Universität Duisburg-Essen
Fachbereich VWL
Lehrstuhl Ökonometrie

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Multivariate Time Series Analysis
Exercise Sheet 8

Exercise 1: Forecast Intervals and Distributional Assumptions

a) Which key assumption about the innovations a_t is made in the lecture to derive the distribution of the forecast errors $e_T(h)$?

b) Assume we knew all parameters / coefficients and let Σ_a be the identity matrix $I_{3\times 3}$. Based on the assumptions from (a), derive the distribution of $e_T(1)$ for any stationary VAR(p).

c) Derive the confidence ellipsoid associated to b) for $\alpha = 5\%$. What is the fraction of forecast errors that lie inside the ellipsoid?

d) Run a simulation in R: Draw the forecast error $e_T(1)$ defined in a) and b) with $K = 3$. Check if it is located inside or outside the confidence ellipsoid derived in c). Use N = 10000 repetitions in total and conclude whether the confidence ellipsoid is appropriate.

e) Repeat the simulation from above but this time assume a_t to be drawn from a uniform distribution. $\Sigma_a = I_{3\times 3}$ remains. How reliable is the confidence ellipsoid in this case?
Hint: Set $\pm\frac{\sqrt{12}}{2}$ *as lower / upper bound for unit variance.*

f) Repeat the simulation drawing innovations from a t-distribution with 2 degrees of freedom and conclude.

This exercise sheet will be discussed in the tutorial on Wednesday, 11 December 2019