

1 Which Constraints are Needed?

It's not immediately obvious which combinations of specified parameter values will yield a fully determined system. Here we present combinations for $G = 3$.

Table 1: Seven fully determined systems with varying sparsity in modelled turnover (ζ).

Parameter	1	2	3	4	5	6	7
ζ :	$\begin{bmatrix} \cdot & 0 & 0 \\ 0 & \cdot & 0 \\ 0 & 0 & \cdot \end{bmatrix}$	$\begin{bmatrix} \cdot & 0 & * \\ 0 & \cdot & 0 \\ 0 & 0 & \cdot \end{bmatrix}$	$\begin{bmatrix} \cdot & z_1 & z_1 \\ 0 & \cdot & 0 \\ 0 & 0 & \cdot \end{bmatrix}$	$\begin{bmatrix} \cdot & z_1 & z_1 \\ 0 & \cdot & * \\ 0 & 0 & \cdot \end{bmatrix}$	$\begin{bmatrix} \cdot & z_1 & z_1 \\ 0 & \cdot & * \\ * & 0 & \cdot \end{bmatrix}$	$\begin{bmatrix} \cdot & z_1 & z_1 \\ 0 & \cdot & * \\ z_3 & z_3 & \cdot \end{bmatrix}$	$\begin{bmatrix} \cdot & z_1 & z_1 \\ z_2 & \cdot & z_2 \\ z_3 & z_3 & \cdot \end{bmatrix}$
\hat{e} :	$\begin{bmatrix} * & * & * \end{bmatrix}$	$\begin{bmatrix} * & * & * \end{bmatrix}$	$\begin{bmatrix} * & * & * \end{bmatrix}$	$\begin{bmatrix} * & * & * \end{bmatrix}$	$\begin{bmatrix} * & * & * \end{bmatrix}$	$\begin{bmatrix} * & * & * \end{bmatrix}$	$\begin{bmatrix} * & * & * \end{bmatrix}$
δ :	$\begin{bmatrix} * & * & * \end{bmatrix}$	$\begin{bmatrix} \delta_1 & * & * \end{bmatrix}$	$\begin{bmatrix} \delta_1 & * & * \end{bmatrix}$	$\begin{bmatrix} \delta_1 & \delta_2 & * \end{bmatrix}$	$\begin{bmatrix} \delta_1 & \delta_2 & \delta_3 \end{bmatrix}$	$\begin{bmatrix} \delta_1 & \delta_2 & \delta_3 \end{bmatrix}$	$\begin{bmatrix} \delta_1 & \delta_2 & \delta_3 \end{bmatrix}$

z_i, δ_i : specified values; *: calculated values; (\cdot): inconsequential.