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Proposal

**THE PERFORMANCE OF MICROINSURANCE PROGRAMS:  
A FRONTIER EFFICIENCY ANALYSIS**

submitted by

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## Abstract:

In this paper, we use frontier efficiency analysis to evaluate the performance of microinsurance programs. Frontier efficiency techniques measure firm performance relative to 'best practice' frontiers comprised of the leading firms in the industry. The two most prominent examples of these techniques are Data Envelopment Analysis (DEA; see Charnes et al., 2003) and Stochastic Frontier Analysis (SFA; see Kumbhakar and Lovell, 2000). Both have been applied in numerous insurance markets (see Eling and Luhnen, 2008 for an overview), but we are not aware of any research that has been undertaken to evaluate the efficiency of microinsurance programs.

Research on performance of microinsurance programs is still in its very early stages. Industry practitioners organized in the *CGAP Working Group on Microinsurance* have set up a *Performance Indicators Sub-group* and developed ten performance ratios during two workshops in 2006 and 2007 that are summarized in a performance indicators handbook (see Wipf and Garand, 2008). The ten performance ratios were also tested on a sample of microinsurance providers. These empirical tests show that the performance indicators can enhance the comparability of different schemes and improve transparency but they cannot capture the large diversity of different microinsurance providers. For example, some programs are small projects in the start-up phase, while others are large, established programs. It is not quite clear what set of indicators signifies poor, average, and excellent performance; the answer depends on many factors including the type of product, operational setup, location, size, and age of the program (see Wipf and Garand, 2008, p. 46). Benchmarking problems as well as differences between microinsurance programs are therefore highlighted in the handbook.

Frontier efficiency techniques might be an ideal tool to assess the performance of microinsurance programs. They are superior to traditional financial ratio analysis because they summarize performance in a single statistic that controls for differences among firms using a multidimensional framework (see Cummins and Weiss, 2000). The techniques are particularly suitable for microinsurance:

- 1) Frontier efficiency methods were originally developed for benchmarking of nonprofit organizations such as schools, because unlike many industries the production function with these institutions is unknown. This is exactly the situation faced by microinsurance providers and efficiency methods are a possible solution.
- 2) Inputs and outputs used in efficiency measurement include financial indicators but the methods can also accommodate social indicators and thus display the important social function of microinsurance providers.
- 3) The techniques measure efficiency, and identify areas in which a program has strengths relative to other programs as well as areas in which the firm is weak. It is possible to identify performance targets for inefficient units, i.e., the results directly indicate the direction in which resources need to be located in order to improve efficiency.
- 4) From an economic point of view, several useful parameters (that have not yet been analyzed in microinsurance) can be generated, such as the marginal rate of substitution (comparing the shadow prices of two inputs), marginal productivity (comparing the shadow prices of one input and one output), and the marginal rate of transformation (comparing the shadow prices of two outputs). All these measures can be helpful in evaluating the effects of different business decisions on the performance.

This paper uses new data and an innovative methodology. For the data, we have set up a collaboration with the *Performance Indicators Sub-group* of the *CGAP Working Group on Microinsurance*. The plan is to analyze an updated dataset on the insurance schemes in the performance indicators handbook, which contains detailed information on a number of microinsurance programs. A second database that is available for this research is the mixmarket database. It contains information on 800 microfinance providers, some of which provide microinsurance. This paper is also innovative in its methodology. We use recent innovations from bootstrapping literature to account for the fact that the standard DEA efficiency scores are sensitive to problems of measurement error, especially with smaller data samples. For the first stage determination of DEA efficiency scores, we use the bootstrapping procedure presented in Simar and Wilson (1998). For the second stage regression of country and firm effects on efficiency scores, we use the truncated regression and bootstrapping approach presented by Simar and Wilson (2007). Another important feature of our analysis is that we cross-check the robustness of our findings using stochastic frontier analysis. While most studies use either DEA or SFA, we combine the advantages of both approaches to ensure the methodological robustness of our findings.

## Cited references

- Cooper, W. W., Seiford, L. M., and Tone, K. (2006): *Data Envelopment Analysis*. 2<sup>nd</sup> ed. Springer: Berlin.
- Cummins, J.D., and Weiss, M.A., 2000. Analyzing firm performance in the insurance industry using frontier efficiency methods. In: Dionne, G. (Ed.), *Handbook of Insurance Economics*. Kluwer Academic Publishers: Boston.
- Eling, M. and Luhn, M., 2008. Frontier efficiency methodologies to measure performance in the insurance industry: Overview and new empirical evidence, Working Paper, University of St. Gallen.
- Greene, W.H., and Segal, D., 2004. Profitability and efficiency in the US life insurance industry. *Journal of Productivity Analysis* 21 (3), 229–247.
- Kumbhakar, S.C., and Lovell, C.A.K., 2000. *Stochastic Frontier Analysis*. Cambridge University Press: Cambridge.
- Simar, L., and Wilson, P.W., 2007. Estimation and Inference in Two-Stage, Semi-Parametric Models of Production Processes. *Journal of Econometrics* 136 (1), 31–64.
- Wipf, J., and Garand, D., 2008. *Performance Indicators for Microinsurance—A Handbook for Microinsurance Practitioners*, ADA: Luxembourg.