Insights from the HIPPOCRATES model of healthcare demand and expenditure

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Outline

- The HIPPOCRATES model: rationale, scope, overview

- HIPPOCRATES: methods, findings for demand projections

- Projecting expenditure: past trends, approaches to projection

- HIPPOCRATES development: introducing components of cost, prices and economic drivers for expenditure projections

- What do we know about how Irish healthcare expenditure compares to other countries'?

- Conclusions

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THE HIPPOCRATES MODEL

Objectives of HIPPOCRATES MODEL – Answer Questions in Irish Health

Published research:
- How much care is used now?
- How much unmet need is there?
- How much demand (need) for care will there be in the future?
- What capacity (infrastructure) is needed to meet future demand?

Future applications of the model:
- How much spending required to address need?
- What are the drivers of Irish healthcare spending?
- Make policy choices transparent – e.g. service growth versus pay increases?
- If reform to change eligibility e.g. further extension free GP care (Sláintecare) – how much additional demand/expenditure?

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Filling knowledge gaps

- How much does Ireland spend relative to other countries?
  - ➤ OECD System of Health Accounts a work in progress

- How much care is supplied?
  - ➤ Number of public health nurse visits? dentist visits? private hospital cases?

- How much is purchased privately?
  - ➤ Number of private physiotherapist visits?

- Age profile of healthcare expenditure?
  - ➤ EU Ageing Reports – Ireland, Greece and Romania only countries of 28 did not supply age-related public healthcare expenditure profile (European Commission 2018)

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Ireland's unusual healthcare system

- Complex mixture of public/private delivery & financing and multiple eligibility tiers

- Only European system without universal primary care (Thomson et al. 2012), 44% access care free, primary care under-resourced

- GP fees at market rate, high versus other countries' co-payments

- 45% hold private health insurance largely for timely access to hospital elective care

- No statutory system of eligibility for home care

…Current reform proposals to move to a universal system (Sláintecare)
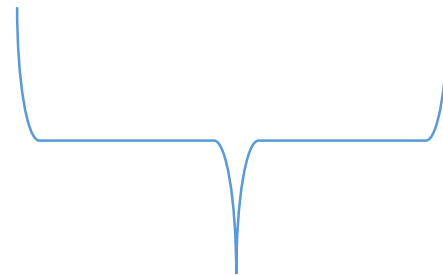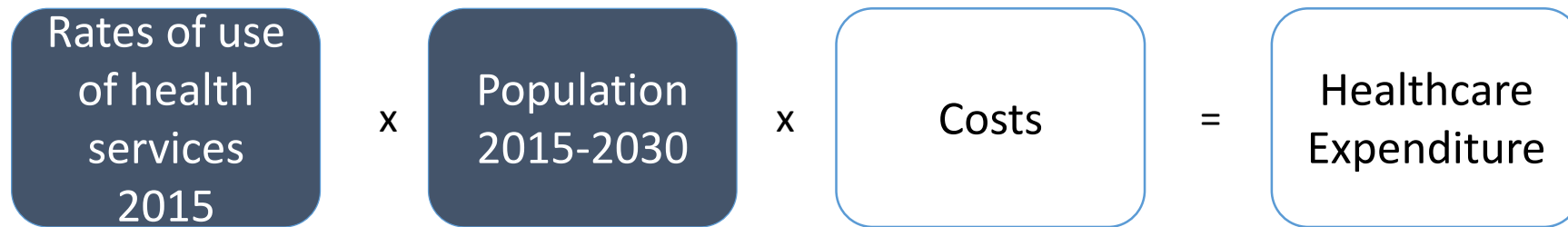
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The HIPPOCRATES MODEL

Scope:

- *All* health and social care services (acute, primary, community, long-term)

- Public *and* private demand and expenditures (private hospitals, private payments for GP and other non-acute care)

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Projecting Demand

- Detailed analysis 2015 healthcare use, projections to 2030

- Compare effect population growth only

- Vary assumptions: population growth, healthy ageing, unmet need and demand

- Projection range by sector

- Key initial assumption no change in models (e.g. location) of care

- Change this assumption in capacity projections

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The HIPPOCRATES MODEL

Rates of use of health services 2015 **x** Population 2015-2030 **x** Costs **=** Healthcare Expenditure

Healthcare Demand 2015-2030

Inpatient & day cases in public & private hospitals

Emergency & outpatient cases in public hospitals

General practice services

Community pharmaceuticals

Long-term & intermediate care

Home care, allied healthcare professionals

Mental health, disability services

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Demographics, Health and Ageing

- ESRI demographic model: assumptions about fertility, mortality & migration to generate population projections

- Migration major driver, sensitive to economic conditions, link to ESRI COSMO macroeconomic model

- Life expectancy increase contributes to larger and older population

- Does longer life expectancy mean extra years in good or poor health? 3 theories:

  - Extra years in ill-health with gains in longevity
  - All gains in longevity in good health
  - Gain in good health exceeds gain in longevity

- Alternative assumptions applied based on sector-specific evidence

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Irish Demographics 1996-2016

- Ireland's demographic profile is unusual in an EU context

  ➢ Rapid population growth, 1996-2016: 31% (1.1 million), 6% in EU28
  ➢ Relative to the EU, Ireland has a younger demographic structure
  ➢ 2016: 13% of pop aged 65+; 19% in EU-28

- But the population has been ageing… between 1996-2016:
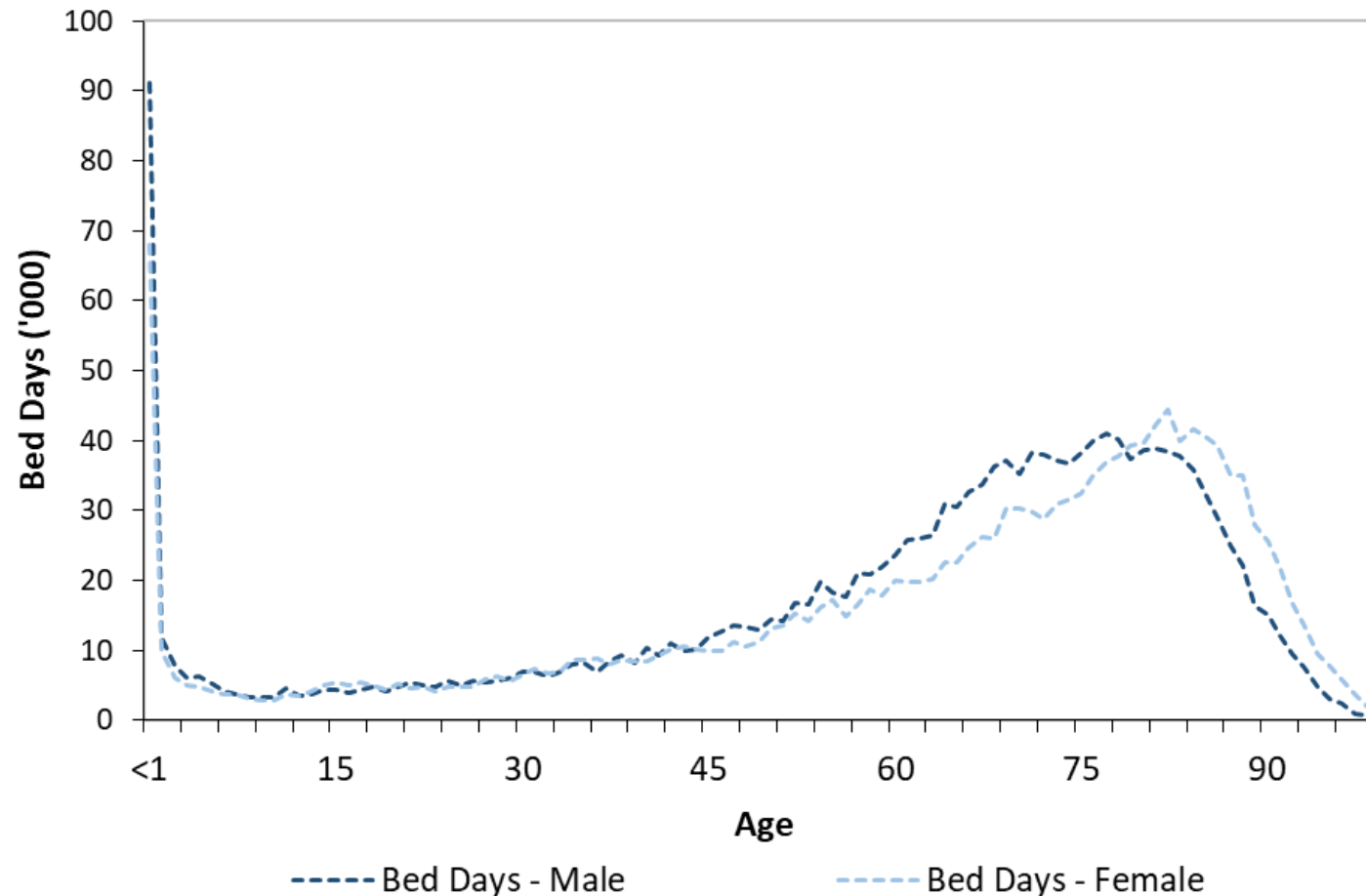 ➢ 64% increase in pop aged 80+

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Demographic projections, 2015-2030

- Population to increase to between **5.35m** to **5.79m** in Central and High scenarios
  - ➤Overall increase of between 14% - 23%
  - ➤Migration key driver of differences in Central and High scenarios

- Number of older persons to increase
  - ➤Aged 65+: 1 in 8 now. By 2030: 1 in 6
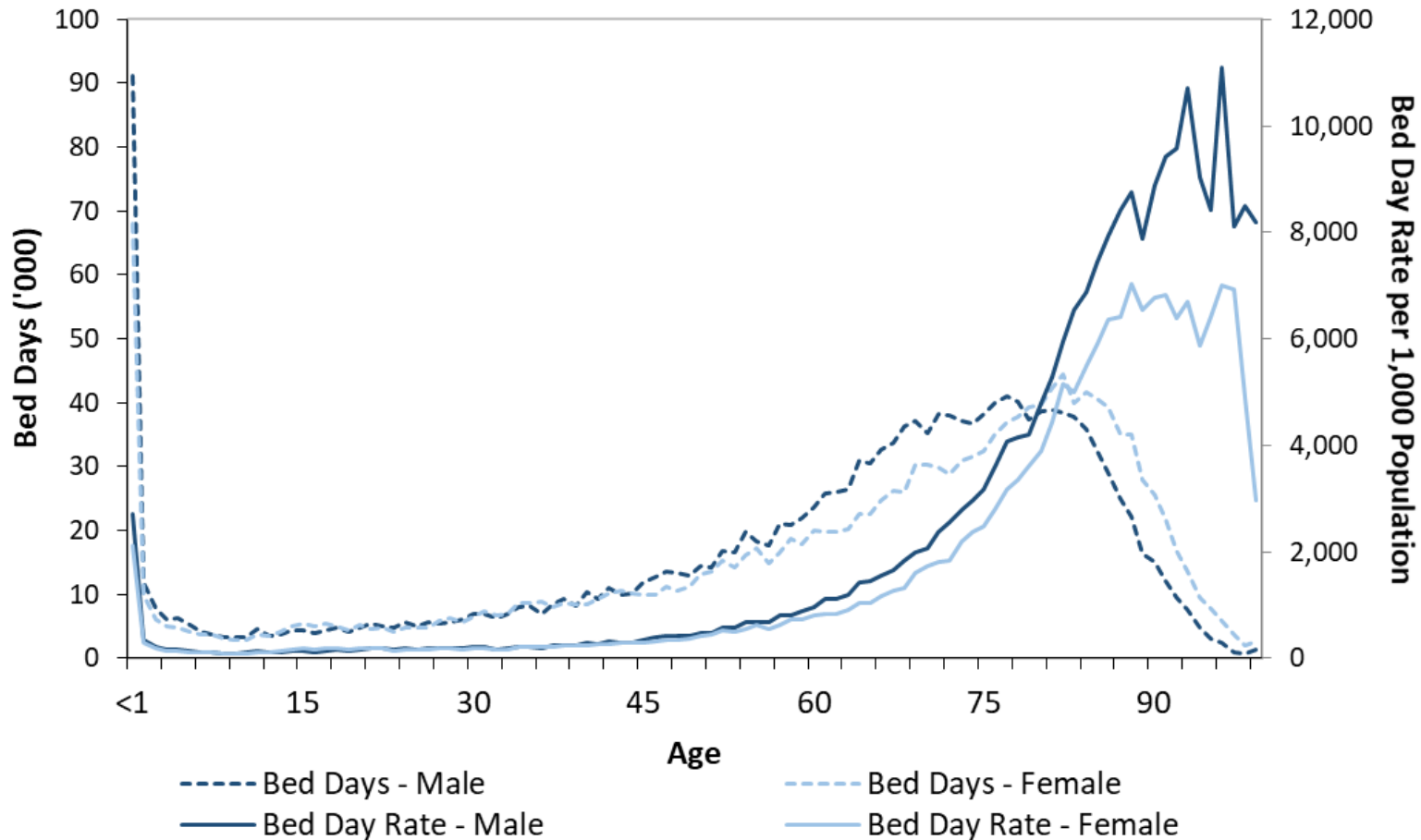 - ➤Aged 80+: increase between 89% - 94%

Source: Wren et al (2017)

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Irish healthcare in 2015

- Hospitals:
  - ➢ 1.5m day cases, 69% in public hospitals
  - ➢ 4.2m bed days, 85% in public hospitals

- Long-term care:
  - ➢ 10.6m bed days

- Home help:
  - ➢ 14.3m home help hours, 27% privately paid

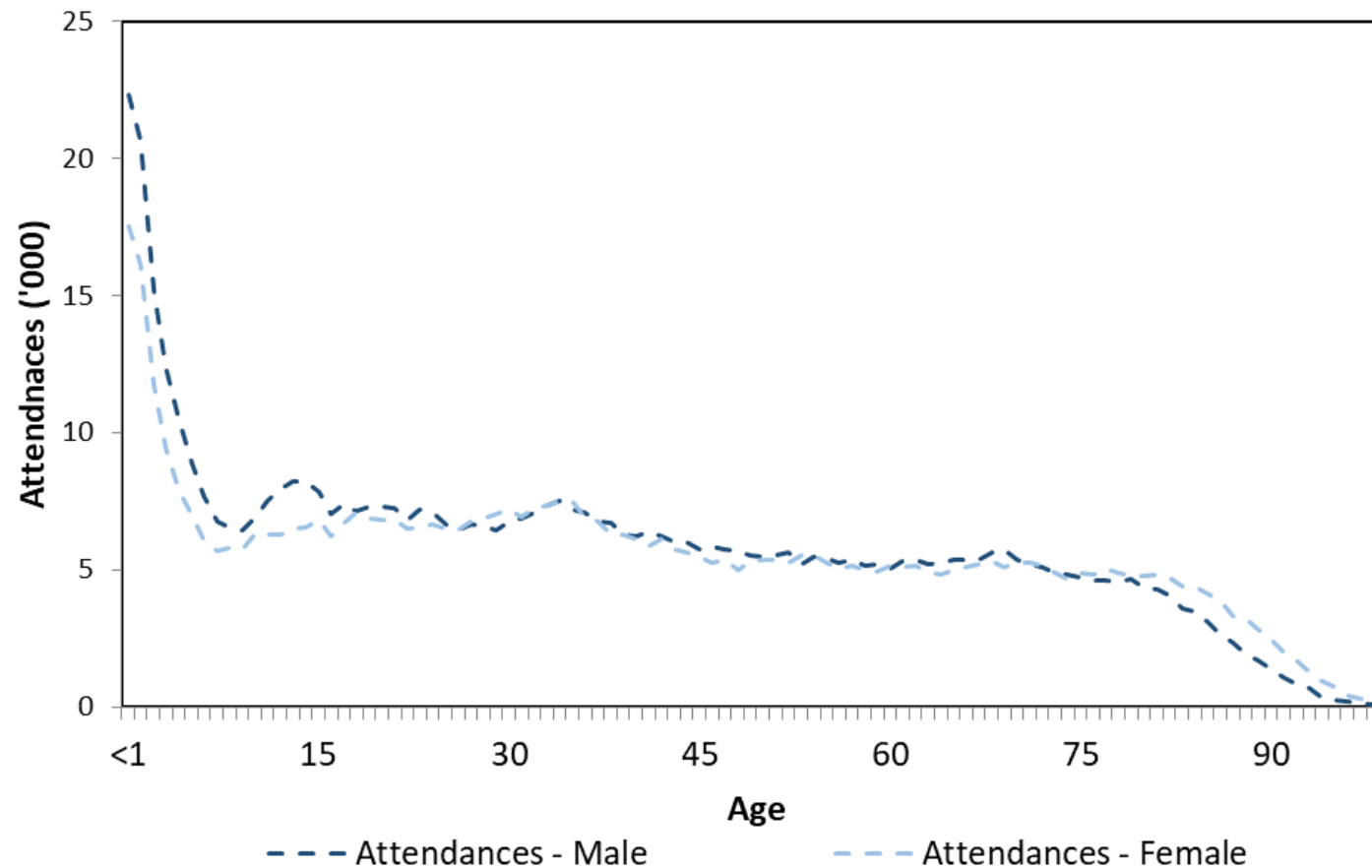- General practice:
  - ➢ 17.6m GP visits, 5.9m practice nurse visits

Source: Wren et al (2017)

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Use by age, days in public hospital beds, 2015

Source: Wren et al (2017)

Use by age, days in public hospital beds, 2015

Source: Wren et al (2017)

Use by age,
Emergency Department attendances, 2015

Source: Wren et al (2017)

Use by age, Emergency Department attendances, 2015

Source: Wren et al (2017)
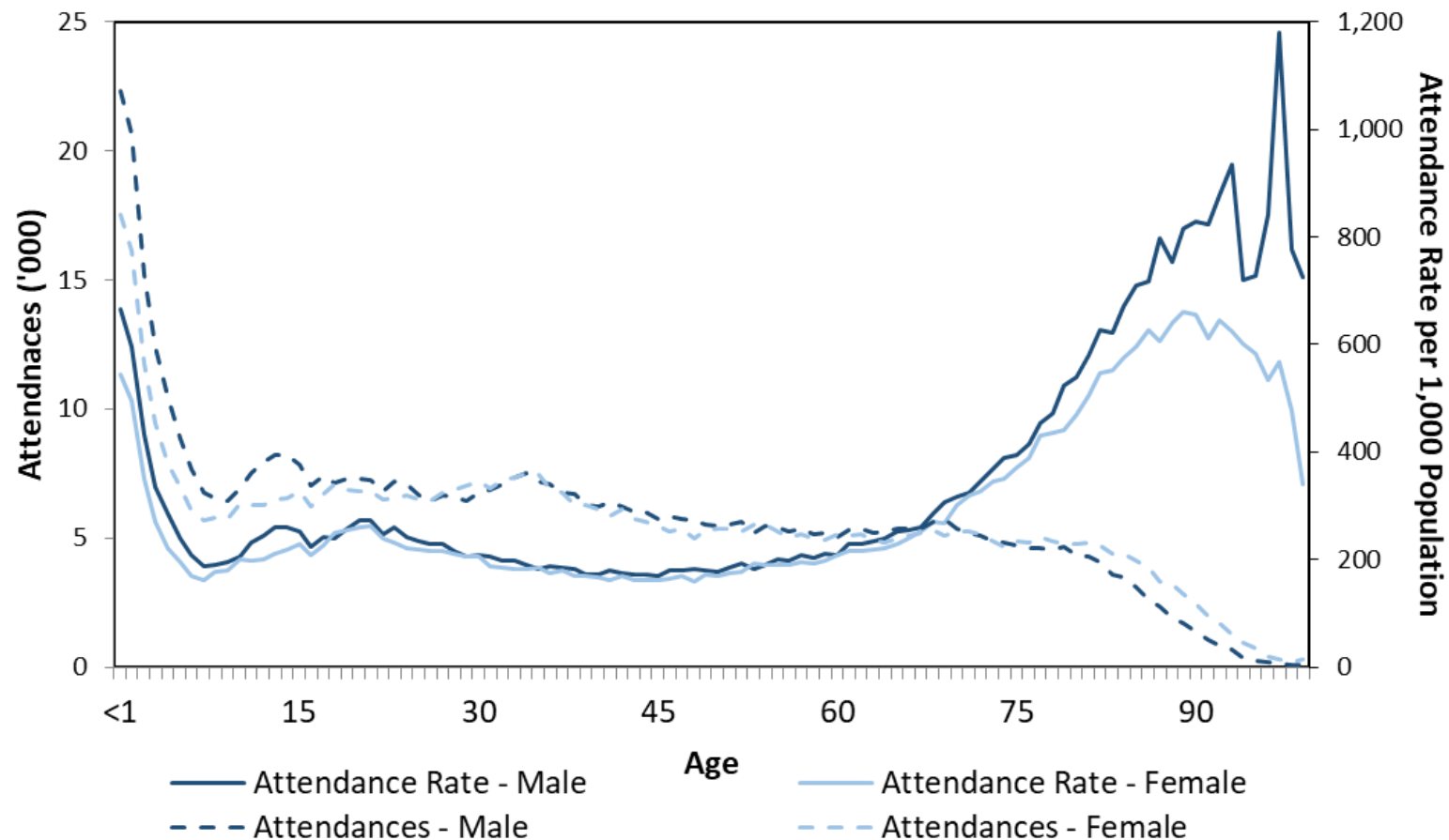
Demand Projections, 2015-2030

Sector	Measure of healthcare use	Projection Range % increase 2015 to 2030	
Public hospitals	Inpatient cases	24	30
	Day patient cases	23	29
	Inpatient bed days	32	37
	Emergency Department attendances	16	26
	Outpatient attendances	21	30
Private hospitals	Inpatient cases	20	25
	Day patient cases	24	28
	Inpatient bed days	28	32
General practice	GP visits	20	27
	Practice nurse visits	26	32

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Demand Projections, 2015-2030

| Sector	Measure of healthcare use	Projection Range % increase 2015 to 2030	
Long-term care	Residents/places	40	54
	Residential long-term care bed days	40	54
Home care	Home help service	44	57
	Homecare package recipients	44	66
	Home help hours	38	54
Community Nursing and Public Community Therapy	Public health nurse visits	26	35
	Public physiotherapist visits	24	30
	Public occupational therapist visits	33	38

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Capacity implications of demand projections

- Irish public hospitals: highest OECD occupancy rate (94.7%), in-patient length of stay among OECD lowest (25th of 29)

- Hospital bed capacity (public & private) among OECD lowest (21st of 32)

- Capacity crisis – diminishing returns to scale? Affecting staff retention?

- Project 3,200 extra public beds by 2030 to accommodate demand, reduce occupancy (26% increase), optimistic assumptions, lower end of range

- In long-term care 11,700 to 15,600 extra places needed to accommodate demand by 2030 (40%-54% increase)

Source: Keegan et al (2018)

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Sustainability of projected demand growth?

- Projected annual average demand increase ranges from 1% - 3%

- Backdrop of growing population and labour force

- Lower projected annual average demand increase per capita:
  - ➤ Hospital services close to or under 1% p.a.
  - ➤ Except if high unmet demand - elective inpatient cases 1.7% p.a.
  - ➤ Higher for services for older people – 2% and over p.a.

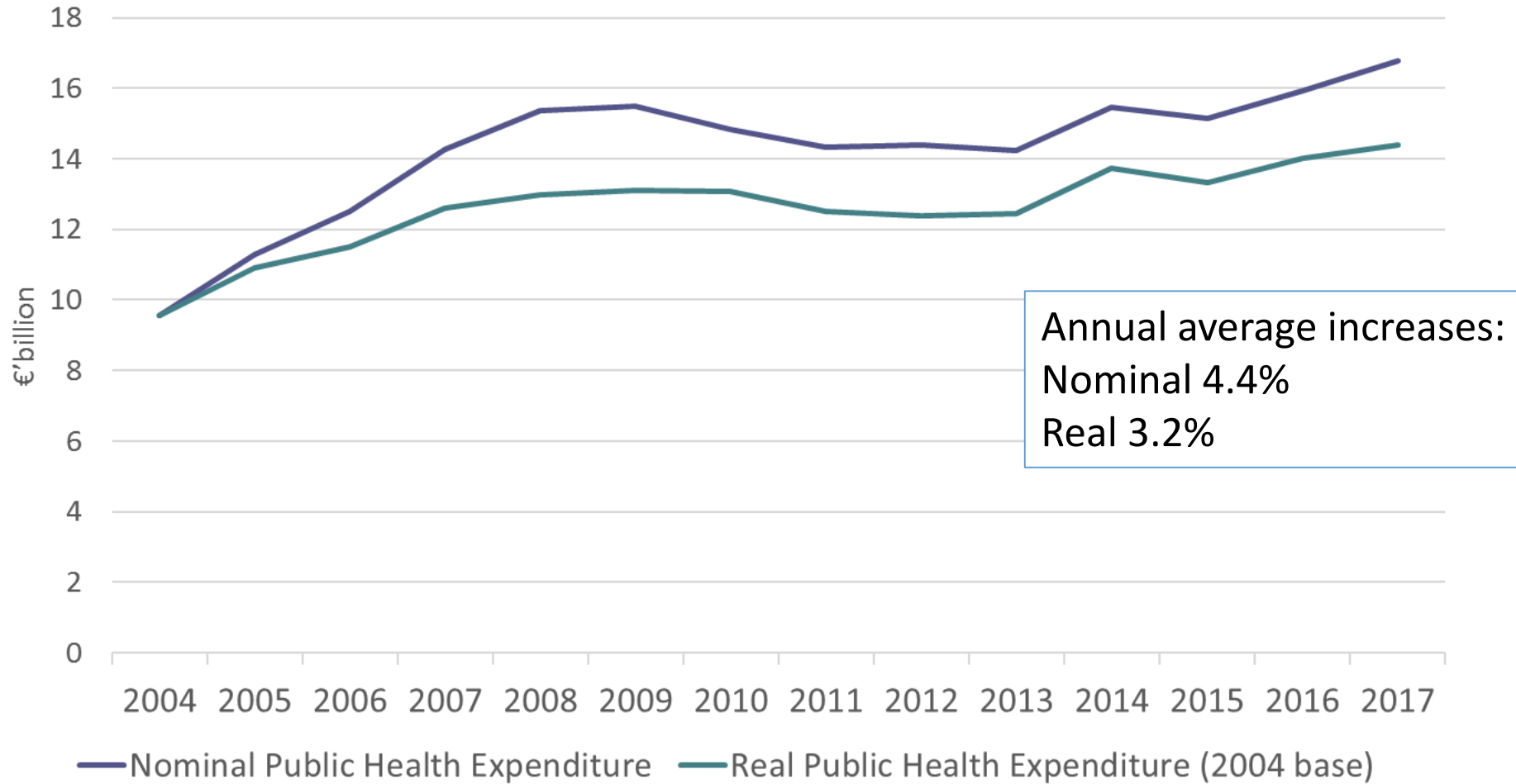- What about projected healthcare expenditure (HCE) increase?

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PROJECTING EXPENDITURE: TRENDS IN IRISH HEALTHCARE EXPENDITURE, MODELLING METHODS

HSE 2017 non-capital vote allocation, Total €15,376 m
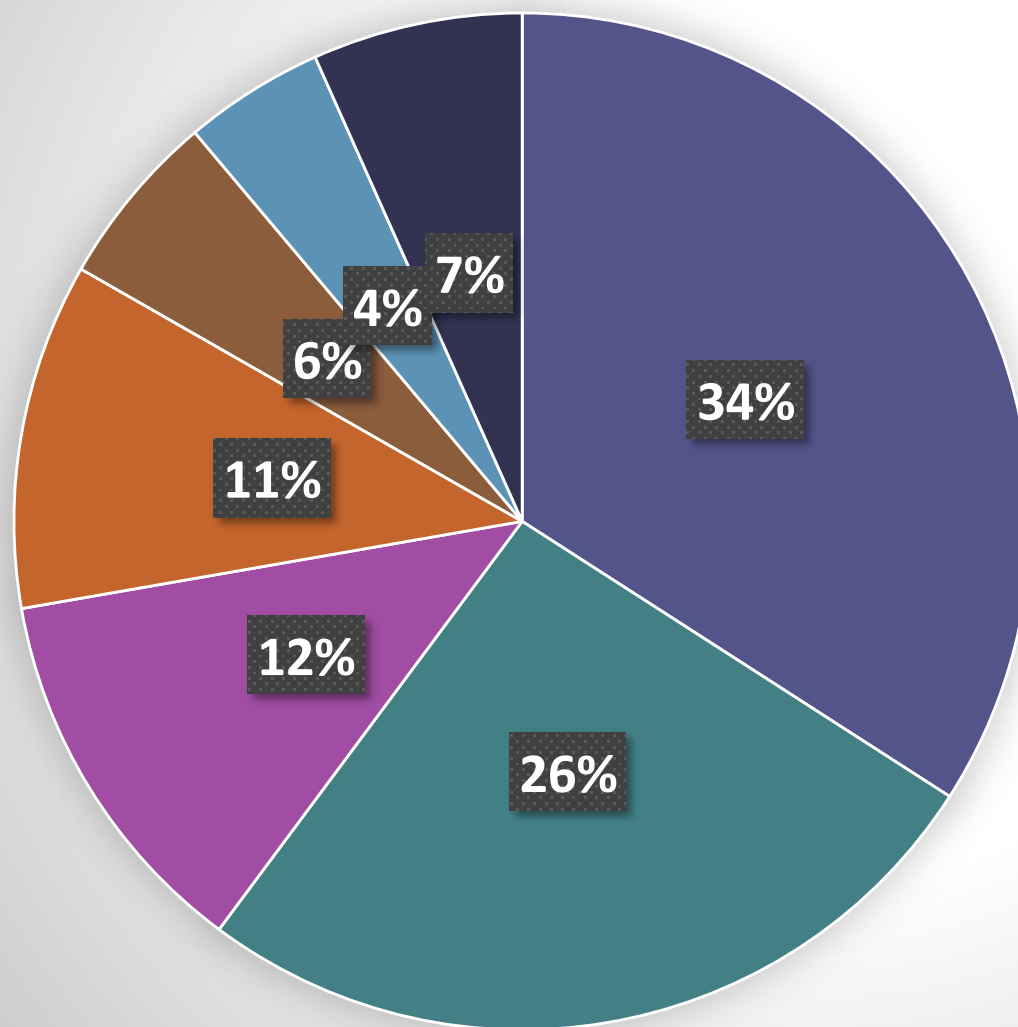
Legend:
- Acute Hospitals — 34%
- Primary Care & Community Health — 26%
- Care for Persons with Disabilities — 12%
- Care of Older People — 11%
- Mental Health — 6%
- Statutory Pensions — 4%
- Other — 7%

Public current HCE 2004-2017

Annual average increases:
Nominal 4.4%
Real 3.2%

€'billion

18
16
14
12
10
8
6
4
2
0

2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017

—Nominal Public Health Expenditure   —Real Public Health Expenditure (2004 base)

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Public current HCE 2004-2017 per capita and per capita aged 65+

Annual average increases:
Real per capita 1.8%
Real per capita 65+ 0.2%

— Real Public Health Exp. per capita   — Real Public Health Exp. per capita over 65

Source: As previous slide; plus ESRI population estimates

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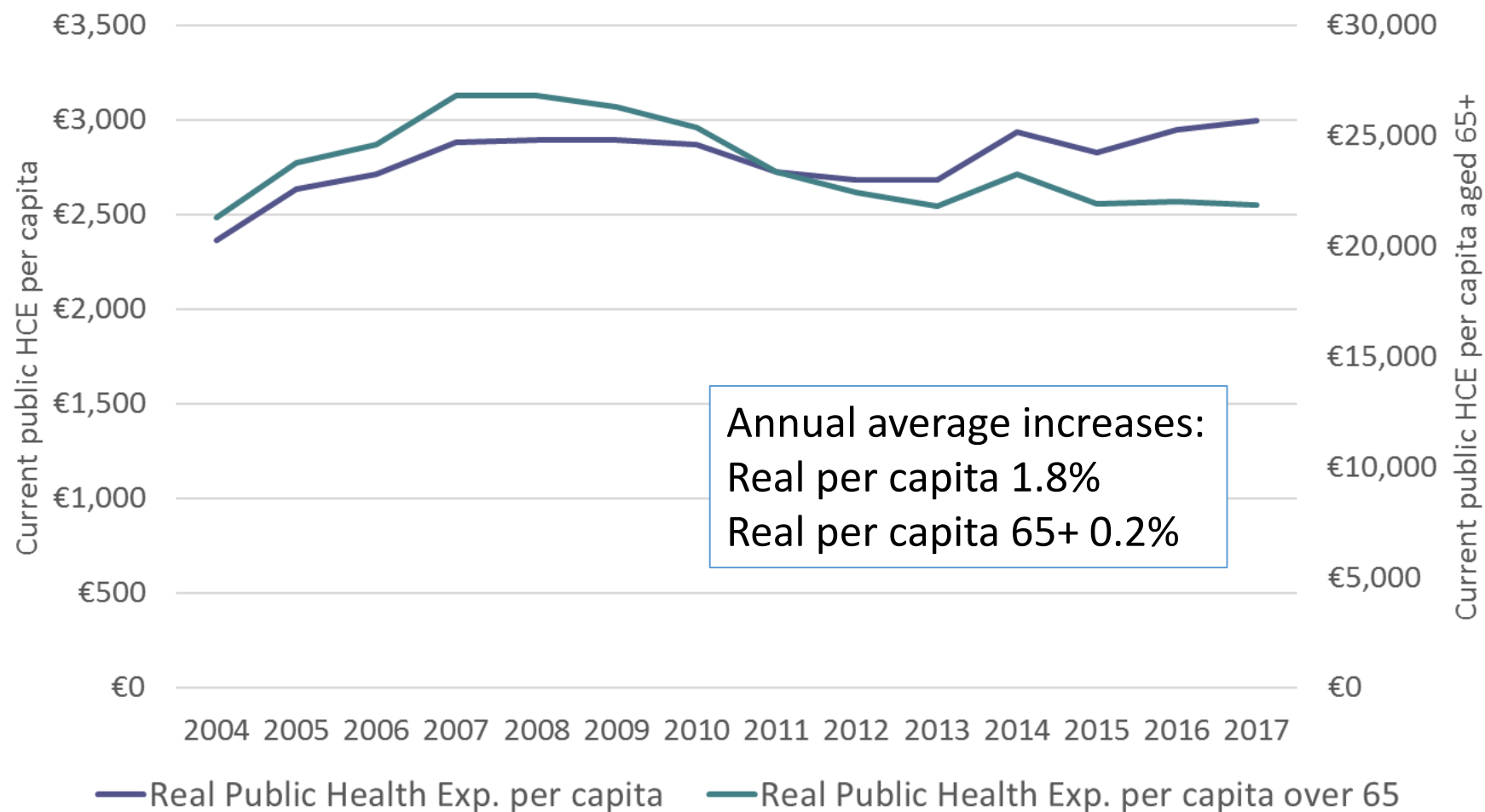
Projections of Irish healthcare expenditure

- EU Ageing Report (2018): plus 0.6 to 2.4 percentage points to public HCE/GDP, 2016-2070

- OECD (2015): plus 3.2 to 7.4 percentage points to public HCE/GDP, 2010-2060

- ***Cross-country projection modelling of Irish HCE constrained - no age-cost data; inapplicability of GDP as national income measure***

- Barrett and Bergin (2005): plus 3.3 percentage points to public HCE/GNP, 2005-2050

- HSE (2017): projects demographic cost pressures for a range of services, 2015-2022

- IFAC (2018): HCE projections inform projected aggregate public current expenditure
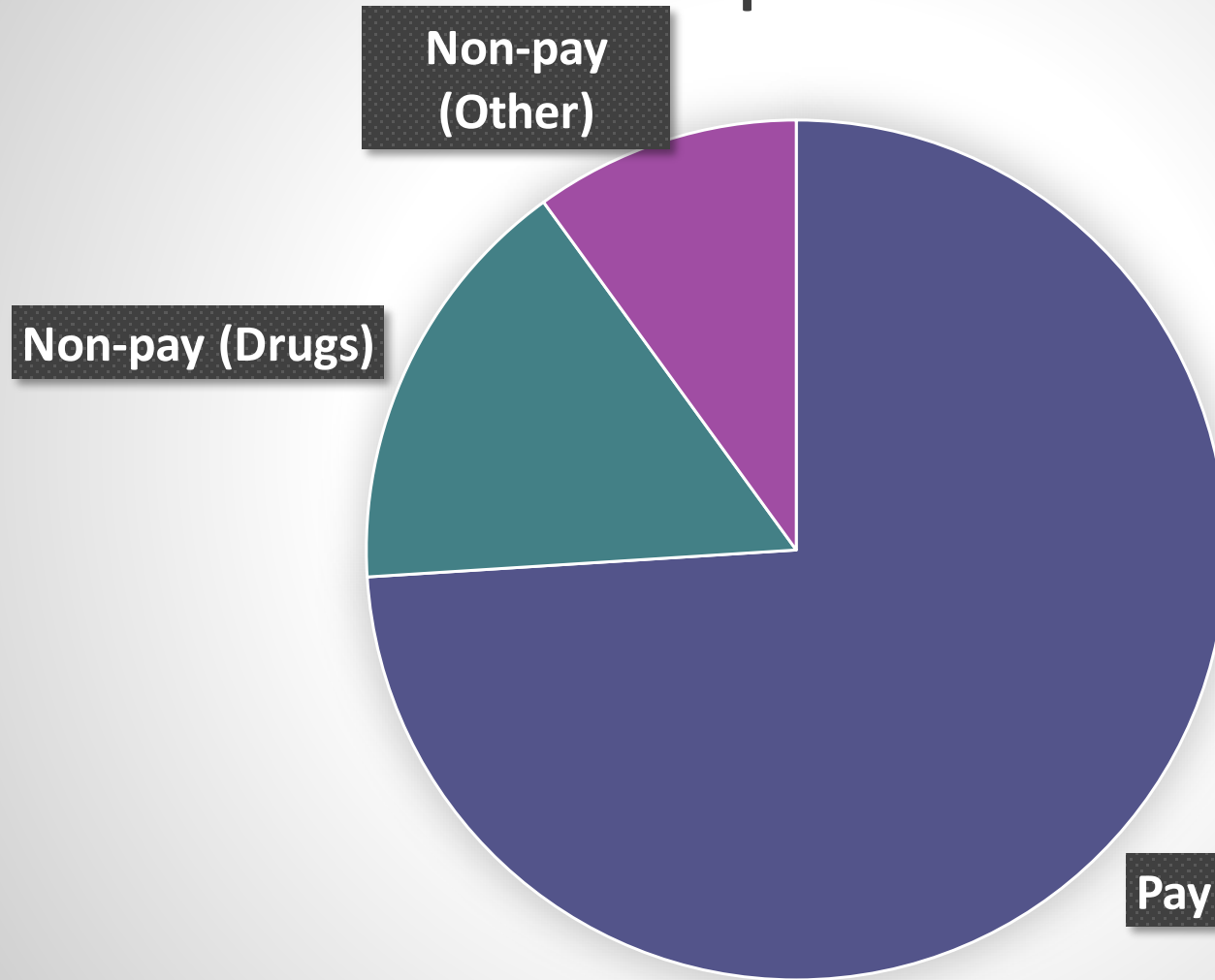
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Projection methods for healthcare expenditure

- Top-down modelling drivers: demographics, national income effects, other cost pressures incl. technology, Baumol effect (earnings & productivity growth gap)

- Bottom-up modelling drivers: demographics, unmet demand, trends in price components especially pay, drugs; can extend to top-down drivers

- IFS/The Health Foundation (2018):

  ➢bottom-up model - patient-level data, explicit modelling of chronic conditions
  ➢attributes higher proportion of growth to demographics than top-down models
  ➢projects 3.3% - 4% annual average increase in real UK expenditure (2018-2034)

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THE HIPPOCRATES MODEL – TOWARDS PROJECTIONS OF EXPENDITURE

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Developing HIPPOCRATES to project expenditure

- Introducing projected prices

- Bottom-up methodology: unit cost analysis x service, sector-specific price indices

- Assumptions about drivers of components of cost

- Projected expenditure by service by age/sex = projected volume x projected price

- Aggregation to broader HCE measures (e.g. public current HCE)

- Yields the age-cost curves required for EU Ageing/OECD reports' methods

- Sensitivity analysis with alternative assumptions about public pay, skill-mix, drug price trends, technology, system reforms…

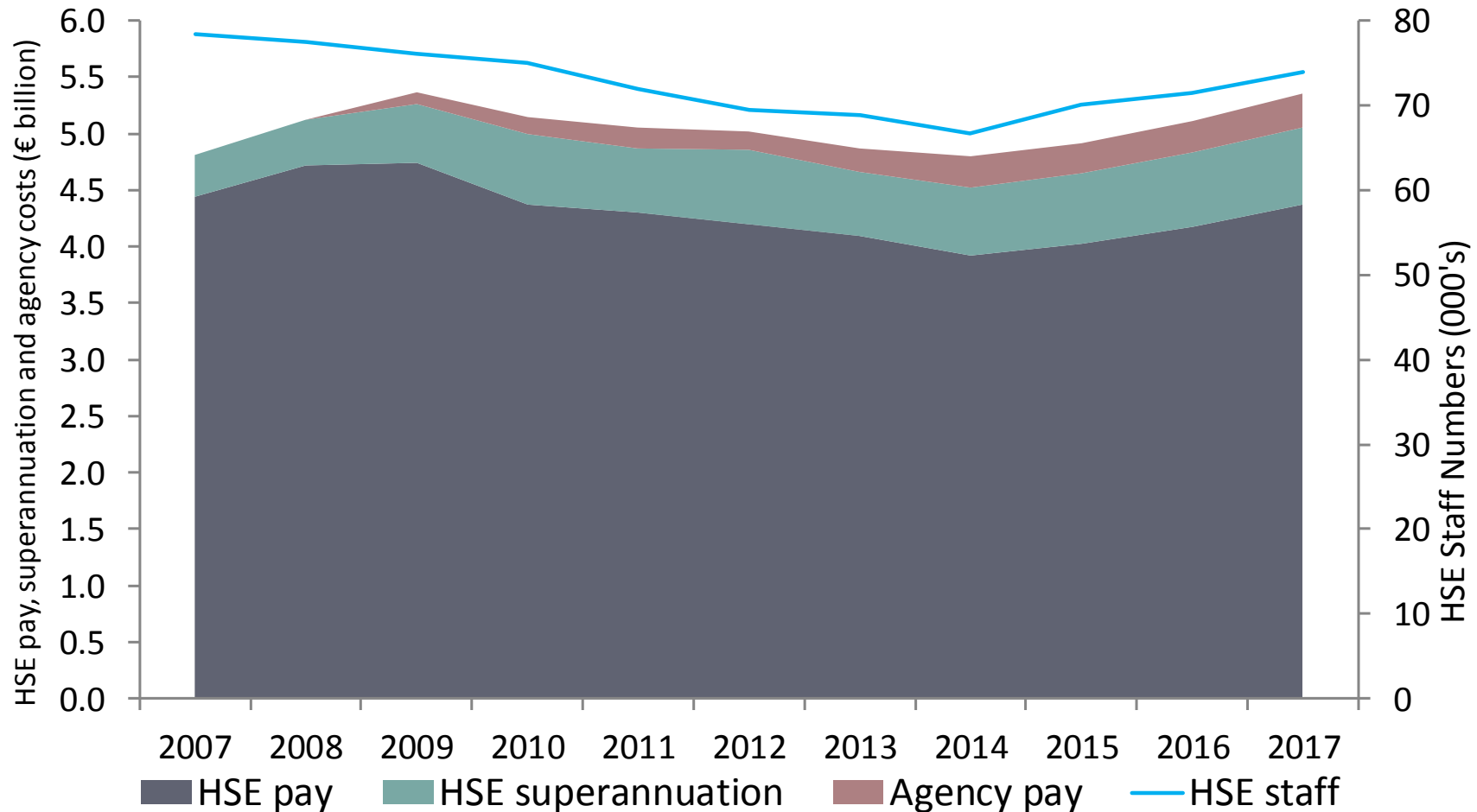- Potential to link to fiscal projections in ESRI COSMO macroeconomic model

HSE 2017 expenditure, estimated pay and non-pay components

Non-pay (Other)

Non-pay (Drugs)

Pay

Source: ESRI estimates, calculated for 85% of HSE non-capital vote allocation

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Centrality of pay assumptions

- Central Government public pay policy critical to healthcare expenditure,

- HSE largest employer in the state with over 75,000 direct employees, over 116,000 public servants in health including voluntary sector

- Also pay component in public purchase of privately-delivered care, includes:
  - ➢ Staffing in grant-funded disability sector
  - ➢ Staffing in Fair Deal-funded nursing home sector
  - ➢ Capitation and fee payments to GPs

- Incentivised retirement period increased pension costs charged to Health vote, while reducing staffing and services
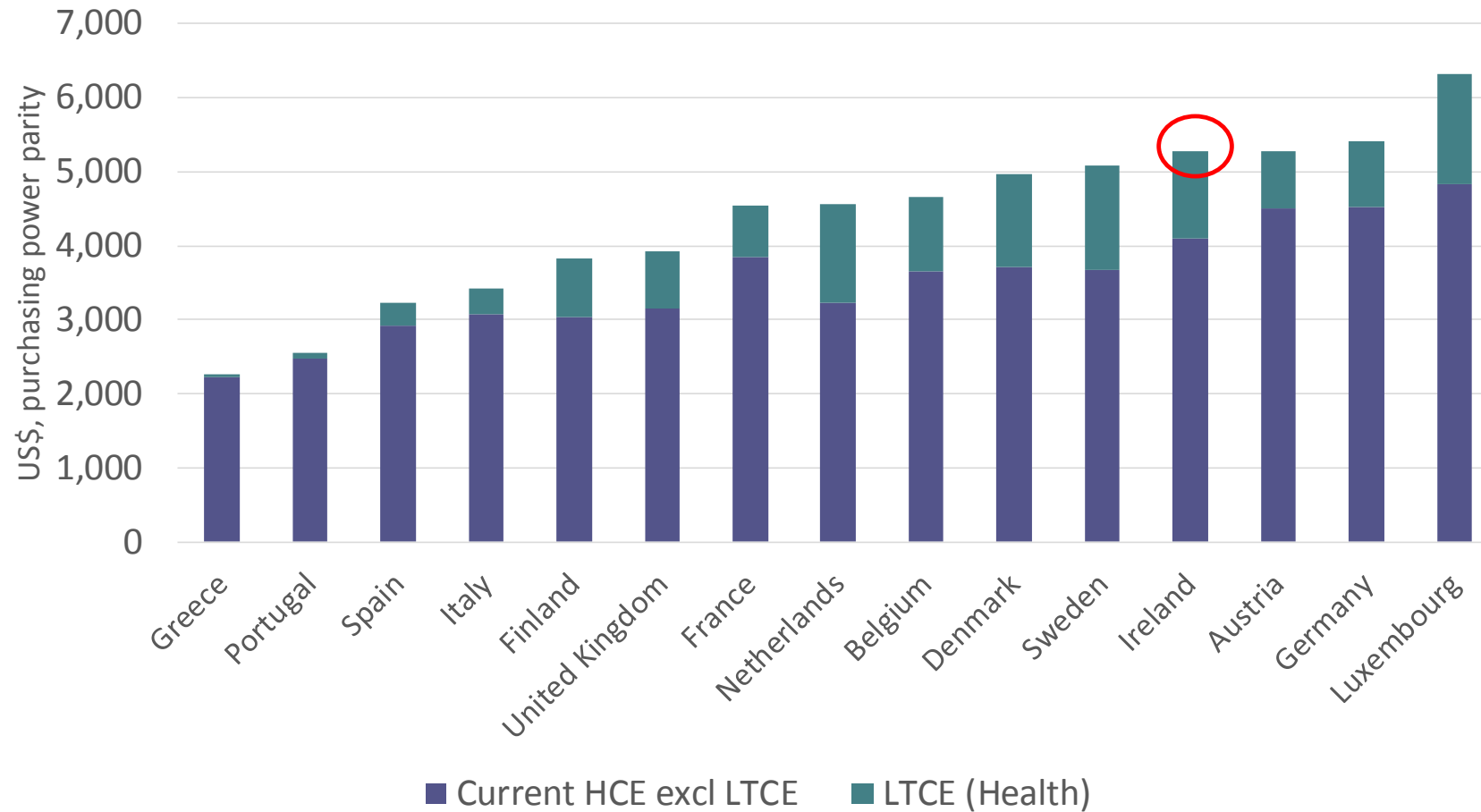
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# HSE pay, pensions, agency staff costs, 2007-2017, €'bn

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Source: HSE Annual Reports and Financial Statements & HSE Personnel Census; agency costs not available pre-2009

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HOW DOES IRISH HEALTHCARE EXPENDITURE COMPARE?

Total current health and long-term care (health) expenditure per capita, EU15, 2016

Source: OECD Health Statistics

Total current health and long-term care (health & social) expenditure per capita, EU15, 2016

Source: OECD Health Statistics
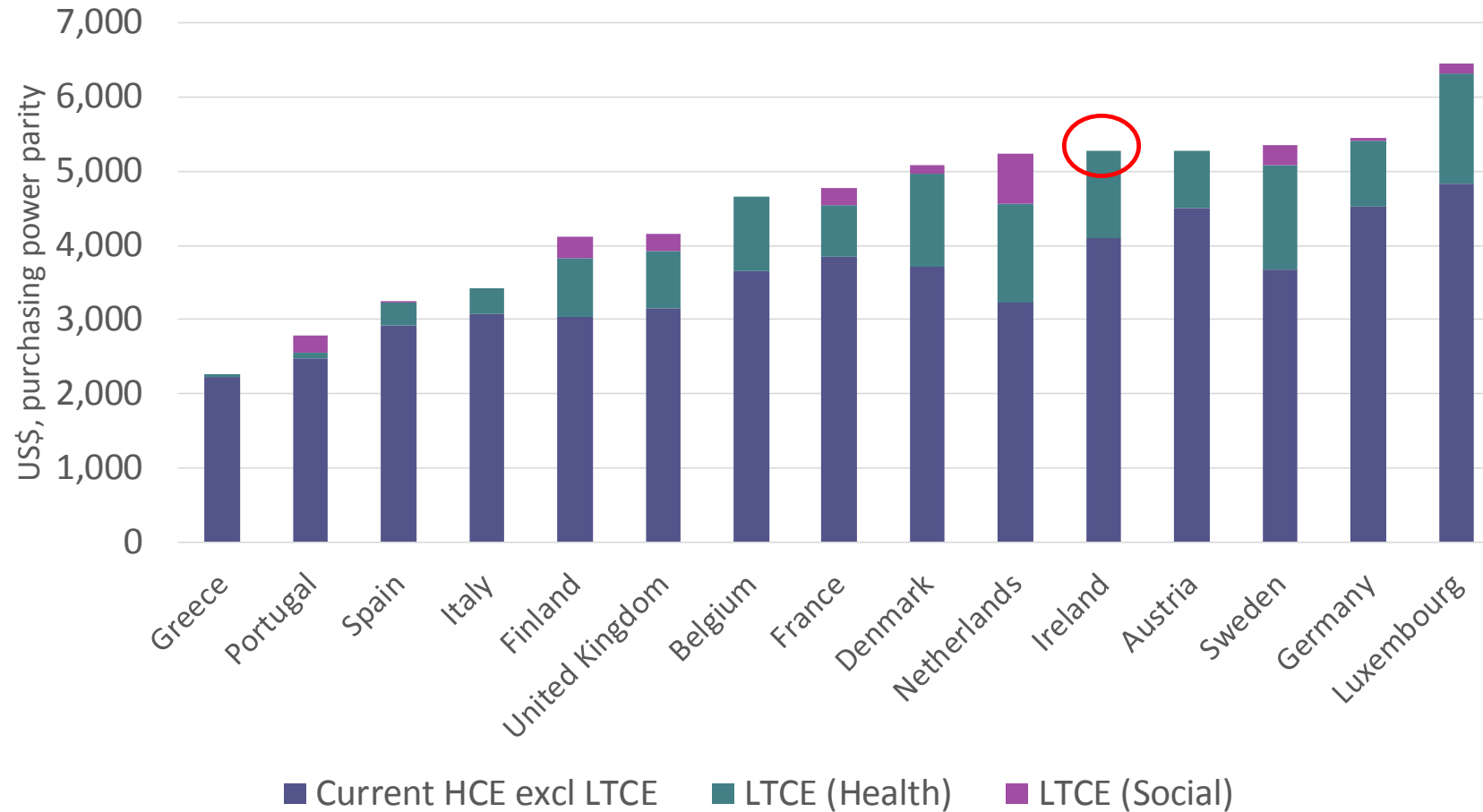
Public current health and long-term care (health & social) expenditure per capita, EU15, 2016

Source: OECD Health Statistics

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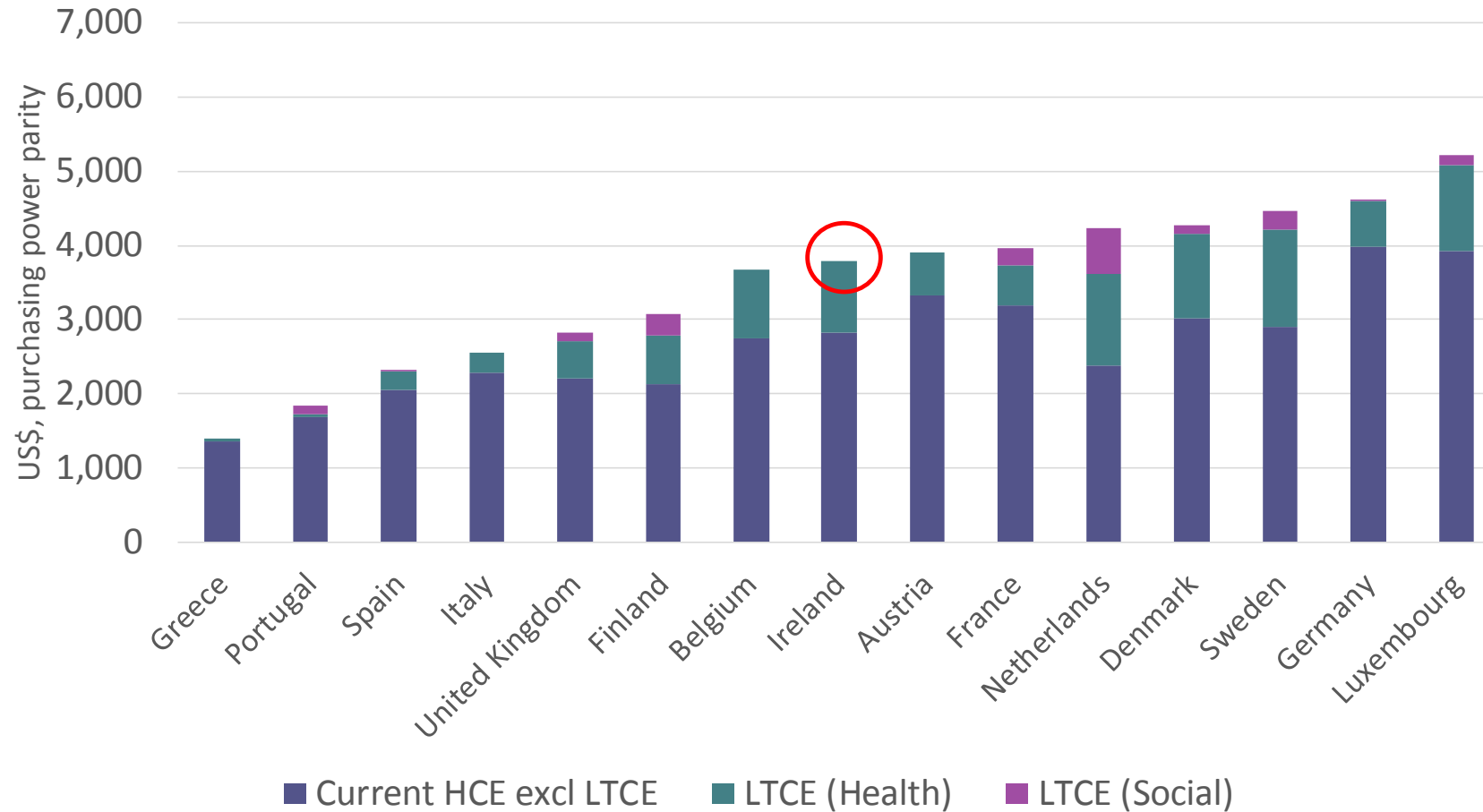
Private current health and long-term care (health & social) expenditure per capita, EU15, 2016

Legend: Current HCE excl LTCE | LTCE (Health) | LTCE (Social)

Y-axis: US$, purchasing power parity

Categories: Denmark, France, Germany, United Kingdom, Greece, Italy, Sweden, Portugal, Spain, Belgium, Netherlands, Finland, Luxembourg, Austria, Ireland

Source: OECD Health Statistics

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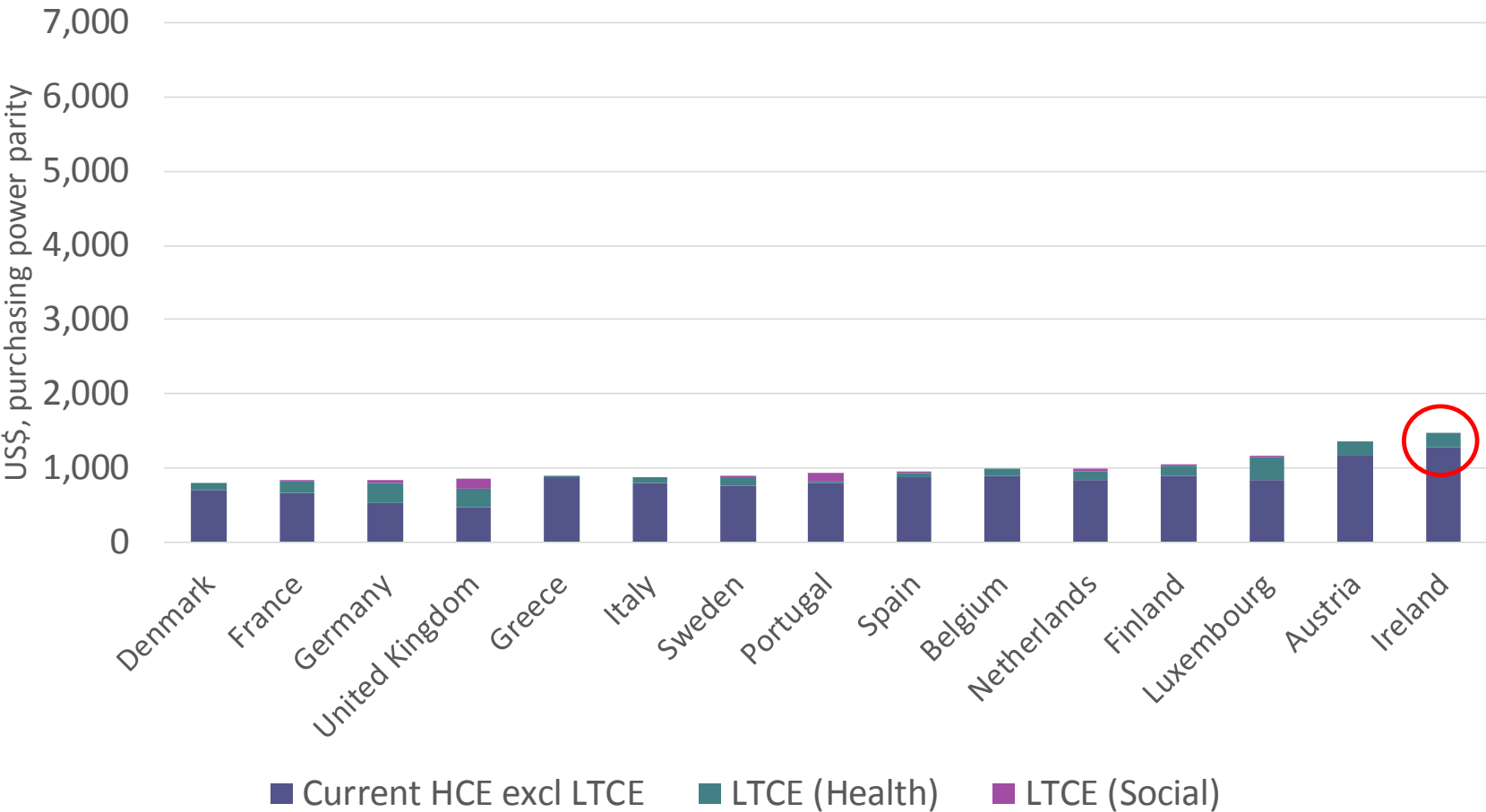
CONCLUSIONS

Improving understanding of expenditure pressures

- Policy response to sustainability issue requires understanding of HCE pressures

- Drivers of healthcare expenditure are complex

- The Irish healthcare system is unusual and…Irish demographics are unusual

- Per capita expenditure controls for demographics to some extent

- HIPPOCRATES model developing to mirror the complexity:
  - Flexible bottom-up model
  - Decomposes volume drivers x price drivers x service
  - Models how reforms will impact

- Policy discussion needs better data, consistent metrics, transparent methods

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