Theoretical study Quarto -document

2026-01-28

To do 22.1.

- Add/integrate previous Rmd file of theoretical result as extension to this one.

- Recheck delta t.

- Check if subindex VAR(1) is necessary for Sigma.

- Integrating Tom's notes (26.1 onwards)

Weak sense stationary VAR(1) and strict longitudinal measurement invariance

In the following VAR(1) process and strict longitudinal measurement invariance (s-LMI) are compared to each other by the covariance structure that VAR(1) imposes and how an s-LMI model fits to this (here equivalently 'is compatible' with) covariance. s-LMI makes sense as a theoretical model since it captures the simplest scenario of a true common factor model where only the common factor itself can change. VAR(1) is also a simple, if not the simplest, vector autoregression symptom-network model. CT-VAR and VAR can be linked through a transformation when fixed time intervals are used, or separate study for CT-VAR can be done.

Especially noteworthy results from mathematical analysis could be possible constraints that arise and how they can guide empirical simulations and tell us the reason why s-LMI might not be compatible with VAR(1) generated data in the first place. Alternatively, if some VAR(1) models can generate s-LMI compatible data, what constraints are necessary for the VAR(1) process to produce it?

First VAR(1) imposed covariance is derived. Then s-LMI imposed covariance. Then we move on to inspect how they compare by equating them together to observe possible contradictions or restrictions. We begin with the simplest and possibly most common scenario where two subsequent measurement time points (from hereon simply time points) of symptoms are observed.