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An Efficient Decomposition of the Expectation of the Maximum for the Multivariate Normal and Related Distributions

Jonathan Eggleston*

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Abstract

In structural dynamic discrete choice models, Monte Carlo integration has been the only way to evaluate the expectation of the maximum when errors are normally distributed. In this paper, however, I show that the expectation of the maximum can be decomposed as a linear combination of multivariate normal CDFs. For related distributions, such as the multivariate t-distribution, this expectation has a similar decomposition. My computational results show speed benefits of my proposed method for models with a low number of choices, although the speed gains are contingent on the use of analytical derivatives as opposed to numerical derivatives.

JEL Classification: C25, C61, C63

Keywords: expectation of the maximum, Emax, multivariate normal, Monte Carlo integration, dynamic structural models

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