel data is used in this paper. It is shown empirically how ignoring this correlation can bias the estimates of individual specific constant terms. Furthermore, it is stated in the abstract that "I apply this model in the framework of stochastic production frontier where firm level output is an additive function of inputs and random error term composed of technical inefficiency and statistical noise. Viewing the statistical noises as productivity shocks due to geographical or economic proximity of cross-section units I argue that productivity

spillovers (correlations) may exist in the statistical noise component, and demonstrate the effect of these spillovers on the estimates of technical efficiency."

Critique: Although this paper follows the framework of the first paper there are some differences which I expected to be spelled out. First, the farm effects in a RE model are not fixed parameters and these random effects can be estimated using Best Linear Unbiased Predictor (BLUP), as discussed in the Schmidt and Sickles (1984) paper. I don't see any mention of how these farm-effects are obtained. Second, estimation of inefficiency: It is not clear which formula is used to estimate inefficiency and whether estimated inefficiency is consistent as T approaches infinity. The reason for raising this question is the statement "ignoring this correlation can bias the estimates of individual specific constant terms". The question is whether the "individual specific constant terms" (these are random variables not constants) can be estimated consistently. Is there any theoretical reason to argue that the estimates of inefficiency are biased if spatial correlation in the noise term is ignored?

Empirically, it would be nice to have some sensitivity of efficiency results comparing across different models, viz., FE model with and without spatial correlation, RE model with and without spatial correlation.

Let's go back to the point that productivity spillovers make the noise term correlated. How about such productivity spillovers affecting inefficiency? As argued before the notion of time-invariant inefficiency is too restrictive to be taken seriously. While I believe that spatial correlations are important, I also believe that inefficiency is time-varying and productivity shocks make inefficiencies correlated both over time and spatially.

The last paper "Too large or too small? Returns to scale in a retail network" is coauthored with František Brázdi. It demonstrates the use of parametric and non–parametric methods for evaluating technical performance in retailing. "Results of this study are used to optimize the retail chain of a European mobile telecommunication network operator by providing estimates of and recommendations for improvements in the productive efficiency of the chain operations. Estimates of store–level technical and scale efficiency indicate that a majority of stores are operating in the decreasing returns to scale region of the production possibility set. The employed methodology allows us to identify input excesses and to address a means of reducing them."

Critique: The main problem with this paper is limited data. With 42 data points, one cannot hope to do a rigorous statistical analysis no matter whether DEA or SFA is used. It is clear that the authors are not familiar with multi-output multi-input SFA models (input/output distance function). These models are routinely used to estimate efficiency

and returns to scale. Note that if outputs are exogenous and firms minimize cost, the use of a production function (in which exogenous output appears as the dependent variable) is not appropriate. One should use an input distance function in the absence of input prices and cost data.

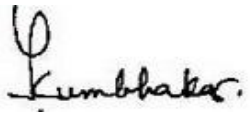
COLS was used in the 1970s to estimate efficiency. I am somewhat surprised to see that the authors talk about this model in 2012!

It is clear that no significant inefficiency is found in either the SIM or Revenue model. Perhaps this is because a production function instead of an input distance function is used. On the other hand, DEA will give estimates of inefficiency no matter how many observations are there. This does not mean that DEA is a better approach to use. The estimated inefficiencies in DEA might not be significant. There are ways to calculate standard errors for the DEA efficiencies.

It is clear that the third paper is the weakest of the three.

Now I add a couple of things about myself and grade the quality of the dissertation. I have been working on efficiency and productivity issues for the last two and a half decades and have published more than 150 papers in referred international journals. I have been involved in Ph.D. dissertation examination in many countries (Sweden, Norway, Finland, Germany, The Netherlands, Australia, and India). Based on my own research experience and supervision/examination of Ph.D. theses in the USA, Europe and Asia, I rank this thesis in the above average category. An indirect proof of the quality of the thesis is that one paper is published in a very good journal. In conclusion I recommend that the dissertation is worthy of a defense for the award of a Ph.D. degree by the Charles University, Prague.

Sincerely,



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