Constraints of the 2M3G APIM

The 2M3G APIM, as described by Equations 4 and 5, requires the following 48 parameter constraints:

Structural coefficients: $b_{101} = b_{202}$, $b_{102} = b_{201}$, $b_{103} = b_{204}$, $b_{104} = b_{203}$, $b_{105} = b_{209}$, $b_{106} = b_{208}$, $b_{107} = b_{207}$, $b_{108} = b_{206}$, $b_{109} = b_{205}$, $b_{110} = b_{211}$, $b_{111} = b_{210}$.

Variances: $s^2_{X_1} = s^2_{X_2}$, $s^2_{G_1} = s^2_{G_2}$, $s^2_{X_1G_1} = s^2_{X_2G_2}$, $s^2_{X_1G_2} = s^2_{X_2G_1}$, $s^2_{X_1G_1G_2} = s^2_{X_2G_1G_2}$, $s^2_{e_1} = s^2_{e_2}$.

Covariances: $\mathrm{Cov}(X_1, G_1) = \mathrm{Cov}(X_2, G_2)$, $\mathrm{Cov}(X_1, G_2) = \mathrm{Cov}(X_2, G_1)$, $\mathrm{Cov}(X_1, G_1G_2) = \mathrm{Cov}(X_2, G_1G_2)$, $\mathrm{Cov}(X_1, X_1G_1) = \mathrm{Cov}(X_2, X_2G_2)$, $\mathrm{Cov}(X_1, X_1G_2) = \mathrm{Cov}(X_2, X_2G_1)$, $\mathrm{Cov}(X_1, X_2G_1) = \mathrm{Cov}(X_2, X_1G_2)$, $\mathrm{Cov}(X_1, X_2G_2) = \mathrm{Cov}(X_2, X_1G_1)$, $\mathrm{Cov}(X_1, X_1G_1G_2) = \mathrm{Cov}(X_2, X_2G_1G_2)$, $\mathrm{Cov}(X_1, X_2G_1G_2) = \mathrm{Cov}(X_2, X_1G_1G_2)$, $\mathrm{Cov}(G_1, G_1G_2) = \mathrm{Cov}(G_2, G_1G_2)$, $\mathrm{Cov}(G_1, X_1G_1) = \mathrm{Cov}(G_2, X_2G_2)$, $\mathrm{Cov}(G_1, X_1G_2) = \mathrm{Cov}(G_2, X_2G_1)$, $\mathrm{Cov}(G_1, X_2G_1) = \mathrm{Cov}(G_2, X_1G_2)$, $\mathrm{Cov}(G_1, X_2G_2) = \mathrm{Cov}(G_2, X_1G_1)$, $\mathrm{Cov}(G_1, X_1G_1G_2) = \mathrm{Cov}(G_2, X_2G_1G_2)$, $\mathrm{Cov}(G_1, X_2G_1G_2) = \mathrm{Cov}(G_2, X_1G_1G_2)$, $\mathrm{Cov}(X_1G_1, X_1G_2) = \mathrm{Cov}(X_2G_2, X_2G_1)$, $\mathrm{Cov}(X_1G_1, X_2G_1) = \mathrm{Cov}(X_2G_2, X_1G_2)$, $\mathrm{Cov}(X_1G_1, G_1G_2) = \mathrm{Cov}(X_2G_2, G_1G_2)$, $\mathrm{Cov}(X_1G_1, X_1G_1G_2) = \mathrm{Cov}(X_2G_2, X_2G_1G_2)$, $\mathrm{Cov}(X_1G_1, X_2G_1G_2) = \mathrm{Cov}(X_2G_2, X_1G_1G_2)$, $\mathrm{Cov}(X_1G_2, G_1G_2) = \mathrm{Cov}(X_2G_1, G_1G_2)$, $\mathrm{Cov}(X_1G_2, X_1G_1G_2) = \mathrm{Cov}(X_2G_1, X_2G_1G_2)$, $\mathrm{Cov}(X_1G_2, X_2G_1G_2) = \mathrm{Cov}(X_2G_1, X_1G_1G_2)$, $\mathrm{Cov}(G_1G_2, X_1G_1G_2) = \mathrm{Cov}(G_1G_2, X_2G_1G_2)$.

Means: $M_{X_1} = M_{X_2}$, $M_{G_1} = M_{G_2}$, $M_{X_1G_1} = M_{X_2G_2}$, $M_{X_1G_2} = M_{X_2G_1}$, $M_{X_1G_1G_2} = M_{X_2G_1G_2}$.

Intercepts: $b_{100} = b_{200}$.