

DRGs – where next for Europe?

HealthBASKET -> EuroDRG

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- **The policy question:** Why do costs of health services differ among EU countries at the micro level?
- **Our research questions:**
 1. What is a “health service“ and how is it defined? (Phase I -> *European Journal of Health Economics*)
 2. How are prices (and underlying costs) calculated per service? (Phase II -> special issue on DRGs of *Health Care Management Science*)
 3. Do prices/ reimbursement rates differ (for similar patients)? Are differences explained by systematic factors (e.g. in/exclusion of capital costs), differences in service intensity/ technologies used or costs per service? (Phase III -> *Health Economics*)



Countries in HealthBASKET (and EuroDRG) projects



Countries in (HealthBASKET and) EuroDRG projects



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Phase I (1)

- clear trend towards a more explicit definition of **benefit baskets** and benefit catalogues in European health care systems.
- Taxonomy 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 ...)



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Phase I (2)

- motivation to establish an explicit benefit basket of services is not always cost-containment or rationing but e.g. to assure equity among the regions
- 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



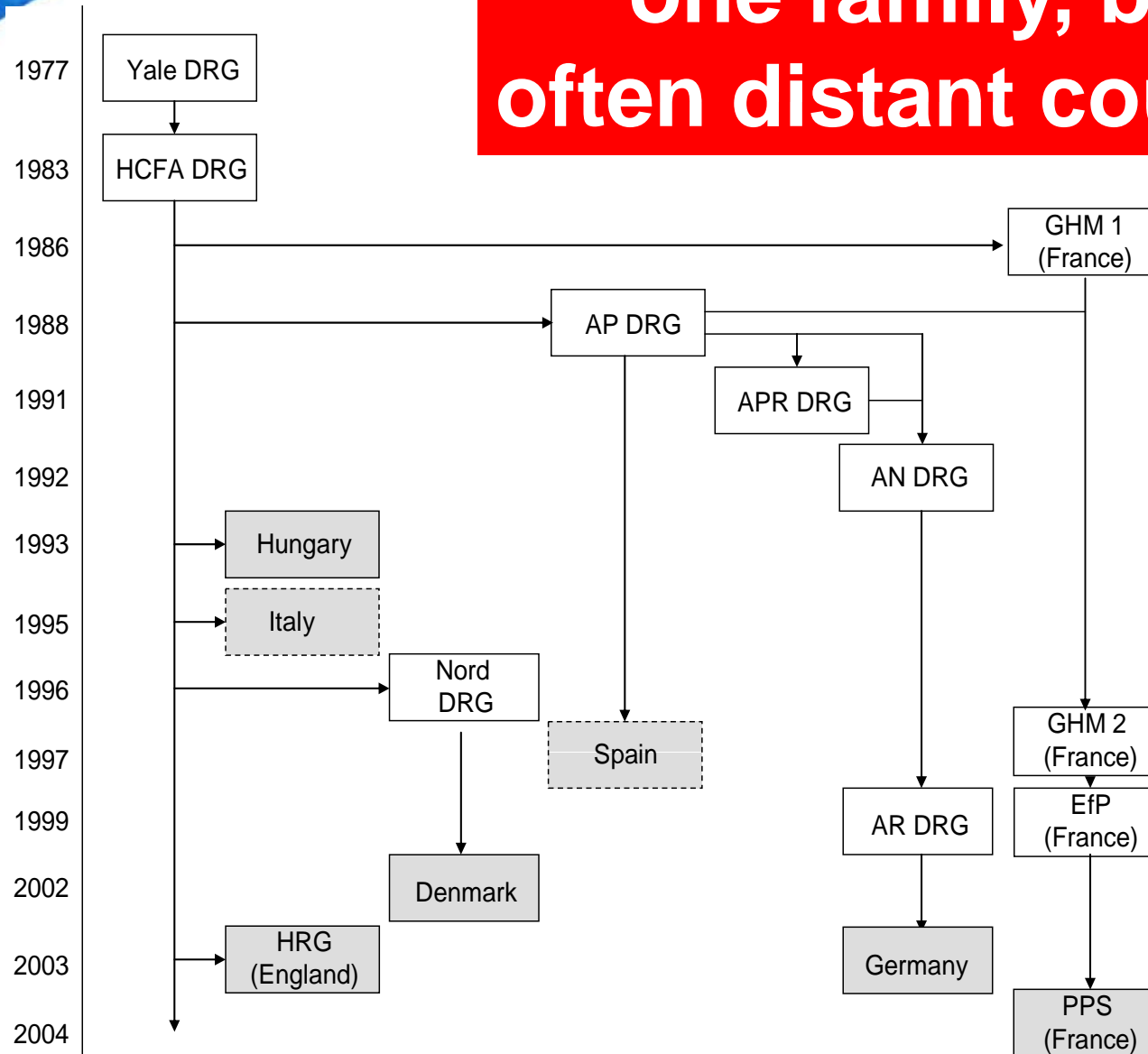
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Phase II (1)

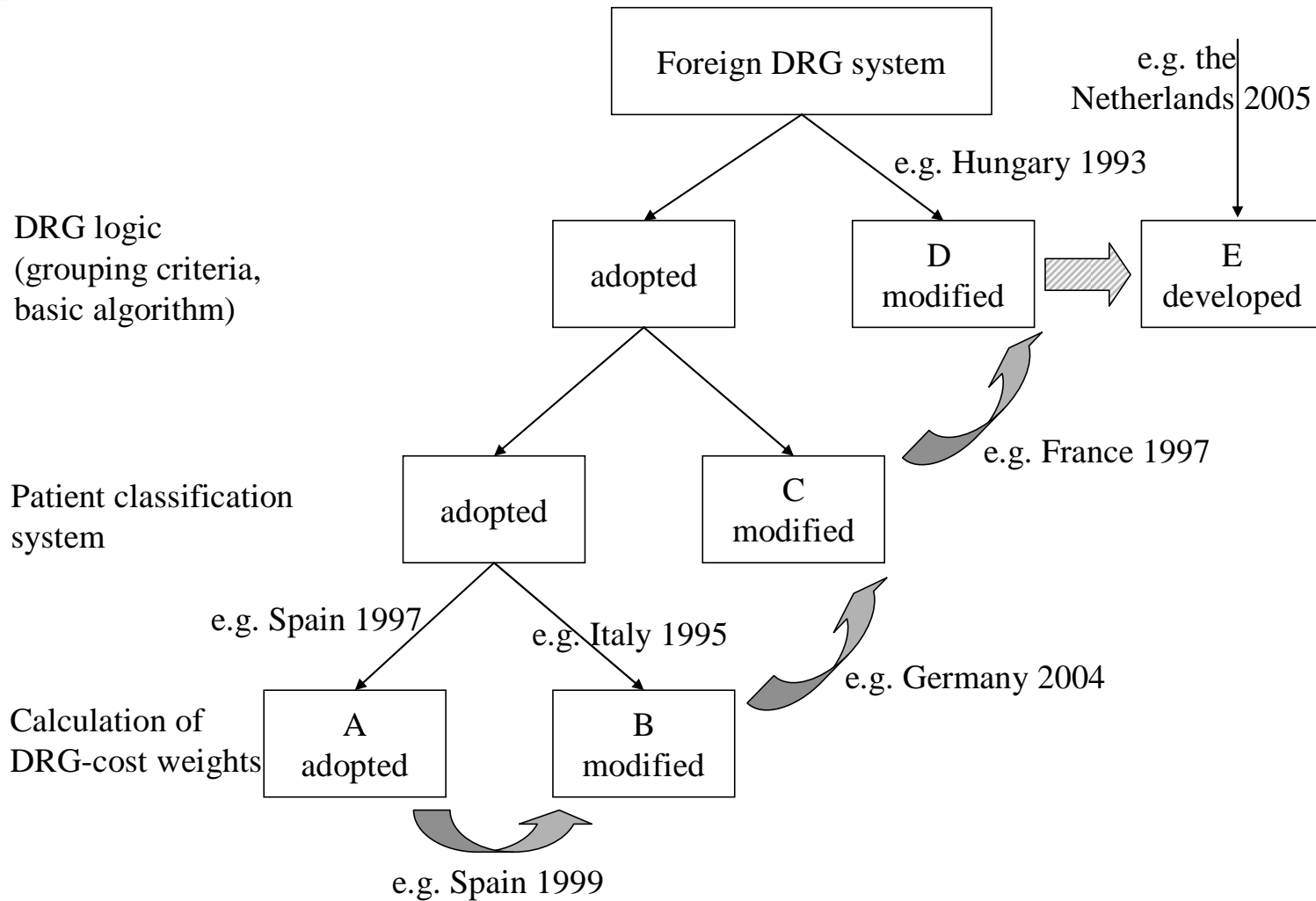
- Most countries have installed activity-based remuneration schemes for in- and outpatient services; often lacking for long-term care, rehabilitation etc.
- clear trend towards the use of micro-costing data (especially for inpatient services -> DRGs) to determine remuneration rates, reflecting actual costs of providers

DRG systems – one family, but often distant cousins





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Steps in the development of DRG-systems



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Phase II (2)

- 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 provider level might be well-justified and “necessary” but enforcing one methodology conflicts with the principle of subsidiarity.
- > we used a self-developed standardised method



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Phase III: Methodology of „Case vignettes“ for 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)



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An example: Hip replacement

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
Example: Hip replacement					
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>				



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Example: Hip replacement

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

	Denmark	England	France	Germany	Hungary	Italy	Netherlands	Poland	Spain
Diagnostic Procedures									
- 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
Normal/Intensive Ward									
- 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
Operation (including wake-up room)									
- 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
Drugs	€ 59.63	€ 571.28	€ 60.99	€ 178.85	€ 72.50	€ 74.30	€ 104.12	€ 175.13	€ 46.20
Overhead	€ 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	77.5%	28.7%	36.2%	26.3%	10.0%	37.7%	32.2%	15.1%	18.9%
TOTAL COST	€ 5,932.24	€ 5,690.94	€ 6,101.09	€ 6,365.20	€ 1,293.81	€ 6,981.90	€ 5,604.92	€ 2,125.36	€ 3,599.02
Total cost (adjusted by PPP)	€ 4,401.10	€ 5,273.78	€ 5,679.66	€ 6,047.12	€ 2,147.05	€ 6,795.04	€ 5,328.38	€ 3,861.48	€ 3,964.99
Reimbursement	€ 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.

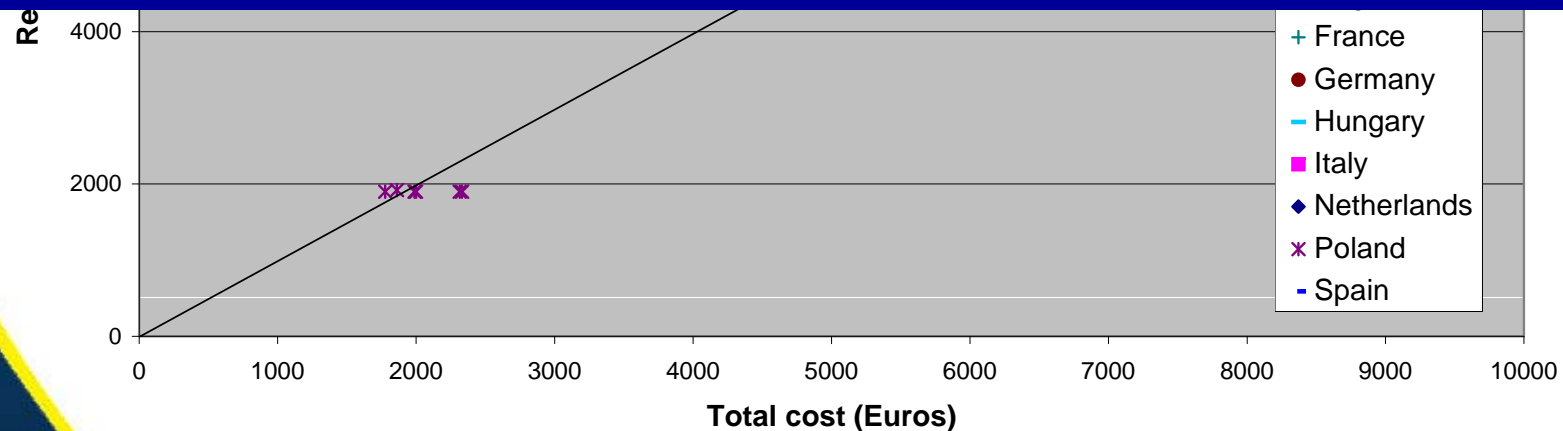


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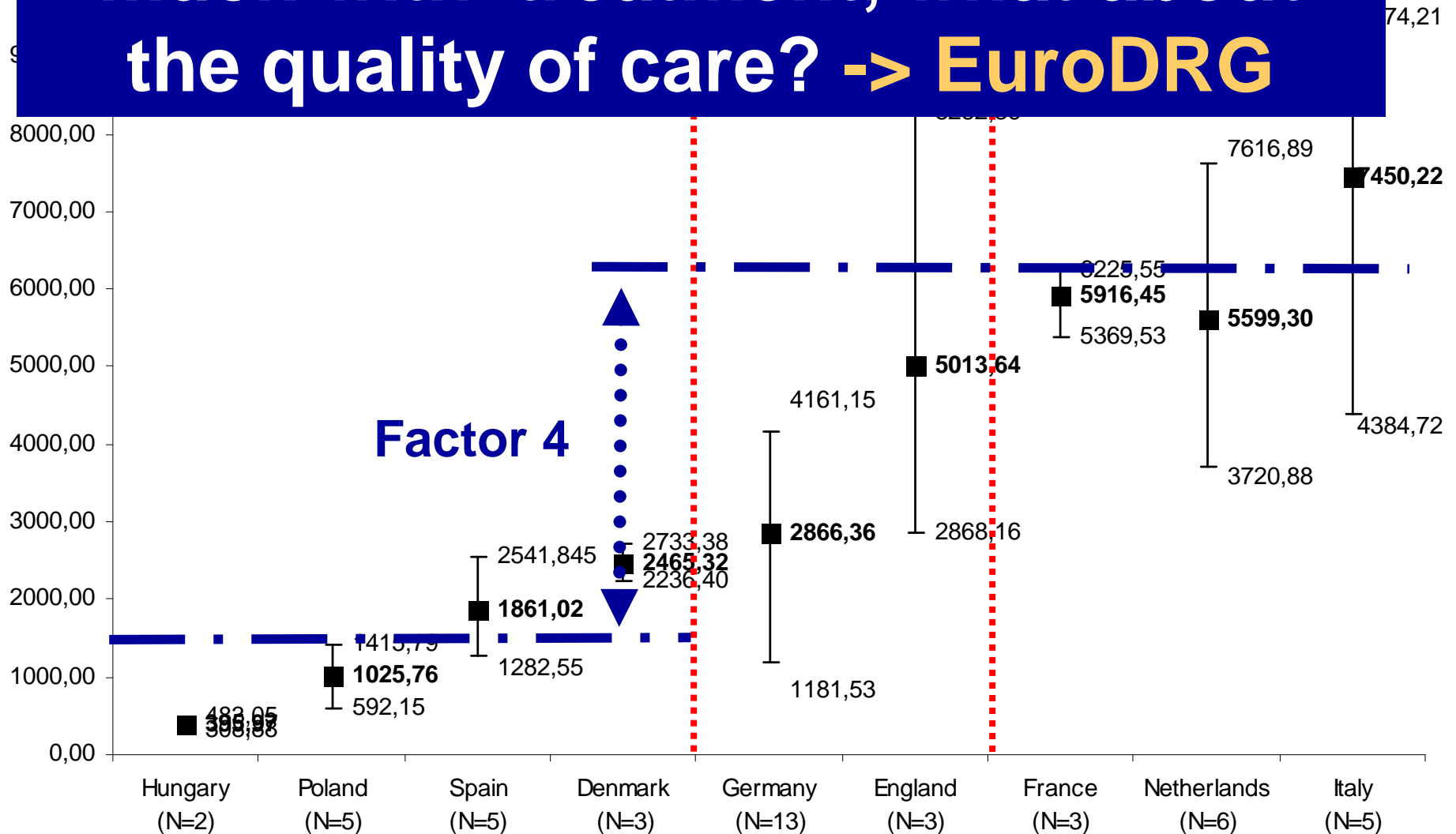


Example: Hip replacement

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?



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



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%)



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	Hip replace- ment	Stroke	Acute myocardial infarction	Normal delivery	Appen- dectomy	Cataract	Tooth filling
Technology/ procedure	** (non- cemented vs. cemented)	* (% with thrombo- lysis)	** (% of PTCA with stenting)		** (laparo- scopic vs. open surgery)	* (soft vs. hard lens)	*_** (% with imaging)
Personnel input (time)						***	
Length-of-stay		*	**	**		*	** (treat- ment time)
Hospital characteristics							
Beds/ hospital	*				**		
Nurses/ bed					(*)		
Urbanity			*				
Setting						***	
Cost of personnel/ hour				** (nurses only)		***	
Purchasing power parities (PPP)	***	#	***		***		#

* significant at .05 level, ** significant at .01 level, *** significant at .001 level, (*) only in one model, # PPP not used as explanatory variable but to adjust costs as dependent variable



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Our analyses show that ...

- use of technology is a major explanation for certain vignettes (hip replacement, acute myocardial infarction, appendectomy ...)
 - skills mix and usage intensity may make a difference (normal delivery ...)
 - length of stay plays a role (especially if shortened by early discharge to rehabilitation; e.g. stroke)
 - costs per resource unit (especially for personnel) do differ – as much or more than technology usage
- > *for efficiency comparisons, adjustment of input costs necessary*

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

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 cost weights (as in US)?

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

EuroDRG (funded under the 7th EU Research Framework Programme 2009-2011)

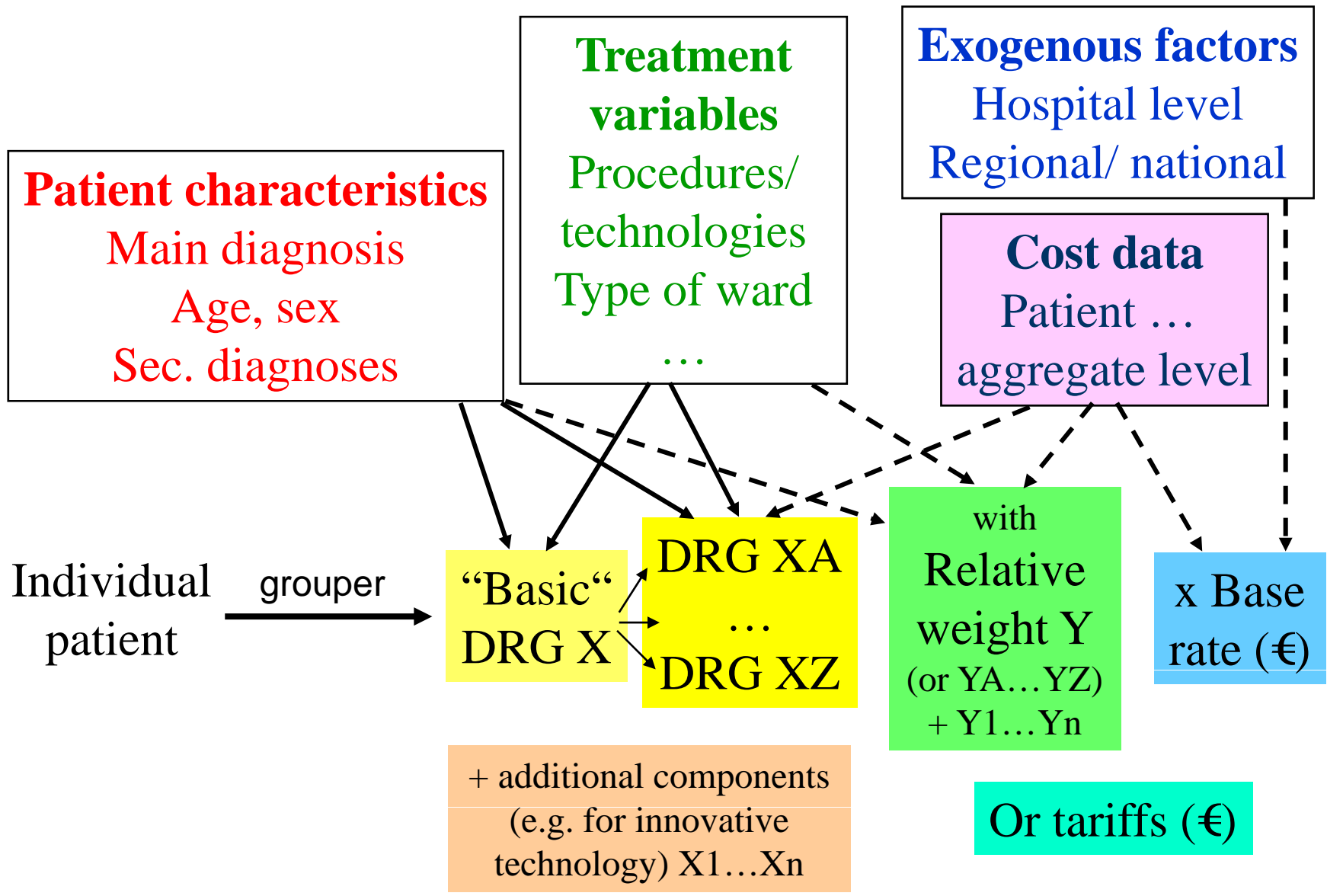
... taking up the open questions, based on the observation that

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)**

(3) **Exogenous factors** between (2) and (3): activity levels
- at hospital level: size (beds, personnel), emergency room, teaching status
- at regional/national level: wage level, costs of other inputs



Patient characteristics
 Main diagnosis
 Age, sex
 Sec. diagnoses

Treatment variables
 Procedures/
 technologies
 Type of ward
 ...

Exogenous factors
 Hospital level
 Regional/ national

Cost data
 Patient ...
 aggregate level

Individual patient → grouper

“Basic“
 DRG X

DRG XA
 ...
 DRG XZ

with
 Relative
 weight Y
 (or $Y_A \dots Y_Z$)
 + $Y_1 \dots Y_n$

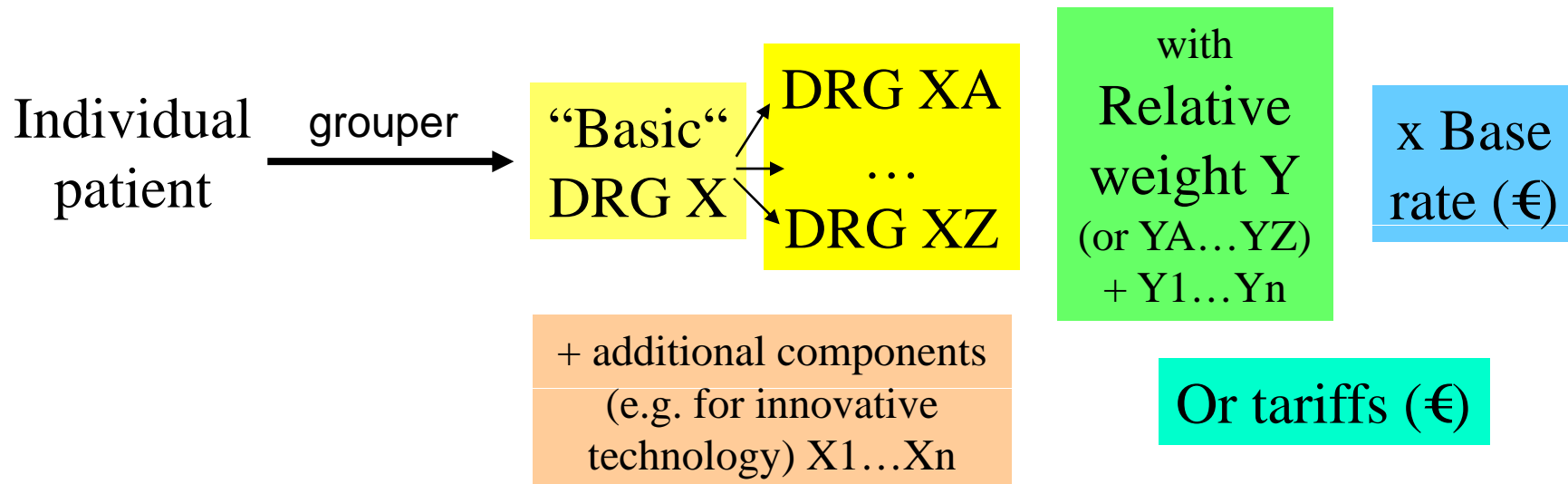
x Base
 rate (€)

+ additional components
 (e.g. for innovative
 technology) $X_1 \dots X_n$

Or tariffs (€)

Possible way of importing/ standardising:

1. X, Y and Z imported
2. X & Y imported, Z developed/ calculated locally
3. X imported, Y & Z developed/ calculated locally
4. X, Y and Z developed/ calculated locally – but classification algorithm of diagnoses, procedures ... imported
5. everything developed/ calculated locally



Possible way of importing/ standardising:

1. X, Y and Z imported
2. X & Y imported, Z developed/ e
3. X imported, Y & Z develo
4. X, Y and Z develop
5. everyth

Many European countries start at 2, then move to 3, 4 and 5.

Shouldn't we aim at least for number 4 (= common diagnoses & procedure classification and algorithm), possibly 3 (common definition of DRGs) or 2 (+ uniform relative weights) at European level?

Or tariffs (€)

rate (€)

... Y_n

X₁...X_n