VB-LKMR – Case Study

Overview:

We present a mean field variational Bayes procedure for lagged kernel machine regression (LKMR), with the aim of identifying time windows of susceptibility to exposures of complex metal mixtures. VB-LKMR identifies critical exposure windows of chemical mixtures, and accounts for complex nonlinear and non-additive effects of the mixture at any given exposure window.

This page presents an overview of using VB-LKMR code to run a case study of simulated data.

We simulate data for a sample size of N = 100. For each individual, 5 environmental exposures are measured at 3 time windows, for a total of 15 time-varying environmental exposures per individual. This simulated data structure is similar to the real data application in the manuscript. In this simulated dataset, Z_1 and Z_2 exert an effect at all three time windows, while Z_4 exerts an effect at the third time window.

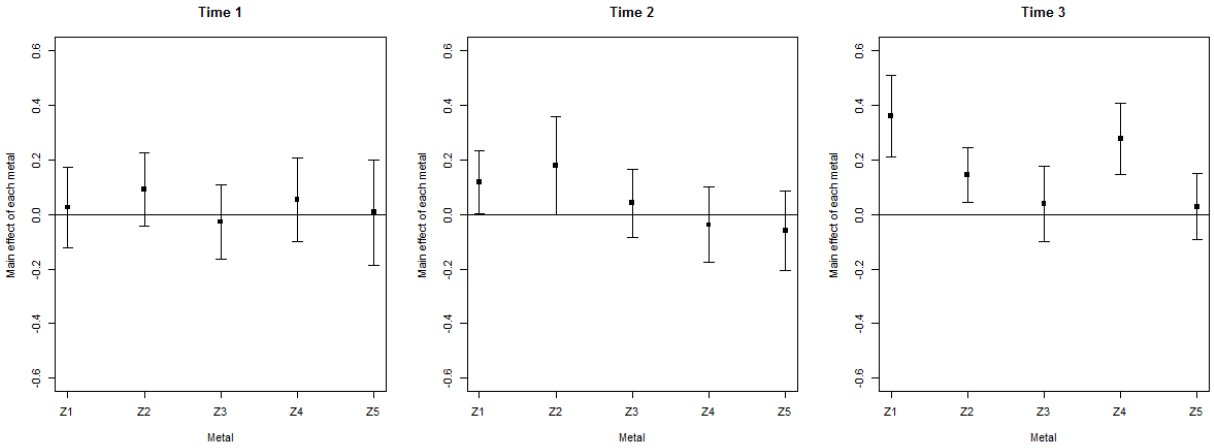
Case study example:

1) Open the dataset and run the MFVB-LKMR procedure.

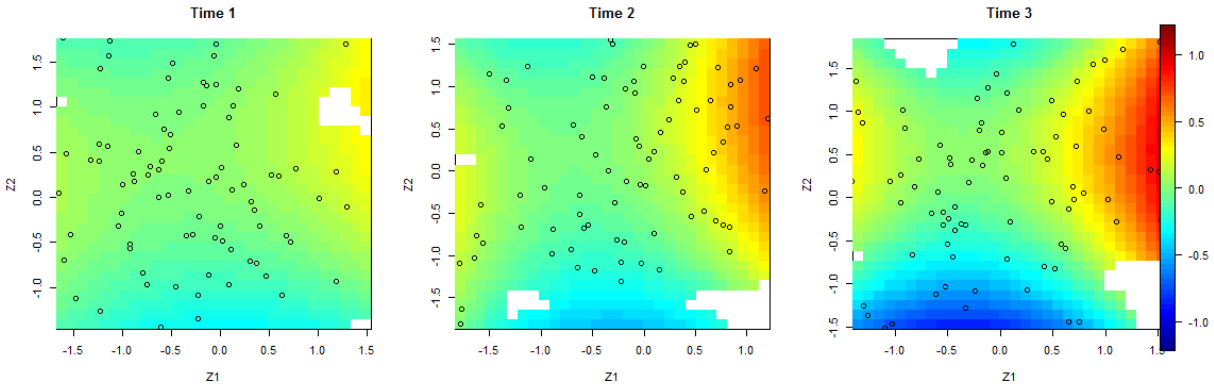
Run `*VB_AnalysisCode.R*` to create the dataset and run the algorithm.

2) Make plots, analogous to Figures 4-7 of the manuscript.

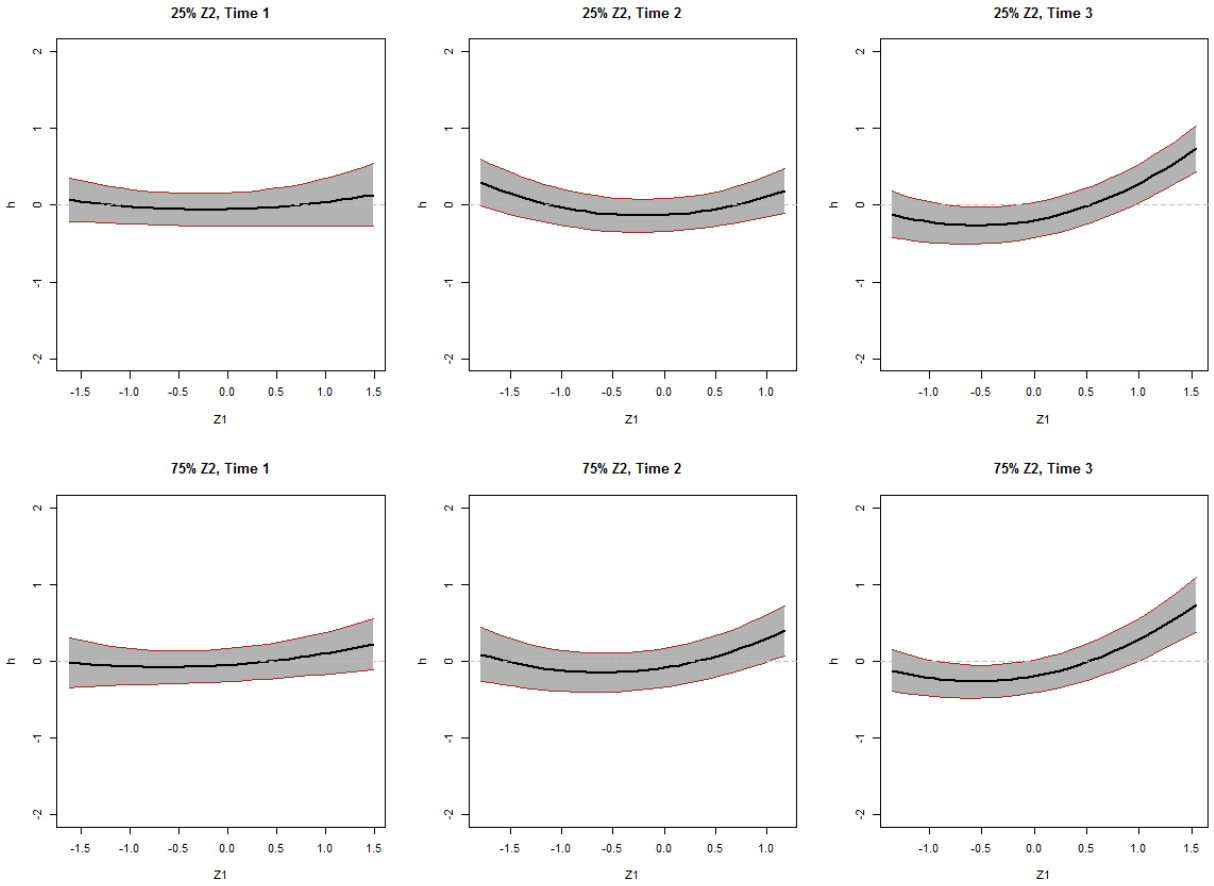
Run `VB_*RelativeImportance_5Metals.R*` to create the 1x3 panel of main effects of five metals at 3 time points.



Run `VB_*Heatmap_5Metals.R*` to create the 1x3 panel of Z_1-Z_2 effects for 3 time points.



Run `VB_*CrossSection_5Metals.R*` to create the 2x3 panel of Z_1 effects at low/high Z_2 for 3 time points.



Run `VB_*Interaction_5Metals.R*` to create the plot of the overall interaction between Z_1-Z_2 at 3 time points.