



EHMA Annual Conference 2010, Lahti

# Diagnosis-Related Groups in Europe: Launch of the Hospital Benchmarking Club

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&

European Observatory on Health Systems and Policies

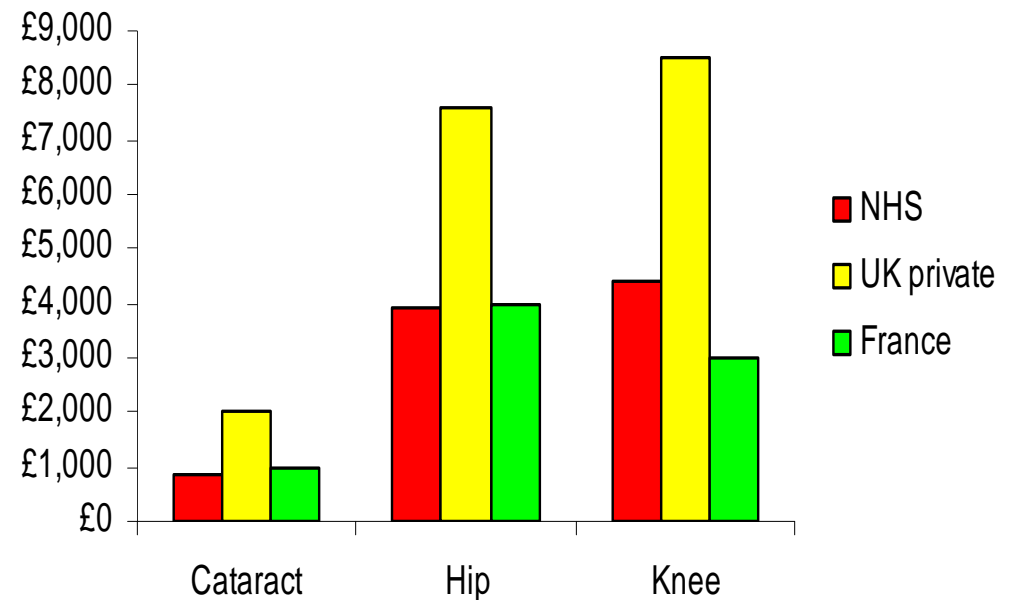


# How I got interested in DRGs (2002)

- **A policy question in the 6th EU Framework Programme:**  
Why do costs of health services differ among EU countries at the micro level?



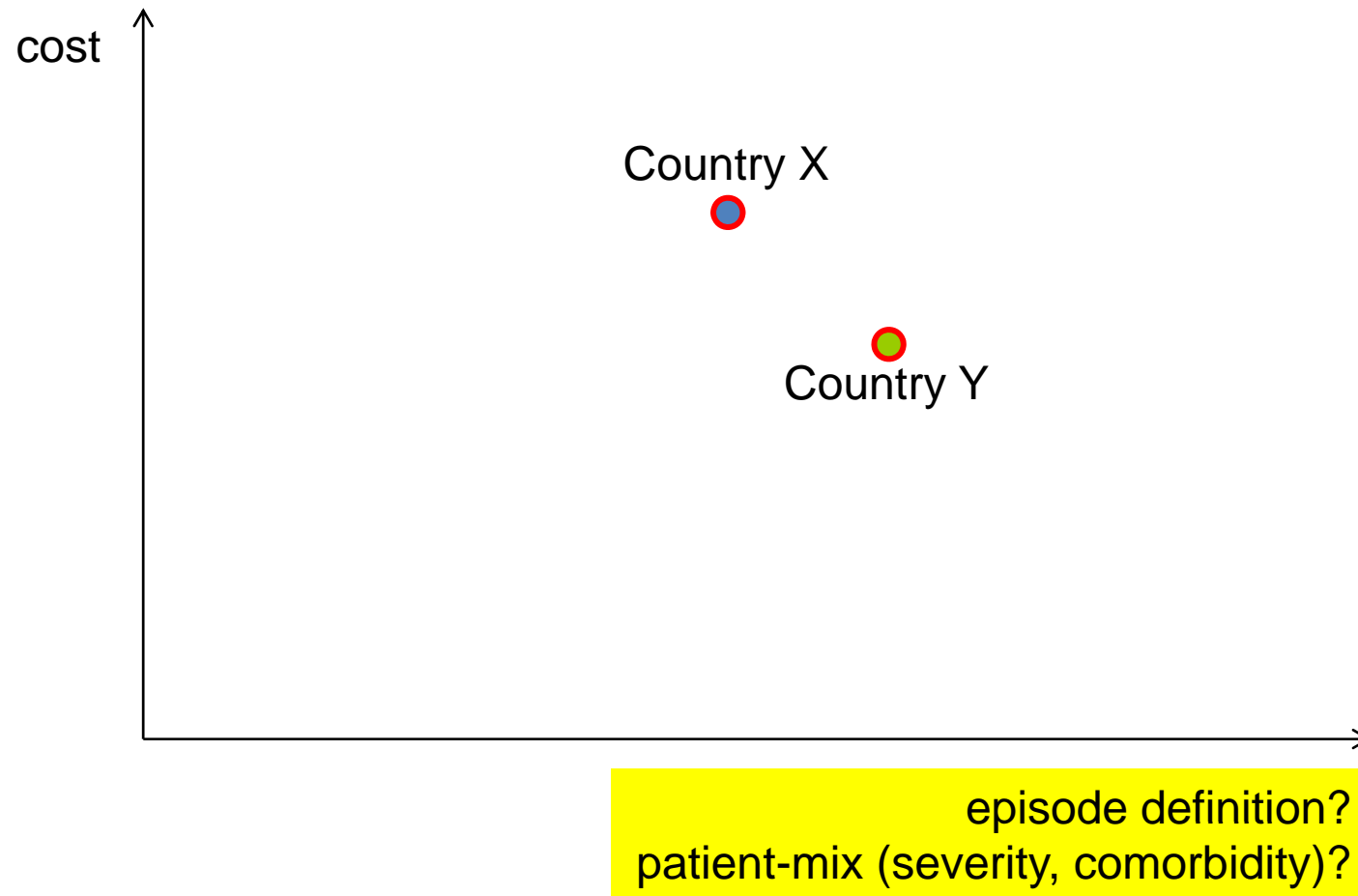
The first nine patients sent to France by the English NHS (not shown: the 40 journalists who accompanied them)



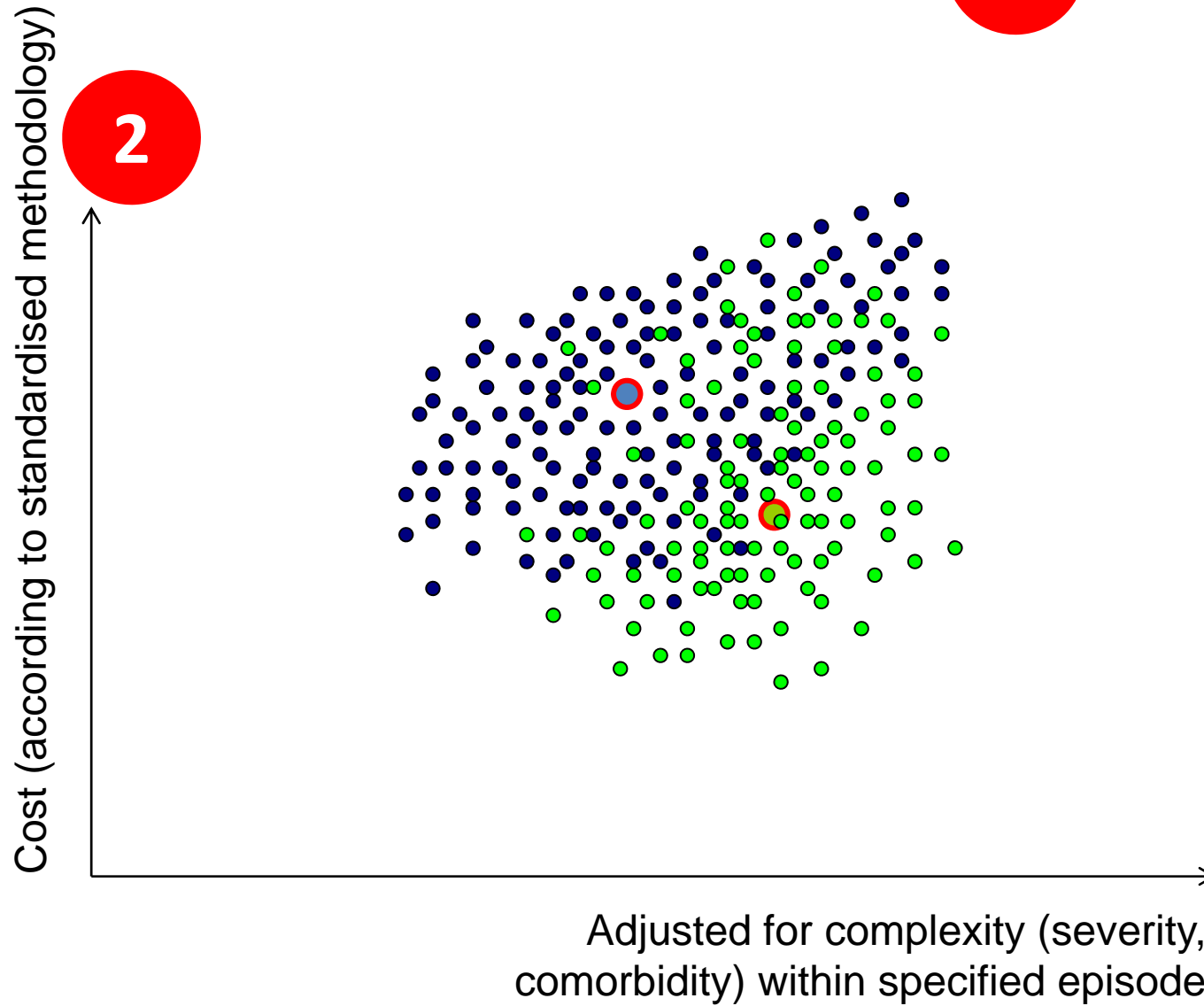
**Are these data realistic?**  
**Are they representative?**  
**How can the differences be explained?**

# Analysis of averages: example of episode A

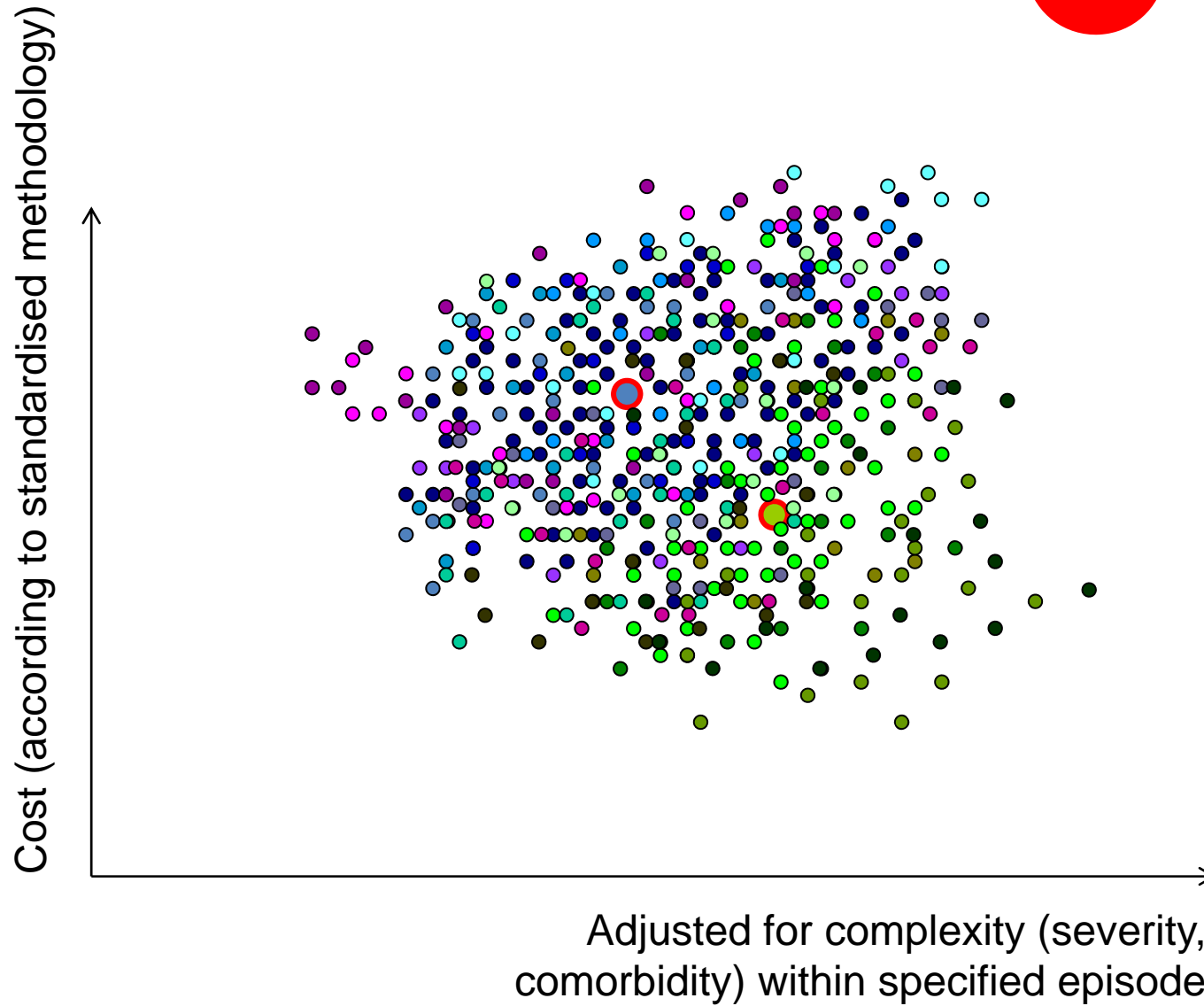
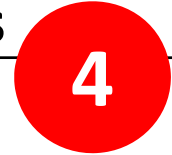
- cost-accounting (e.g. in/exclusion of capital costs)?
- service intensity/ technologies used?
- costs per service?



# Country averages = averages of hospitals



# Averages of hospitals = averages of patients





Countries in HealthBASKET project 2004-2007

- **Taxonomy** of services differs largely from country to country – even if most tend to sort **ambulatory care by physician specialty** and **inpatient care by diagnosis and procedure** (DRGs/ HRGs/ DBCs ...)
- Conclusion: a **uniform taxonomy** (“European Classification of Health Services”) to explore and describe differences (not to standardise the baskets!) **is urgently needed** for both practical and scientific purposes

- Most countries have installed activity-based remuneration schemes for in- and outpatient services; often lacking for long-term care, rehabilitation etc.
- clear trend towards the use of micro-costing data (especially for inpatient services -> DRGs) to determine remuneration rates, reflecting actual costs of provider
- *Problems:*
  - cost-accounting **methodologies differ** between and within countries
  - **insufficient quality of data** delivered by providers

- Prerequisites of international cost comparison: mutually accepted **methodological guidance** (standard costing method) and reasonably **good compliance** with it.
- Harmonisation of methodologies not sufficient to ensure meaningful comparability; **accounting systems should be coordinated and standardised**

*--> serious dilemma:*

*standardised "European" accounting methodology right down to provide for well-justified and "comparable" data. Enforcing one methodology conflicts with the principle of subsidiarity.*

**Voluntarily → Hospital Benchmarking Club**

**→ we used a self-developed standardised method**

- 10 case vignettes (“service packages”) were designed around episodes of care

<i>Need for care</i>	<i>Age group</i>	<i>Type of Care</i>			<i>ECHI*</i>
Appendectomy	14-25	In-patient	Surgery	Emergency	-
Normal delivery	25-35	In-patient	Obstetrics	Elective	+
Hip-replacement	65-75	In-patient	Surgery	Elective	+
Cataract	70-75	Out-patient (day case)	Surgery	Elective	+
Stroke	60-70	In-patient	Medical	Emergency	+
AMI (PTCA)	50-60	In-patient	Medical	Emergency	+
Cough	2	Out-patient	Paediatrics/GP	Emergency	-
Colonoscopy	60-70	Out-patient	Diagnostic	Elective	+
Tooth filling	25-35	Out-patient	Dental	Emergency	+
Physiotherapy (knee)	12	Out-patient	Rehabilitative	-	-

\*ECHI: related to European Community Health Indicators set (+ yes/ - no)

- To ensure homogeneity within case vignettes (*i.e. to avoid risk adjustment*), health status and indication of each patient was defined in detail for each vignette
  - To ensure comparability across vignettes, each was divided into detailed path components, e.g. diagnostic procedures, care before operation etc.
  - Partners in each country documented technology use, service intensity and costs (prices) for case vignettes with data from at least 5 representative providers
- Costs (and prices) compared and differences analysed

## An example: Hip replacement

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Female, 65-75 years old, with hip osteoarthritis requiring hip replacement because of considerable impairment is finally (after waiting time if normal in the hospital) admitted for her first hip replacement (one side).

(= standardised severity)

The patient is without co-morbidity (i.e. expensive drugs due to treating co-morbidity should be excluded), the surgeon uses the most frequently used implant for female patients; the operation is without severe complications

(= standardised outcome)

End of case vignette: discharge  
(home or *to separate rehabilitation institution*).

Phase	Elements	Units	No. of units used/patient	Unit Cost	Total costs
	<b>Example: Hip replacement</b>				
Pre-operative (admission and planning)	<i>Diagnostic Procedures</i>				
	Imaging (e.g. X-Ray)	No.			
	Imaging (e.g. ultrasound)	No.			
	Imaging (e.g. CT)	No.			
	Laboratory (e.g. blood count)	No.			
	Laboratory (e.g. blood coagulation, C-reactive protein (CRP), etc.)	No.			
	Other (ECG, lung-function, etc.)	No.			
	<i>Care before OP</i>				
	Surgeon/Physician input	Patient days*			
	Nursing input	Patient days			
	Other (paramedical)	Patient days			
	<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	DD**			
Operation	<i>Devices (type of implant, stent, etc.) total price paid by hospital</i>	No.			
	OP-Team (altogether or separately)	Min.			
	Surgeon	Min.			
	Anaesthetist	Min.			
	OP-nurses etc.	Min.			
	Drugs (anaesthetics, other?)	DD			
	OP-Theatre running costs (e.g. sterilisation)***	Min.			
Wake-up room****					
Post-operative	<i>Intensive Care Unit</i>				
	Surgeon/Physician	Patient days			
	Nursing	Patient days			
	Other	Patient days			
	Drugs	DD**			
	Diagnostic Procedures (e.g. imaging, laboratory)	No.			
	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.			
	<i>Normal Ward</i>				

## Example: Hip replacement

Table 2: Total cost, cost components and reimbursement of total hip replacement

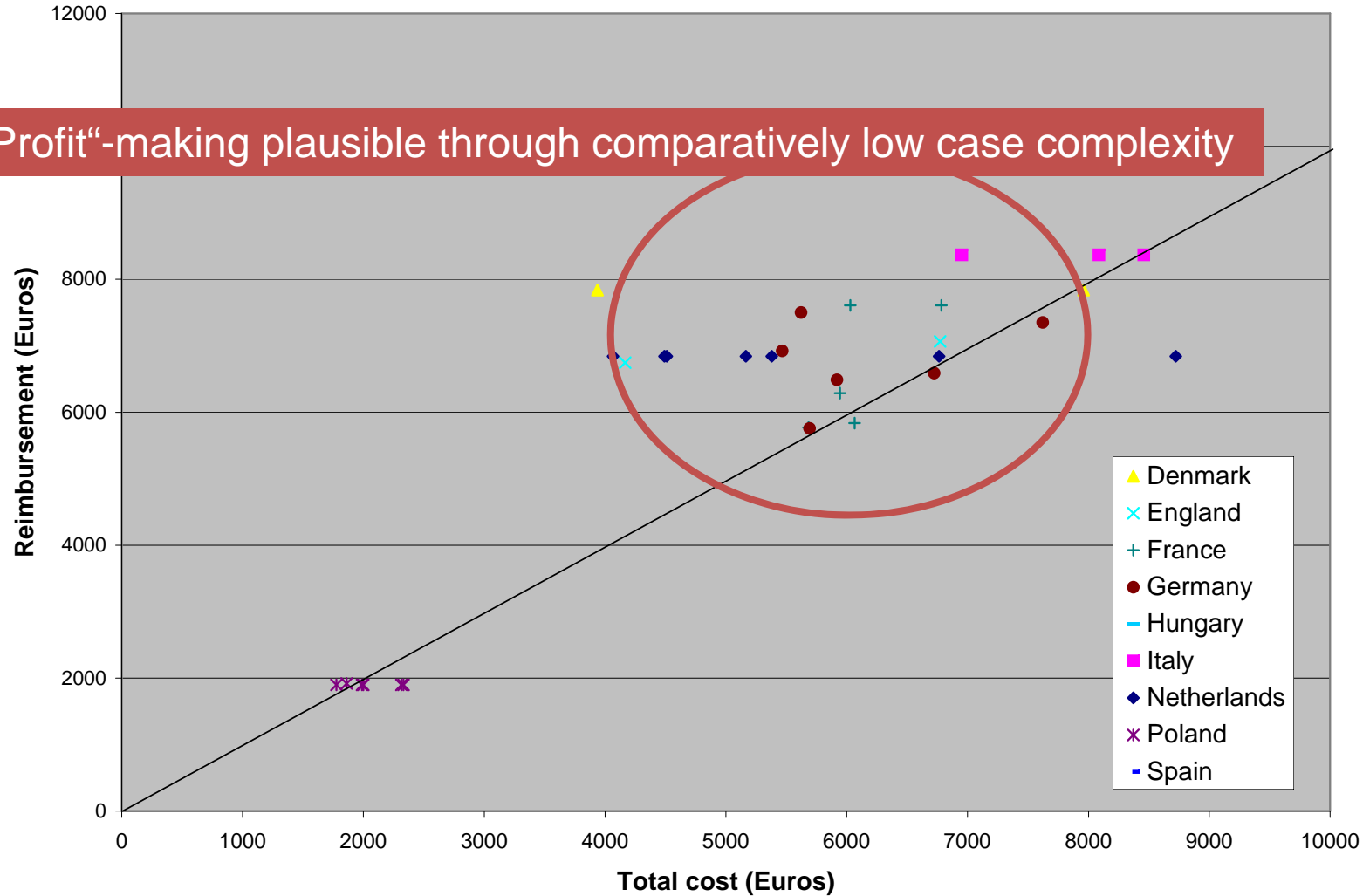
	Denmark	England	France	Germany	Hungary	Italy	Netherlands	Poland	Spain
<b>Diagnostic Procedures</b>									
- Imaging	€ 141.00	€ 87.95	€ 60.01	€ 79.83	€ 7.82	€ 63.37	€ 32.90	€ 33.80	€ 42.53
- Laboratory	€ 35.01	€ 5.74	€ 100.58	€ 137.00	€ 10.02	€ 58.42	€ 45.12	€ 14.00	€ 54.62
- Other	a)	€ 6.22	€ 0.00	€ 107.39	€ 2.87	€ 18.06	€ 19.07	€ 15.30	€ 2.52
<b>Normal/Intensive Ward</b>									
- Physician	€ 18.04	€ 450.88	€ 88.80	€ 414.40	€ 135.49	€ 171.90	a)	€ 236.62	€ 203.67
- Nursing	€ 470.98	€ 1,237.22	€ 428.14	€ 1,167.56	€ 341.15	€ 104.58	€ 538.40	€ 192.42	€ 278.19
- Other Staff	€ 111.37	€ 274.78	€ 193.11	€ 249.24	€ 0.51	€ 78.00	€ 189.64	€ 45.97	€ 0.00
- Material	a)	a)	€ 6.40	€ 129.46	a)	€ 5.78	a)	€ 16.75	€ 1.27
<b>Operation (including wake-up room)</b>									
- Anaesthetist / Surgeon	€ 202.04	€ 534.55	€ 728.15	€ 596.34	€ 93.25	€ 228.51	€ 669.47	€ 52.08	€ 400.16
- Nursing	€ 136.90	€ 123.47	€ 171.78	€ 283.77	€ 18.53	€ 99.57	€ 200.50	€ 9.64	€ 108.69
- Other Staff	€ 42.52	€ 0.00	€ 44.75	€ 133.18	a)	€ 11.42	€ 177.69	€ 0.00	€ 0.00
- Implant	a)	€ 657.50	€ 1,852.24	€ 963.46	€ 481.75	€ 3,416.05	€ 1,825.00	€ 978.38	€ 1,780.00
- Material	€ 115.61	€ 106.63	€ 154.54	€ 249.13	a)	€ 22.31	a)	€ 35.00	€ 0.18
<b>Drugs</b>	€ 59.63	€ 571.28	€ 60.99	€ 178.85	€ 72.50	€ 74.30	€ 104.12	€ 175.13	€ 46.20
<b>Overhead</b>	€ 4,599.14	€ 1,634.72	€ 2,211.60	€ 1,675.59	€ 129.92	€ 2,629.63	€ 1,803.01	€ 320.27	€ 680.99
% overhead of total	<b>77.5%</b>	<b>28.7%</b>	<b>36.2%</b>	<b>26.3%</b>	<b>10.0%</b>	<b>37.7%</b>	<b>32.2%</b>	<b>15.1%</b>	<b>18.9%</b>
<b>TOTAL COST</b>	<b>€ 5,932.24</b>	<b>€ 5,690.94</b>	<b>€ 6,101.09</b>	<b>€ 6,365.20</b>	<b>€ 1,293.81</b>	<b>€ 6,981.90</b>	<b>€ 5,604.92</b>	<b>€ 2,125.36</b>	<b>€ 3,599.02</b>
<b>Total cost (adjusted by PPP)</b>	<b>€ 4,401.10</b>	<b>€ 5,273.78</b>	<b>€ 5,679.66</b>	<b>€ 6,047.12</b>	<b>€ 2,147.05</b>	<b>€ 6,795.04</b>	<b>€ 5,328.38</b>	<b>€ 3,861.48</b>	<b>€ 3,964.99</b>
<b>Reimbursement</b>	€ 7,840.00	€ 6,905.45	€ 6,622.14	€ 6,767.36	€ 1,794.93	€ 8,963.60	€ 6,842.00	€ 1,903.17	b)

a) subsumed in overhead costs

b) hospitals are receive budget. It only partly depends on the number of cases treated.

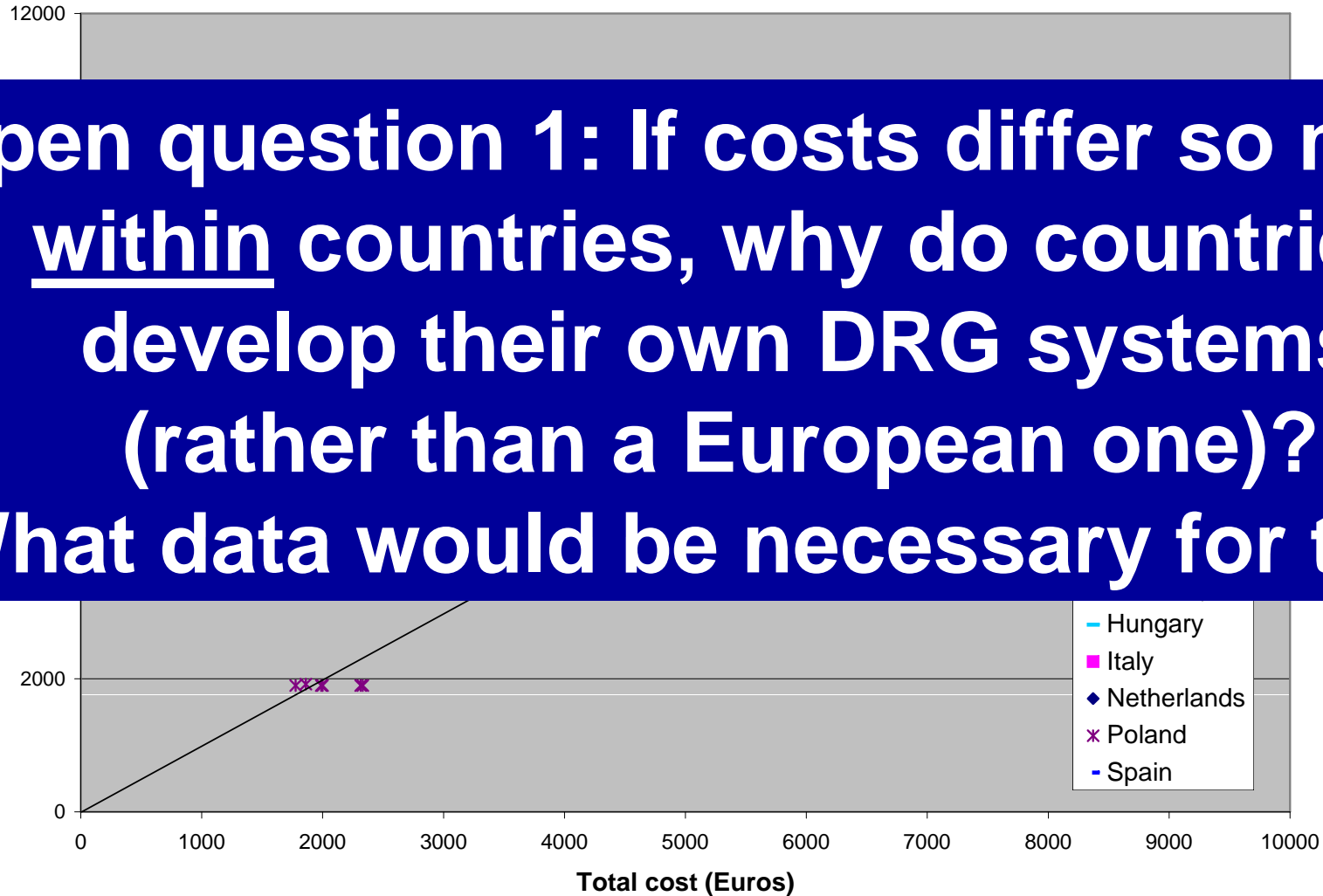
Example: Hip replacement

“Profit“-making plausible through comparatively low case complexity

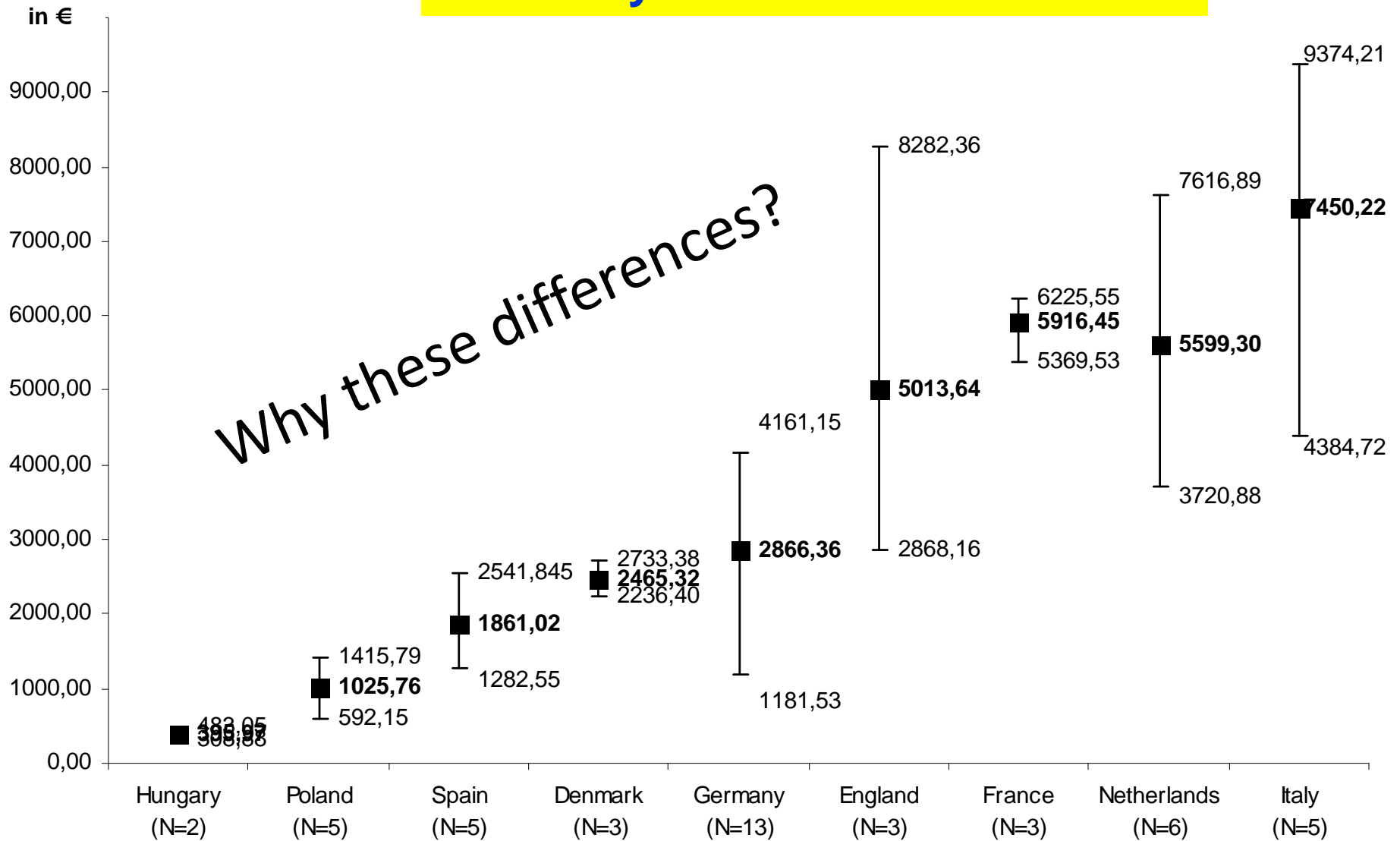


**Example: Hip replacement**

**Open question 1: If costs differ so much within countries, why do countries develop their own DRG systems (rather than a European one)? What data would be necessary for this?**



Acute myocardial infarction

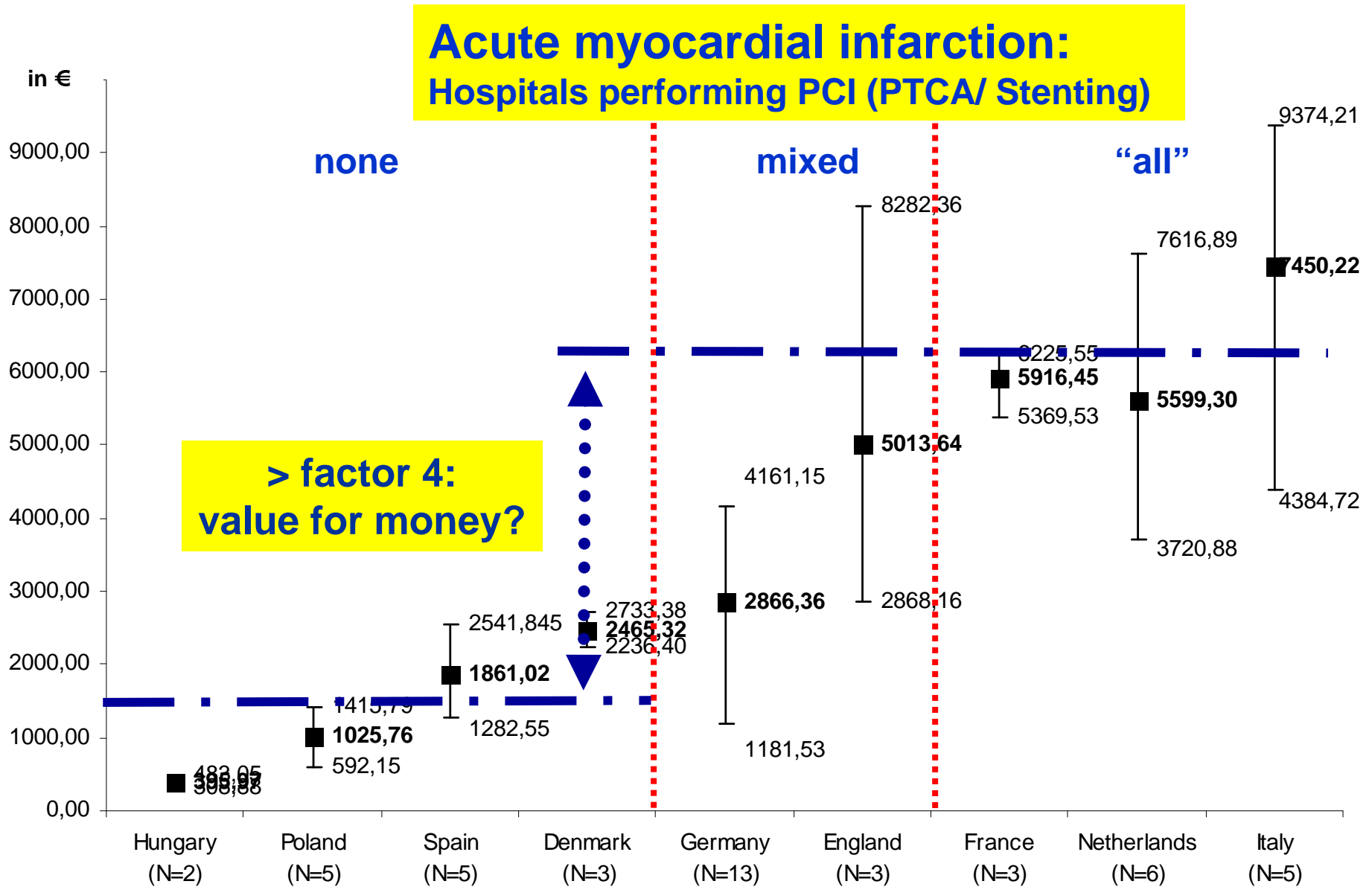


## Acute myocardial infarction

Table 1. Sample Characteristics

	England	France	Germany	Netherlands	Hungary	Italy	Poland	Spain	Denmark*
Hospitals included (no.)	3	3	13	6	2	5	5	5	3
<i>Treatment characteristics</i>									
PTCA (%)	0.33 ± 0.58	0.95 ± 0.05	0.43 ± 0.49	0.91 ± 0.15	0 ± 0	1 ± 0	0 ± 0	0 ± 0	/
PTCA & Stenting (%)	0.33 ± 0.58	0.95 ± 0.05	0.34 ± 0.39	0.91 ± 0.15	0 ± 0	1 ± 0	0 ± 0	0 ± 0	/
Drug eluting Stents	0.05 ± 0.09	0 ± 0	0.08 ± 0.12	0.83 ± 0.41	0 ± 0	0.32 ± 0.34	0 ± 0	0 ± 0	/
Length of stay (days)	6.0 ± 0.08	6.0 ± 1.5	6.9 ± 2.1	5.7 ± 0.08	8.9 ± 2.1	7.0 ± 2.9	11.0 ± 3.0	8.2 ± 1.1	5.9 ± 2.7
<i>Hospital characteristics</i>									
Beds per hospital (no.)	776.3 ± 192.5	486.3 ± 148.5	436.5 ± 193.0	533.3 ± 250.3	608.5 ± 181.7	794.6 ± 312.9	359.4 ± 211.9	401.8 ± 275.6	585.3 ± 175.3
Physicians per hospital bed (no.)	0.34 ± 0.06	0.35 ± 0.04	0.22 ± 0.07	0.27 ± 0.11	0.14 ± 0.06	0.59 ± 0.03	0.27 ± 0.04	0.67 ± 0.09	0.68 ± 0.22
Nurses per hospital bed (no.)	1.56 ± 0.10	1.39 ± 0.22	0.56 ± 0.12	2.62 ± 0.84	0.79 ± 0.09	1.26 ± 0.14	0.76 ± 0.22	2.31 ± 1.37	2.18 ± 1.02
Beds per dept. (no.)	57.8 ± 0	32.0 ± 8.0	90.1 ± 22.9	26.0 ± 10.4	71.5 ± 12.0	34.6 ± 17.1	51.7 ± 4.6	57.8 ± 0	47.6 ± 22.5
Physicians per dept. bed (no.)	0.23 ± 0	0.29 ± 0.05	0.17 ± 0.06	0.22 ± 0.06	0.09 ± 0.11	0.61 ± 0.14	0.17 ± 0.05	0.23 ± 0	0.45 ± 0.14
<i>Country characteristics</i>									
Eurostat Purchasing Power Parities	1.0791	1.0742	1.0526	1.0519	0.6026	1.0275	0.5504	0.9077	1.3479

a) subsumed in overhead costs b) no data available \* for information only; excluded from the further analysis



## Acute myocardial infarction

Table 3. Two-level random intercept regression model

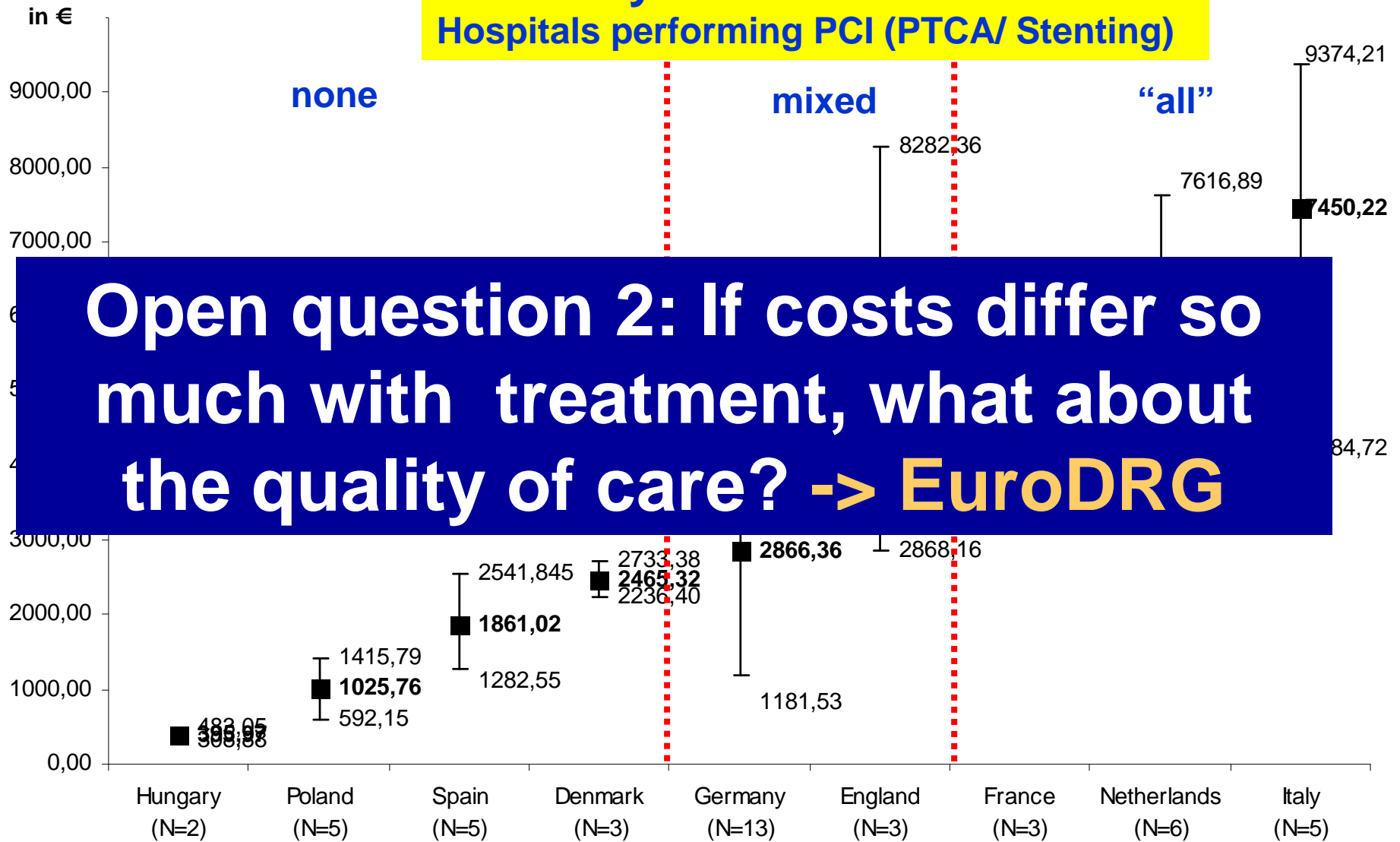
Independent variable	Coefficient	S.E.	t-value	p-value
<i>Treatment characteristics</i>				
PTCA and stenting	0.5249	0.1619	3.24	0.0028***
Length of stay	0.0725	0.0238	3.04	0.0048***
<i>Hospital characteristics</i>				
Urbanity	0.2488	0.1025	2.43	0.0212**
<i>Country characteristics</i>				
PPPs	3.8327	0.6900	5.55	<.0001***

\*\*\*P<0.01, \*\*P<0.05

\*\*\* The coefficient is significant (1%)

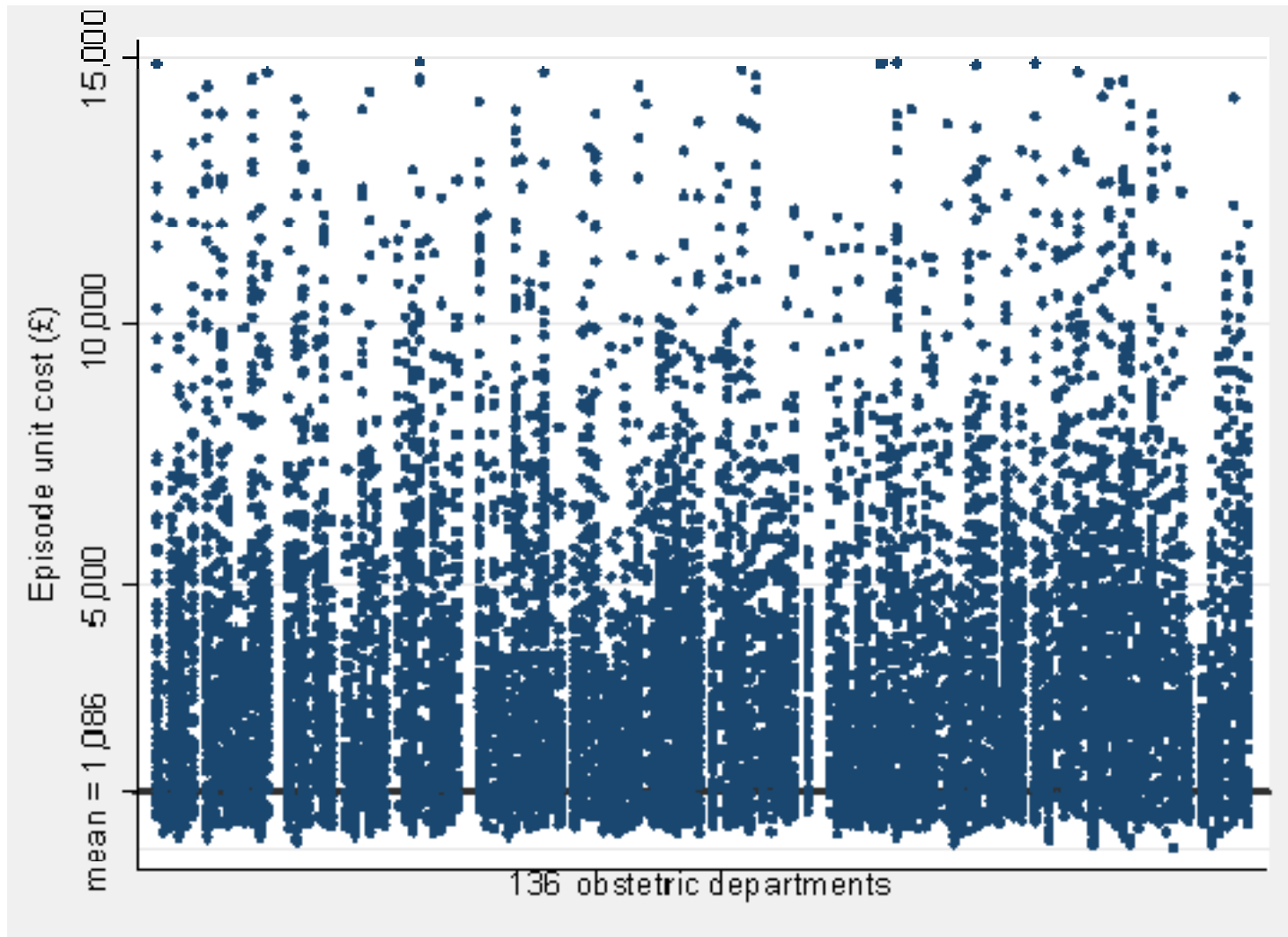
\*\* The coefficient is significant (5%)

**Acute myocardial infarction:  
Hospitals performing PCI (PTCA/ Stenting)**

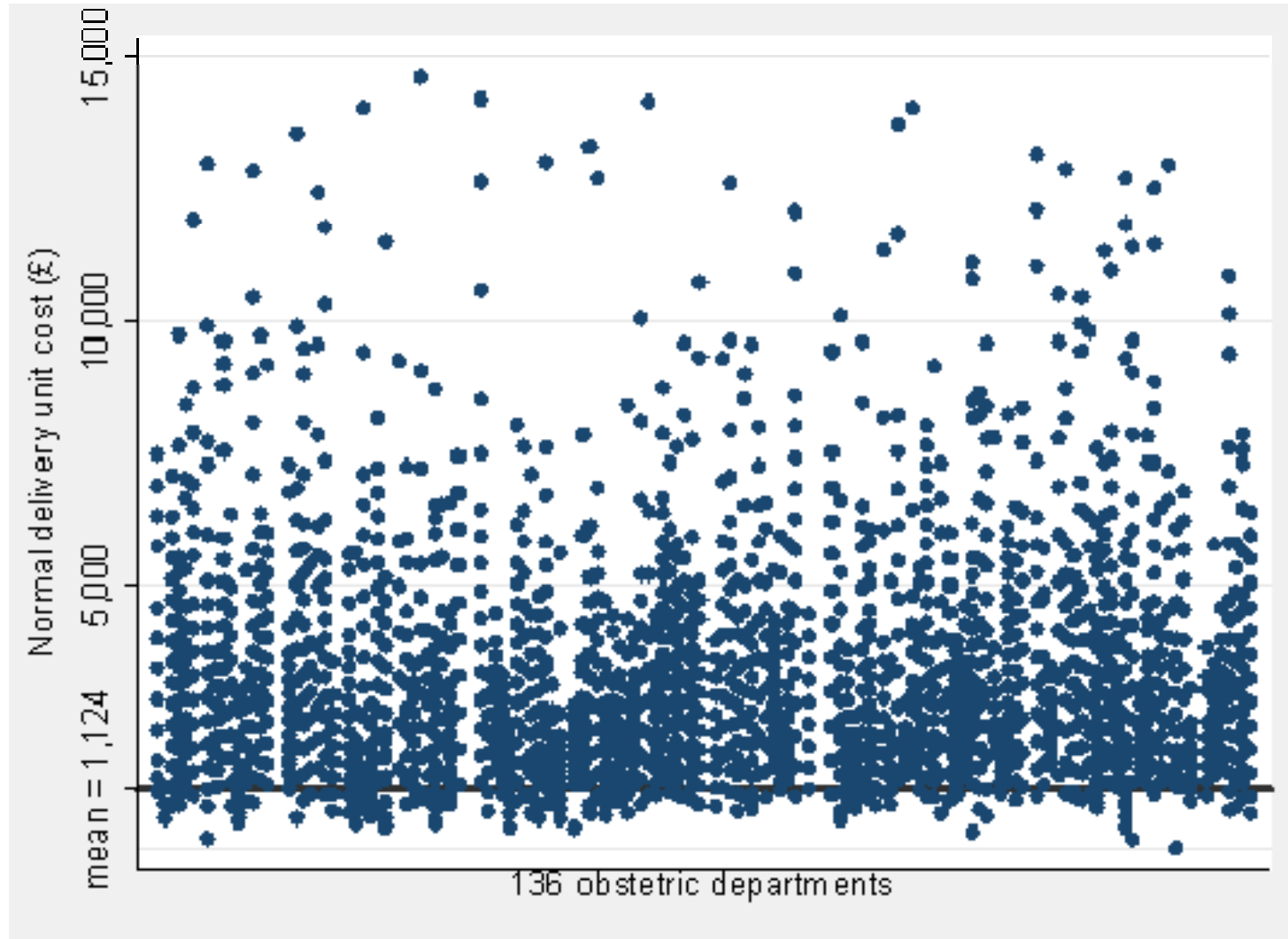


**Open question 2: If costs differ so much with treatment, what about the quality of care? -> EuroDRG**

# Comparing costs within one country in detail: Observed patient costs across English obstetric departments



# Step 1: Limit or adjust patient-mix – Cost of a normal delivery across obstetric departments

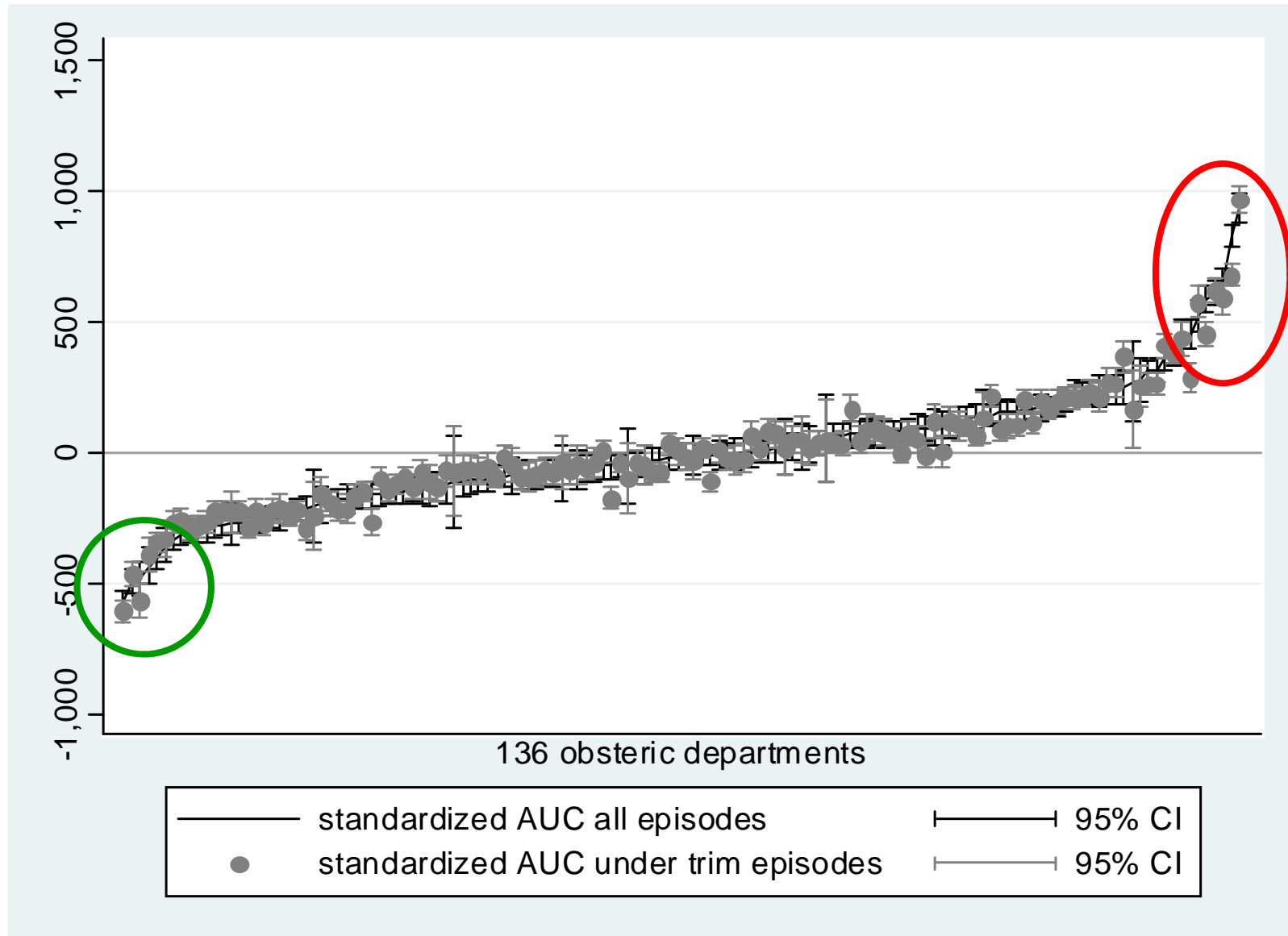


## Step 2: Analysis of variation in average costs between obstetrics departments

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- 19% of the variation in patient costs is related to the obstetrics department where they were treated
- Why are some departments more expensive than others?
  - Volume of patients
  - Staffing levels and mix
  - Insurance contributions
  - Neonatology unit
  - Total obstetrics sites
  - Coding quality
  - Factor prices – Market Forces Factor

# Department ranking: all obstetrics patients



# Development of Episode-specific

## Purchasing Power Parities

### → Definition of homogeneous cost categories

- material costs
- drug costs
- physician costs
- nursing costs
- costs related to diagnostic procedures

Constitute  
> 50% of  
total costs

Care episode	Country								Average
	Germany	England	France	Hungary	Italy	Netherlands	Poland	Spain	
<i>Hip</i>	0.68	0.66	0.60	0.90	0.61	0.61	0.83	0.81	0.71
<i>AMI</i>	0.73	0.68	0.74	0.76	0.55	0.85	0.73	0.74	0.72
<i>Appendectomy</i>	0.64	0.41	0.39	0.68	0.45	0.62	0.46	0.76	0.55
<i>Delivery</i>	0.78	0.43	0.39	0.40	0.34	0.64	0.63	0.78	0.55
<i>Stroke</i>	0.64	0.32	0.52	0.52	0.34	0.39	0.57	0.76	0.51

**Average  
adjusted  
costs per  
case by  
country  
and care  
episode**

Care episode/ Conversion approach	Country							
	Germany	England	France	Hungary	Italy	Netherlands	Poland	Spain
<i>Hip</i>								
Exchange rate	6,365	5,691	6,101	1,294	6,982	5,605	2,125	3,599
GDP per head	6,365	5,372	5,985	4,251	7,771	5,016	9,866	4,929
GDP PPP	6,365	5,551	5,979	2,260	7,152	5,609	4,065	4,174
Medical care PPP	6,365	5,146	6,245	2,782	5,709	5,633	5,121	4,269
ESPPP	6,365	5,646	7,880	4,979	6,924	7,687	5,334	5,770
<i>AMI</i>								
Exchange rate	2,866	5,014	5,916	396	7,450	5,599	1,026	1,861
GDP per head	2,866	4,732	5,803	1,301	8,292	5,011	4,762	2,549
GDP PPP	2,866	4,891	5,798	692	7,632	5,603	1,962	2,158
Medical care PPP	2,866	4,533	6,056	852	6,092	5,627	2,472	2,208
ESPPP	2,866	2,403	2,728	2,060	4,804	2,481	2,154	2,006
<i>Appendectomy</i>								
Exchange rate	1,922	2,037	2,027	469	1,632	1,898	466	594
GDP per head	1,922	1,923	1,988	1,541	1,816	1,698	2,164	813
GDP PPP	1,922	1,987	1,986	819	1,672	1,899	891	688
Medical care PPP	1,922	1,842	2,074	1,008	1,334	1,907	1,123	704
ESPPP	1,922	2,203	2,872	1,362	2,246	1,979	2,429	1,454
<i>Delivery</i>								
Exchange rate	2,365	1,638	2,107	342	1,534	762	400	572
GDP per head	2,365	1,546	2,067	1,124	1,707	682	1,857	783
GDP PPP	2,365	1,598	2,065	597	1,571	763	765	663
Medical care PPP	2,365	1,481	2,157	735	1,254	766	964	679
ESPPP	2,365	3,868	4,751	5,239	4,226	2,552	2,538	2,257
<i>Stroke</i>								
Exchange rate	3,456	6,123	4,337	628	4,588	6,872	1,238	1,932
GDP per head	3,456	5,779	4,255	2,065	5,106	6,150	5,746	2,645
GDP PPP	3,456	5,972	4,250	1,098	4,700	6,877	2,367	2,240
Medical care PPP	3,456	5,536	4,440	1,352	3,751	6,907	2,983	2,291
ESPPP	3,456	5,378	3,859	3,220	5,072	4,473	3,337	2,486

**Open question 3: Does this adjustment hold with better data? Euro-DRG:**

**(1) routine cost and activity data for broader patient categories and**

**(2) Hospital Benchmarking Club.**

**If yes, has more emphasis to be put on exogeneous factors (such as wages) when using DRGs for reimbursement? Could this lead to a European system with differing base rates (as in US)?**

GDP per head	3,138	3,779	4,233	2,883	3,188	3,138	3,778	2,843
GDP PPP	3,456	5,972	4,250	1,098	4,700	6,877	2,367	2,240
Medical care PPP	3,456	5,536	4,440	1,352	3,751	6,907	2,983	2,291
ESPPP	3,456	5,378	3,859	3,220	5,072	4,473	3,337	2,486



**... taking up the open questions, based on the observation that costs differ due to three groups of factors:**

**(1) Patient characteristics, i.e. main diagnosis, age, sex, secondary diagnoses (upon admission)**

**(2) Medical/ treatment variables, i.e. procedures/ technologies used, type of ward (e.g. intensive care), intensity of inputs (e.g. personnel), length of stay, secondary diagnoses (-> complications)**

between (2) and (3): activity levels

**(3) Exogenous factors**

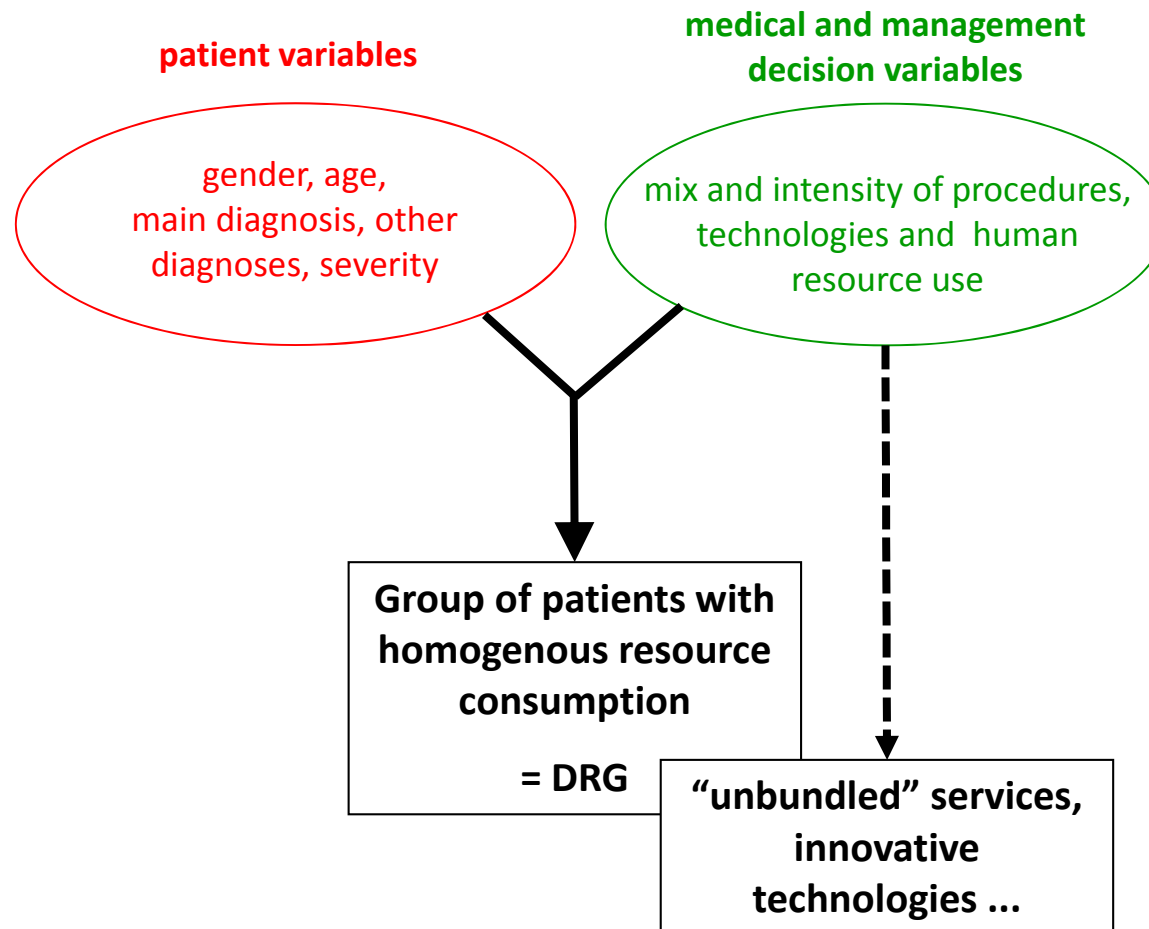
- at hospital level: size (beds, personnel), emergency room, teaching status

- at regional/national level: wage level, costs of other inputs

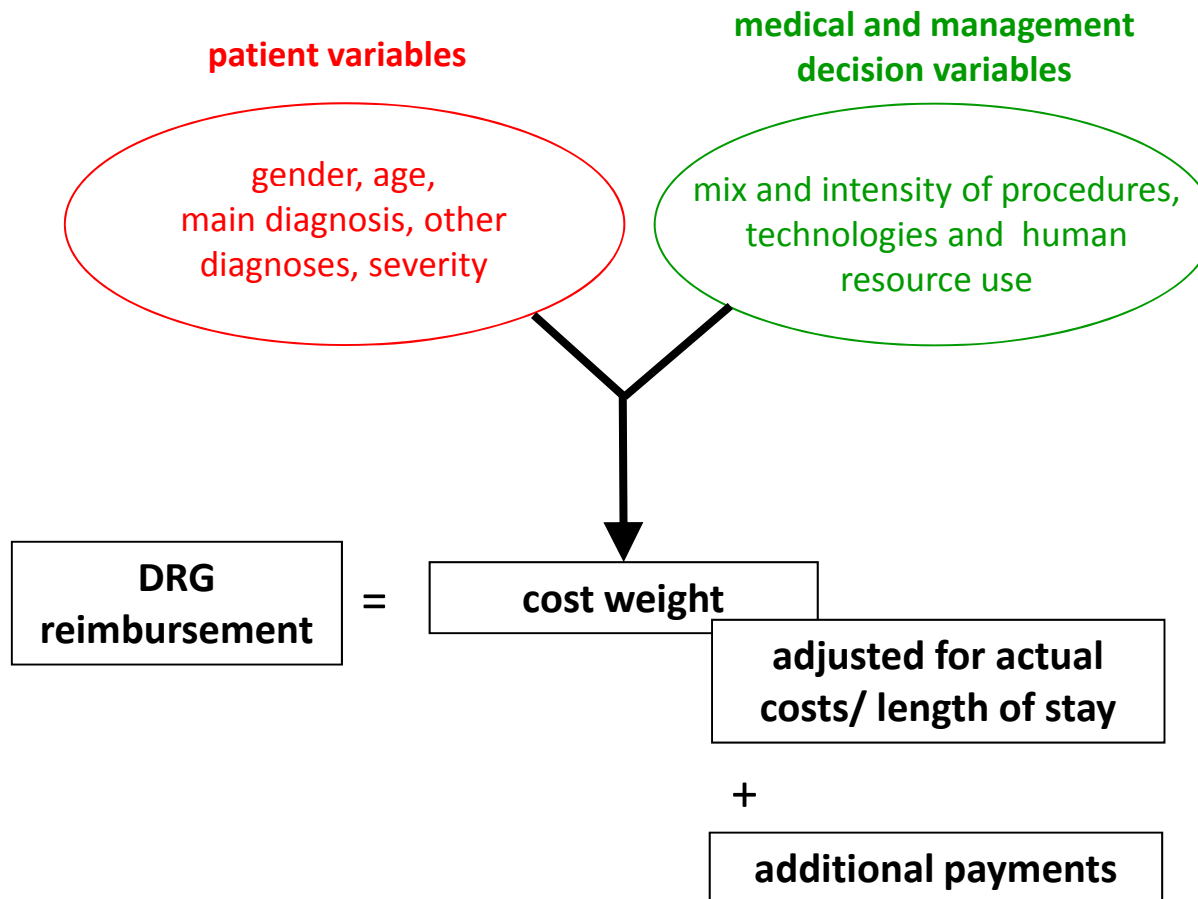


**Countries in (HealthBASKET and) EuroDRG projects**

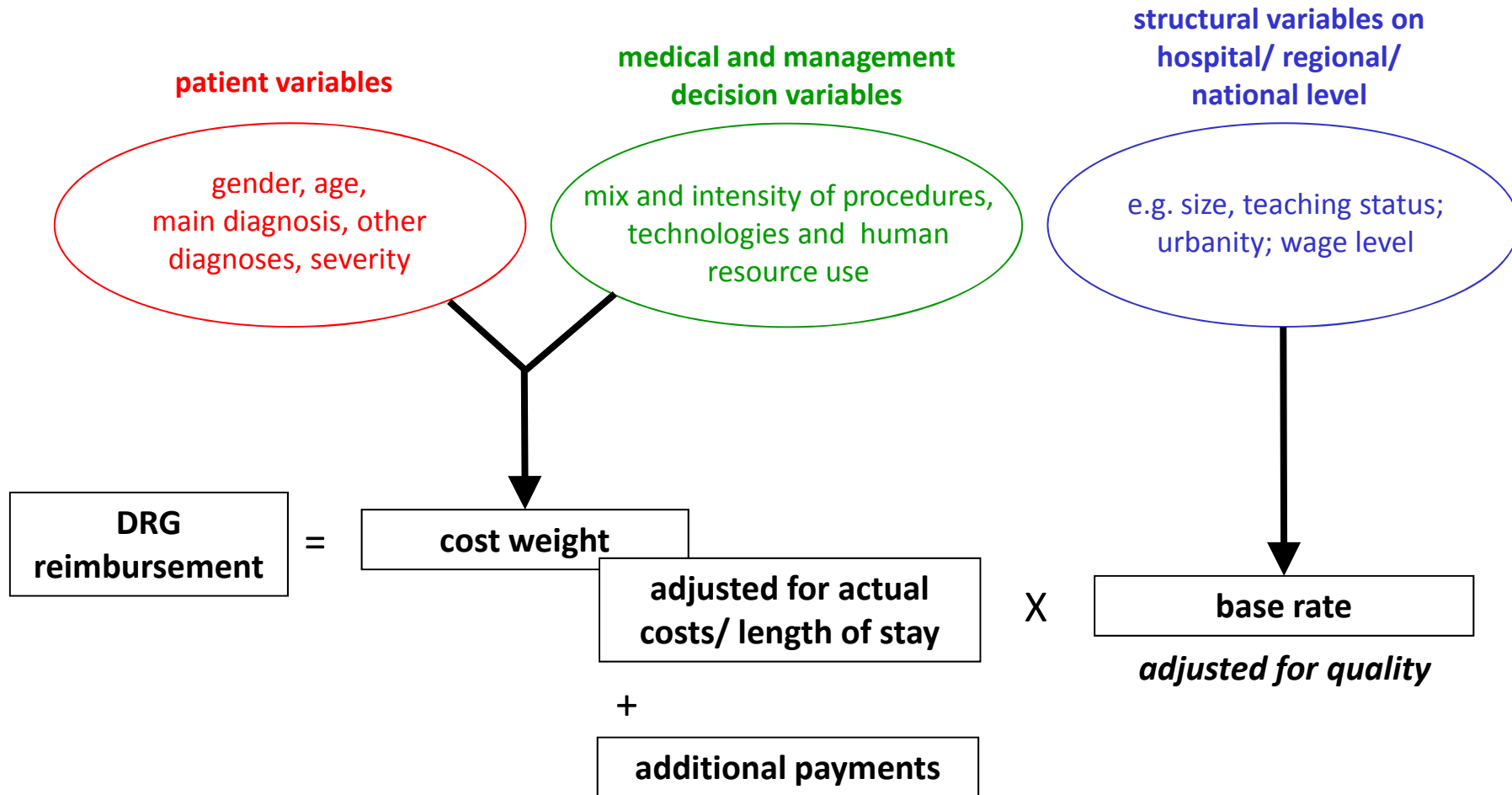
# Understanding the role of the 3 factors in cost differences and price setting (1)



# Understanding the role of the 3 factors in cost differences and price setting (2)



# Understanding the role of the 3 factors in cost differences and price setting (3)



## determinants of hospital costs for 10 episodes of care

patient variables

gender, age,  
main diagnosis, other  
diagnoses, severity

medical and management  
decision variables

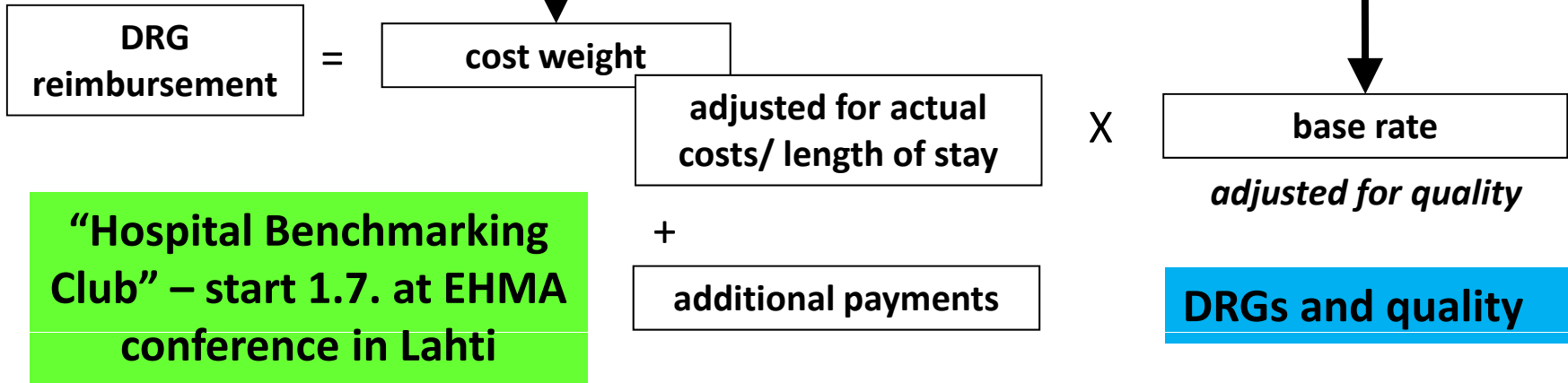
intensity of procedures,  
technologies and human  
resource use

structural variables on  
hospital/ regional/  
national level

e.g. size, status;  
wage level

**Phase II (2010): within countries**

**Phase III (2011): across countries**



material5\_EoC\_feasibility.xls [Kompatibilitätsmodus] - Microsoft Excel

Start Einfügen Seitenlayout Formeln Daten Überprüfen Ansicht

Calibri 8 A A Standard Bedingte Formatierung Als Tabelle formatieren Zellenformatvorlagen Einfügen Löschen Format Sortieren Suchen und Auswählen Bearbeiten

Zwischena... Schriftart Ausrichtung Zahl Formatvorlagen Zellen

N1 Poland - NHF

	A	D	G	J	M	N	O	P	S	V	Y
		Finland - THL	England - CHE	Austria - MSIG	Netherlands -	Poland - NHF			Spain - IMAS	Germany - TUB	Sweden - CPK
	EoC and related questions	Recommended for inclusion? (yes/no)	Recommended for inclusion? (yes/no)	Recommended for inclusion? (yes/no)	Recommended for inclusion? (yes/no)	Can you differentiate the	Remarks	Recommended for inclusion?	Recommended for inclusion? (yes/no)	Recommended for inclusion? (yes/no)	Recommended for inclusion?
3	1. Breast cancer										
4	Types of carcinoma (invasive and not invasive)	no	NO - CANNOT IDENTIFY DISEASE STAGE, SO COMPARABILITY PROBLEMATIC	yes, however we should explicitly in- or exclude certain treatments.	We could have a clear picture of breast cancer.	Yes	ICD10		YES	yes, but cannot identify disease stage	
5	Stages of the disease (TNM, IJCC, ...)					No					
6	Protein and gene expression status (oestrogen receptor)					No					
7	Types of treatment: surgery, radiation, hormone, immune					Yes	excluding hormone immune				
8	Types of surgery: tumourectomy, mastectomy -					Yes	ICD9				yes
9	2. Colorectal cancer										
10	Location of the cancer, i.e. in the colon (possibly further)	no	NO - CANNOT IDENTIFY DISEASE STAGE, SO COMPARABILITY PROBLEMATIC	yes, but a detailed definition is required	We could have a clear picture of colorectal cancer. However, we can not identify patients who had both surgery and chemotherapy.	Yes	ICD10		YES	yes, but cannot identify disease stage	
11	Stages of the cancer (TNM, IJCC, Dukes classification, ...)					No					
12	Types of treatment: surgery, radiation, chemotherapy					Yes	ICD9				
13	Extent of surgery (both within colon/rectum and other)					Yes	ICD9				yes
14	3. Diabetes mellitus										
15	Types of diabetes (type 1 and 2)	yes, although is complicated	NO	yes	It is rather difficult to get a clear picture of diabetes mellitus.	Yes			YES	yes	
16	Reason for admission (e.g. ...)					Yes					

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- explore meaningful and feasible ways of implementing a benchmarking system between hospitals on a European level,
- introduce the application of a common benchmarking system that adjusts for differences in costs taking patient variables, technology use and structural variables into account in order to allow fair comparisons of costs, quality and efficiency,
- create an experience exchange forum for European hospital managers.

- HBC is especially interesting for hospitals which
  - cannot compare themselves to other hospitals in their own county (e.g. university hospitals in small countries),
  - are part of chains operating in different European countries,
  - are interested in attracting patients from other European countries.
- Prerequisites
  - reasonably good coding of patients (→ risk-adjustment) and procedures
  - reasonably good cost-accounting allowing calculation of costs/patient
  - willingness to share data
  - willingness to invest time (and travel costs)

- Today
  - Selection of episodes
  - Agreement on important steps and timelines
- Next steps
  - Finding (more) hospitals to participate
  - (e-)meeting of participating hospitals
  - Data gathering
  - Working group at next EHMA meeting in Porto 06/11
  - Presentation at final EuroDRG conference in Berlin 11/11  
*(managers of HBC hospitals will be invited)*

Final conference regarding policy conclusions in November 2011 in Berlin:

- Are hospital services and costs across European countries really so different to justify different systems for patient classification and cost weights? Could cost differences be handled through base rate adjustments?
- What do we know regarding the effects on hospital efficiency and quality of service delivery under DRGs?



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