Medical Spending at Older Ages in England: Evidence from National Health Service Administrative Records

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Introduction

- This workshop aims to further understanding of cross-country variation in patterns of medical spending
- All developed countries have experienced sharp increases in medical spending in recent years
  - Significant variation in patterns of expenditure and in funding methods
- Medical spending in the UK has increased rapidly over time
  - 5.8% of GDP in 1990, 9.3% in 2012
- The UK provides an interesting case study given the high proportion of medical expenditure conducted by the government (84% in 2012)

Objectives

- This presentation will examine the distribution of spending on inpatient health care for the elderly population in England
  - Detailed administrative data are available on inpatient care
  - Hospital care accounts for 65% of the NHS budget, or 15% of all public service spending in 2011/12
  - Rapidly expanding population aged 65+
- We will focus on three specific questions:
  - How does spending change as an individual ages?
  - How concentrated is spending across individuals?
  - How concentrated is spending across time?

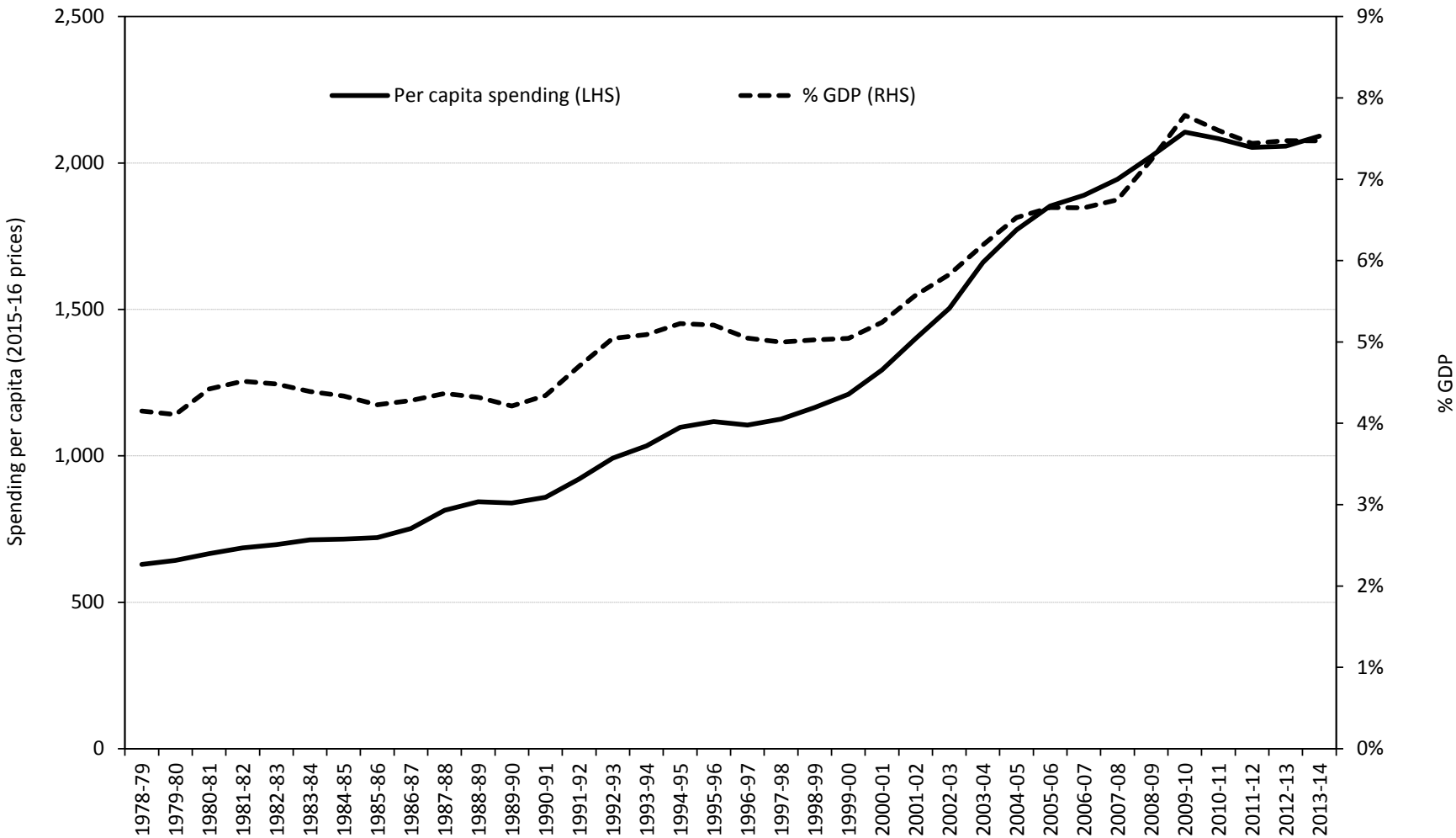
Outline

Table : UK health spending, 1990 - 2012 (2005 US Dollars)

	1990	2000	2010	2012
Health expenditure				
Total (billions)	75.0	120.2	191.3	191.8
% GDP	5.8	6.9	9.4	9.3
Per capita	1,311	2,041	3,047	3,012
Sources				
Government	83.6%	79.1%	83.5%	84.0%
Private insurance	5.8%	9.8%	7.3%	7.0%
Out of pocket	10.6%	11.1%	9.2%	9.0%

Notes: Authors' calculations using OECD health statistics data, extracted in March 2015. Expenditure is given in 2005 US Dollar PPP values.

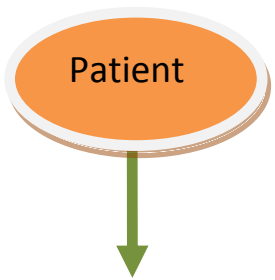
Figure : UK public health spending, per capita (2015/16 prices) and as a percentage of GDP, 1978/79 - 2013/14



Institutional background

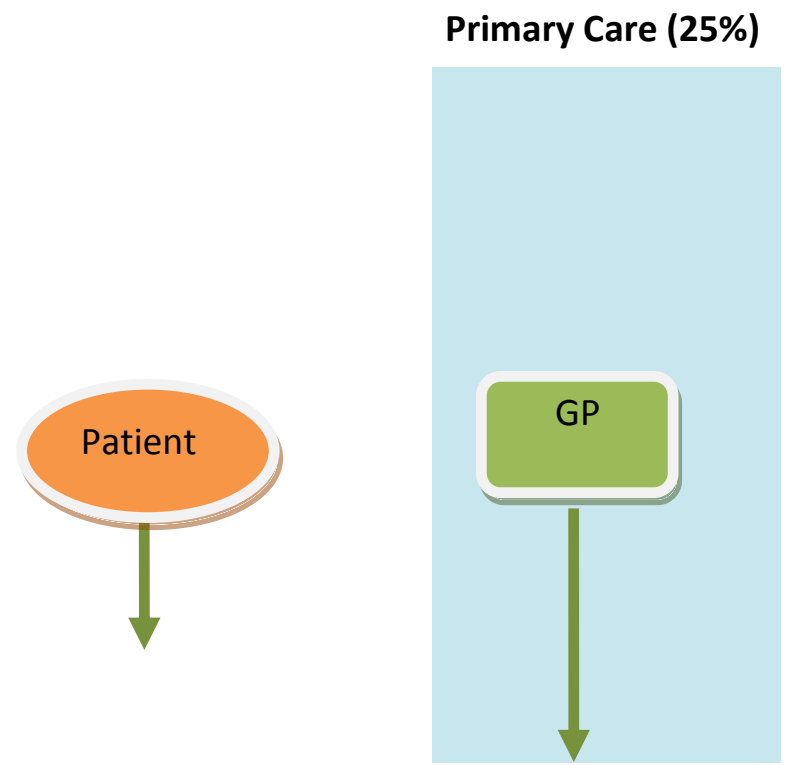
- Public spending on healthcare is funded through general taxation
- Care is provided through the National Health Service (NHS)
- The NHS provides free at the point of use care to all residents (>6 months in the UK)

A stylised example



Patients decide not to visit the doctor

A stylised example



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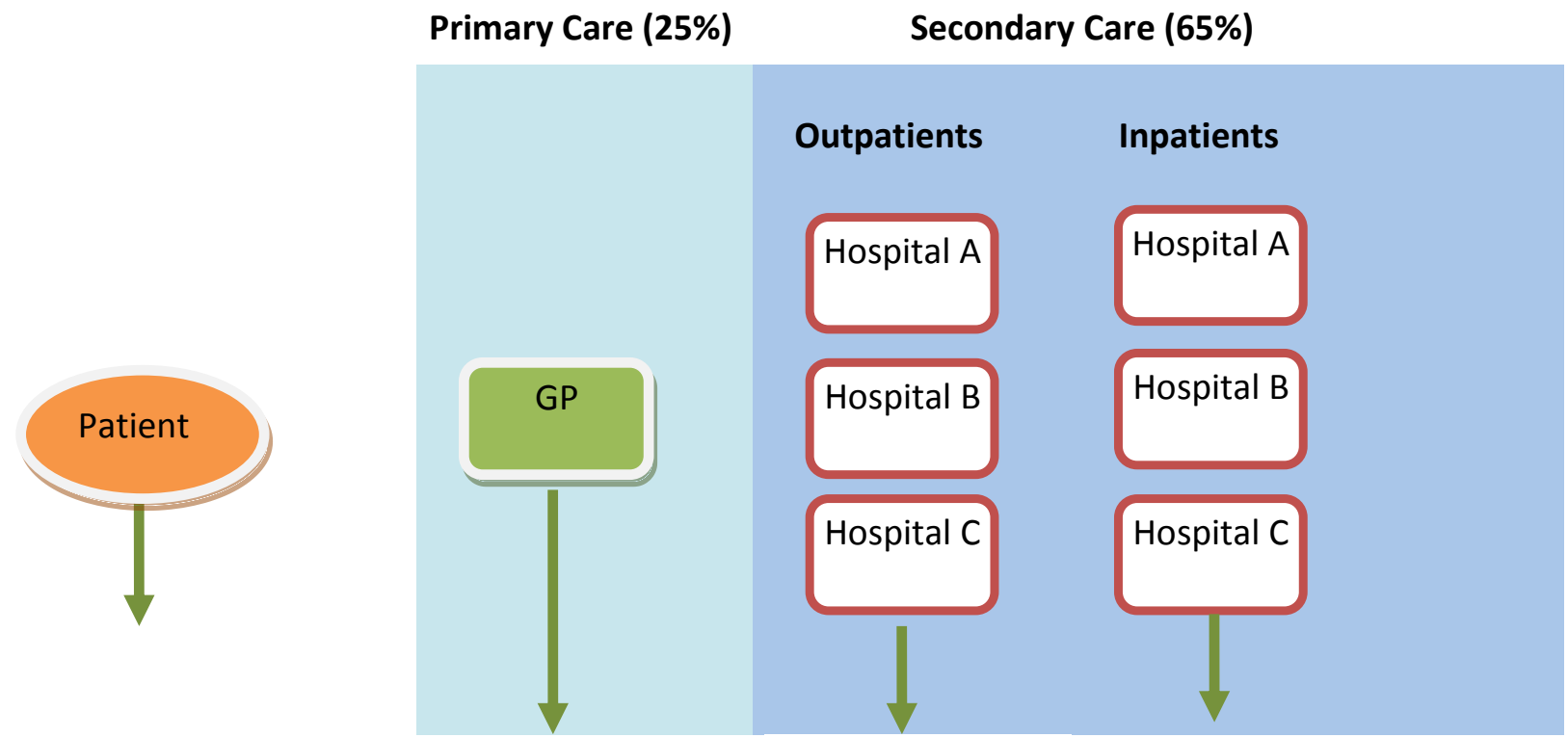

Patients decide not to visit the doctor

Patients receive treatment within primary care

Patients receive outpatient treatment or discharged without treatment

Patients are admitted to hospital and discharged after treatment

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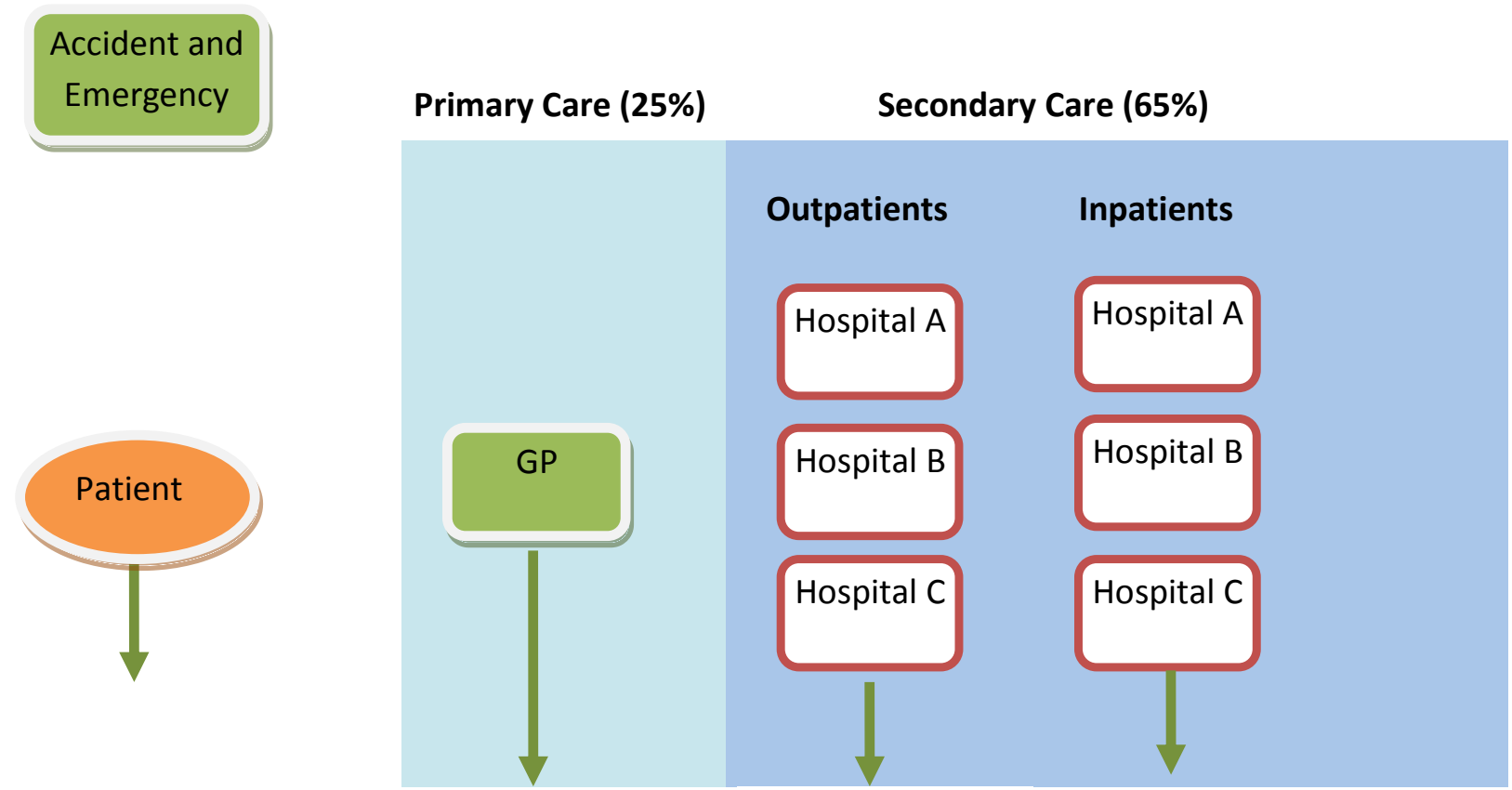
A stylised example



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Inpatient care

- The remainder of this presentation will focus on inpatient care
  - Accounts for a significant proportion of NHS spending
  - Administrative records provide detailed data on inpatient care in NHS hospitals
  - Comparable data for private expenditures and payments for other types of care is extremely scarce
- Focus on the population aged 65 and above
  - Consume more, and more expensive, health care
  - Forecast to increase by 22% over the next decade (ONS, 2013)

Funding inpatient care

- Within the NHS, suppliers (hospitals) and commissioners (organisations that fund treatment) are separated
- Hospitals are reimbursed by commissioners for providing care to patients in two ways:
  - Payment for care bundles provided
  - Non-tariff income
- Payments for care provided accounted for 60% of hospital income in 2010-11 (Department of Health, 2010-11)
- We will focus on these specific costs, as we are able to assign these costs to individual patients through the use of Healthcare Resource Groups (HRGs)

Healthcare resource groups

- HRGs group together sets of diagnoses and interventions that consume similar levels of NHS resources
  - Similar to Diagnosis-related Groups (DRGs) in US
- Hospitals are (partially) reimbursed for providing care through the use of HRGs
  - A fixed national tariff is assigned to each HRG
  - Tariffs are traditionally based upon the average cost of providing these services (reference costs)
- Costs are then adjusted according to a Market Forces Factor (MFF)
  - Captures unavoidable variation in regional costs
- Further adjustments for specific policy goals and for long stays

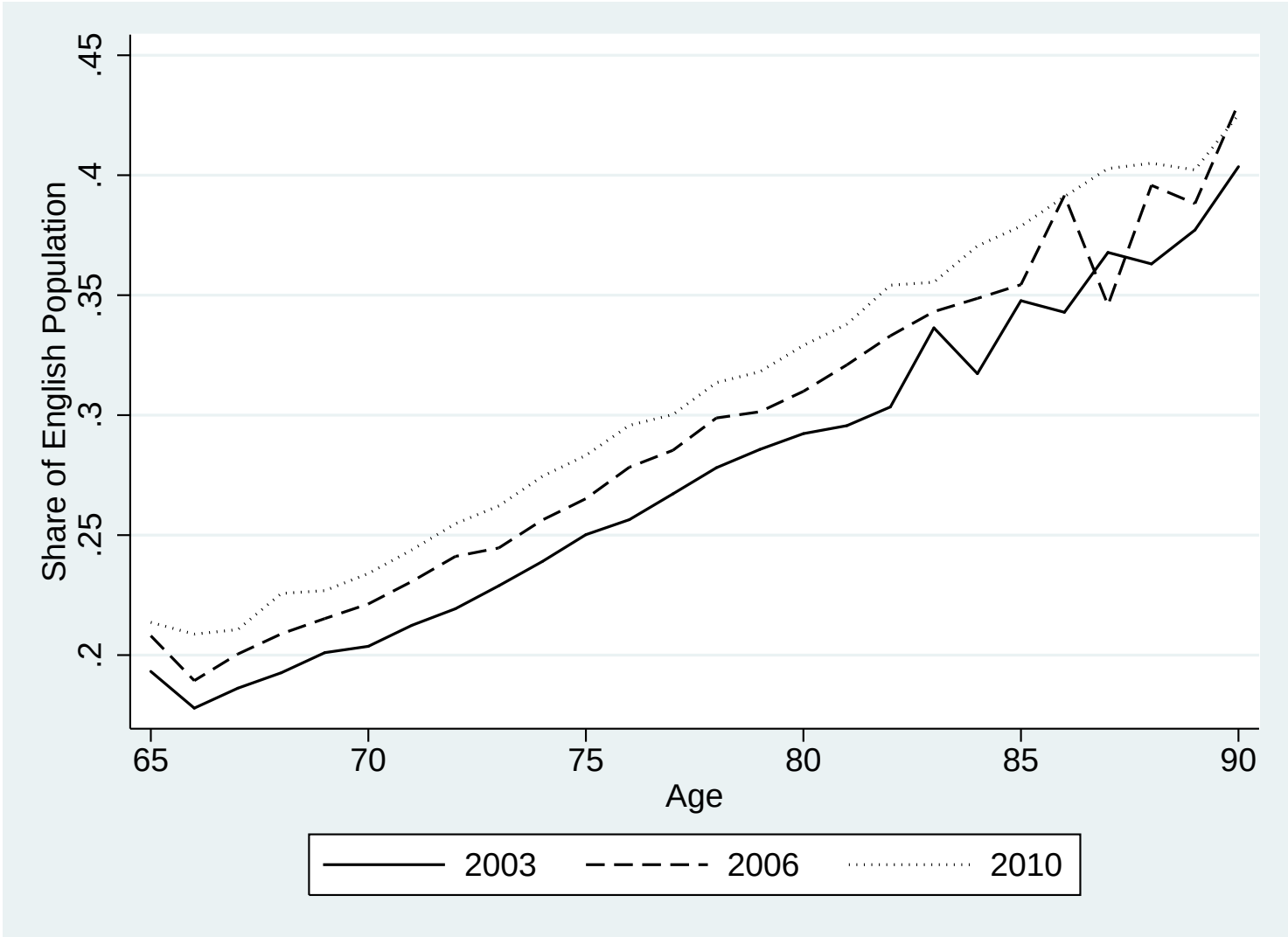
Hospital Episodes Statistics

- The Hospital Episodes Statistics (HES) record all NHS-funded inpatient hospital care in England
  - Around 2.5 million patients aged 65 and above in each year
  - Inpatient-level data available between 2003 and 2010
- Information on patients:
  - Gender, age, local area (LSOA) of residence
  - Does not contain information on patient characteristics (i.e. income)
- Information on treatment received:
  - Specific procedure codes (ICD-10) and diagnoses codes (OPCS4)
  - Provider codes
  - Healthcare resource groups (HRG)
- HES only captures individuals who are admitted to hospital
  - We need to account for the rest of the population

Estimating individual costs

- Annual costs can be estimated on an individual basis by combining HRG codes with provider codes (adjusting for MFF)
- Ideally: we would use the relevant tariffs and MFF for each year
  - Precise HRG codes, tariffs and MFF change in each year
  - However, tariff data are not available for each year
- We estimate costs using the 2008/9 tariff and MFF values for all years
  - Cost each episode between 2003/4 and 2010/11
  - Sum episodes in each year to estimate individual annual costs
- Current results do not adjust for length of stay (additional payments for longer stays)

Figure : The share of the English population admitted to hospital, by age and year of admission



Accounting for individuals with no hospital use

- HES contains only data on individuals who are admitted to hospital
  - Does not provide a representantive sample of the population
- We use population data to estimate the proportion of the population who are admitted to hospital in any given year, by sex and age
- These estimates are used as weights when producing lifecycle profiles of average public expenditure on inpatient care
  - Accounts for individuals with zero expenditures

Figure : Average inpatient spending for females, by age, with and without adjustments for cohort effects

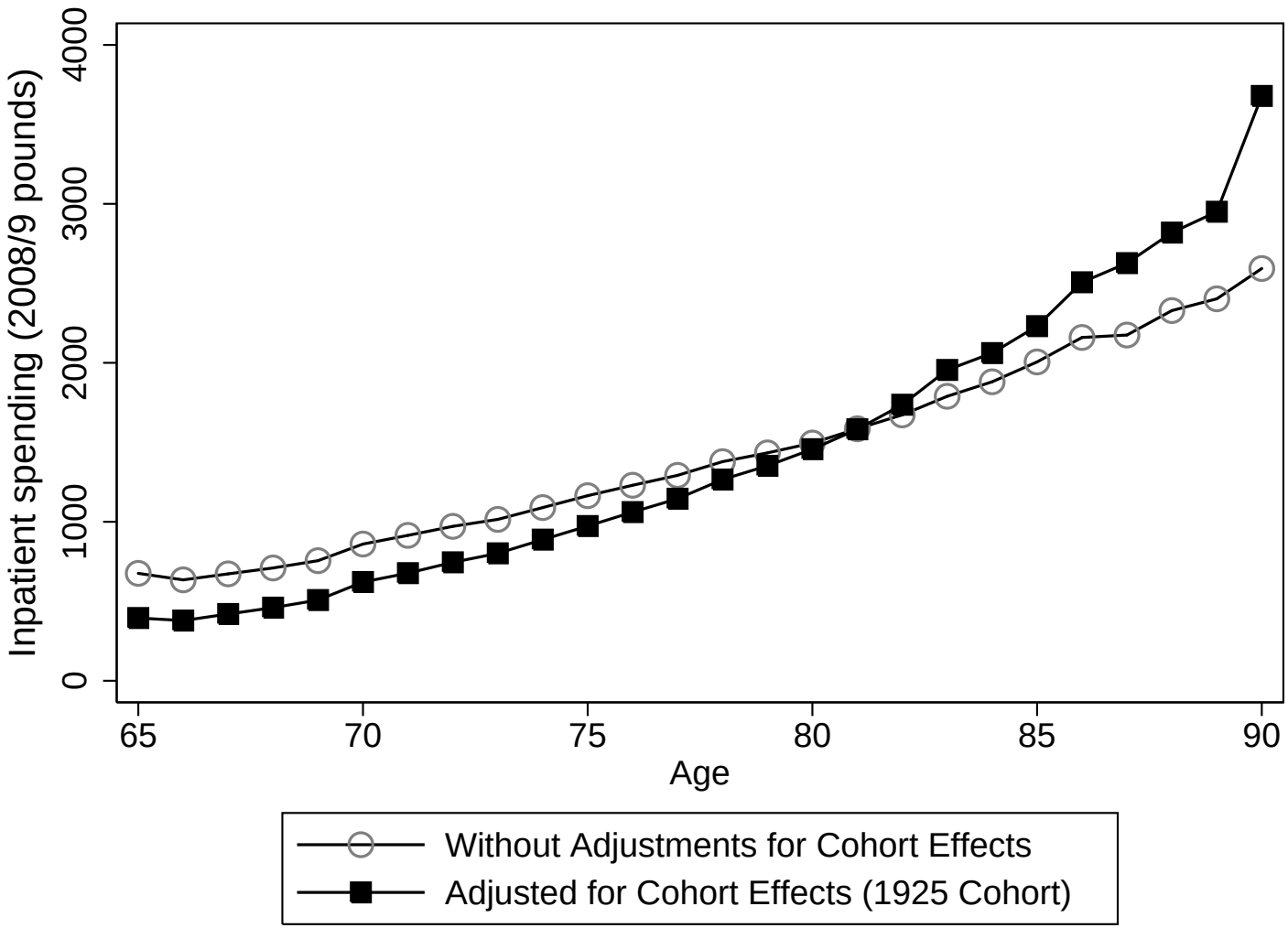


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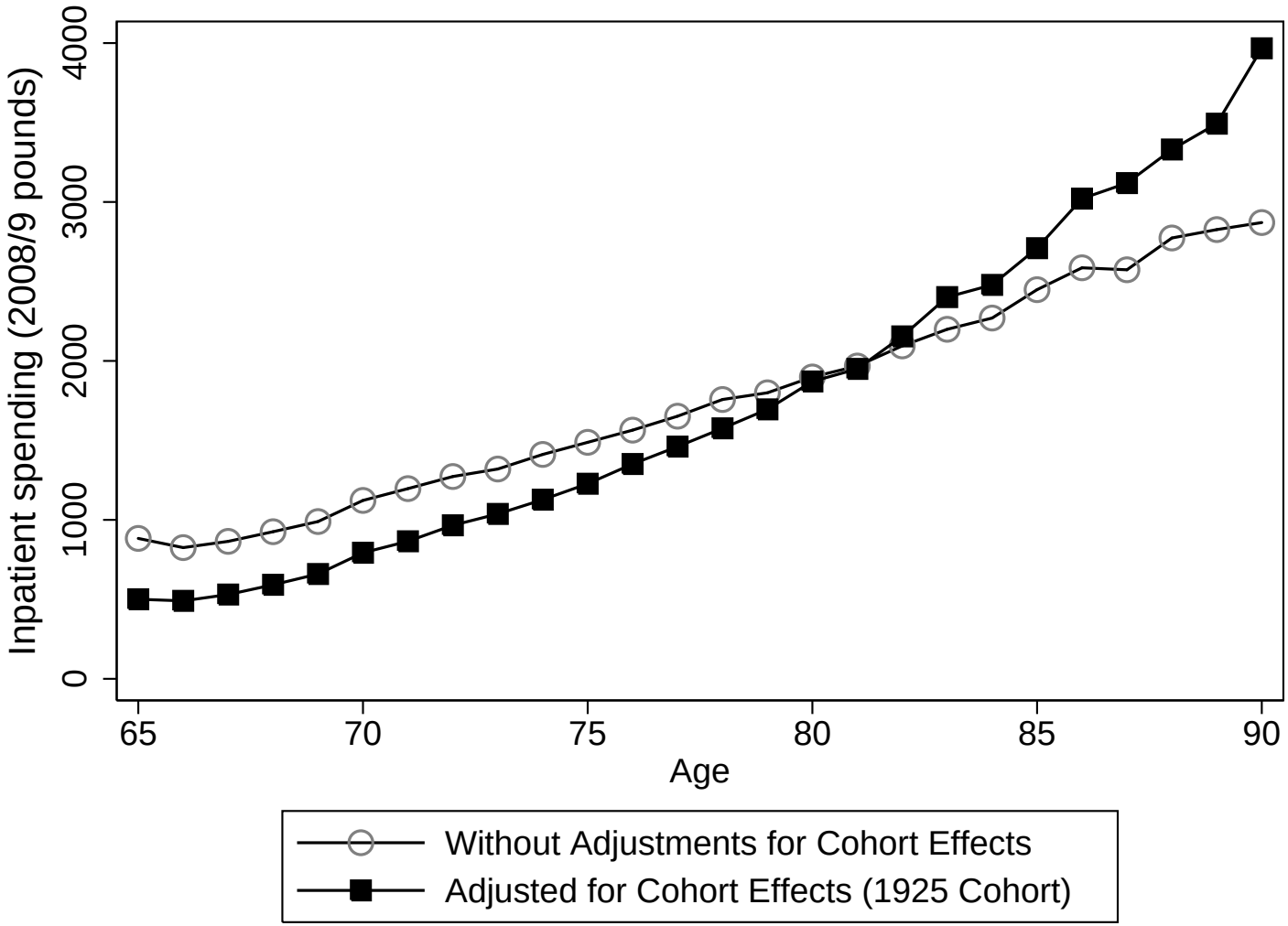
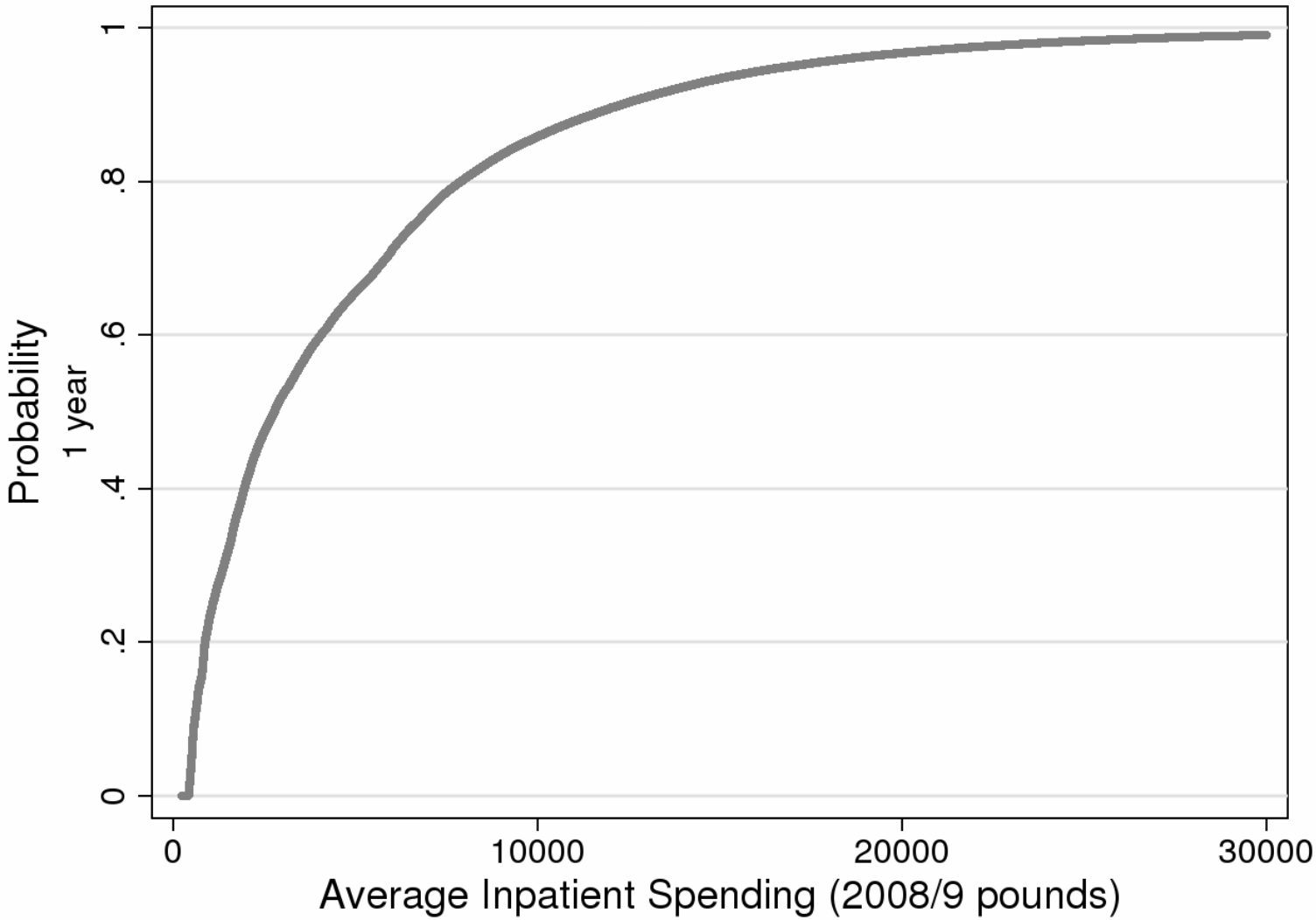
Figure : Average inpatient spending for males, by age, with and without adjustments for cohort effects



Lifecycle profiles

- Higher spending for males than females
  - Magnitude is small
  - Similar gradient
- Costs rise steeply in later ages
  - An average 85 year old male has more than double the expenditure (£2,200) of an average 65 year old (£900)
- Introducing cohort effects leads to a steeper age gradient

Figure : CDF of inpatient spending, 2008/9



Concentration of spending

- It is important to understand who benefits from health expenditures
  - How concentrated is expenditure on particular individuals?
  - How does spending vary by individual characteristics, such as income or wealth?
- HES contains little information on individual characteristics
- We proxy wealth through the deprivation level of the local areas in which residents live
  - Index of Multiple Deprivation values in 2004
- Analysis using the English Longitudinal Study of Ageing (ELSA) suggests a strong connection between wealth and IMD quintile

Table : Mean wealth recorded in ELSA (Wave 3), by local area IMD quintile

	Total net (non-pension) wealth	Total net financial wealth
All	303,036	62,195
Deprivation quintiles		
Least deprived	436,067	99,919
2	342,655	68,957
3	328,285	62,114
4	195,184	34,756
Most deprived	97,437	18,593

Notes: Authors' calculations using ELSA wave 3 (2006) data. Wealth is given in 2006 prices.

Table : Mean inpatient spending, by expenditure and deprivation quintiles

	All	Men	Women
All	5,027	5,117	4,952
Expenditure quintiles			
Least	612	596	625
2	1,361	1,322	1,396
3	2,787	2,730	2,833
4	5,674	5,671	5,678
Most	14,702	15,264	14,230
Deprivation quintiles			
Least deprived	4,738	4,795	4,688
2	4,813	4,879	4,756
3	4,963	5,019	4,919
4	5,110	5,247	4,996
Most deprived	5,512	5,643	5,400

Notes: Authors' calculations using HES data. Expenditure is given in 2008/9 pounds. Deprivation quintiles are calcualted using the ONS Index of Multiple Deprivation (2004 values). Expenditure relates to all inpatient spending in 2003/4, 2006/7 and 2010/11.

Correlation of spending over time

- Previous results showed the static concentration of medical spending
- It is perhaps more important to understand the concentration of medical spending over time
  - Is spending more or less concentrated when averaging over a number of years?
  - How does current spending relate to future spending?
- We examine:
  - Correlation between spending in one year and the next
  - Variation across the expenditure distribution

Table : Measurements of the concentration of medical spending (2008/9 - 2010/11)

	Total medical spending averaged over		
	1 year	2 year	3 year
Gini coefficient on medical spending	0.56	0.56	0.56
% spent by top 1% of spenders	9.5%	7.7%	6.7%
% spent by top 10% of spenders	40.0%	33.3%	29.3%

Notes: Authors' calculations using HES data.

Table : Correlation of Medical Spending in 2008, 2009 and 2010

	2008	2009	2010
Levels			
All	1.00	0.33	0.21
Men	1.00	0.38	0.23
Women	1.00	0.31	0.18
Levels - bottom coded			
All	1.00	0.36	0.22
Men	1.00	0.39	0.25
Women	1.00	0.32	0.20
Logs - bottom coded			
All	1.00	0.10	-0.05
Men	1.00	0.12	-0.04
Women	1.00	0.08	-0.06

Notes: Authors' calculations using HES data. Bottom coding replaces observations with zero costs in any given year with 10% of the mean annual expenditure.

Table : Inpatient spending transition matrices (2008/9 - 2010/11)

			2009			
2008	Zero	Least	2	3	4	Most
Zero	43.5	12.6	12.3	11.3	10.9	9.3
Bottom	60.3	12.7	8.1	7.1	6.4	5.4
2	58.3	8.3	10.1	8.3	7.8	7.3
3	54.4	6.5	8.1	10.6	9.8	10.7
4	53.0	5.6	6.8	9.7	11.8	13.2
Most	45.7	4.1	5.6	9.8	12.9	21.9

			2010			
2008	Zero	Least	2	3	4	Most
Zero	32.8	14.4	14.2	13.5	13.2	
Bottom	63.3	10.1	7.5	6.8	6.3	5.9
2	61.8	7.7	8.3	7.7	7.2	7.2
3	59.9	6.1	7.3	8.8	8.5	9.6
4	60.0	5.2	6.2	8.2	9.2	11.0
Most	58.1	3.9	5.0	7.8	9.5	15.6

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Notes: Authors' calculations using HES data.

Conclusions

- Expenditure rises with age, particularly beyond the age of 80
  - Higher for men but similar gradient for both sexes
  - Costs for 90 year old male approximately £4,000 per year
- There is a positive gradient in spending across deprivation quintiles
- Expenditure becomes slightly less concentrated over time
  - Top 1% and 10% consume a smaller fraction, although the gini coefficient remains unchanged
- The correlation in spending across years is relatively weak
  - Correlation weakens over time
  - Correlation is driven by individuals in the top expenditure quintile
- Future work will utilise linked survey-administrative data