

Comparative Analysis of Casemix-based Efficiency Measures and Use among three countries: South Korea, France, UK (England)

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PCSI in Slovenia 29 May 2024

Outline

- I. Introduction
- II. Health System and Implementation
- III. Efficiency Measures
- IV. Comparative Analysis and Results
- V. Conclusion and Implication

I. Introduction

❖ The Background is . . .

- The challenges and responses to the healthcare financing crisis vary across countries
- The approach to healthcare financing issues can vary depending on the differences in the healthcare environment and the features of existing hospital payment systems
- Efficient and Equitable management of healthcare budgets and hospital finances and the implementation of Casemix-based Funding System(CbFS) are common across the country

❖ Goals are . . .

- To compare three systems(Market-based, Public-based, Mixed-based) to see the extent to which the Efficiency has been achieved
- To explore the Efficiency Measures across countries before and after CbFS implementation

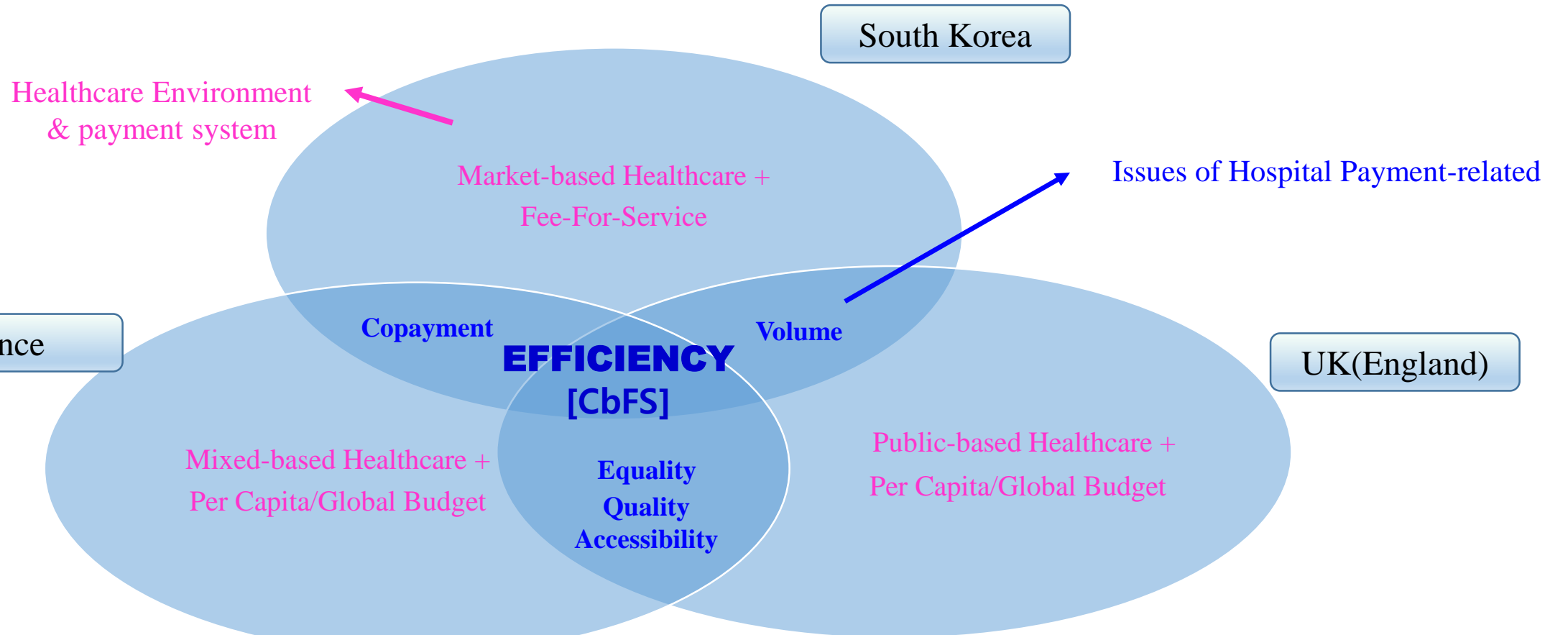
❖ The Tool is . . .

- The country-specific measures and effects through the frames of Technical Efficiency(TE) and Allocative Efficiency(AE)

I. Introduction

(Different) Healthcare & Typical Payment systems

(Same) Casemix-based Funding System & Efficiency issue



* CbFS : Casemix_based Funding System

II. Health System and Implementation

Health System

- **South Korea**
 - **Market-based Healthcare system**
 - : Private for Non-profit providers(90% of total number, 2023)
 - Profit-seeking behaviors and performance
 - Competition among providers to attract patients (hospitals vs. clinics, Acute vs. Chronicle)
 - Payment System: almost 95% of total inpatient spending under Fee-For-Service(in 2023)
- **France**
 - **Mixed Healthcare Providing System**
 - : **Hospitals** CbFS budget since 1997; from 500 DRG groups to 2500 DRG Groups
 - : **Private Physicians** and **Medicines** Fee-For-Service
 - Universal Health Coverage
 - : Tax on all income and mandatory public insurance
 - NHS financial law each year with a splitting
 - : Hospitals, Ambulatory Care, Medicines Public Health

Implementation

- **South Korea**(Private for non-profit hospitals/7-diseases DRGs CbFS)
 - 2006-2012: CbFS for 7-diseases DRGs(Voluntary/Pilots)
 - 2012, 2013: CbFS for 7-diseases DRGs (**Mandatory**)
 - 2018: CbFS for **All-diseases** DRGs (Voluntary/Pilots)
 - 2020: **Cost-based** CbFS for 7-diseases DRGs

※ 7-disease DRG groups are 25 in 2020. (Version KDRG3.5)
Major Lens Procedures, Tonsillectomy & Adenoidectomy, Appendectomy, Inguinal & Femoral Hernia Procedure, Anal Procedure, Laparoscopic Hysterectomy for Non-Malignancy, Cesarean Deliver
- **France**
 - **CbFS for all hospitals**
 - : 1997, 2002 Casemix based Budget (500 groups, cost index by group)
 - : 2003 to day Prospective Payment System PPS(2500 groups, cost by group)
 - FFS only for **Private Physicians** in Private For Profit hospitals

II. Health System and Implementation

Health System

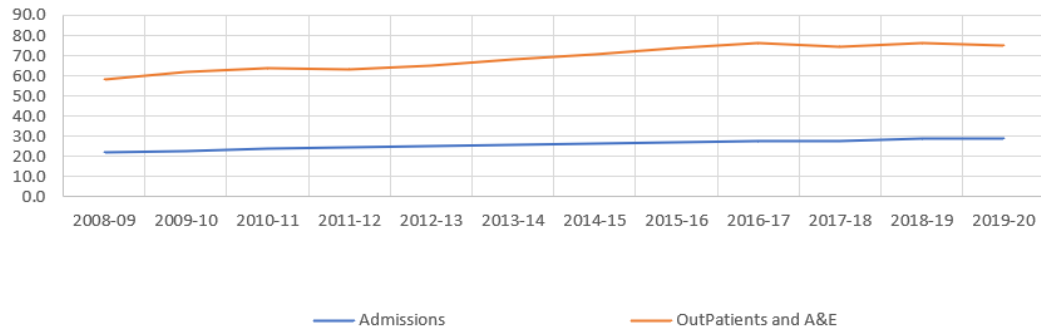
- **UK(England)**
 - In 2019-20 the **NHS funded** around 29 million hospital **admissions** and 75 **outpatient** and A&E services.
 - Services are mostly provided by **NHS hospitals**, but are augmented by a significant number of **Privately operated Hospitals**.
 - The number of services has increased steadily until the COVID pandemic in 2020.
 - BED numbers have approximately halved in the last 30 years. This has been achieved by falling lengths of stay and greater use of day admission.
 - In November 2022 there were 132,900 doctors, 350,600 nursing staff (including midwives and health visitors) and 36,600 managers in the NHS out of a total workforce of 1.26 million (all figures are full-time equivalent).

Implementation

- **UK(England)**
 - England Casemix system (Healthcare Resource Groups):
 - Launched 1991 (534 groups) for **benchmarking and performance assessment**.
 - Used in some contracts during the late 1990's
 - Expanded to HRG3 (572 groups) in 1997 and further refined (6.10 Groups) in 2003. CbFS used for some HRGs .
 - **HRG4 introduced in 2006-07 to collect costs and for funding 2009-10**. This doubled the number of HRGs and extend the classification to non-inpatients.
 - HRG4+ were defined over a period of 3 years eventually resulting in around 2700 categories..
 - HRG4 and 4+ have and **national prices** in been used to fund hospitals under CbFS (In UK PBR) for the majority of inpatients since 2013-14.
 - Recently NHEngland has moved away from National prices and uses CbFS for elective patients and day cases only.

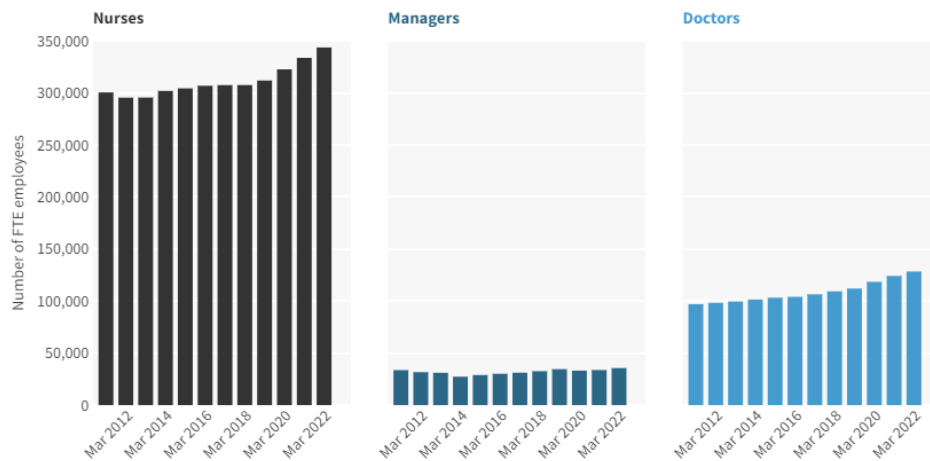
NHSEngland Trends

NHSEngland Commissioned Hospital Activity (millions)
2008-09 to 2019-20



Source: <https://www.england.nhs.uk/statistics/statistical-work-areas/hospital-activity/quarterly-hospital-activity>

Compared to 2011 the number of doctors and nurses rose, while the number of managers is broadly similar

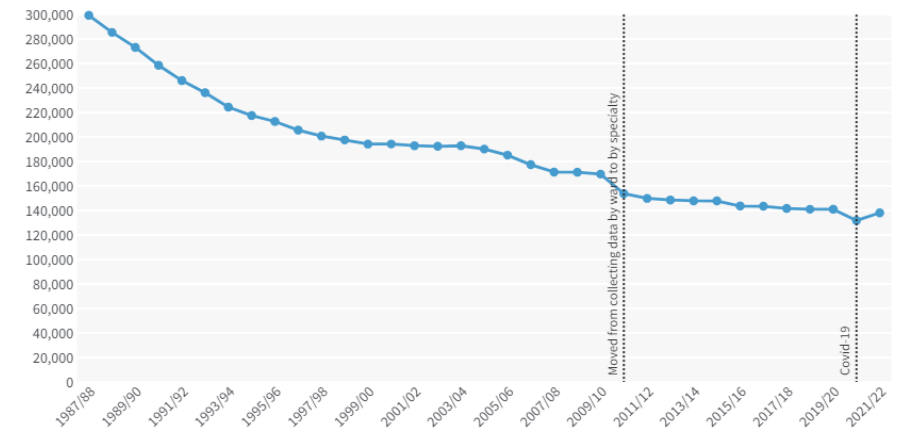


Source: [NHS Digital](#) • Number of full-time equivalent staff working in hospital and community health services. Excludes GPs, staff in private hospitals and those working in national bodies. Nurses includes midwives and health visitors and doctors includes consultants.

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The number of hospital beds in England has halved over the past 30 years

Average number of hospital beds (overnight and day only)

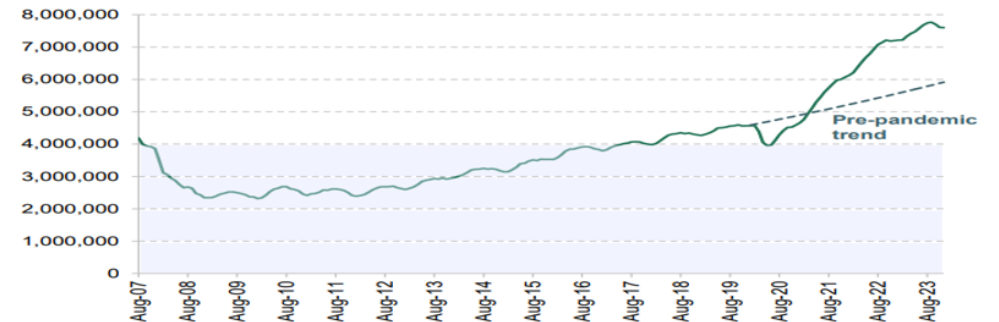


Source: [NHS England \(1987/88 - 2009/10\)](#), [NHS England \(2010/11 onwards\)](#)

The fall in bed numbers in 2020/21 reflects the impact of the Covid-19 pandemic, for example infection control measures meaning few beds can be accommodated in the same space.

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Size of Waiting Lists in England 2007 to 2023



Note: Pre-pandemic trend calculated using the average monthly growth rate between January 2016 and January 2020.

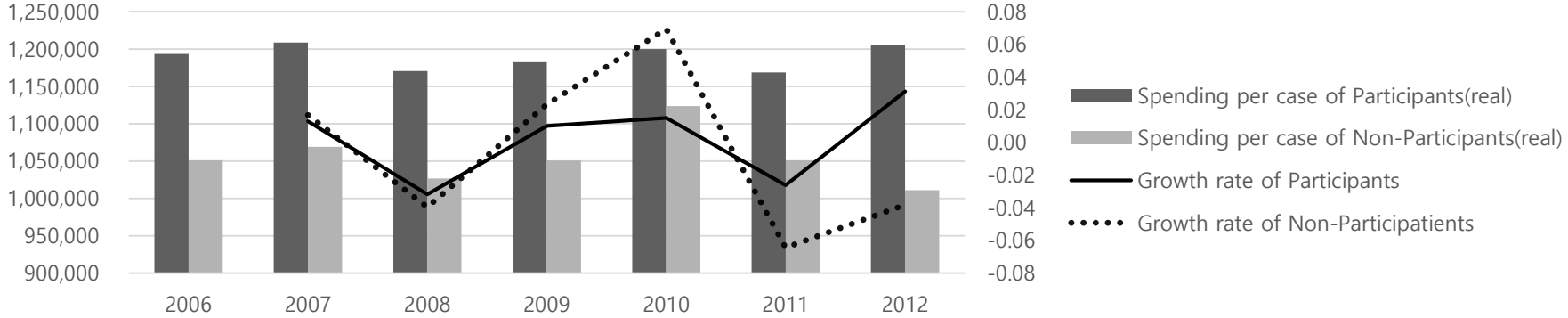
Source: Graphic: The past and future of NHS waiting lists in England, IFS Report R302, Warner & Zaranko Feb 2024

Data: NHSEngland 2024a

III. Technical Efficiency Measure(South Korea)

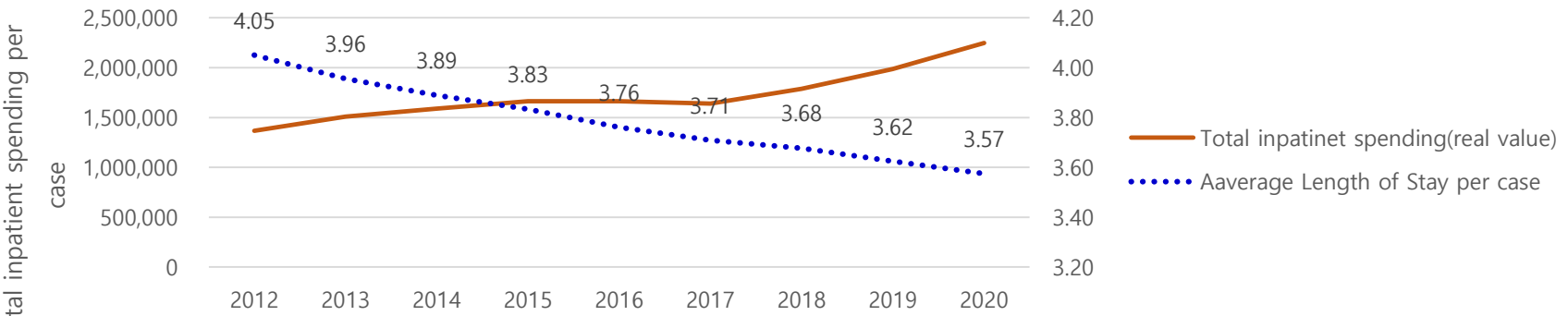
Efficiency

Comparison of inpatient spending per case and growth rate **BEFORE** the CbFS
(between Participants(CbFS) and Non-Participants(FFS) of 7-diseases DRGs Pilot, Won, %)



Total inpatient spending and ALOS per case of CbFS for 7-diseases DRG groups

AFTER the CbFS



Measure

The Technical Efficiency ratio

[Output]
the variation 2012-2020 for LOS in hospital inpatient per case (of 7-disease DRG groups)

[Input]
the variation 2012-2020 of Total hospital spending per case adjusted for hospital scale, case, and inflation in 2020 (of 7-disease DRG groups)

The share for 7-diseases DRGs in total inpatient spending was 4.85% from 2009 to 2020.

※ Sources. HIRA Statistics.

III. Allocative Efficiency Measure(South Korea)

Efficiency				
	life expectancy	total inpatient Spending (estimates value, Won)	inpatient claims(actual value)	total inpatient spending per claim (Won)
2010 (before)	80.2	19.8 trillion	10342047	1,914,318
2015 (after 3 years)	82.1	24,0 trillion	13884802	1,800,303
2020 (after 7 years)	83.5	33,3 trillion	15650921	2,130,393

Measure
<p>The Allocative Efficiency ratio</p> <p>[Output] the variation of Life expectancy</p> <p>[Input] The variation of total inpatient spending(estimates value) per capita adjusted inflation in 2020. - the share of 7-diseases DRGs of total claims(6.9%) and Medical expense(5.5%)</p> <p>※ Total inpatient spending was estimated that it calculated by applying the growth rate in spending for 7-disease DRGs by year to total inpatient spending in 2010 (actual value)</p>

III. Technical Efficiency Measure(France)

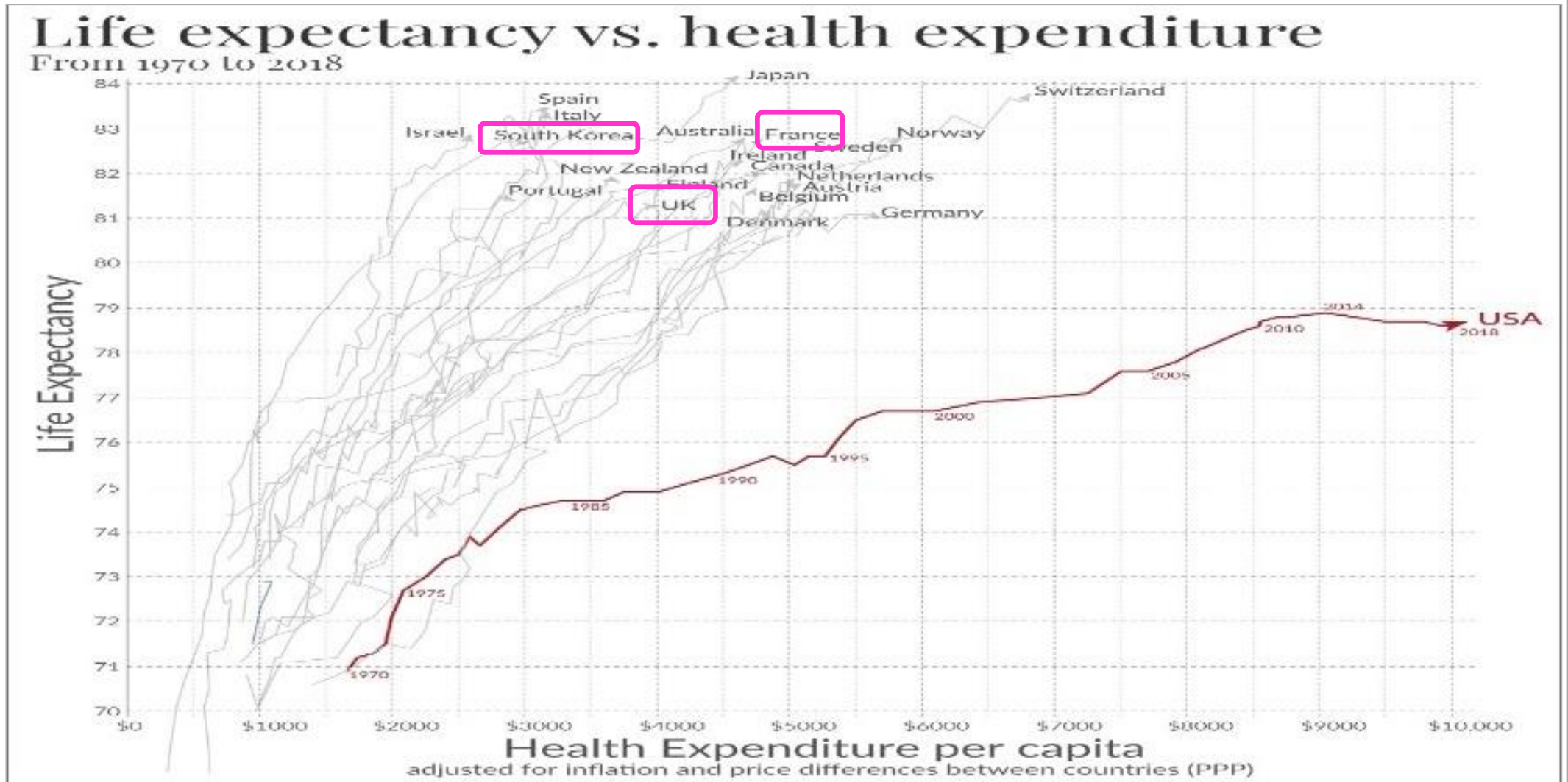
Efficiency				
Year	Total hospitals spending in Billions Euros 2023 (nominal euros)	Mean LOS (days)	Hospital Spnding Per capita in Euros 2023 (population million)	Hospital Spending Per capita in Euros 2023 PPP (GDP thousand billions)
1996 (before)	62.2 (43.3)	7.1	1054 (59)	1718 (1.3thousand Billions)
2003 (after 7 years)	71.2 (51.2)	6.8	1165 (61.1)	1782 (1.6 thousand Billions)
2023 (after 12 years)	100.7	5.1	1472 (68.4)	1472 (2.8thousand Billions)

Measure
<p>The Technical Efficiency ratio</p> <p>[Output] the variation 1996-2023 for LOS in hospitals acute care inpatient</p> <p>[Input] the variation 1996-2023 of Total hospital spending per capita in Euros 2023 adjusted for PPP</p>

III. Allocative Efficiency Measure(France)

Efficiency			Meseasure	
Year	Total healthcare spending per capita US \$ PPP (OECD)	Life expectancy Women Men		
1996 (before)	1800	82.3 75.5	[Output] the variation of Life expectancy	
2003 (after 7years)	2200	83 77	[Input] The variation Total Healthcare Spending per capita US\$ PPP	
2018 (after 12years)	4700	84.3 79.5		
2023		85.5 80		

Allocative Efficiency International comparison



III. Technical Efficiency Measure(UK:England)

Efficiency

- **ALOS** (source - Statista data):
 - Until 2017 6.0 or 5.9 roughly constant with the lowest point (5.9 days) in 2017 ;
 - 2019 - 6.7 days
 - 2021 - 8.3 days
 - Increases due to increased complexity of patients
 - More Non-Elective and Urgent care
 - Covid19
- **Cost per episode** (Source: National Cost Collections)
 - Fixed at 2019-20 £'s
 - Basically stable to 2019-20. Increase in 2020-21 impacted by COVID

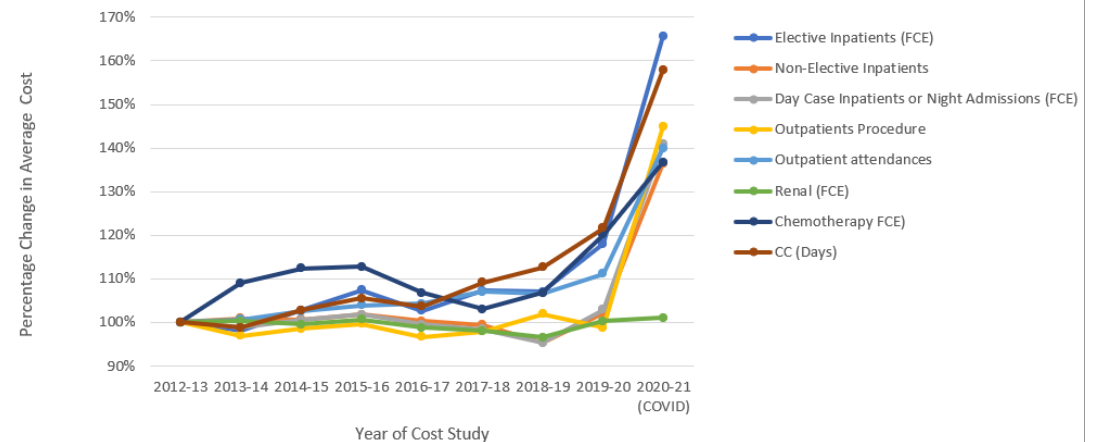
Cost for Select Patient activities (£000s)

Activity	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Elective Inpatients (FCE)	4.16	4.08	4.27	4.46	4.27	4.46	4.45	4.91	6.89
Non-Elective Inpatients	1.93	1.95	1.94	1.96	1.94	1.92	1.84	1.97	2.63
Day Case Inpatients or Night Admissions (FCE)	0.82	0.81	0.82	0.83	0.81	0.80	0.78	0.84	1.15
Outpatients Procedure	0.16	0.15	0.16	0.16	0.15	0.16	0.16	0.16	0.23
Outpatient attendances	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.18
Renal (FCE)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Chemotherapy FCE)	0.46	0.51	0.52	0.52	0.50	0.48	0.50	0.56	0.64
CC (Days)	1.18	1.17	1.21	1.25	1.22	1.29	1.33	1.44	1.86

Measure

- **Average length of stay:**
 - Length of stay has been decreasing over many years.
 - The extent to which this has been driven by CbF or through bed supply or other factors in uncertain
- **Costs per episode of care:**
 - We use broad aggregates of patients to minimize the impacts of changes in HRG rules over time, although changes in complexity can impact results.
 - Change costing methodology: Reference Costs 2012-13 to 2016-17 and Patient Level Costs 2017-18 onwards
 - Slight variations in coverage over time

Percentage Change in Average Costs for Selected Hospital Services Over Time Since 2012-13



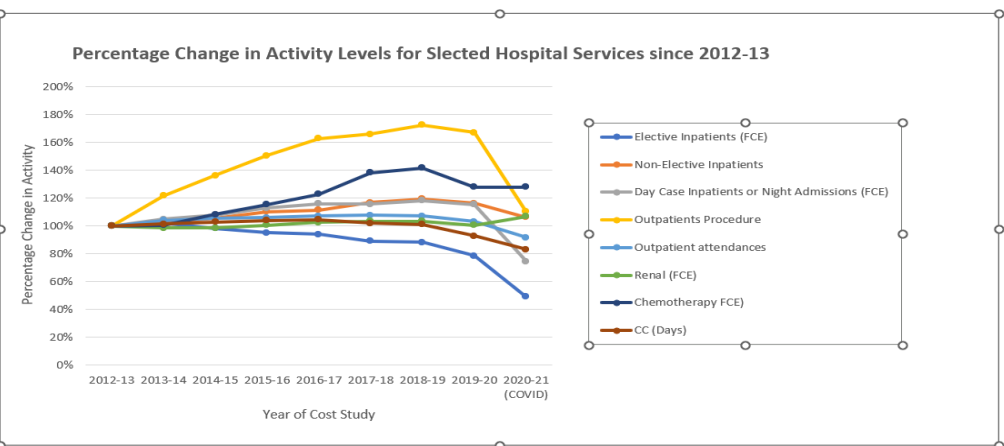
III. Allocative Efficiency Measure(UK:England)

Service Reconfiguration

- Reducing Elective Care resulting in longer waiting lists
- Outpatient services, CC days and renal roughly constant
- Growth in Day Case and non-elective care
- Rapid growth in chemotherapy and Outpatient Procedure
- Small reduction 2019-20 may result from cost study coverage, large reduction 2020-21 results from COVID

Selected Patient Activity: Finished Consultant Episodes and Days (1000s)

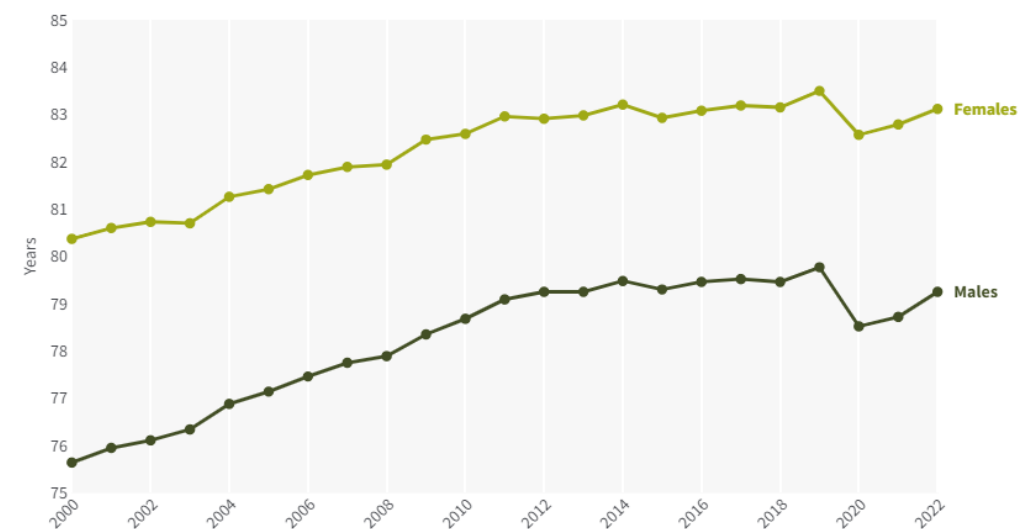
Activity	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Elective Inpatients (FCE)	1,499	1,528	1,473	1,424	1,408	1,337	1,322	1,179	735
Non-Elective Inpatients	8,882	9,050	9,354	9,780	9,890	10,364	10,590	10,310	9,439
Day Case Inpatients or Night Admissions (FCE)	5,383	5,637	5,802	6,072	6,237	6,219	6,365	6,210	4,009
Outpatients Procedure	7,951	9,671	10,836	11,972	12,945	13,190	13,725	13,284	8,759
Outpatient attendances	69,272	72,029	73,020	73,422	74,073	74,524	74,220	71,339	63,443
Renal (FCE)	4,136	4,079	4,070	4,157	4,241	4,277	4,275	4,152	4,411
Chemotherapy FCE)	2,526	2,540	2,730	2,914	3,102	3,488	3,575	3,232	3,231
CC (Days)	2,669	2,709	2,747	2,777	2,793	2,717	2,699	2,473	2,218



Life Expectancy

- Generally increasing until COVID19, but rate of change slowing
- Rebounding after COVID19

UK Life expectancy at Birth 2000-22



Source: Office for National Statistics (2024)

TheKingsFund

IV. Comparative analysis and results

Technical Efficiency		Country	Implementation of CbFS		
			Before	After	
				Short-term	Long-term
Input	Total Spending for Hospitals per capita if it is not possible to have the spending for inpatient care adjusted for inflation rate and PPP	Korea	▲	▲	▲
		France	▲	▼	▼
		UK(England)	▲	▲	▲
Output.	LOS for the same sector (Total hospitals if not available for inpatient)	Korea	▼	▼	▼
		France	▼	▼	▼
		UK(England)	▼	▼	▲

Allocative Efficiency		Country	Implementation of CbFS		
			Before	After	
				Short-term	Long-term
Input	Total healthcare spending per capita adjusted for inflation and PPP and percentage of GDP/Total inpatient spending per claim	Korea	▲	▼	▲
		France	▲	▲	▲
		UK(England)	▲	▲	▲
Output.	Life expectancy OECD statistics	Korea	▲	▲	▲
		France	▲	▲	▲
		UK(England)	▲	▲	▲

V. Conclusion (Technical Efficiency)

South Korea

- Even after CbFS for 7-disease DRGs was mandated in 2012, the impact on **TE has been negligible.**
- The 8-year average (2012-2020) for **LOS** was 3.8 days, with a **steady declined** over time
- CbFS for 7-disease DRGs accounted for only about 5% of total inpatient spending, **the remaining 95% affected by FFS has been offsetting** the impact of CbFS to improve efficiency.

France

- **The technical efficiency increase** for hospitals is very important: 2023 LOS is 0,72 % of the 1996 LOS.
- **The Hospital Spending per capita** adjusted for inflation (Euros 2023) and for PPP has **decreased** from 1718 Euros in 1996 to 1472 in 2023.

UK(England)

- **Technical efficiency is difficult to measure** over time as both the underlying ways in which clinical and cost data are classified and collected vary over time.
- In the early years after HRG4 was introduced and UK move to a detail CbF system, despite improvements in some specific HRGs, **ALOS remained roughly constant** and **costs rose slowly.**
- **Both ALOS and Costs have started to rise since 2017-18** prompting NHEngland to start a major project to investigate and monitor efficiency.

V. Conclusion (Allocative Efficiency)

South Korea

- The allocative efficiency shows that **total inpatient spending per claim decreases** in the early stage of CbFS, but increases over time even if increasing life expectancy.
- To **properly separate CbFS from FFS and improve efficiency**, Korea was transitioning from Charge-based pricing, which is based on charge data from FFS, to **Cost-based pricing(2020)**.

France

- **The Allocative efficiency shows a real increase** of life expectancy (3,8% for women and 5,9% for men) which started before in 1946. The increase is less than Japan and better than UK, equal to Australia, Norway, Sweden, Ireland, Canada, much better than USA.
- **Total healthcare spending per capita PPP**: France is **much less expensive** than USA Less expensive than Switzerland, Norway, Germany, Austria, Sweden and Belgium equal to Australia, Ireland, Canada and Japan, **more expensive** than UK.

UK(England)

- NHEngland has focused on trying to **manage costs, increase services** and contain expenditure through service reconfiguration.
- Significant changes in the way services are being delivered can be seen in the **shifting activity patterns**.
- **Elective procedures numbers** have been **falling** and focus has shifted to Elective Recovery , reducing waiting lists and monitoring efficiency

V. Implication

- DRGs and similar measures were initially introduced to:
 - Make benchmarking easier
 - Improve financial transparency
 - Improve funding fairness for hospitals
 - Encourage Technical Efficiency
- Different health systems have introduced CbF for different reasons. The effectiveness of CbF needs to be interpreted concerning the primary goals of its implementation
 - Systems implementing CBF for funding fairness (eg UK) are unlikely to show the same results as systems using CbF to effectively reduce Hospital budgets (eg Victoria, Australia in the 1990's)
- Hospital systems are complex with multiple outputs and influences. These are often difficult to disentangle. Eg does ALOS fall because of cost incentives or bed supply pressures
- **It is difficult to compare Technical Efficiency** in inpatient care due to the differences in the organization of the different systems, the funding mechanisms and the Casemix classification used
- **Allocative efficiency measures are likely to be more reliable within a system over time** than between systems
- It is not possible to explain the role of different parts of healthcare systems Technical Efficiency in the global Allocative Efficiency. For instance in France The part of hospital spending in the total health spending decreased from 50 % to 40 % but with an increase in the total spending per capita PPP and inflation-adjusted of more than 2 (2.20 4768/2161 US dollars) source WHO 2023.
- **Both efficiency ratios are necessary to assess and monitor the efficiency of the different systems**
- The International comparison should be **useful for learning about alternative approaches and insights into issues that can be expected in designing policies** even though the TE frame is difficult to compare