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The ability of DRG systems to explain variations in resource consumption

Andrew Street

Centre for Health Economics

University of York, UK

Questions

- Why do costs/LoS vary for patients who are receiving the same treatment?
- How much of the variation is captured by:
  - The **DRG** to which they are allocated
  - Other **patient** characteristics
  - The **hospital** in which they are treated
- Do some DRG systems have greater explanatory power than others?

- 10 countries
  - Austria, England, Estonia, Finland, France, Germany, Ireland, Poland, Spain, Sweden
- 10 episodes of care
  - AMI, appendectomy, breast cancer, CABG, childbirth, cholecystectomy, hernia, hip replacement, knee replacement, stroke

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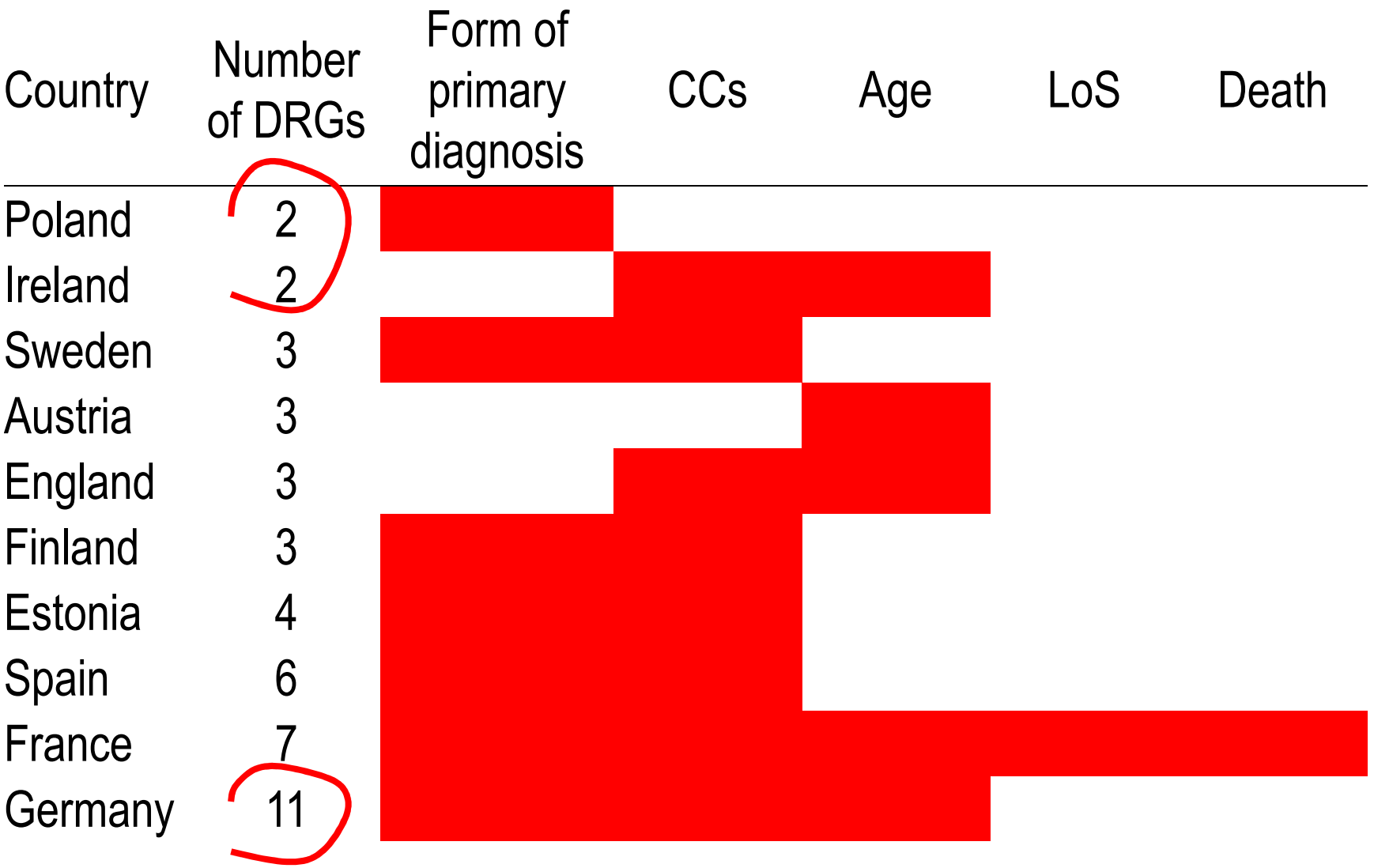
European DRGs for appendectomy



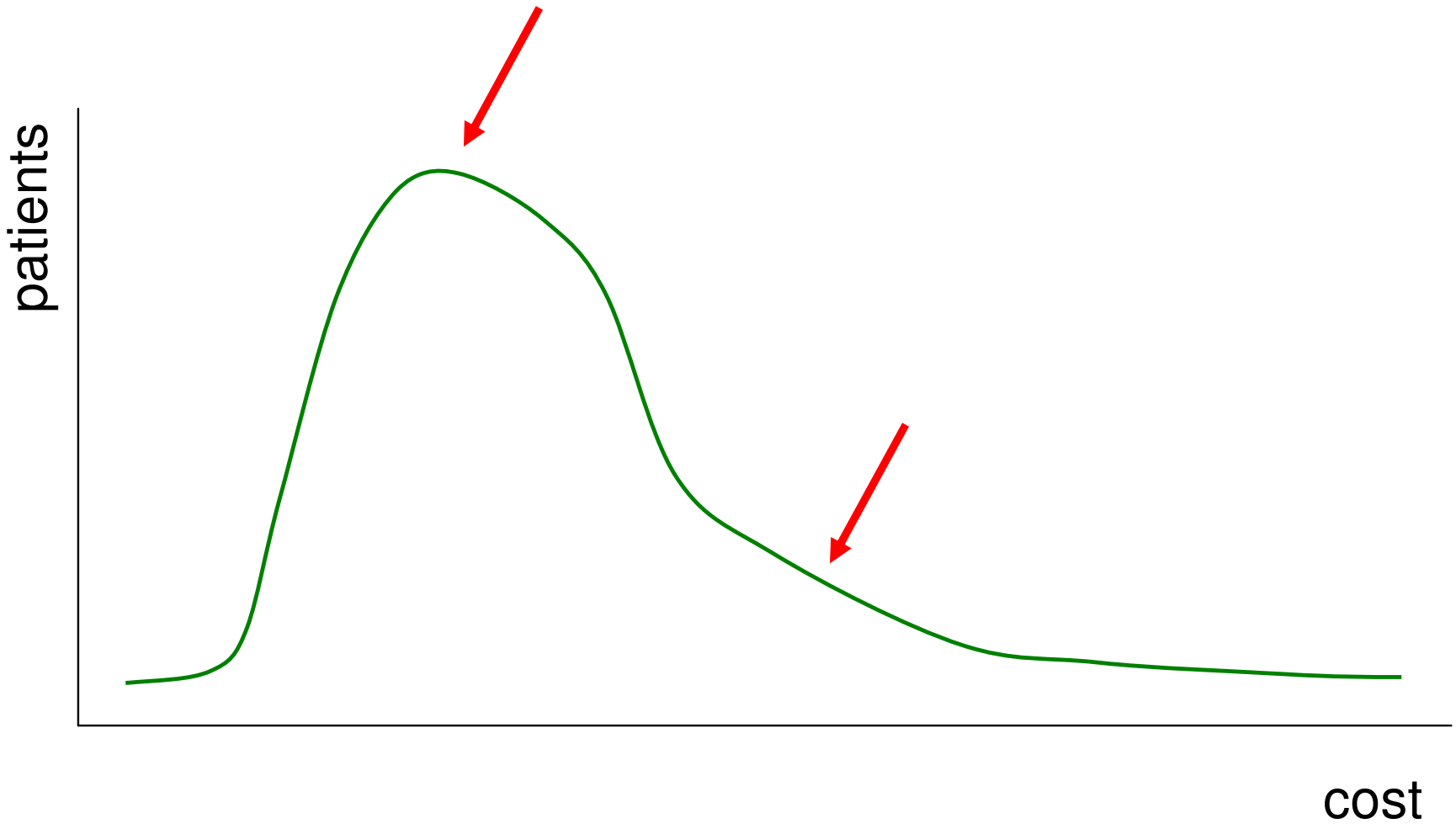
Methods: data

- Analysis of routine patient-level data
  - Costs or LoS for patients having the particular episode of care
  - Diagnostic and treatment details for all these patients
- Analysis of the hospitals in which patients were treated
- Comparison of explanatory power of DRGs and patient characteristics

Samples

Country	Patients	Hospitals
Finland	1,480	5
Spain	1,814	8
Estonia	2,113	18
Germany	2,451	22
Sweden	5,609	29
Ireland	5,813	37
France	9,948	82
Austria	13,202	112
Poland	31,105	475
England	33,394	152

Distribution of costs



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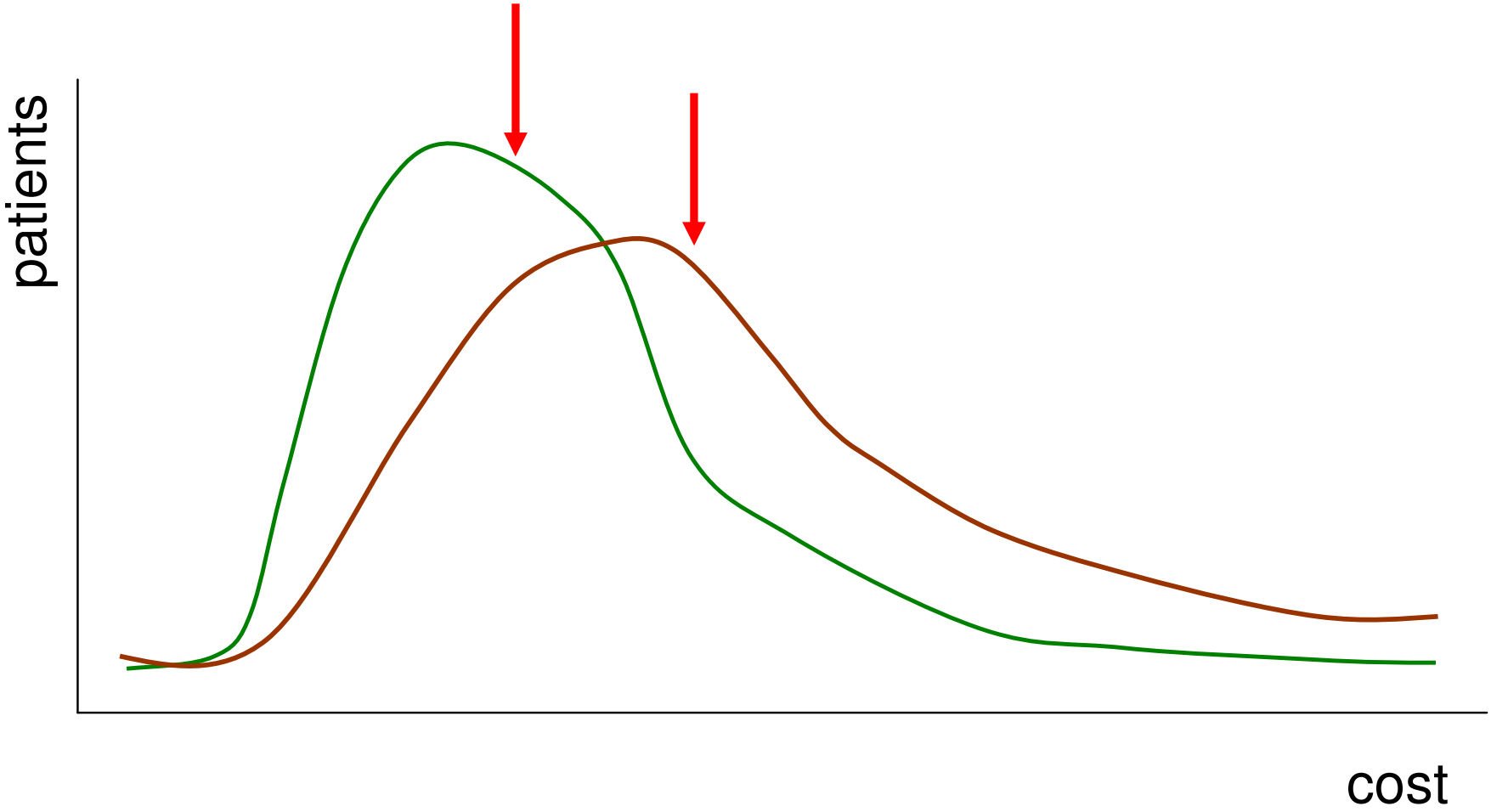
Distribution of costs



Analysing variation

- What explains resource use among patients?

[A] Cost = f(DRGs, Patient variables, Hospital) + error

[B] LoS = f(DRGs, Patient variables, Hospital) + error

Methods: cost equation

- Why do some patients have different costs than others?

$$\ln c_{ij} = \alpha + \boldsymbol{\beta}^{d}\mathbf{d}_{ij}^{d} + \boldsymbol{\beta}^{p}\mathbf{x}_{ij}^{p} + u_{j} + \varepsilon_{ij}$$

Log cost patient i in hospital j

DRGs

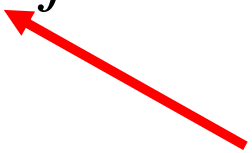
Patient-level variables

Hospital effect

Methods: LoS equation

- Why do some patients have different LoS than others?

$$s_{ij} = \alpha + \boldsymbol{\beta}^{d}\mathbf{d}_{ij}^{d} + \boldsymbol{\beta}^{p}\mathbf{x}_{ij}^{p} + u_{j} + \varepsilon_{ij}$$



LoS patient i
in hospital j

- Estimate Poisson or Negbin models
- Extract hospital effect by introducing dummy variable for each hospital

Methods: hospital effects

- Why is the average cost/LoS of treating patients in one hospital higher than in another?

$$\hat{u}_j = \alpha_o + \sum_{m=1}^{M} \gamma_m z_j + \mu_j$$

Estimated hospital effect for hospital j

Hospital characteristics Eg size, teaching status

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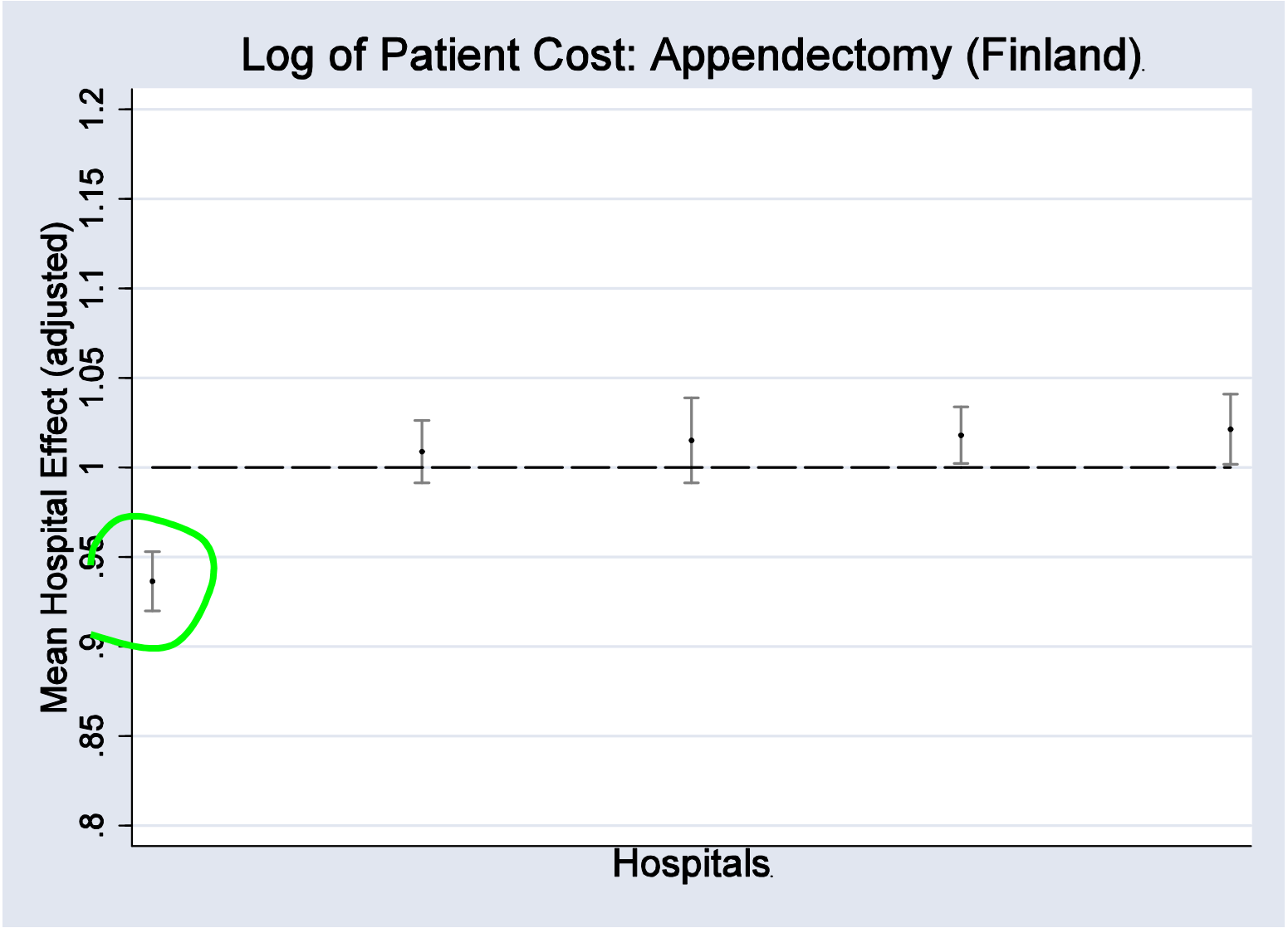
Appendectomy patients have HIGHER costs/LoS if they.....

- Are <11 or >35 years old
- Had more diagnoses
- Underwent more procedures
- Were admitted as emergencies
- Died (but shorter LoS)
- Suffered wound infection

Finnish hospitals



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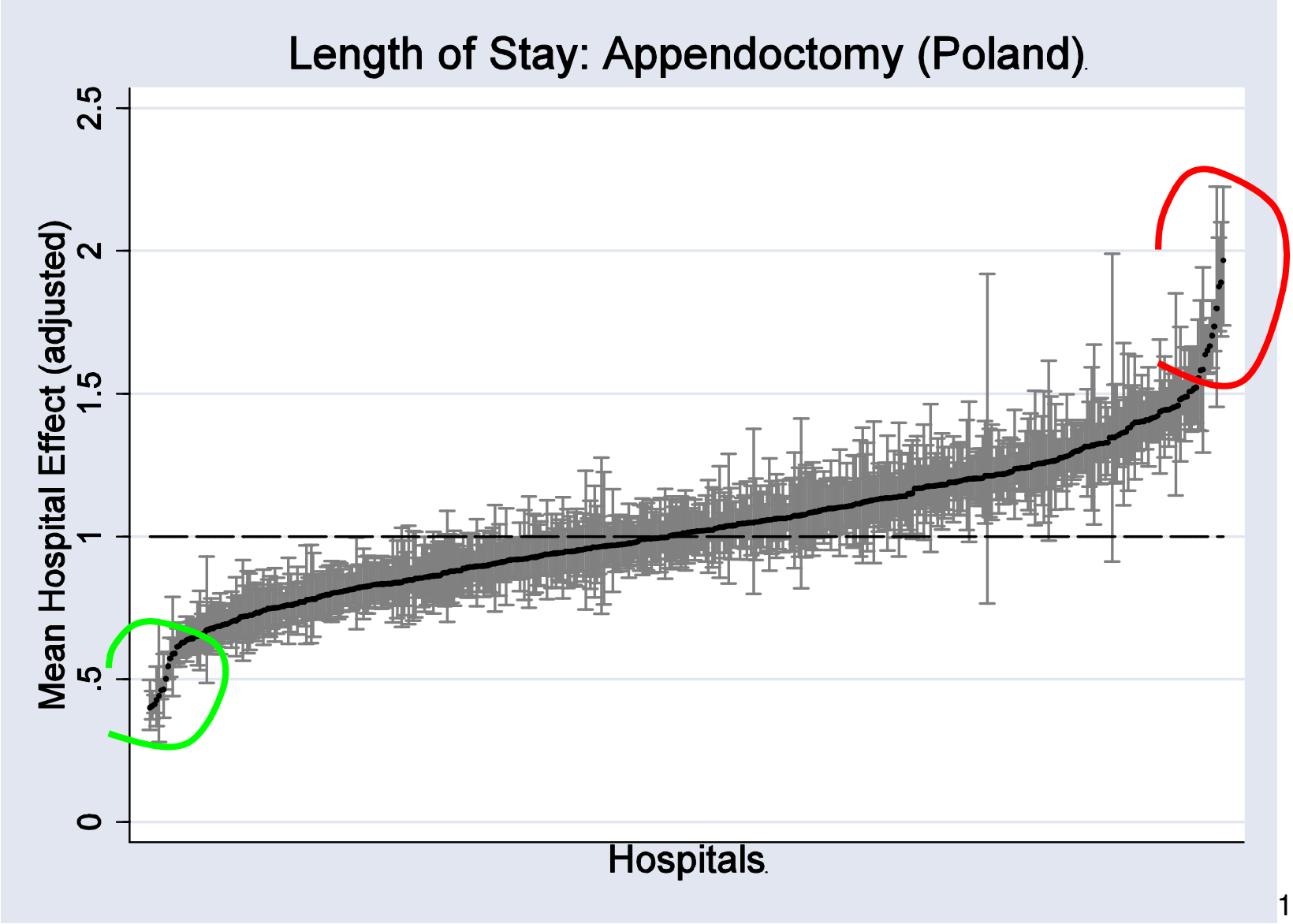
Polish hospitals



Evaluating DRGs

- Are DRGs better than patient characteristics at explaining costs?

  [1] Cost = f(DRGs, Patient variables)

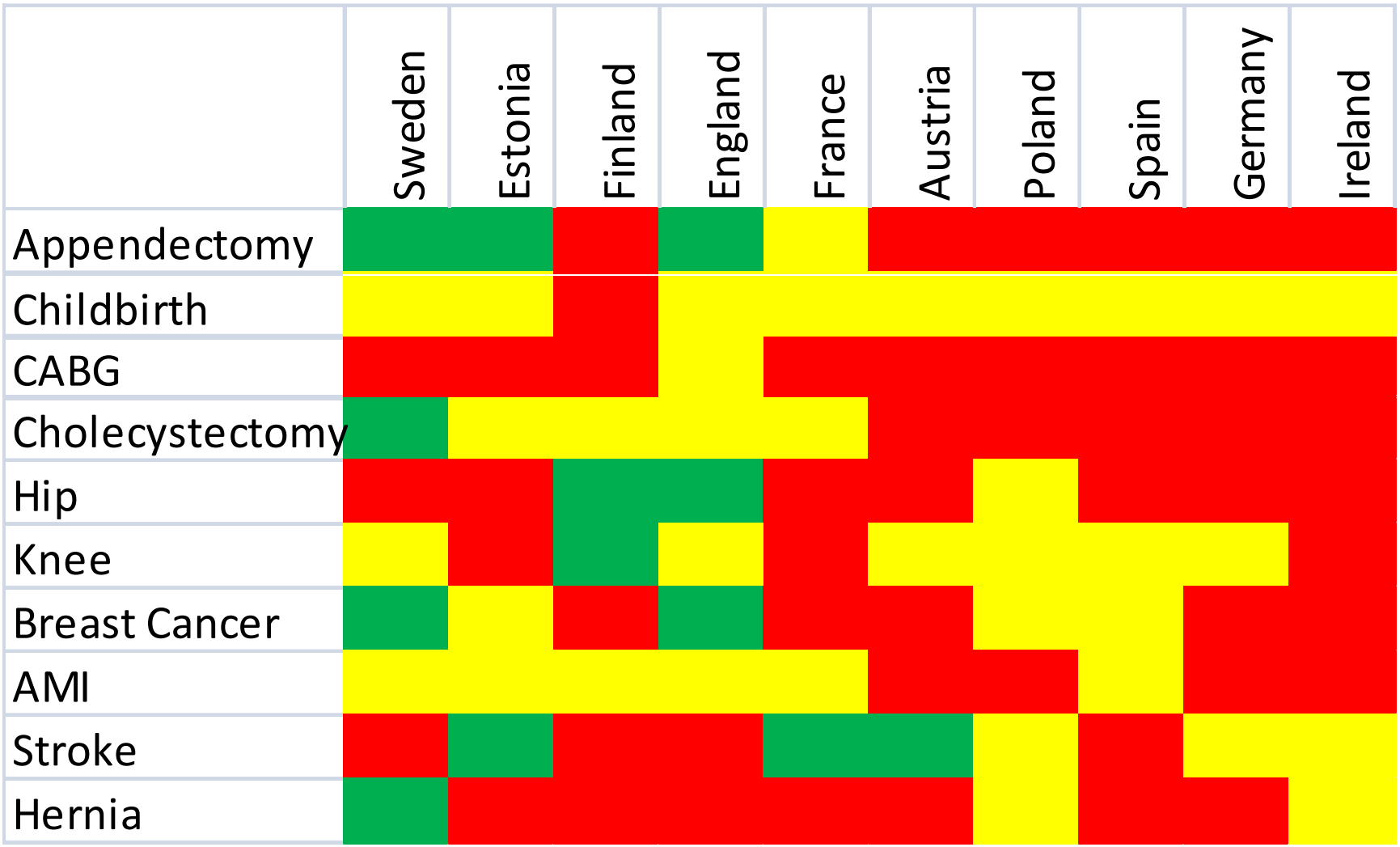
  [2] Cost = f(DRGs)

  [3] Cost = f(Patient variables)

- Yes: if $R^2[2] > R^2[3]$

Evaluating DRGs

- Are DRGs better than patient characteristics at explaining costs?
  - Yes: England, Sweden, Estonia
  - No: Austria, Finland, Germany, Ireland, Poland, Spain
  - About the same: France


Sweden
Estonia
Finland
England
France
Austria
Poland
Spain
Germany
Ireland
Appendectomy
Childbirth
CABG
Cholecystectomy
Hip
Knee
Breast Cancer
AMI
Stroke
Hernia

Issues to bear in mind

- Complementary not substitute way to evaluate DRG systems
- Important differences in national coding and accounting practices
  - Eg recording of secondary diagnoses
  - Should not pool data from different countries
- No-one knows the true costs of treatment!

Conclusions

- Some DRG systems have higher explanatory power than others
  - Scope for refinement, but not necessarily more groups
- Should there be a EuroDRG?
  - What is the variation in medical practice?
  - Great similarities in underlying architecture and data (ICD)
  - Local ownership

Further details

http://www.eurodrg.eu/