**TITLE OF DISSERTATION PROPOSAL**

**Ph.D. Dissertation Proposal Defense**

**by**

**Name of Student**

***Thursday, March 18, 2018, 1pm – 3pm, Snell Engineering 328 (fill in your own information)***

**ABSTRACT**

This dissertation addresses two problems that frequently arise in practice when applying Data Envelopment Analysis (DEA) – proportional estimates and longitudinal targets. DEA is mathematical tool for measuring relative efficiencies of multiple decision making units (DMUs) at transforming multiple inputs into multiple outputs, with applications ranging from healthcare, banking, airlines, sports, education, supply chain, tourism- where the DMUs can be university departments, bank branches, cities, manufacturing sites, franchises, individual physicians, public policies, investment funds, and so on. A set of fractional programs is transformed into linear programs to determine primarily the optimal possible efficiency score for each DMU, corresponding weights for each input and output that maximize each DMUs efficiency score relative to those other DMUs, target values of each input and output for each DMU to reach the efficiency frontier, and a reference set of comparable efficient DMUs.

The first problem occurs while using proportional estimates as inputs to a DEA model. Unlike classic applications, however, where the input and output values for all DMU are assumed to be known (and positive real numbers), in many healthcare and other applications one or more of the data are proportional rates that are unknown precisely and instead estimated from historical data. Rather than using point estimates and solving the DEA model once, we propose two Monte Carlo (MC) approaches that repeatedly randomly generate the input-output matrix and resolve the model some large number of times, with each replication producing potentially different efficiency scores, target values, and reference sets. The simulated distributions, confidence intervals (CIs) for efficiency scores, optimized weights, and targets are examined assuming a range of sample sizes and number of proportions estimated. In all cases the estimated proportions may lead to biased estimates which are eliminated with inner percentile intervals. The MC results are compared with the most common SDEA (Stochastic Data Envelopment Analysis) methods such as bootstrapping, chance constraint DEA, and a most/least favorable.

The second problem stamps from setting targets to an inefficient DMU. A typical interpretation of the DEA targets is to set performance goals that if achieved will project inefficient decision making units onto the efficiency frontier. However, this will occur only if all other units maintain their same input and output levels, which is rarely the case. Every decision making unit is going to try to improve itself (reducing inputs and increasing outputs) for future periods, so these decision making units will have different level of inputs and outputs in the future. Three new approaches are introduced for setting longitudinal targets that consider uncertain future behaviors of other DMUs. All methods are demonstrated using several healthcare data sets, including from World Health Organization (WHO), and the Commonwealth Fund (CWF).

**Dissertation/Thesis Committee Members**

Also indicate the adviser and any co-advisers