

Appendix to “To What Extent Are Labor-Saving Technologies Improving Efficiency in the Use of Human Resources? Evidence from the Banking Industry”

Appendix

Generally speaking, two major competing approaches have been commonly used for efficiency analyses in the operations management literature, namely, the non-parametric approach, e.g., data envelopment analysis (DEA), and the parametric approach, e.g., stochastic frontier analysis (SFA). While the major drawback of the first approach is its restrictive assumption of no random error, the second approach suffers the problem of imposing a particular functional form on the output-input relationship. Note that both DEA and SFA provide a relative measure of efficiency – efficiency scores relative to a frontier of the “best practice”. It is generally impossible to determine which of these two major approaches dominates the other because the true level of efficiency is unknown. There are two major reasons for the use of SFA in this study. First, the integration of efficiency estimation and hypotheses testing for control variables requires the use of a specific functional form, i.e., the parametric approach. Second, a parametric method is used in this study because a survey by Berger and Humphrey (1997) of 130 past studies on banking efficiency shows that the non-parametric studies tend to result in greater dispersions and larger standard errors associated with estimated efficiency ratios.