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**Resolution of Degenerate Critical Parameter Values
in Parametric Quadratic Programming**

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Abstract This paper develops an algorithm which solves a convex parametric quadratic programming problem. Most parametric quadratic programming algorithms assume that all critical parameter values are nondegenerate. In this paper, we remove that assumption and handle degenerate critical parameter values by solving a special quadratic programming problem. We show that degenerate critical parameter values arise when solving the mean-variance portfolio problem. We solve this problem by applying both an algorithm which does not account for degenerate critical parameter values (i.e., an unmodified method) and the algorithm developed in this paper. In most cases, our algorithm requires less iterations than an unmodified one to proceed from a degenerate critical parameter value. Further computational results indicate that for certain data, if the unmodified method is applied to the dual of the mean-variance portfolio problem, then the method cycles. By contrast, the algorithm developed here correctly solves these dual problems.

Keywords Parametric quadratic programming, degenerate critical parameter values, quadratic programming, mean-variance portfolio problem.