

The ability of DRG systems to explain variations in resource consumption

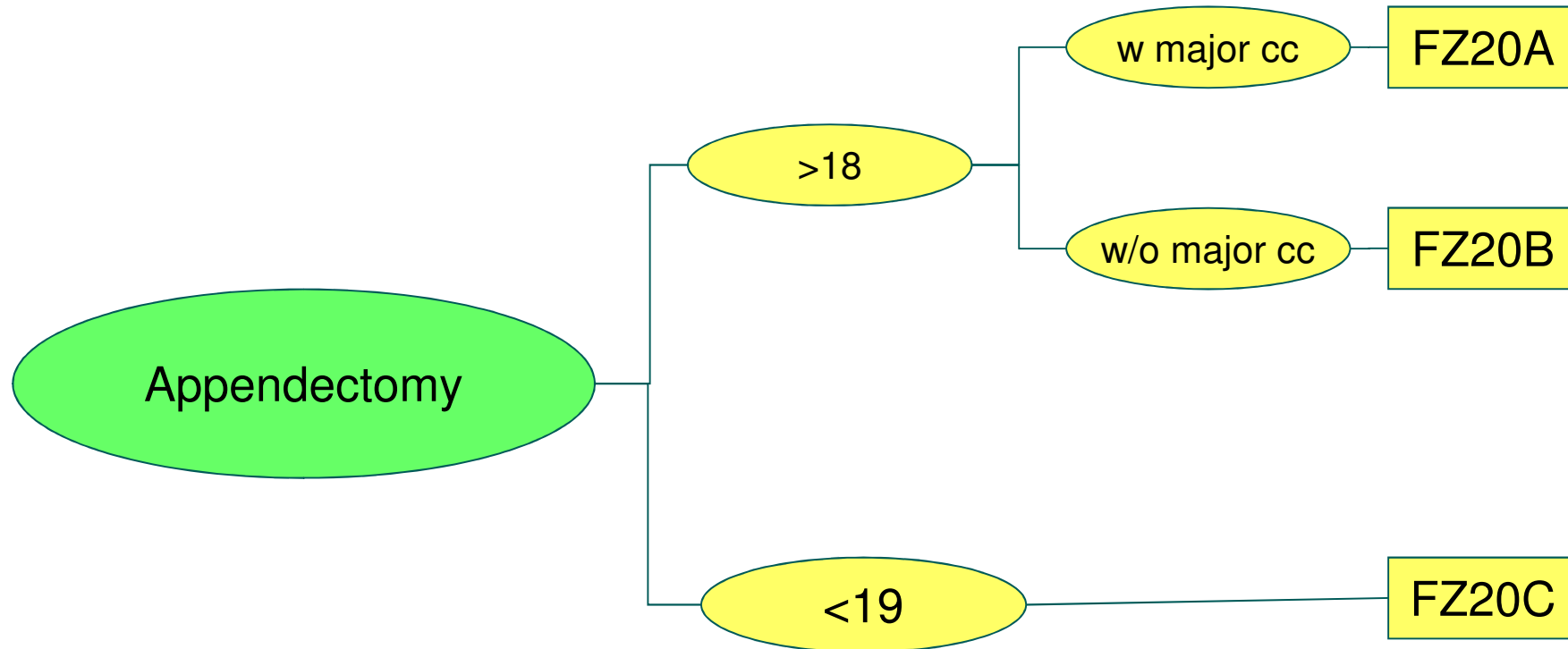


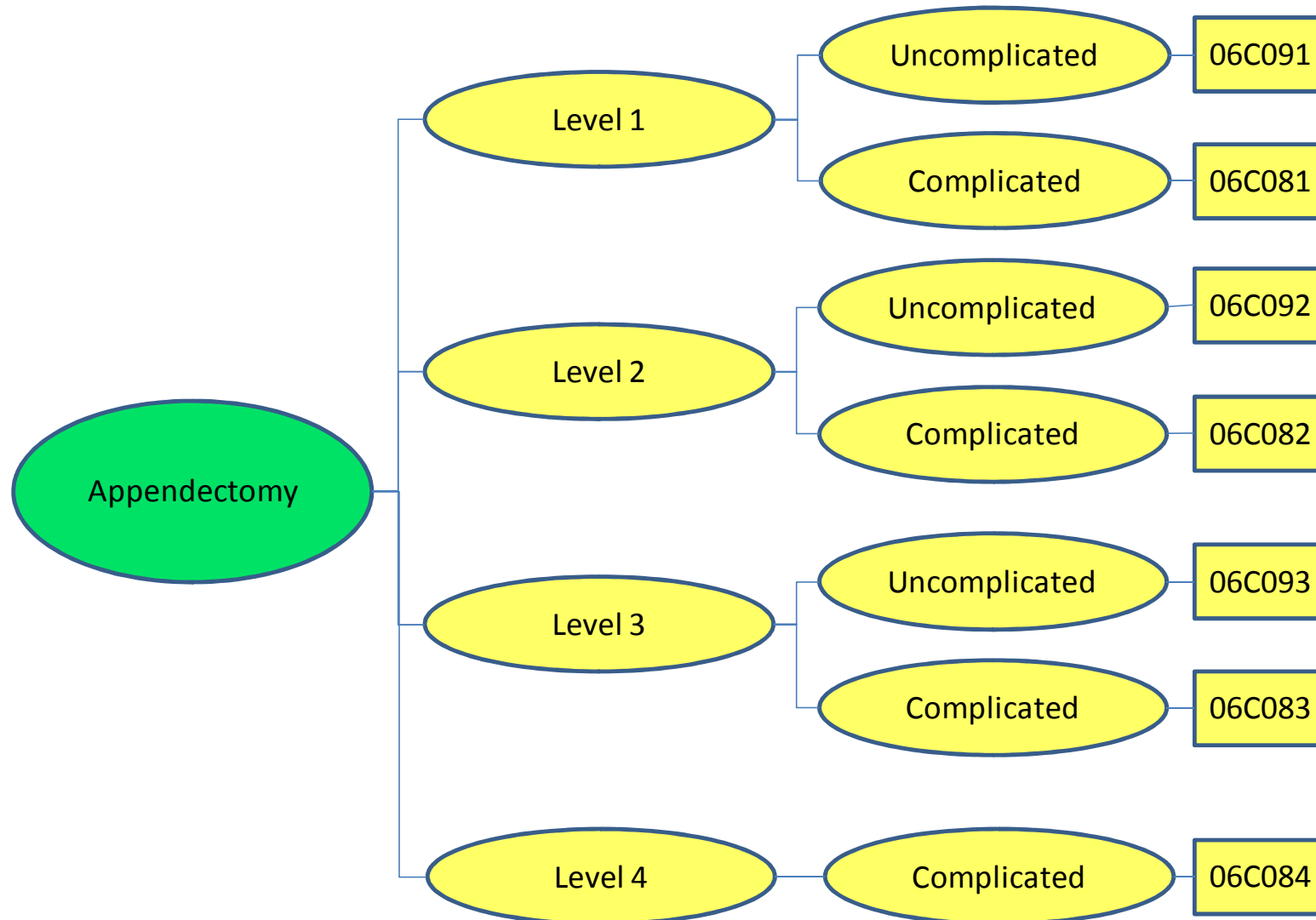
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- Classification system for hospital patients
- Used to reimburse hospitals
 - Transparent funding with price set in advance
 - Equal pay for equal work: same price paid for all patients in the same DRG
- Different DRG systems across Europe
- How well do these DRG systems perform?

- 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
 - Socio-demographic characteristics
 - Diagnostic characteristics and co-morbidities
 - Quality and adverse events
 - 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

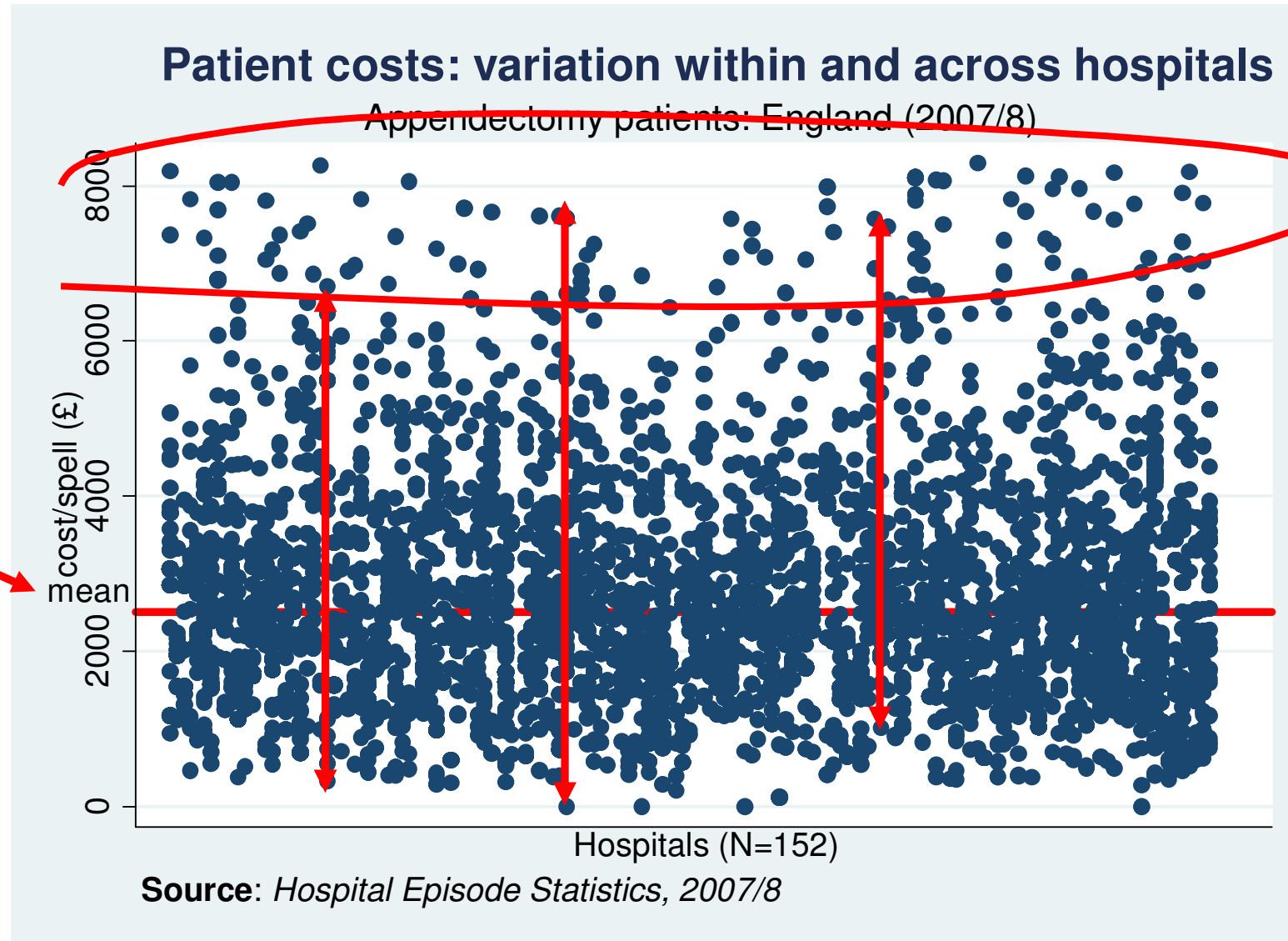


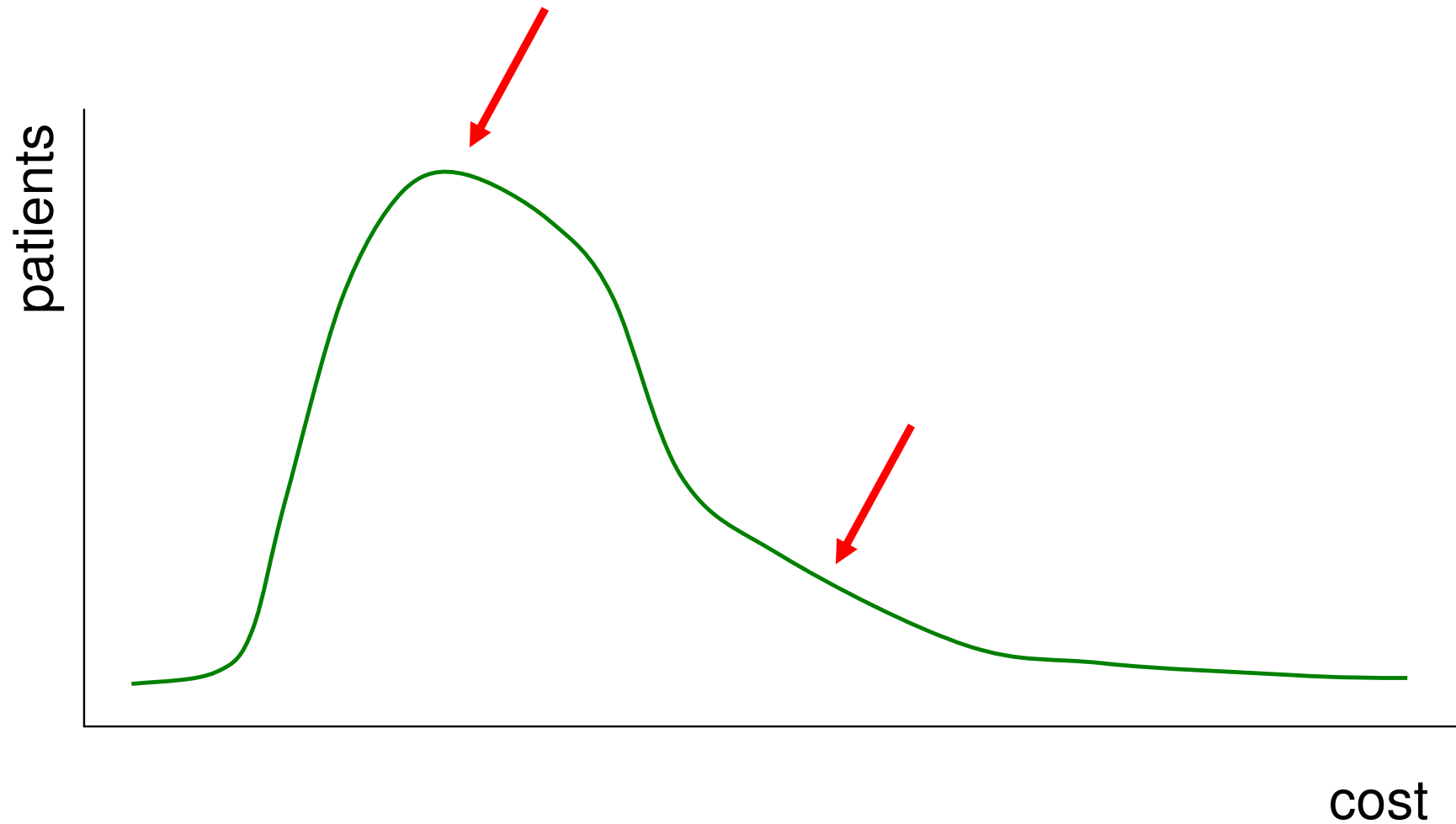


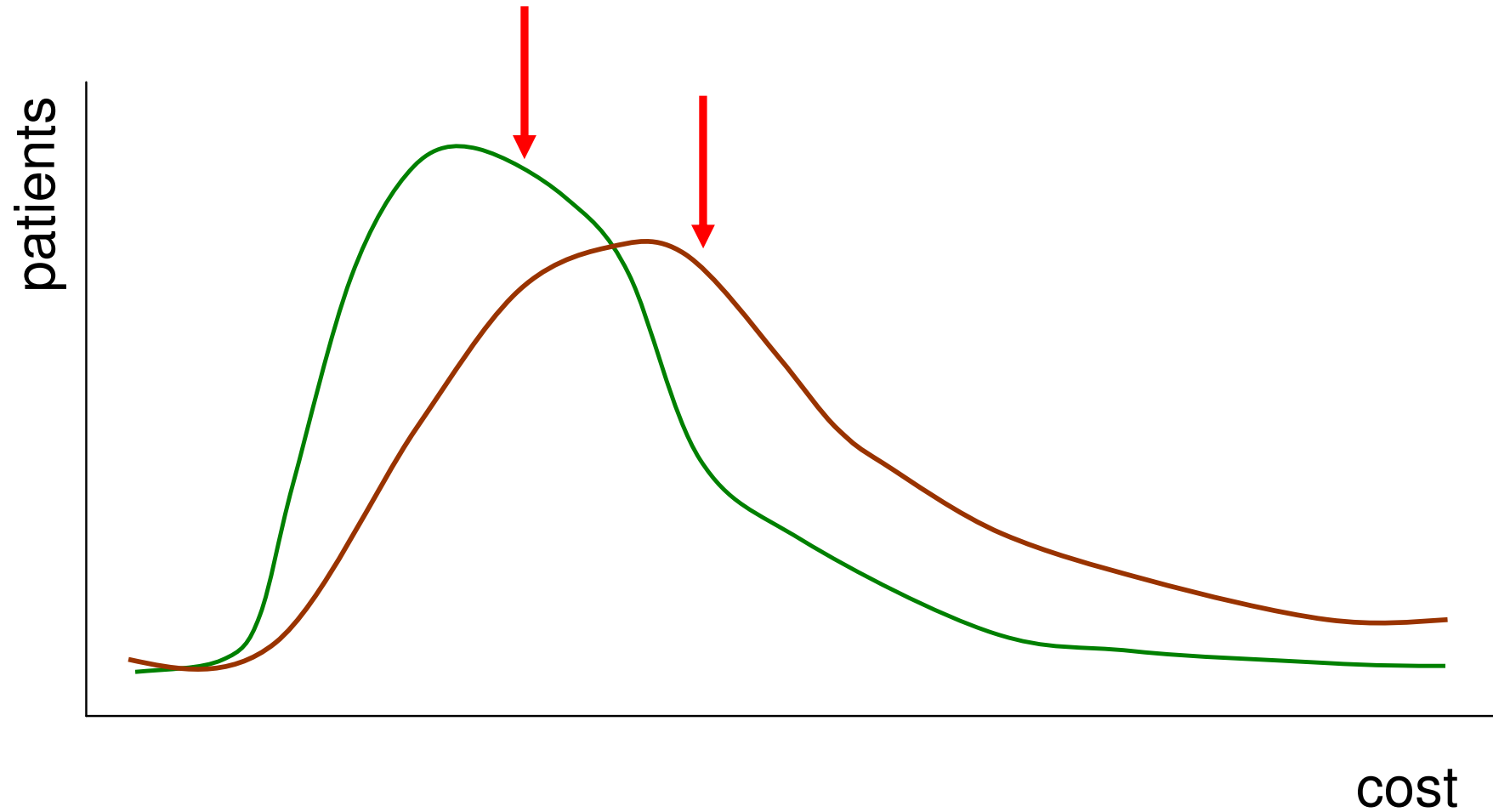
Country	Number of DRGs	Form of primary diagnosis	CCs	Age	LoS	Death
Poland	2	[Redacted]				
Ireland	2	[Redacted]	[Redacted]			
Sweden	3	[Redacted]	[Redacted]			
Austria	3	[Redacted]		[Redacted]		
England	3	[Redacted]	[Redacted]	[Redacted]		
Finland	3	[Redacted]	[Redacted]			
Estonia	4	[Redacted]	[Redacted]			
Spain	6	[Redacted]	[Redacted]	[Redacted]		
France	7	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
Germany	11	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]

- Analysis of routine patient-level data
 - Costs or length of stay 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

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







- Why do some patients have different costs than others?

$$\ln c_{ij} = \alpha + \beta^d d_{ij}^d + \beta^p x_{ij}^p + u_j + \varepsilon_{ij}$$

Log cost patient i in hospital j

DRGs

Patient-level variables

Hospital effect

- Are DRGs better than our patient variables at explaining costs?

- Age and gender
- Type of admission (emergency)
- Whether transferred to/from hospital
- Counts of diagnoses and procedures
- Specific diagnoses and procedures
- Charlson and other co-morbidities
- OECD Patient safety indicators
- Urinary tract and wound infections
- Discharged dead or alive

- LoS are “count” data
- Estimate Poisson or Negbin models
- Include same patient-level variables as for cost equation
- Extract hospital effect by introducing dummy variable for each hospital

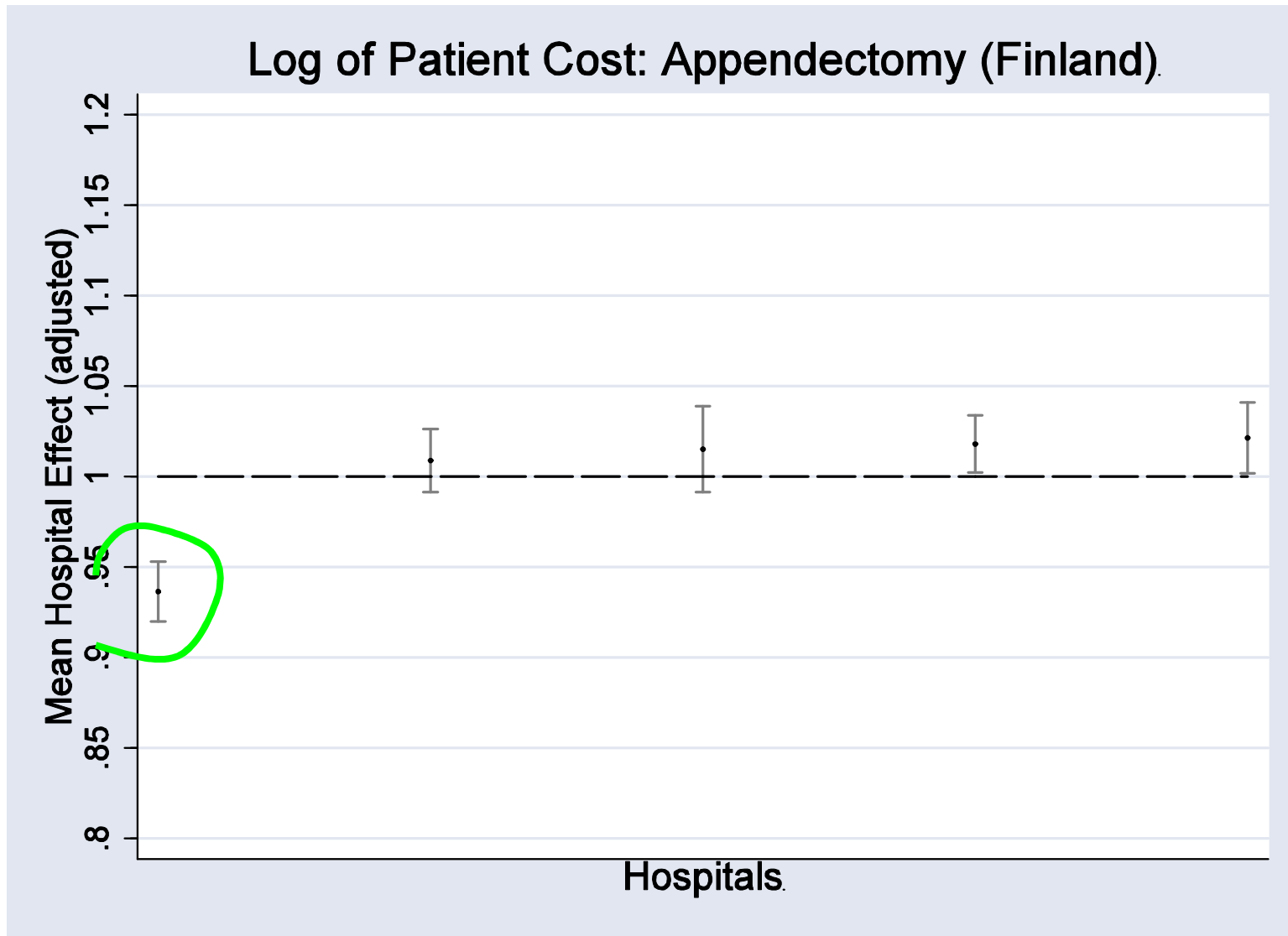
- Why is the average cost/LoS of treating patients in one hospital higher than in another?

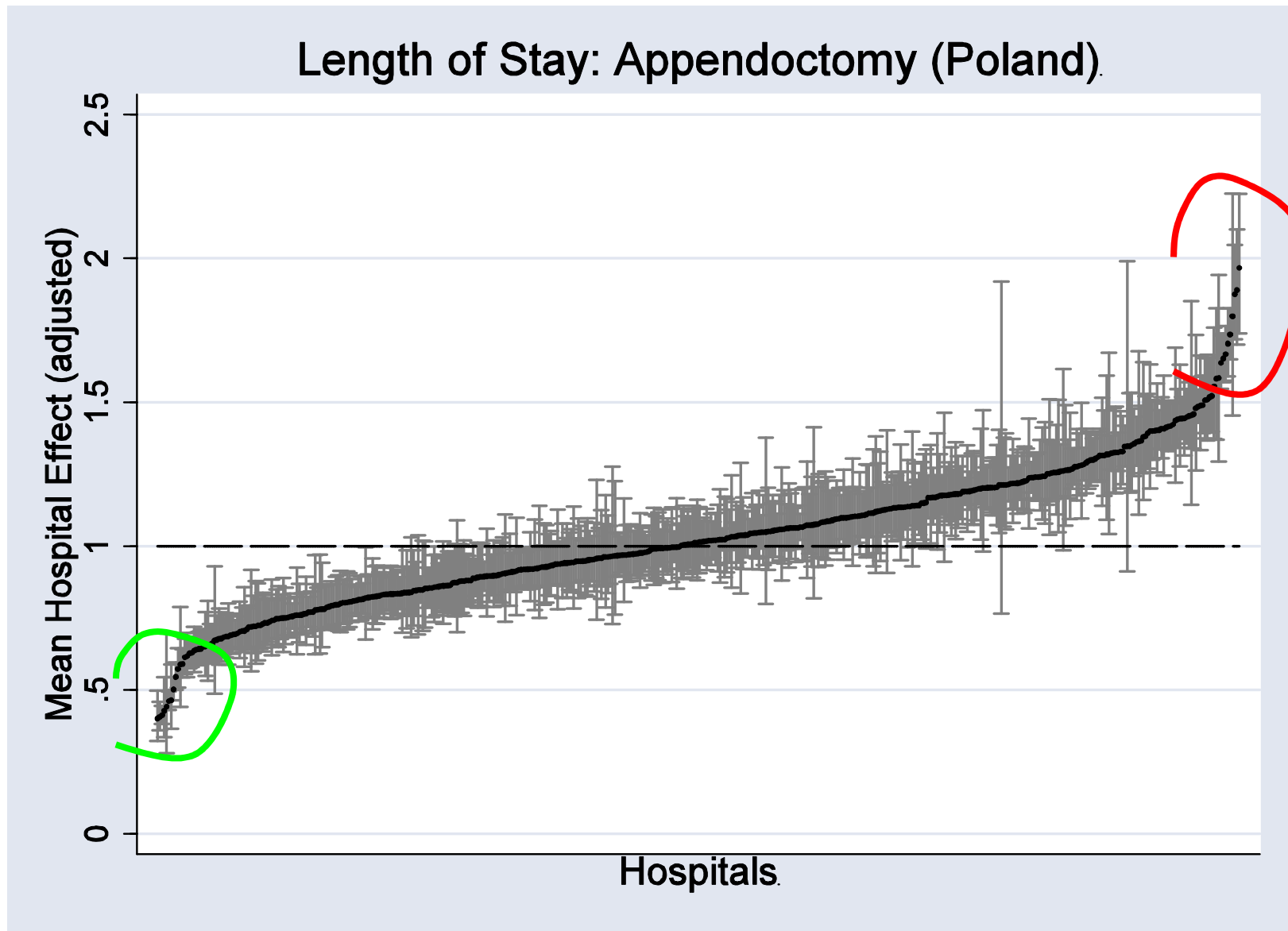
$$\hat{u}_j = \alpha_o + \sum_{m=1}^M \gamma_m z_j + \mu_j$$

↑
Estimated
hospital
effect for
hospital j

↑
Hospital
characteristics
Eg size, teaching
status

- Are less than 11 or more than 35 years old
- Had a higher number of total diagnoses
- Underwent more procedures
- Were admitted as emergencies
- Had a laparoscopy
- Died (but shorter LoS)
- Had deep vein thrombosis pulmonary embolism
- Suffered wound infection





- 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 $R^2[2] > R^2[3]$

- 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	Green	Red	Red	Green	Yellow	Red	Red	Red	Red	Red
Childbirth	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
CABG	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Cholecystectomy	Green	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red
Hip	Red	Red	Green	Green	Red	Red	Yellow	Red	Red	Red
Knee	Yellow	Red	Green	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Red
Breast Cancer	Green	Yellow	Red	Green	Red	Red	Yellow	Yellow	Red	Red
AMI	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Yellow	Red	Red
Stroke	Red	Green	Red	Red	Green	Green	Yellow	Red	Yellow	Yellow
Hernia	Green	Red	Red	Red	Red	Red	Yellow	Red	Red	Yellow

- Complementary not substitute way to evaluate DRG systems
- No single national DRG system dominates
- Important differences in national coding and accounting practices
 - Eg recording of secondary diagnoses
 - No-one knows the true costs of treatment!

- Generally DRGs have good explanatory power
- Variation also driven by patient characteristics
- Large variation in resource use among hospitals
 - Scope for better utilisation of resources

- 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



<http://www.eurodrg.eu/>

European Conference
Health Economics,
Zurich, 18-20 July 2012