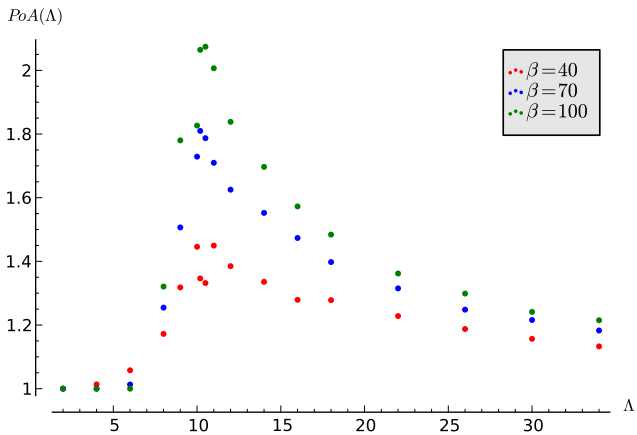+Vincent.Knight
@drvinceknight
www.vincent-knight.com
drvinceknight.github.io/Talks

@IzabelaKomenda

$$\begin{pmatrix} (2,2) & (5,0) \\ (0,5) & (4,4) \end{pmatrix}$$
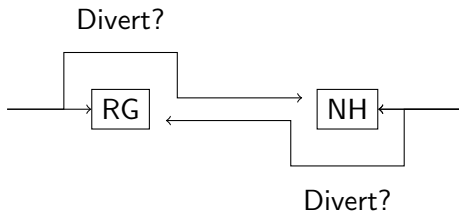
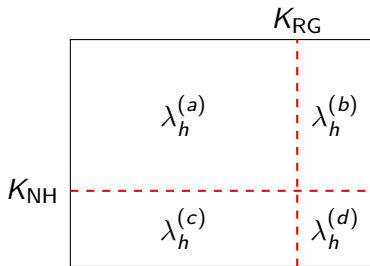# What about the controllers?

What about the controllers?

S. Deo and I. Gurvich. **Centralized vs. Decentralized Ambulance Diversion: A Network Perspective.** *Management Science*, 57(7):13001319, May 2011.
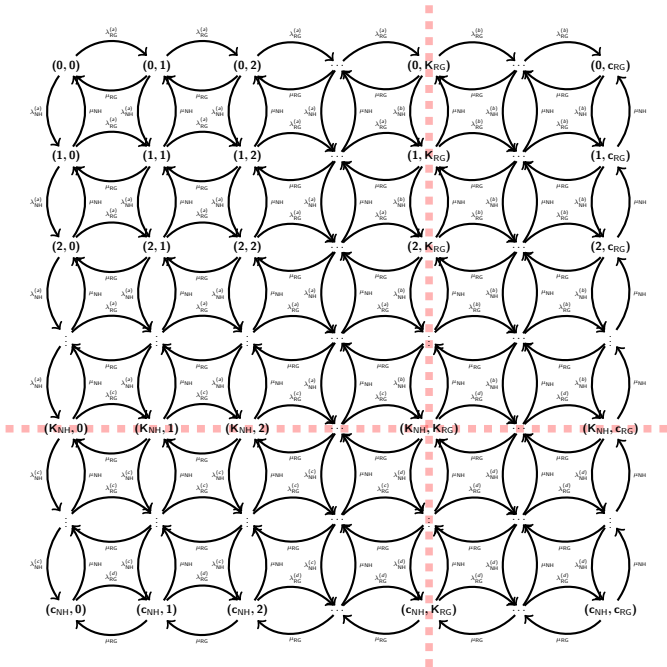
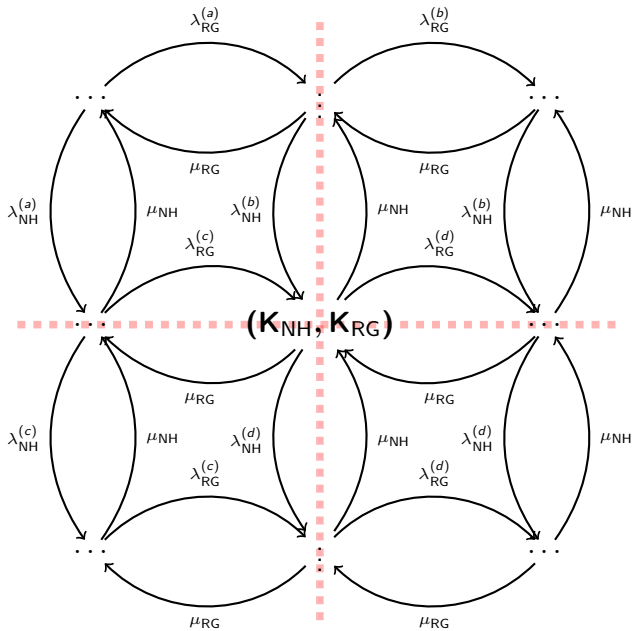[INCLUDE ANY PLOT FROM PAPER WITH IZA]

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Mathematical modelling of patient flows to predict critical care capacity required following the merger of two District General Hospitals into one., *Submitted to Anaesthesia*
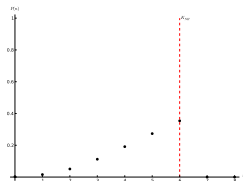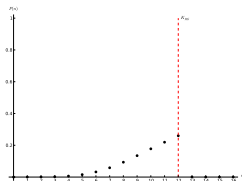
(0, 0)   (0, 1)   (0, 2) $\cdots$ (0, K_{RG}) $\cdots$ (0, c_{RG})

(1, 0)   (1, 1)   (1, 2) $\cdots$ (1, K_{RG}) $\cdots$ (1, c_{RG})

(2, 0)   (2, 1)   (2, 2) $\cdots$ (2, K_{RG}) $\cdots$ (2, c_{RG})

(K_{NH}, 0)   (K_{NH}, 1)   (K_{NH}, 2) $\cdots$ (K_{NH}, K_{RG}) $\cdots$ (K_{NH}, c_{RG})

(c_{NH}, 0)   (c_{NH}, 1)   (c_{NH}, 2) $\cdots$ (c_{NH}, K_{RG}) $\cdots$ (c_{NH}, c_{RG})

Transition rates: $\lambda_{RG}^{(a)}$, $\lambda_{RG}^{(b)}$, $\lambda_{RG}^{(c)}$, $\lambda_{RG}^{(d)}$, $\lambda_{NH}^{(a)}$, $\lambda_{NH}^{(b)}$, $\lambda_{NH}^{(c)}$, $\lambda_{NH}^{(d)}$, μ_{RG}, μ_{NH}

$(K_{NH}, K_{RG}) = (6, 12)$:

$h = NH$ $h = RG$

$(K_{NH}, K_{RG}) = (1, 12)$:
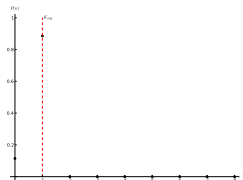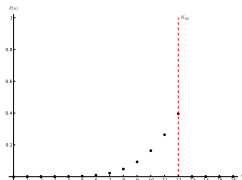
$h = NH$ $h = RG$

For all $h \in \{NH, RG\}$ minimise:

$$(U_h - t)^2$$

Subject to:

$$0 \leq K_h \leq c_h$$
$$K_h \in \mathbb{Z}$$

$$A = \begin{pmatrix} U_{\mathsf{NH}}(1,1) - t & \ldots & U_{\mathsf{NH}}(1, c_{\mathsf{RG}}) - t \\ U_{\mathsf{NH}}(2,1) - t & \ldots & U_{\mathsf{NH}}(2, c_{\mathsf{RG}}) - t \\ \vdots & \ddots & \vdots \\ U_{\mathsf{NH}}(c_{\mathsf{NH}},1) - t & \ldots & U_{\mathsf{NH}}(c_{\mathsf{NH}}, c_{\mathsf{RG}}) - t \end{pmatrix}$$

$$B = \begin{pmatrix} U_{\mathsf{RG}}(1,1) - t & \ldots & U_{\mathsf{RG}}(1, c_{\mathsf{RG}}) - t \\ U_{\mathsf{RG}}(2,1) - t & \ldots & U_{\mathsf{RG}}(2, c_{\mathsf{RG}}) - t \\ \vdots & \ddots & \vdots \\ U_{\mathsf{RG}}(c_{\mathsf{RG}},1) - t & \ldots & U_{\mathsf{RG}}(c_{\mathsf{RG}}, c_{\mathsf{RG}}) - t \end{pmatrix}$$