Set-valued Optimization in Welfare Economics

Truong Q. Bao[1] **and Boris S. Mordukhovich** [2]

[1] Department of Mathematics & Computer Science, Northern Michigan University, Marquette, MI 481855, USA
(btruong@nmu.edu)

[2] Department of Mathematics, Wayne State University, Detroit, MI 48202, USA
(boris@math.wayne.edu)

Abstract. This paper mainly concerns applications of advanced techniques of variational analysis and generalized differentiation to nonconvex models of welfare economics with finite-dimensional and infinite-dimensional commodity spaces. We pay special attention to establishing new relationships between necessary conditions in multiobjective/set-valued optimization and appropriate extensions of the second fundamental theorem of welfare economics to nonconvex economies with general preference relations. The variational approach developed in this paper allows us to obtain new necessary conditions for various types of local optimal solutions to constrained multiobjective problems and to derive from them new versions of the second welfare theorem applied to Pareto as well as weak, strict, and strong Pareto optimal allocations of nonconvex economies under certain qualification conditions developed in the paper. We also establish relationships of the latter conditions with some versions of Mas-Colell's uniform properness.