Accepted Manuscript

An efficient decomposition of the expectation of the maximum for the multivariate normal and related distributions

Jonathan Eggleston

PII: S0304-4076(16)30136-1
DOI: http://dx.doi.org/10.1016/j.jeconom.2016.07.003
Reference: ECONOM 4283

To appear in: *Journal of Econometrics*

Received date: 26 March 2013
Revised date: 9 February 2016
Accepted date: 2 July 2016

Please cite this article as: Eggleston, J., An efficient decomposition of the expectation of the maximum for the multivariate normal and related distributions. *Journal of Econometrics* (2016), http://dx.doi.org/10.1016/j.jeconom.2016.07.003

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

Jonathan Eggleston*

July 28, 2016

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

*Economist, U.S. Census Bureau, 4600 Silver Hill Road, Washington, DC 20233. Email: jonathan.s.eggleston@census.gov. Telephone: 301-763-3257. Any opinions expressed are those of the author and not those of the U.S. Census Bureau.