Abstract for "Technological Inefficiency Indexes: A Binary Taxonomy and Generic Theorems"

R. Robert Russell (UC Riverside)

William Schworm (UNSW)

Over the years, a large number of indexes of technological inefficiency (or, equivalently, technological efficiency) have been specified, and a spate of papers has examined the properties, or axioms, satisfied by these indexes. In an effort to obtain an overview of these many results, Russell and Schworm [2011 JPA] developed a more synthetic analysis of these axioms and index specifications. Their theorems suggest the possibility of generic results on classes of indexes and their properties. The purpose of the present paper is to present such results. In particular, we consider a broad class of indexes containing almost all known indexes and a partition of this class into two subsets, which we term "slacks-based indexes" and "path-based indexes". Slacks-based indexes are expressed in terms of additive or multiplicative slacks for all inputs and outputs, so that the contraction of inputs and expansion of outputs to the boundary of the technology follows a coordinate-wise path, and particular indexes are generated by specifying the form of aggregation over the coordinate-wise slacks. Path-based indexes are expressed in terms of a common contraction/expansion factor, and particular indexes are generated by specifying the form of the path to the boundary of the technology. Owing to an impossibility result in Russell and Schworm [2011 JPA], we know that the set of all inefficiency indexes can be partitioned into three subsets: those that satisfy continuity (in quantities and technologies) and violate indication, those that satisfy indication (equal to some specified value if and only if the quantity vector is efficient) and violate continuity, and those that satisfy neither. We prove two generic theorems showing that slacks-based indexes satisfy indication and hence violate continuity and path-based indexes satisfy continuity and hence violate indication. We also discuss the few indexes that do not belong to either of these two sets.