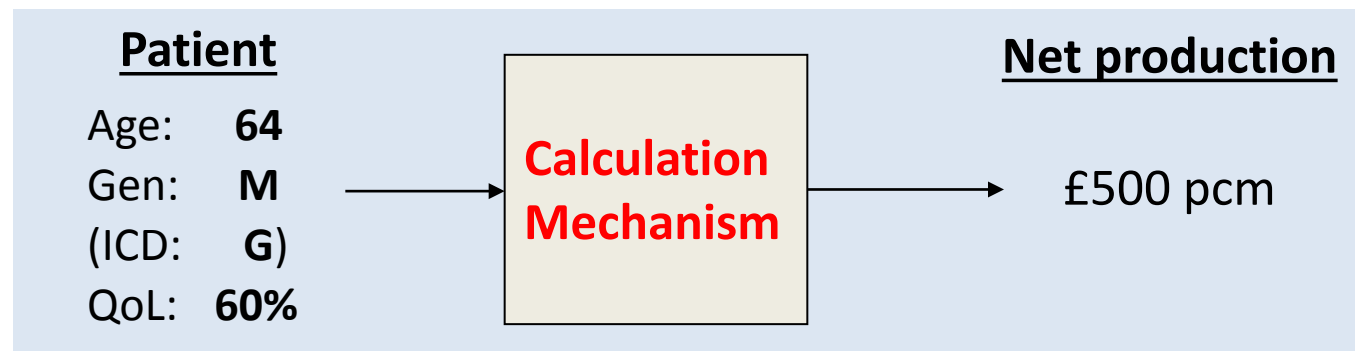


Methodology for estimating the wider economic impacts of health treatments

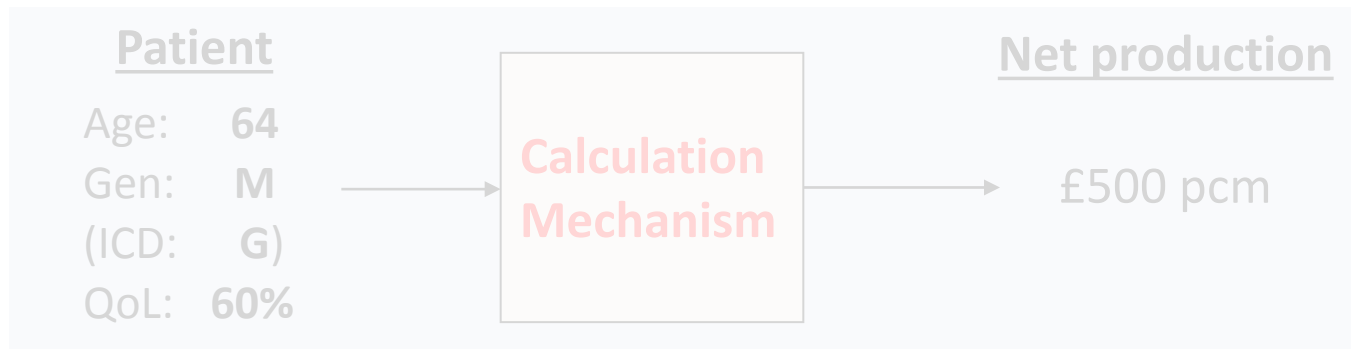
1. Changes in patient health have wider economic consequences
2. Patients' wider economic impact: *production net of consumption*
3. Estimating **net production** as a function of patient health



4. Results – single patient net production rates (given health state)
5. Results – treatment impacts (by ICD, and for marginal NHS £)

Methodology for estimating the wider economic impacts of health treatments

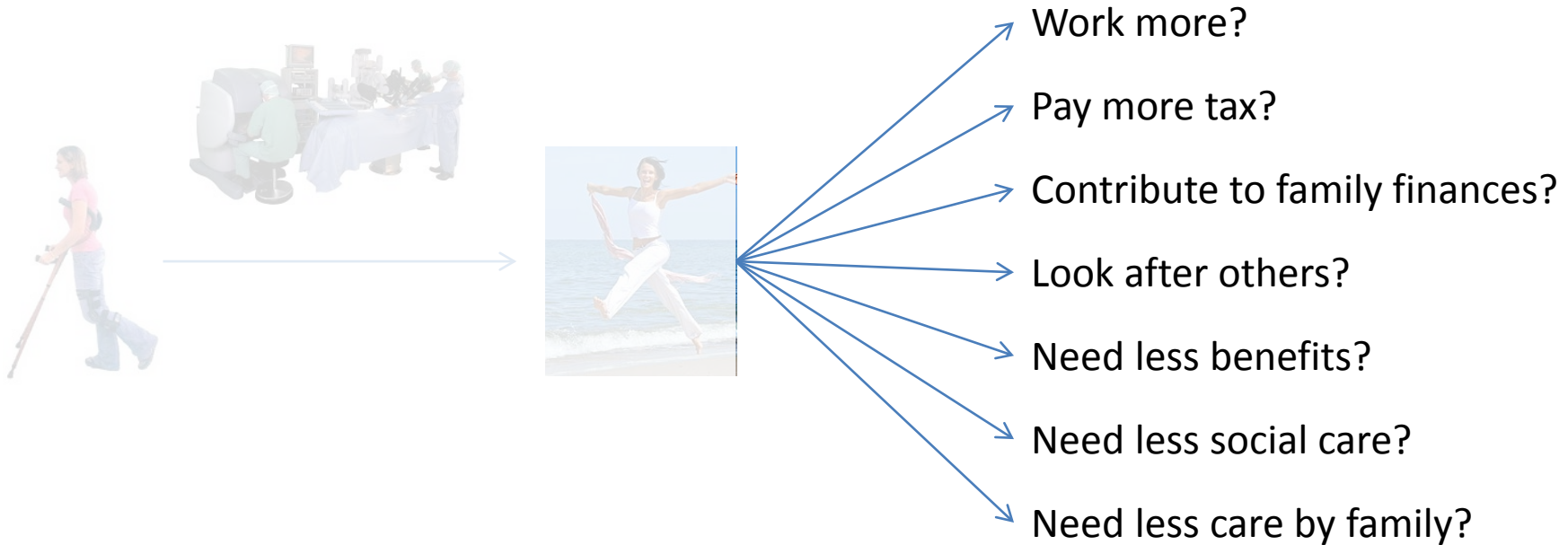
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Measuring the economic impact of health using *net production*

Health (and treatments) have impacts beyond the patient



Costs
(£)



Health
(QALYs)

+

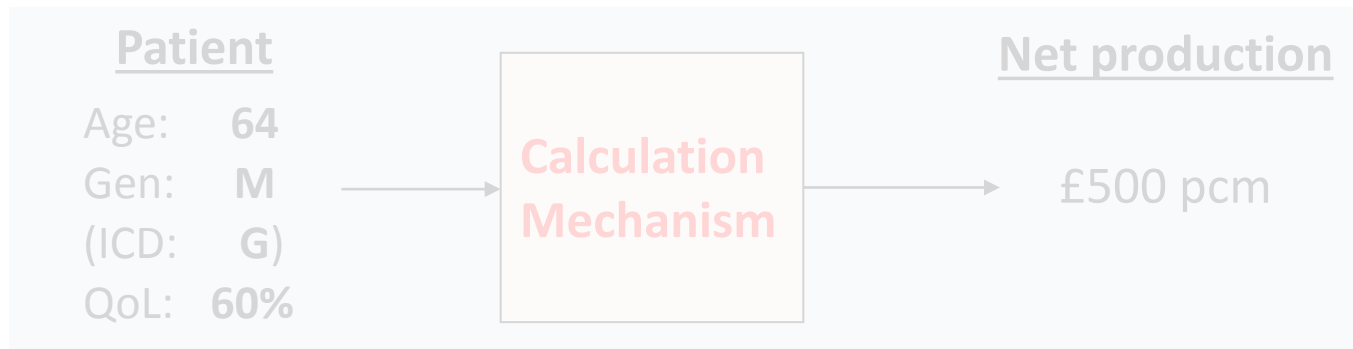
**Economic impact
on society
(i.e. other people)**

Methodology for estimating the wider economic impacts of health treatments

1. Changes in patient health have wider economic consequences

➔ 2. Patients' wider economic impact: *production net of consumption*

3. Estimating **net production** as a function of patient health

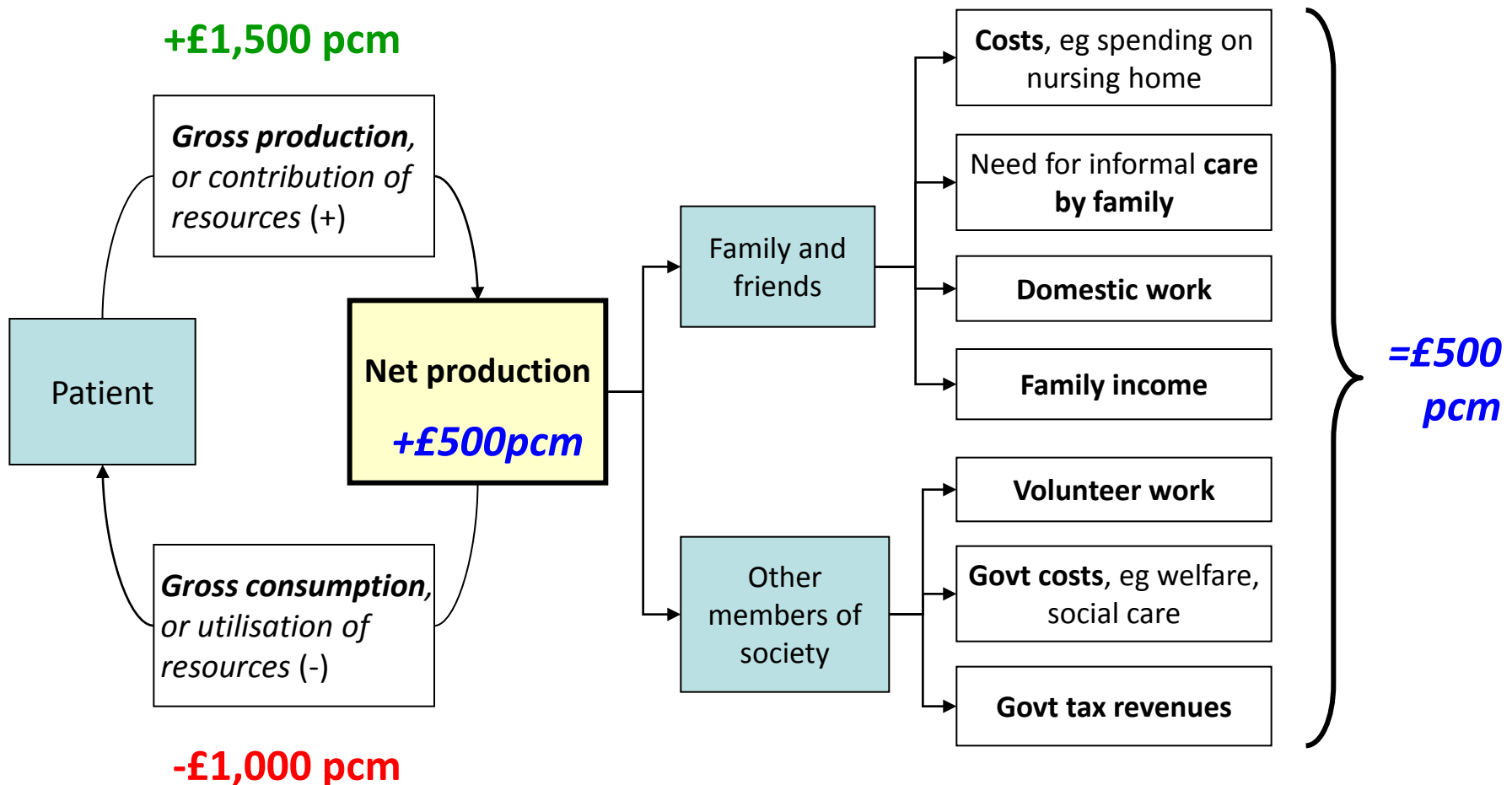


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Defining production and consumption effects

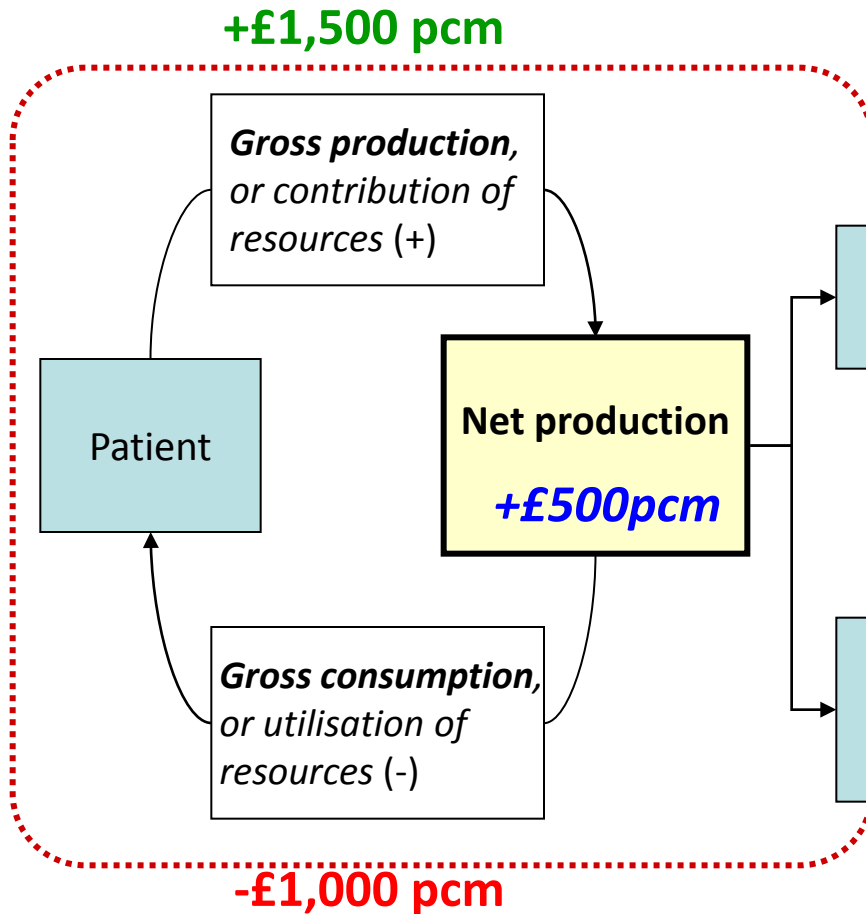
Net production = *consumption for others*



Any excess *production* (*consumption*) by patient means a *benefit* (*cost*) to someone else

Defining production and consumption effects

Net production = consumption for others

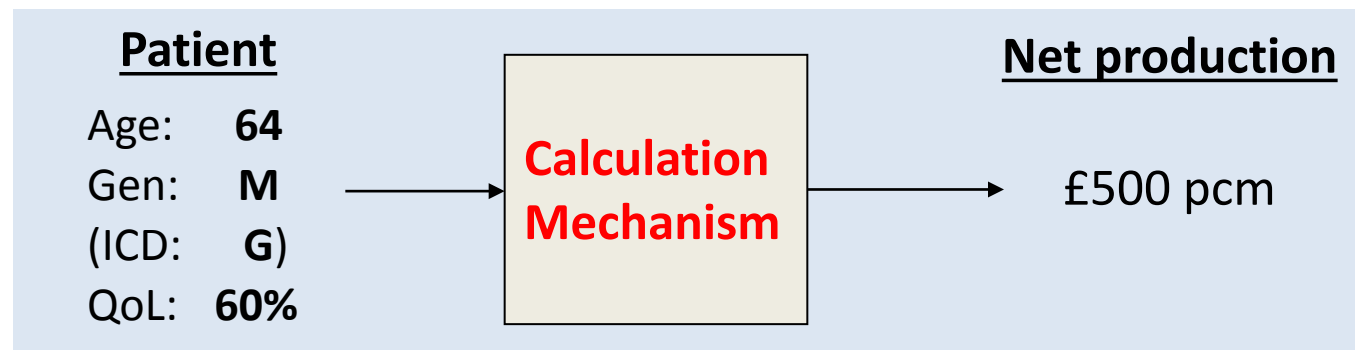


Any excess **production** (**consumption**) by patient means a **benefit** (**cost**) to someone else

Methodology for estimating the wider economic impacts of health treatments

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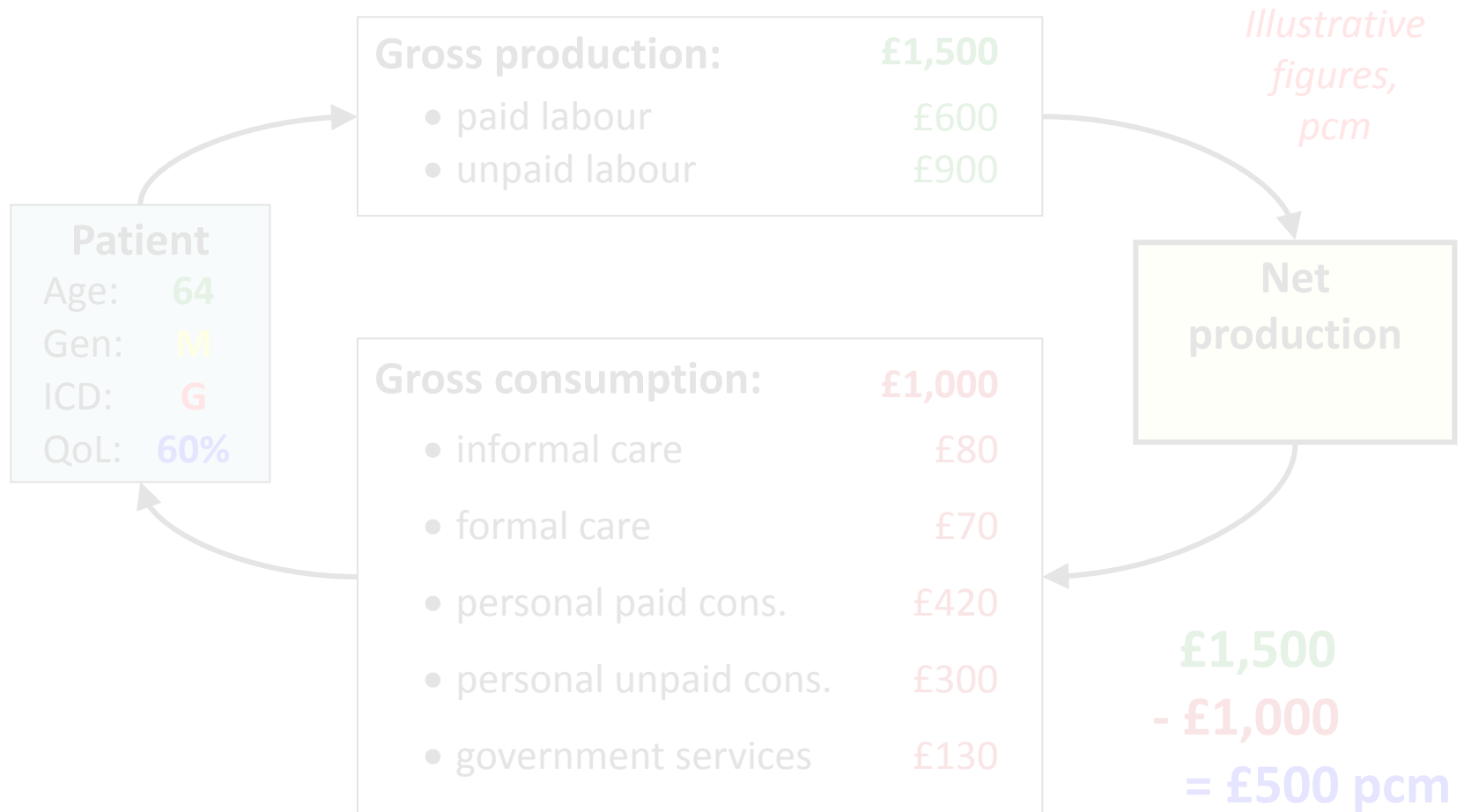
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Estimating production and consumption effects

Mechanism estimates production / cons as a function of health



Estimating production and consumption effects

Example: *washing up, consume 20 hpcm per person = £200*

If you do all your own washing up, your net washing up is zero

Estimating production and consumption effects

Example: *washing up, 20 hpcm = £200*

If someone else does it for you, your net washing up is negative

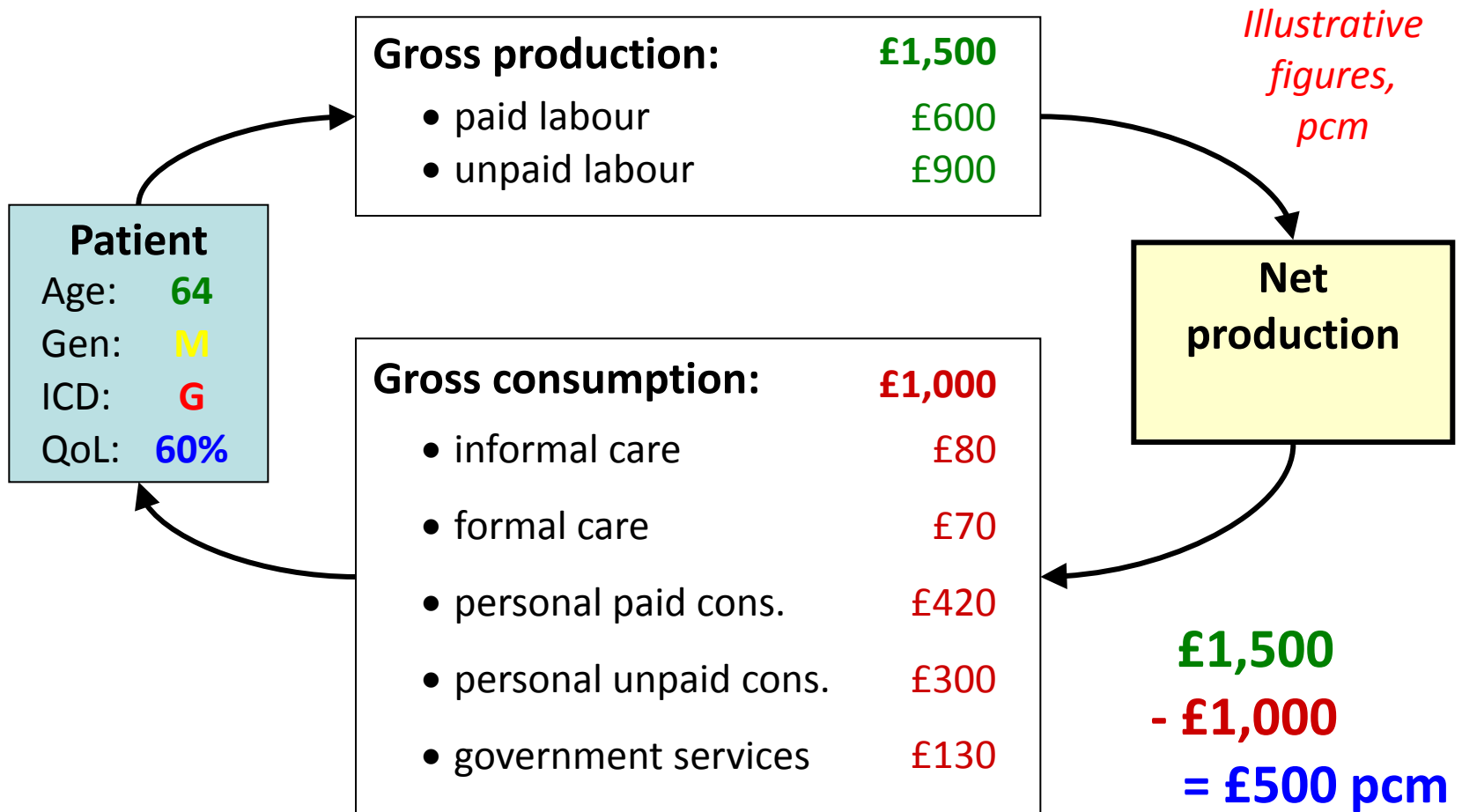
Estimating production and consumption effects

Example: *washing up, 20 hpcm = £200*

If you do someone else's washing up too, your net washing up is positive

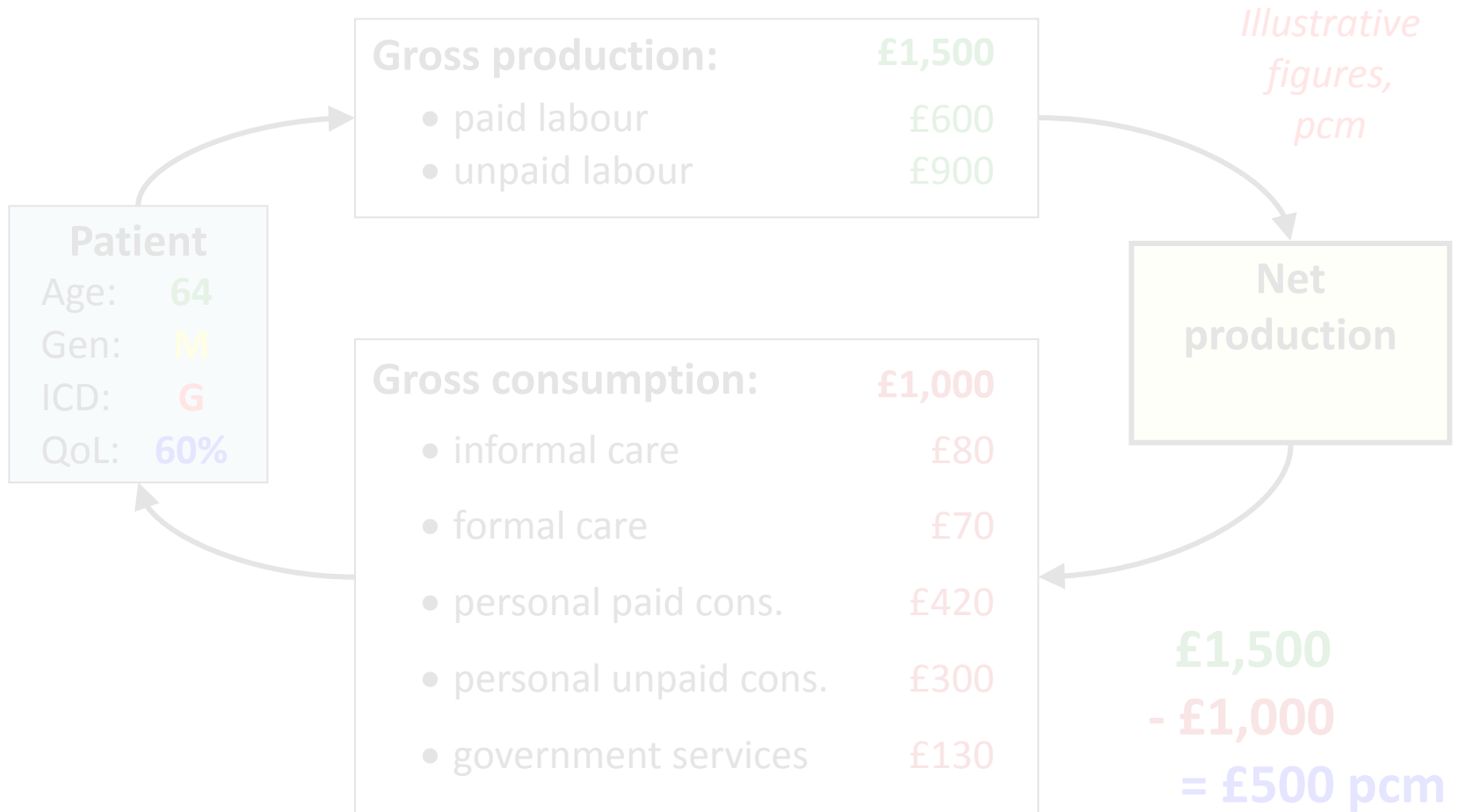
Estimating production and consumption effects

Mechanism estimates production / cons as a function of health



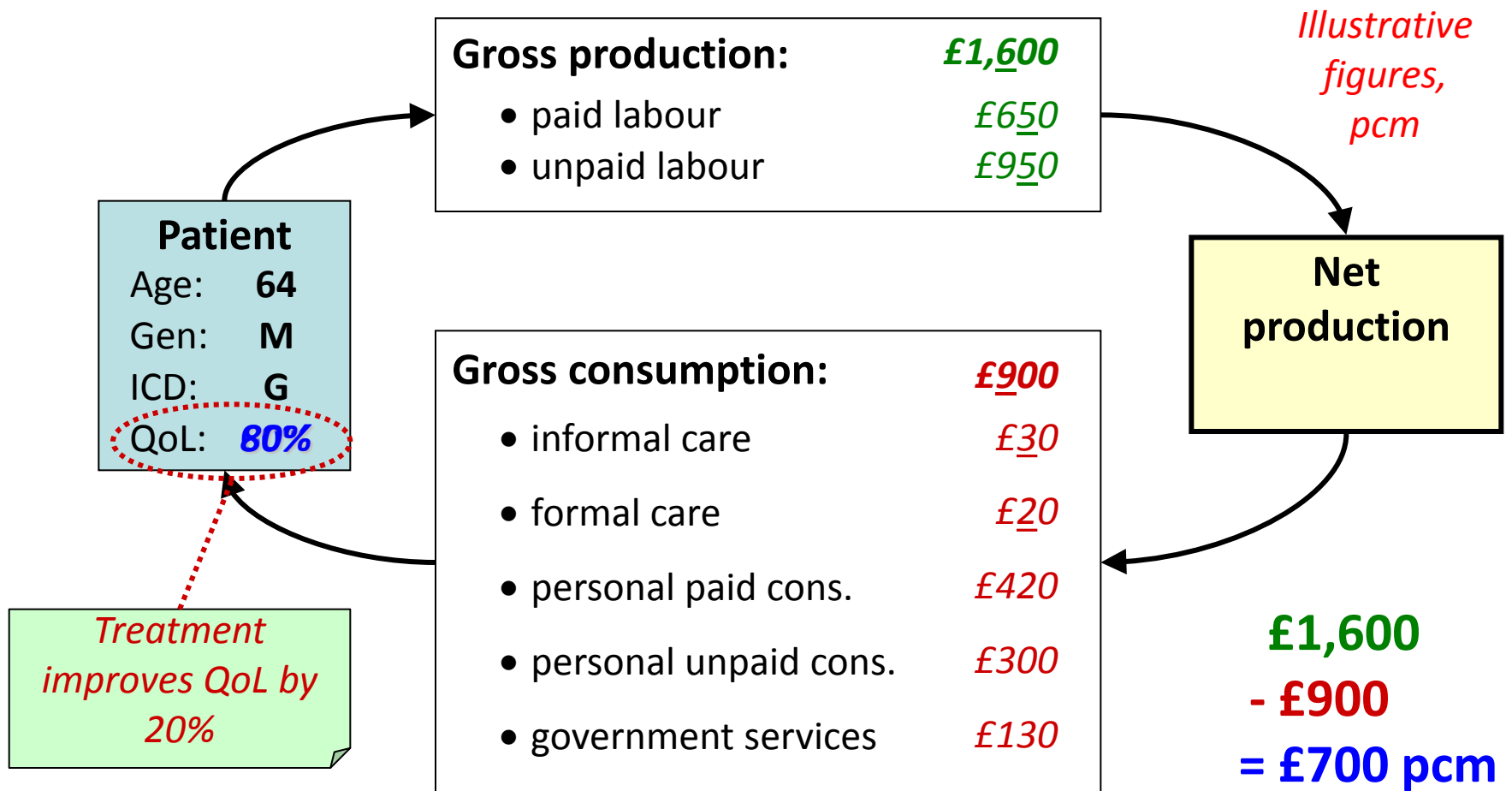
Estimating production and consumption effects

Compare to production with treatment to give impact



Estimating production and consumption effects

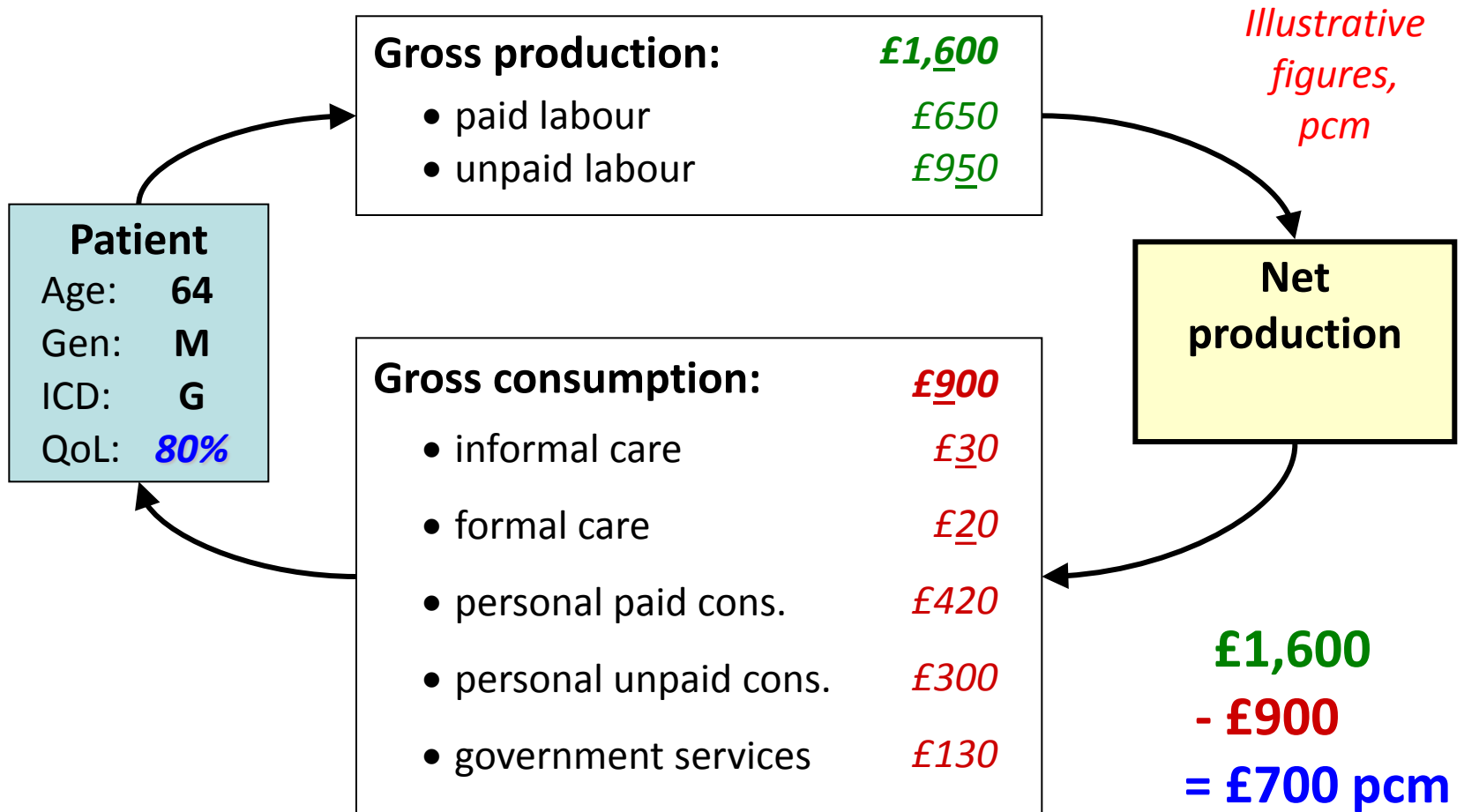
Compare to production with treatment to give impact



Raising this patient's QoL from 60% to 80% generates **£200pcm** in net production

Estimating production and consumption effects

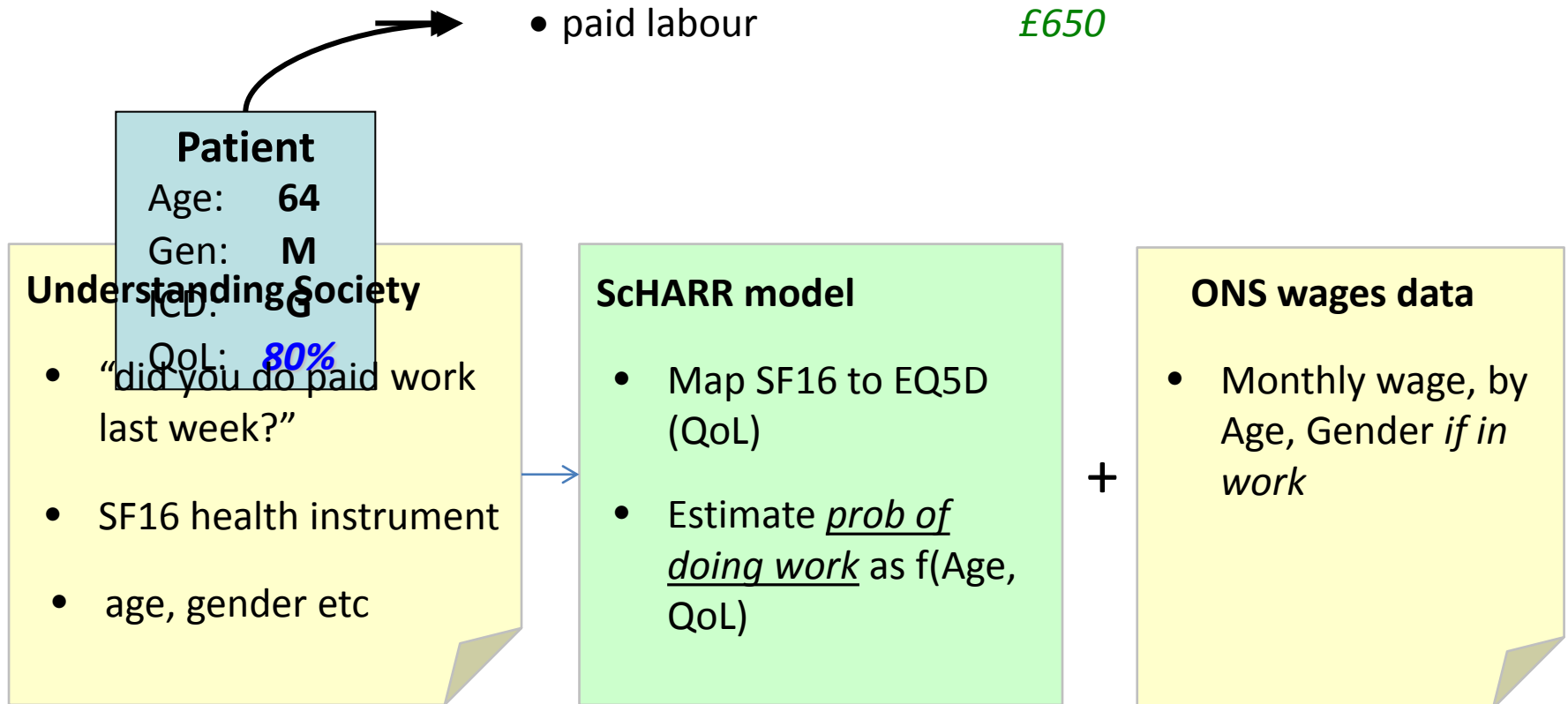
Estimating elements as functions of AGIQ – eg *paid labour*



Estimating production and consumption effects

Estimating elements as functions of AGIQ – eg *paid labour*

- paid labour £650



-> £ paid labour pcm = $f(\text{Age, Gender, QoL})$

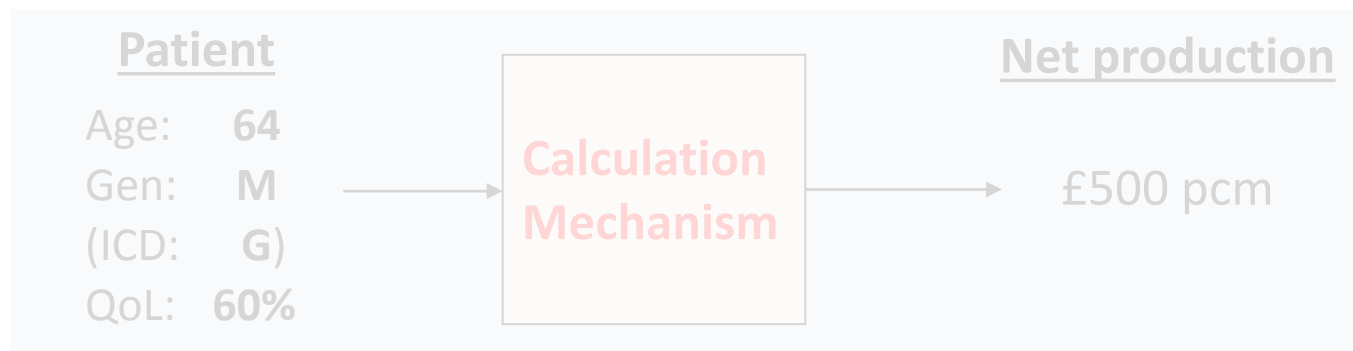
Estimating production and consumption effects


Main current data sources

Element	Dependent variables	Main data sources
Paid labour	AGQ	Annual Survey of Hours and Earnings (AG) Understanding Society (AQ)
Unpaid labour	AGQ	Time Use Survey (AG) Sick rate, derived from Understanding Soc. (Q)
Informal care	AGIQ	HoDAR
Formal care	A(I)Q	Adult Soc. Care Survey, GP Patient Survey, PSSRU data
Personal paid consumption	A	Living Costs and Food Survey
Personal unpaid consumption	(const)	Time Use Survey
Government services	A	Public Expenditure Statistical Analysis

Methodology for estimating the wider economic impacts of health treatments

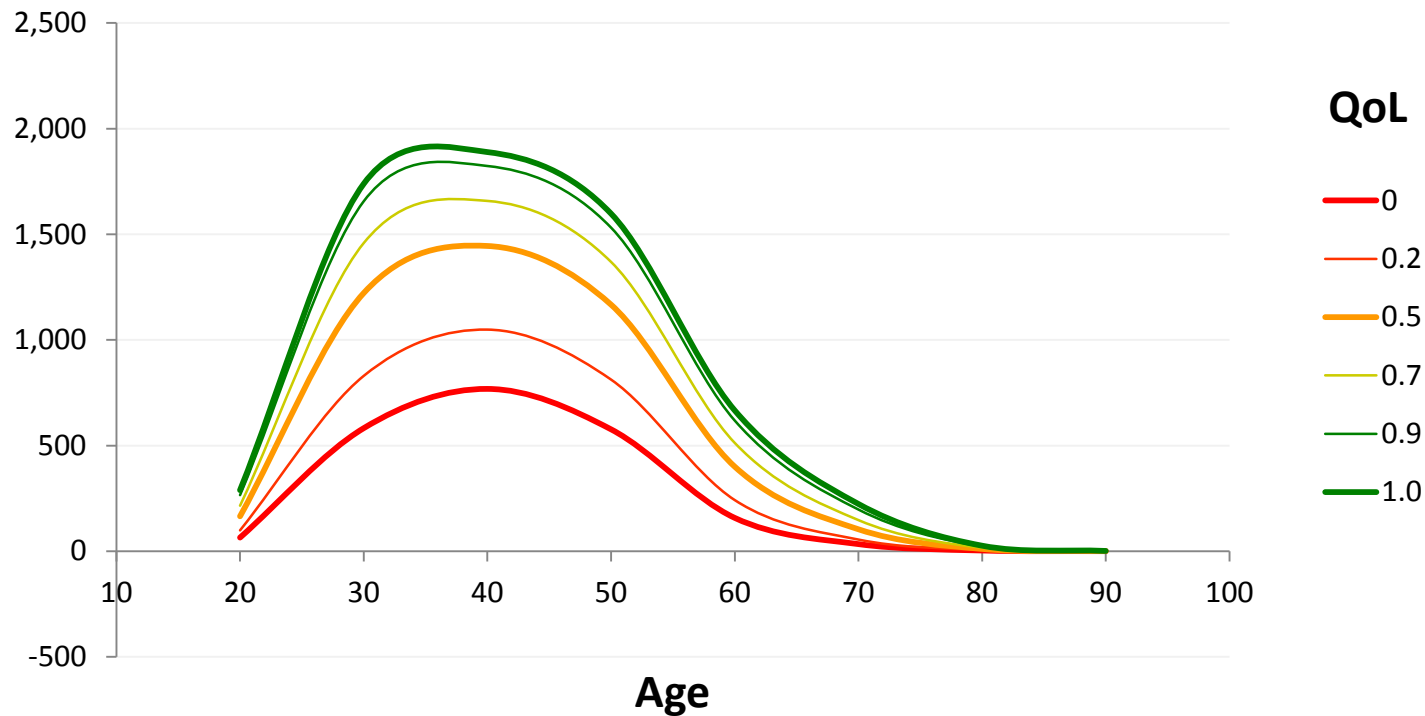
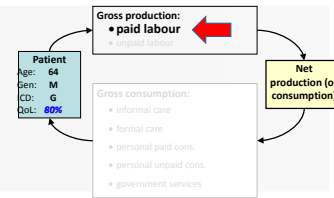
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Results – *paid production*

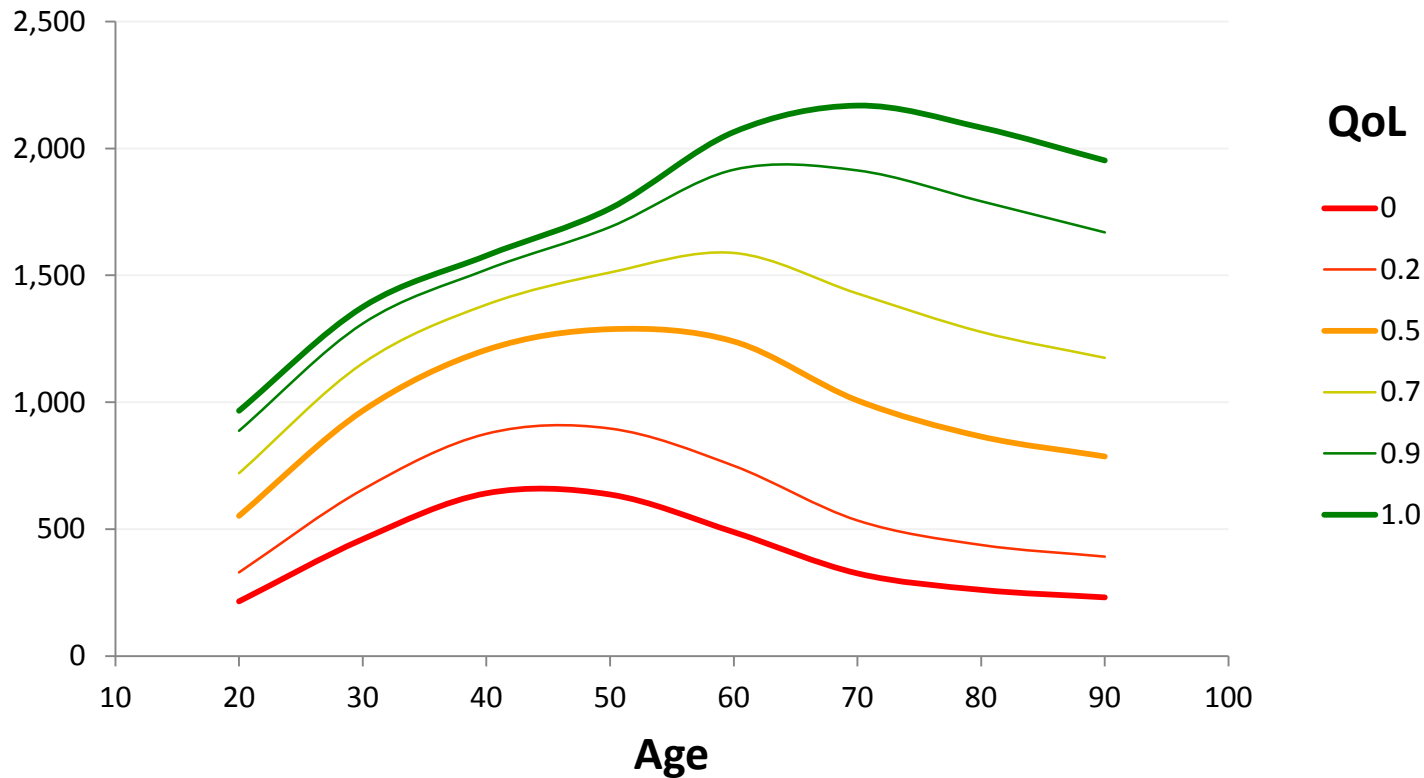
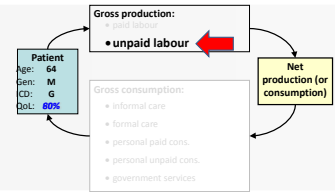
£pcm paid production as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Results – *unpaid production*

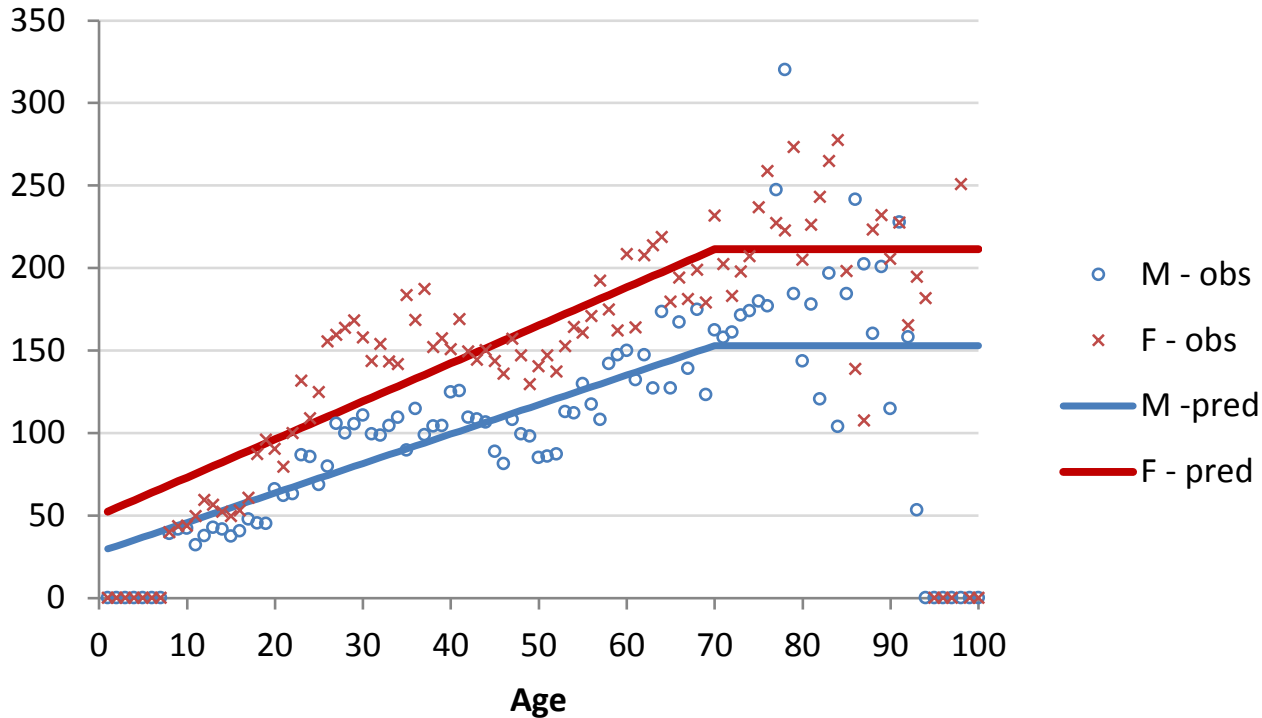
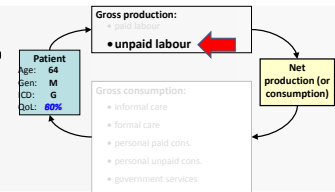
£pcm as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Results – *unpaid production* – general unpaid labour

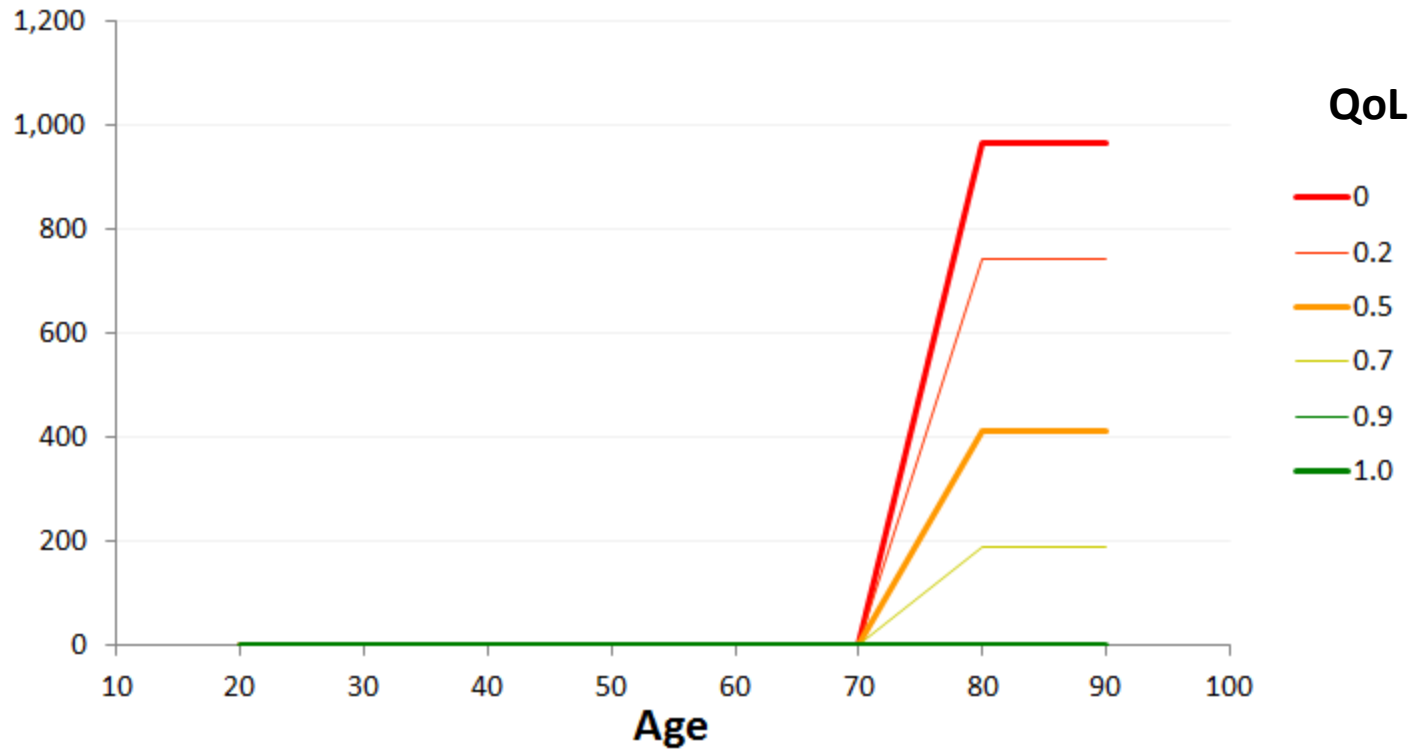
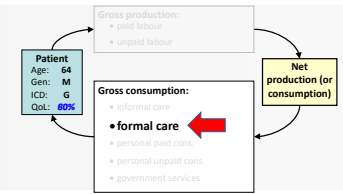
Hours pcm in full health



- Data from Time Use Survey
- Diaries identify activity for each 10 min interval
- ~3000 activities classified according to whether represent *unpaid labour*

Results – *formal care consumption*

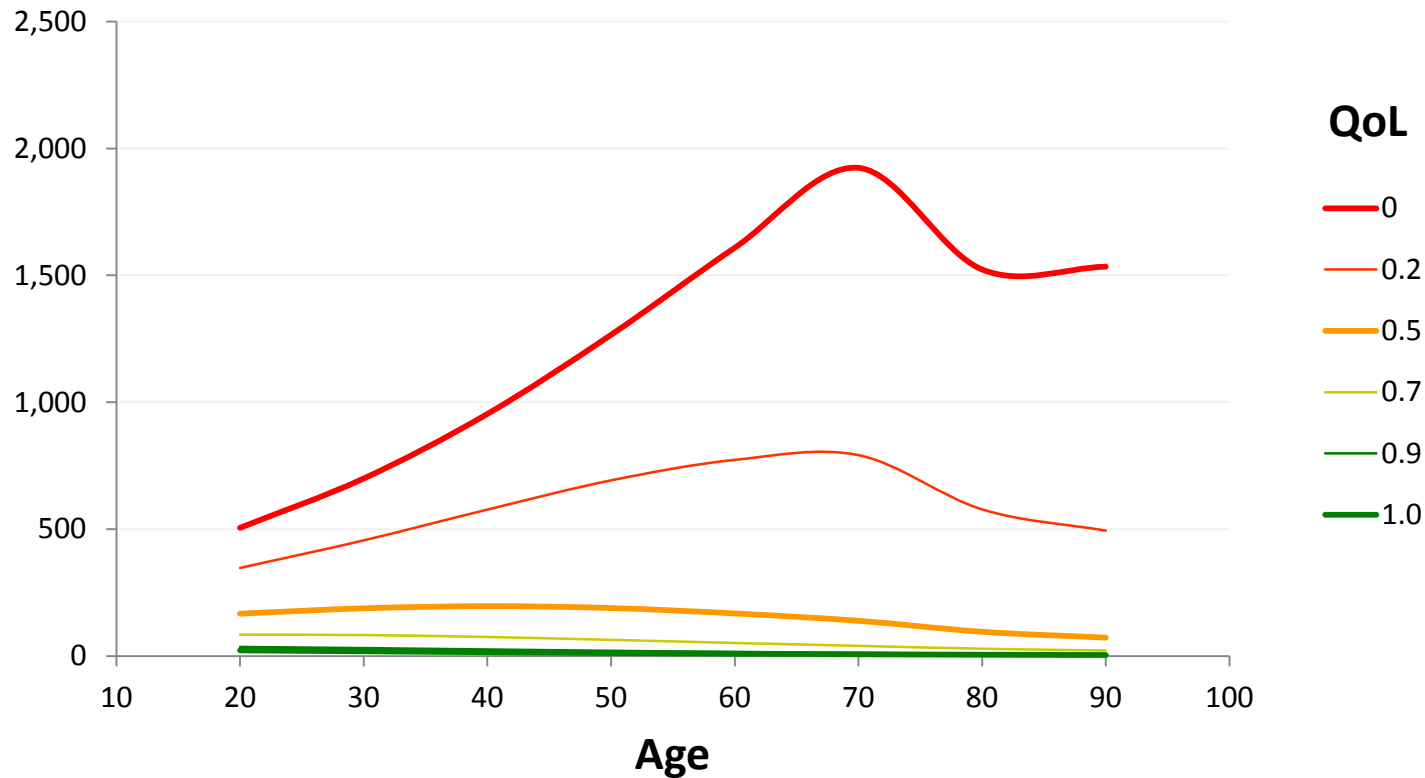
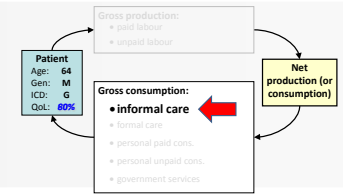
£pcm as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Results – *informal care consumption*

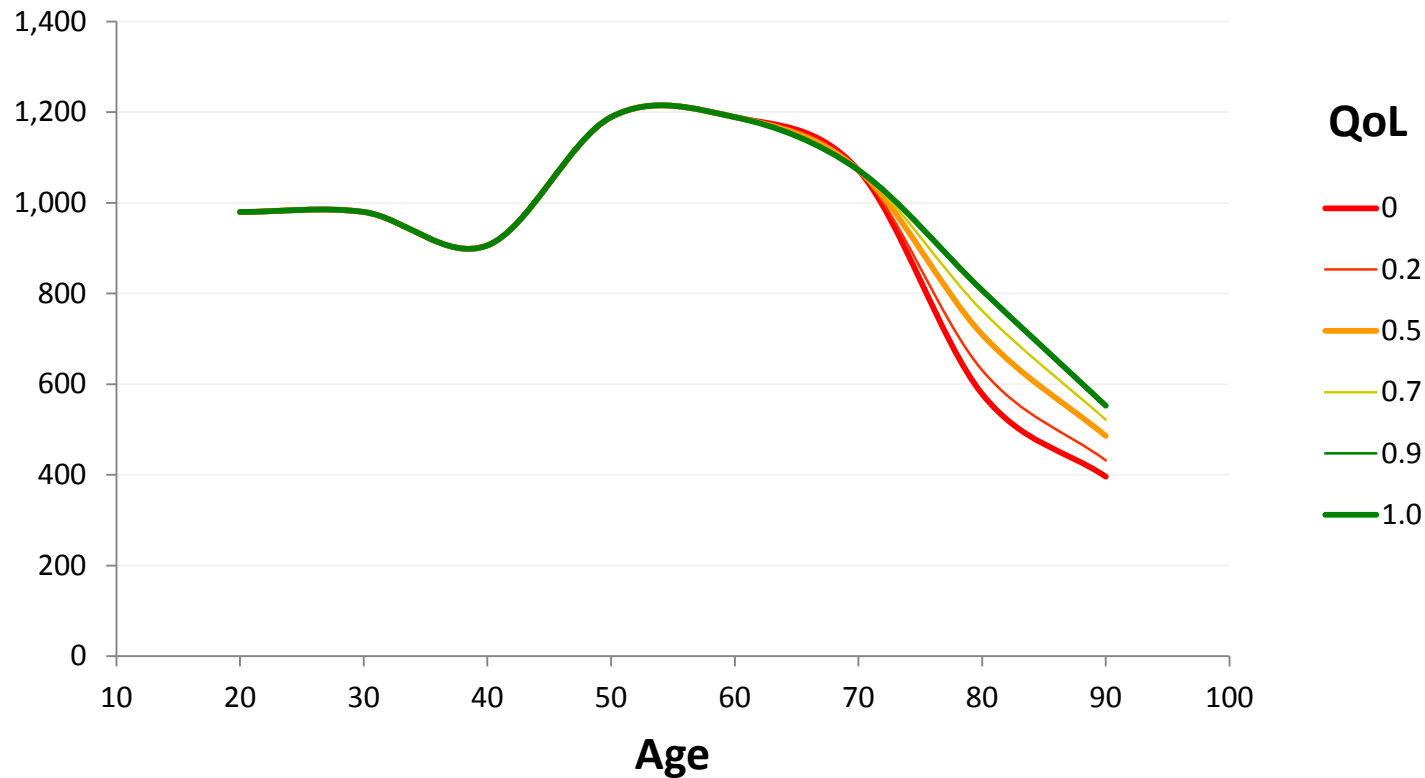
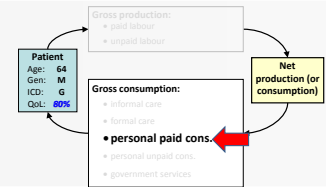
£pcm as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Results – *private paid consumption*

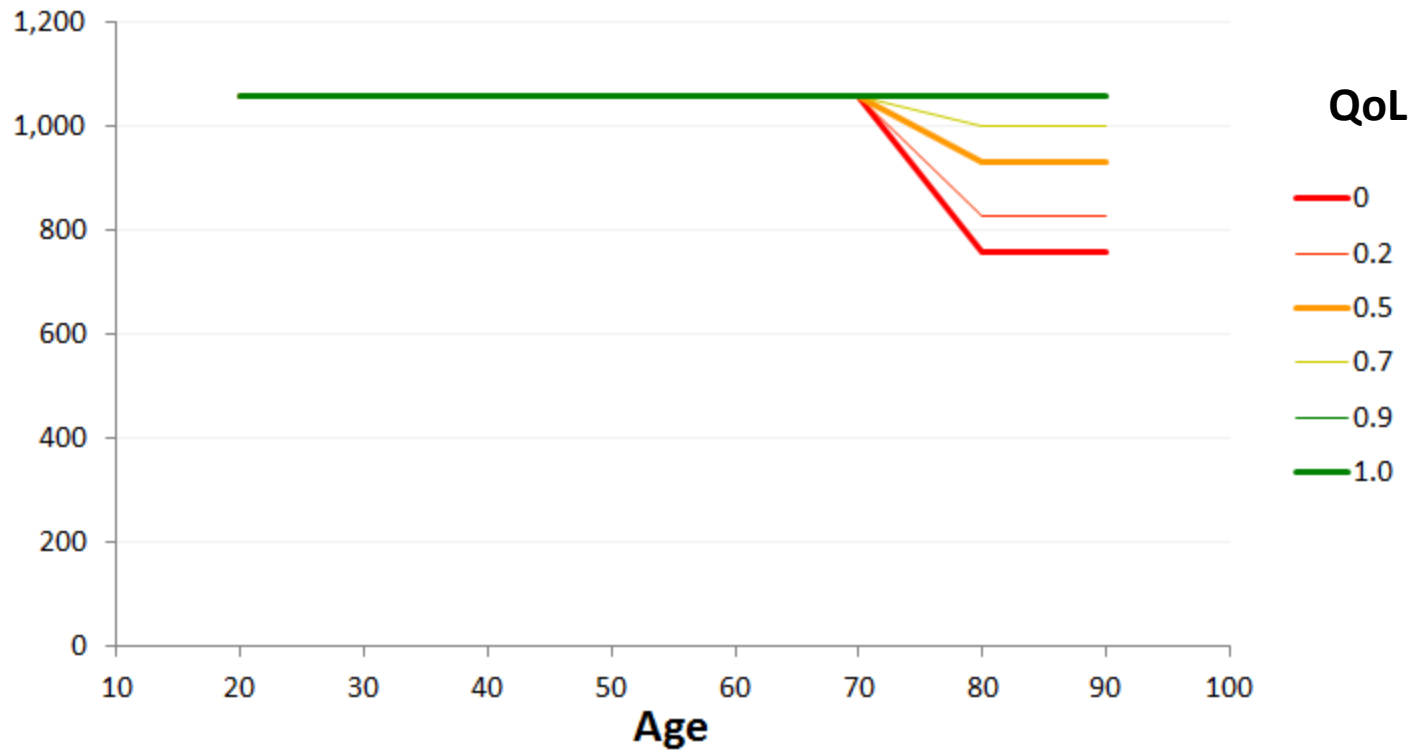
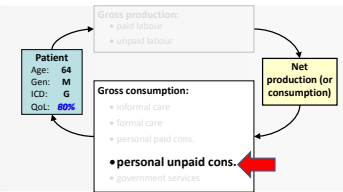
£pcm as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Results – *private unpaid consumption*

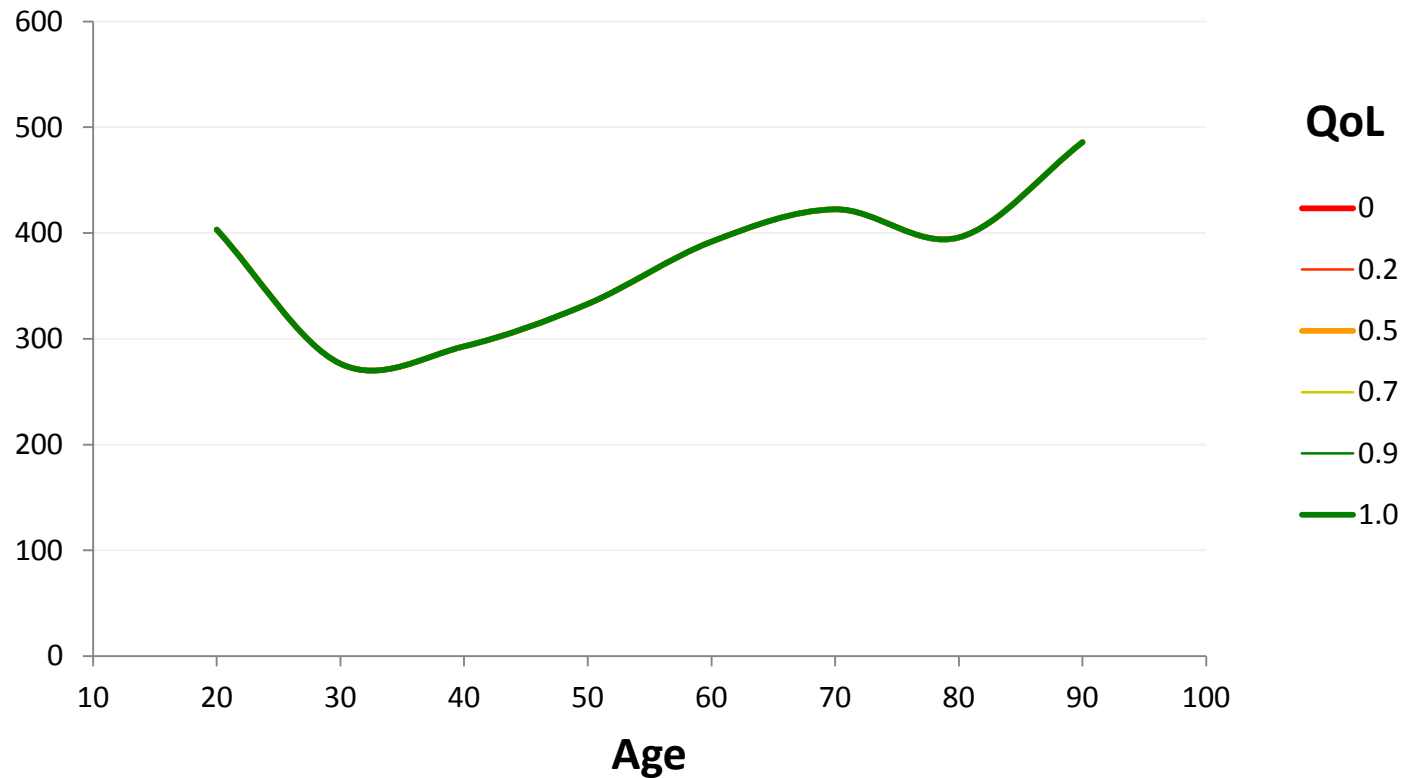
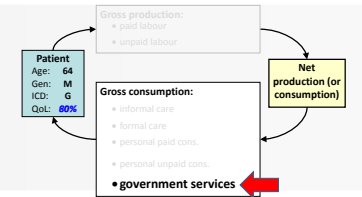
£pcm as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Results – *Government consumption*

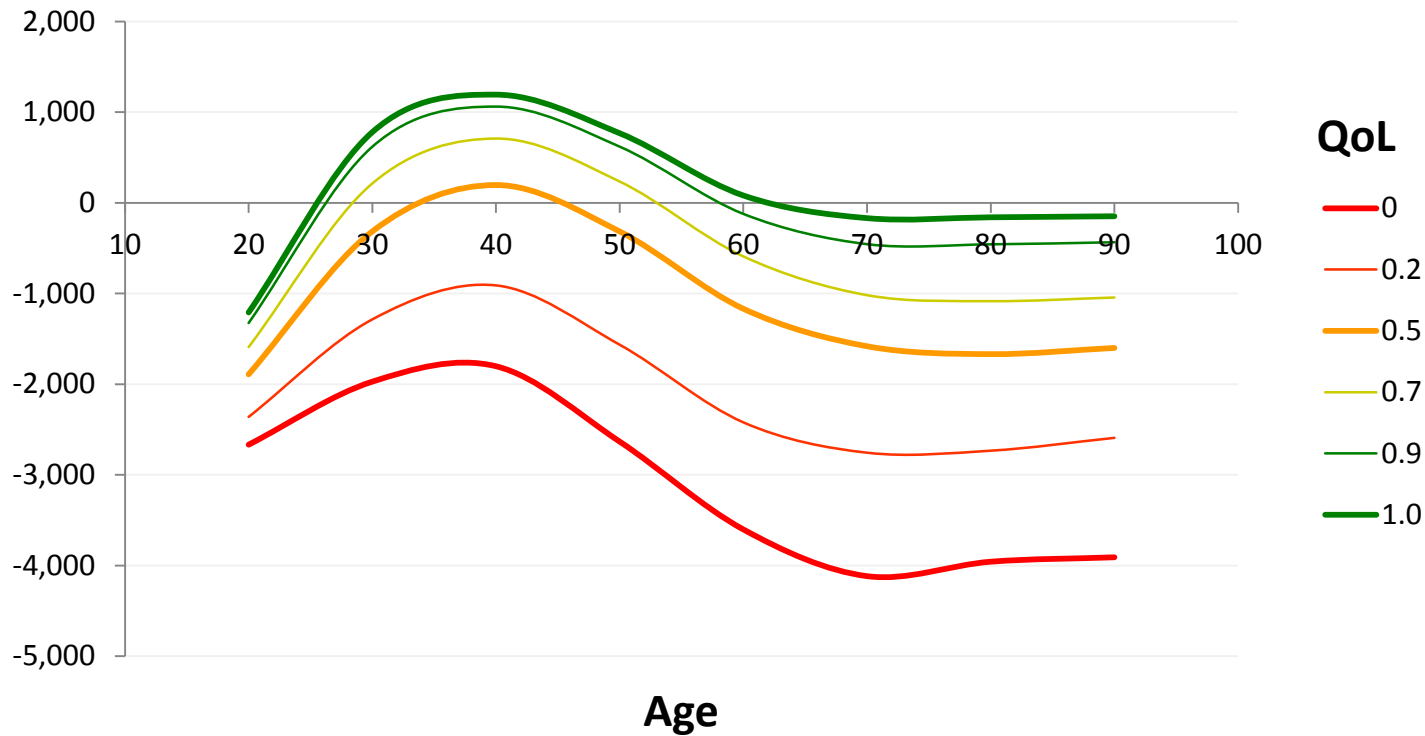
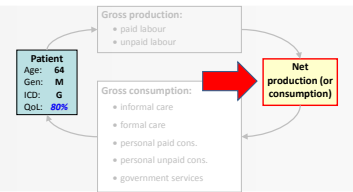
£pcm as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Results – *TOTAL NET PRODUCTION*

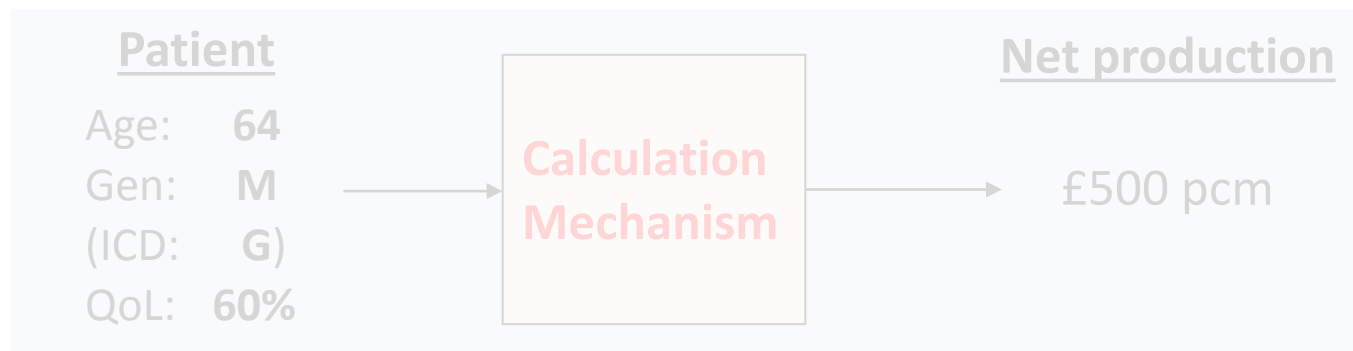
£pcm as a function of age and QoL



NB this is the rate in a given state – not a treatment impact

Methodology for estimating the wider economic impacts of health treatments

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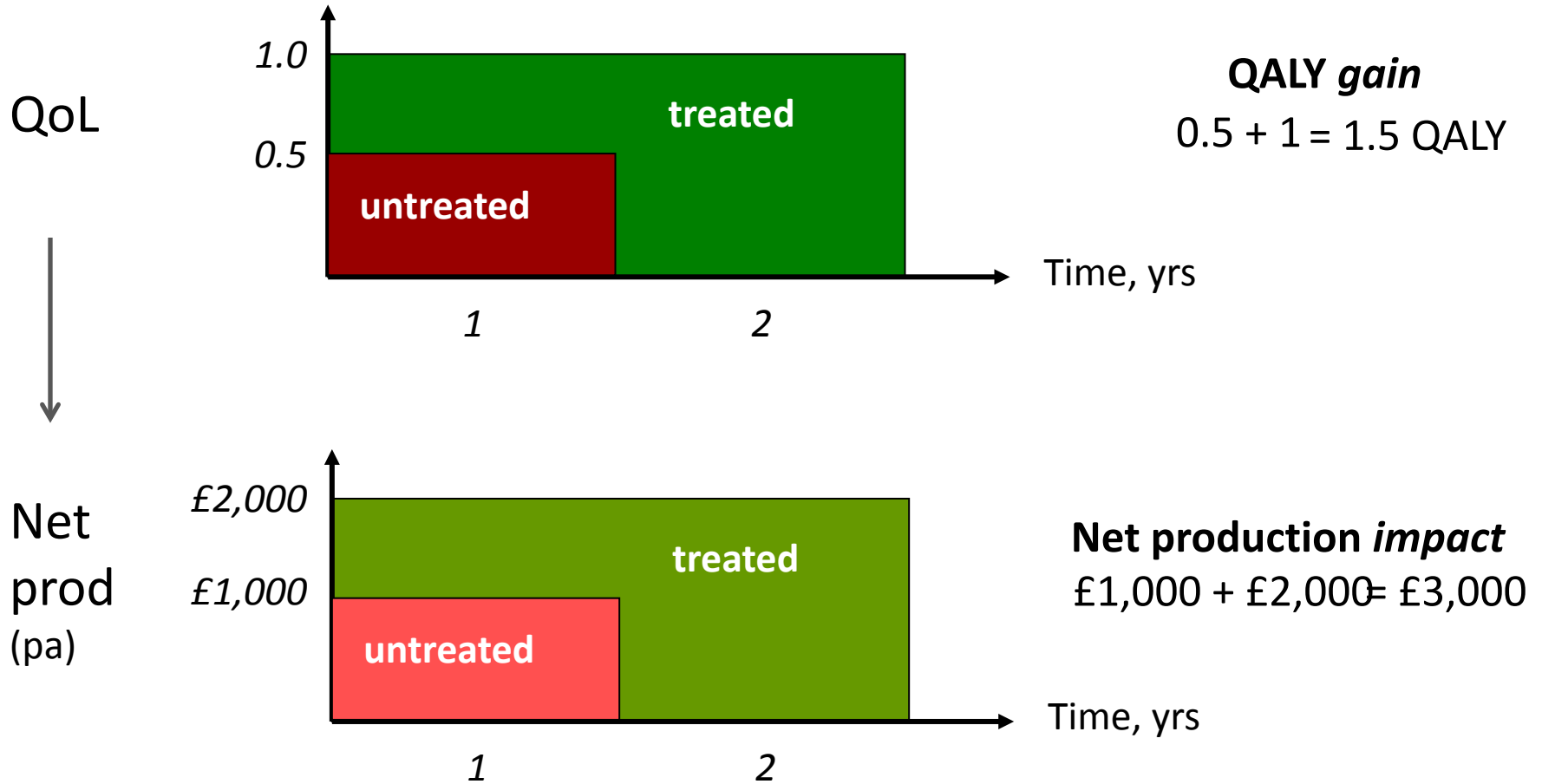


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Calculating net production effects *of health treatments*

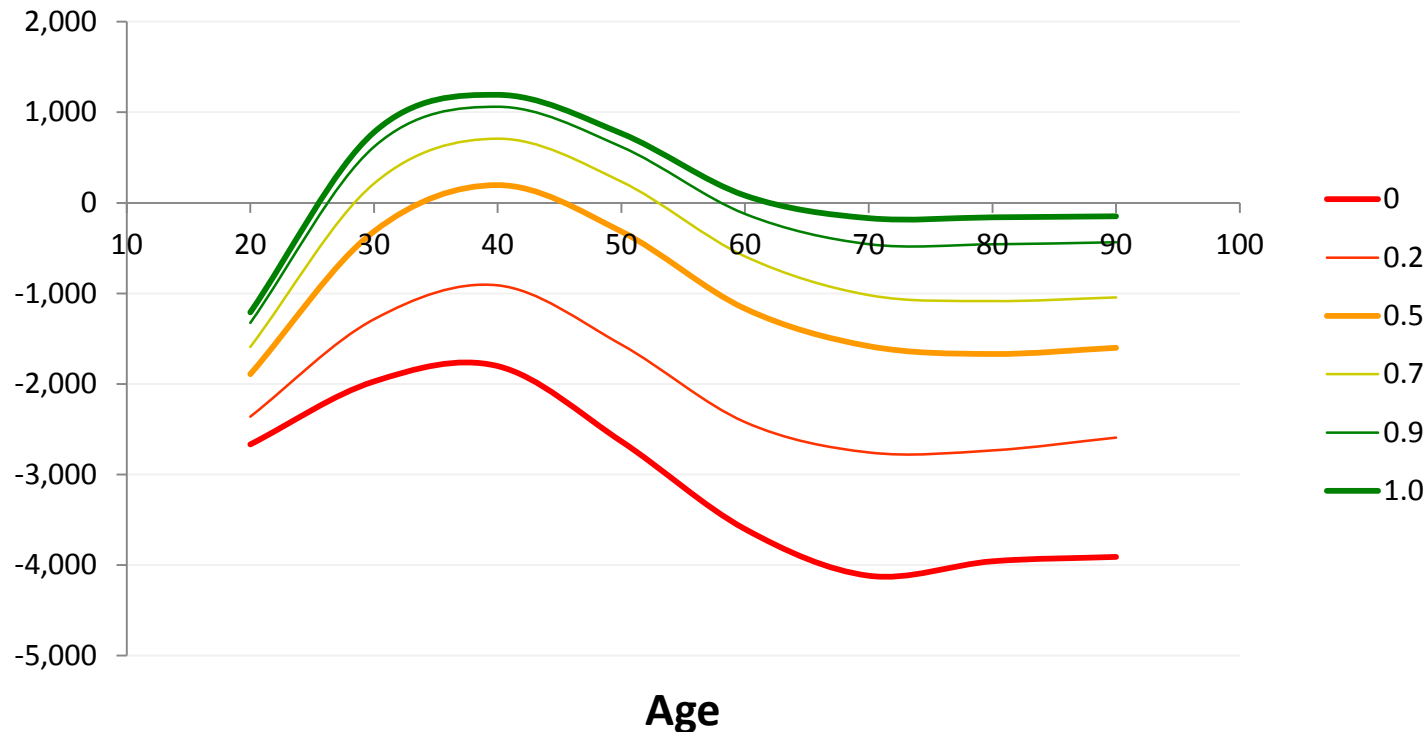
Principle: aggregate over time, like QoL (for QALYs)



In principle straightforward – map directly from QoL

Calculating net production effects *of health treatments*

Practical problem: *net production non-linear, esp. over age*



- Cannot use average patient ages
- Need to calculate across actual ages for affected population..
- ..or use *reference estimates* representing population age distribution

Calculating net production effects of health treatments

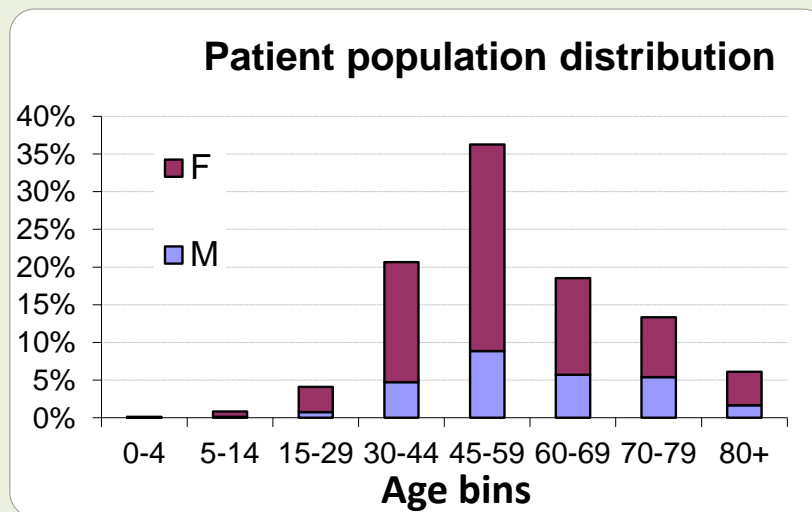
One solution: *use reference estimates*

Reference Estimates (1281 ICDs)

For each ICD: *distrib. of patients* (16 AG bins)

ICD

-eg M06:
*Rheumatoid
Arthritis*



+ enough data for each bin to *calculate*
all elements of net production

**£ net
production**

= **£37,745**
per QALY gained

= **£2.52**
per £NHS*

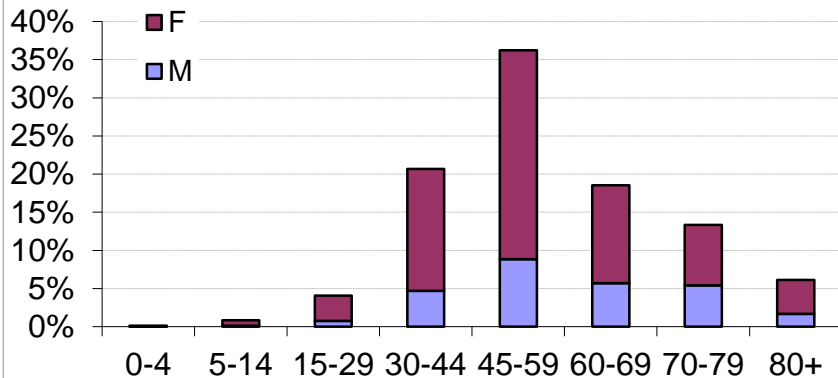
* Assuming £15,000
marginal cost / QALY

Production and consumption effects of health treatments

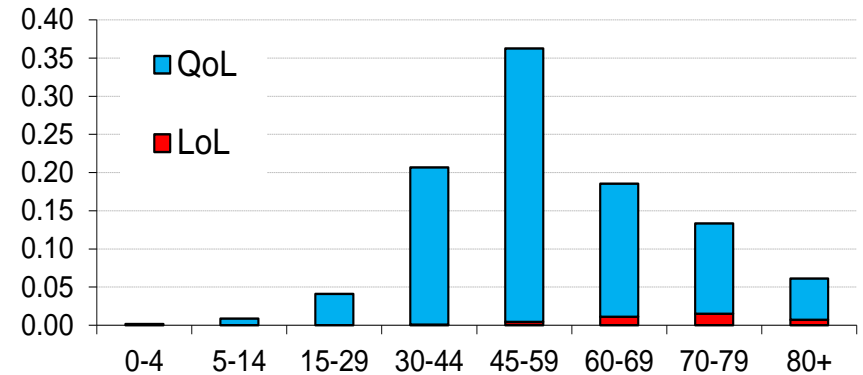
M06 Rheumatoid arthritis: *results by category, and key inputs*

	Total
Total production, £	26,849
Paid production, £	11,276
Unpaid production, £	15,573
Total consumption, £	-10,896
Residential care, £	-1,765
Non-residential care, £	-13,157
Informal care, £	1,492
Private paid consumption, £	1,946
Private unpaid consumption, £	0
(Childcare consumption), £	588
Govt consumption, £	26,849
Net production (prod - cons), £	<u>37,745</u>

Patient population distribution

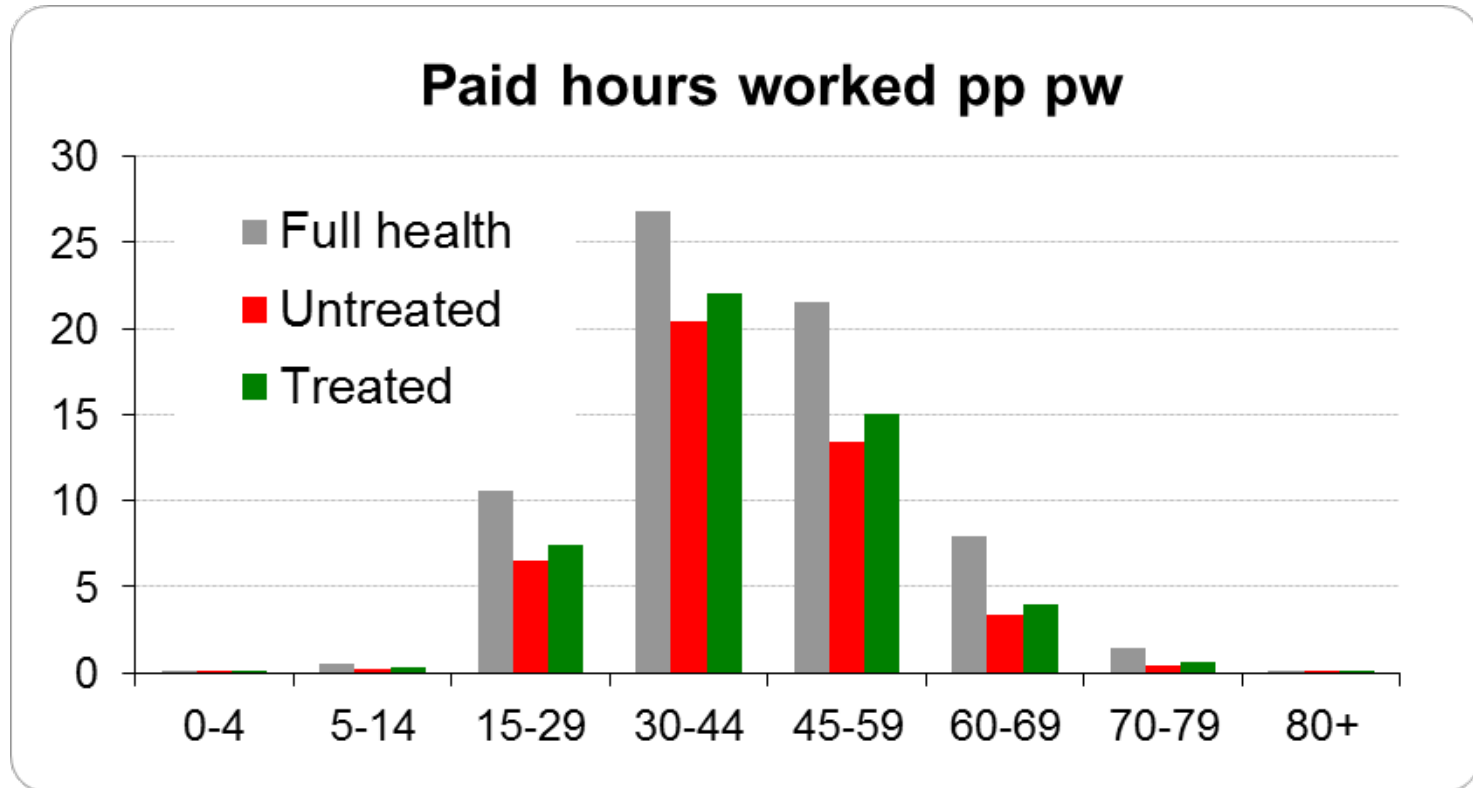


Distribution of QALY gain by QoL vs LoL



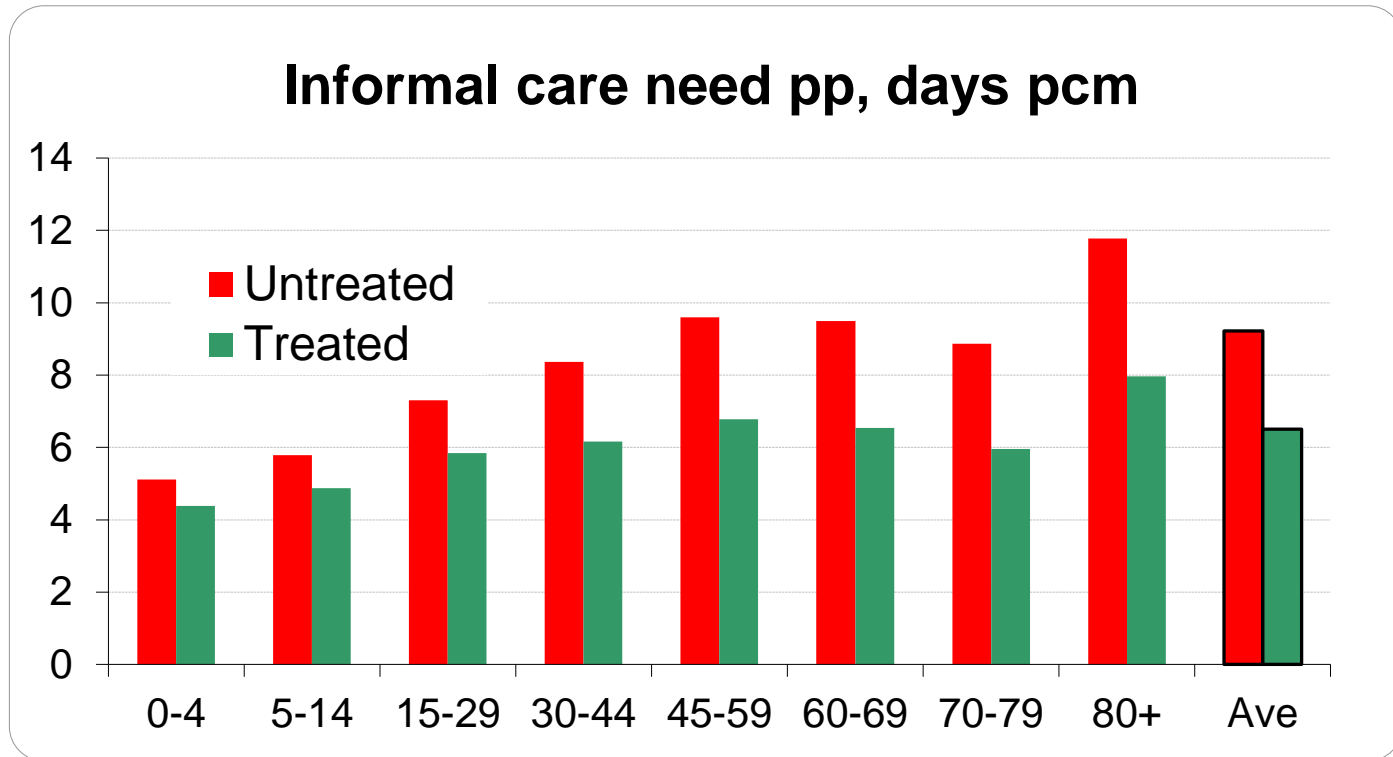
Production and consumption effects of health treatments

M05 Rheumatoid arthritis: *paid labour impact*



Production and consumption effects of health treatments

M05 Rheumatoid arthritis: *informal care impact*



Results: net production impact of NHS treatments

Net production impact in select conditions

Code	Disease	£NP / QALY	£NP / £NHS
F03	Dementia	40,068	2.67
M05	Rheumatoid arthritis	37,745	2.52
E11	Diabetes	30,969	2.06
M81	Osteoporosis	23,483	1.57
F30	Depression	22,826	1.52
F20	Schizophrenia	19,625	1.31
G20	Parkinson's disease	16,950	1.13
J45	Asthma	16,267	1.08
G40	Epilepsy	16,031	1.07
displ	(average displaced QALY)	13,925	0.93
C53	Cervical cancer	11,248	0.75
E66	Obesity	8,524	0.57
C50	Breast cancer	8,072	0.54
I64	Stroke	-1,350	-0.09
C18	Colon cancer	-2,262	-0.15
I21	Acute myocardial infarction	-8,223	-0.55
I26	Embolisms, fibrillation, thrombosis	-10,705	-0.71
J10	Influenza	-14,982	-1.00
C22	Liver cancer	-25,867	-1.72
C34	Lung cancer	-29,135	-1.94
C25	Pancreatic cancer	-46,141	-3.08

Results: net production impact of NHS treatments

Description of NHS activity at the margin

1,281 conditions

Abnormal blood-pressure reading, without diagnosis
Abnormal findings in cerebrospinal fluid
Abnormal findings in specimens from digestive organs & abdominal cavity
Abnormal findings in specimens from male genital organs
Abnormal findings in specimens from other organs, systems and tissues
Abnormal findings in specimens from respiratory organs and thorax
Abnormal findings on antenatal screening of mother
Abnormal findings on diagnostic imaging of breast
Abnormal findings on diagnostic imaging of central nervous system
Abnormal findings on diagnostic imaging of lung
Abnormal findings on diagnostic imaging of other body structures
Abnormal involuntary movements
Abnormal results of function studies
Abnormal serum enzyme levels
Abnormalities of breathing
Abnormalities of forces of labour
Abnormalities of gait and mobility
Abnormalities of heart beat
Abnormality of red blood cells
Abnormality of white blood cells, not elsewhere classified
...
Venous complications in pregnancy
Venous complications in the puerperium
Ventral hernia
Viral agents as the cause of disease classified to other chapters
Viral and other specified intestinal infections
Viral conjunctivitis
Viral infection of unspecified site
Viral meningitis
Viral pneumonia, not elsewhere classified
Viral warts
Visual disturbances
Vitamin A deficiency
Vitamin B12 deficiency anaemia
Vitamin D deficiency
Vitiligo
Voice disturbances
Volume depletion
Whooping cough
Yaws
Zoster [herpes zoster]
Zygomycosis

16 A/G groups

F	0-5
F	6-15
F	16-30
F	31-45
F	46-59
F	60-69
F	70-79
F	80+
M	0-5
M	6-15
M	16-30
M	31-45
M	46-59
M	60-69
M	70-79
M	80+
F	0-5
F	6-15
F	16-30
F	31-45
F	46-59
F	60-69
F	70-79
F	80+
M	0-5
M	6-15
M	16-30
M	31-45
M	46-59
M	60-69
M	70-79
M	80+
F	0-5
F	6-15

Net prod. / £

-1.27
-1.32
-0.51
1.20
0.55
-0.85
-1.59
-2.31
-1.43
-1.52
-0.59
1.52
0.76
-0.90
-1.63
-2.18
-0.13
0.09
0.72
1.70
1.61
0.24
0.04
-0.01
-0.27
-0.12
0.32
1.83
1.51
-0.08
-0.41
-0.55
-0.15

£1
NHS
(margin)

£
Net
Prod
(margin)

Results: net production impact of NHS treatments

Net production impact marginal £ spent in NHS

£1 NHS (margin)	→	Net production	0.93	Total economic value
		Production	1.51	Total production impact
		Paid production	0.63	Direct GDP impact
		Unpaid production	0.89	
		Consumption	0.59	Impact on informal carers
		Formal care consumption	-0.02	
		Informal care consumption	-0.17	
		Private paid consumption	0.29	
		Private unpaid consumption	0.34	
		Childcare consumption	0.00	
Government consumption	0.14			

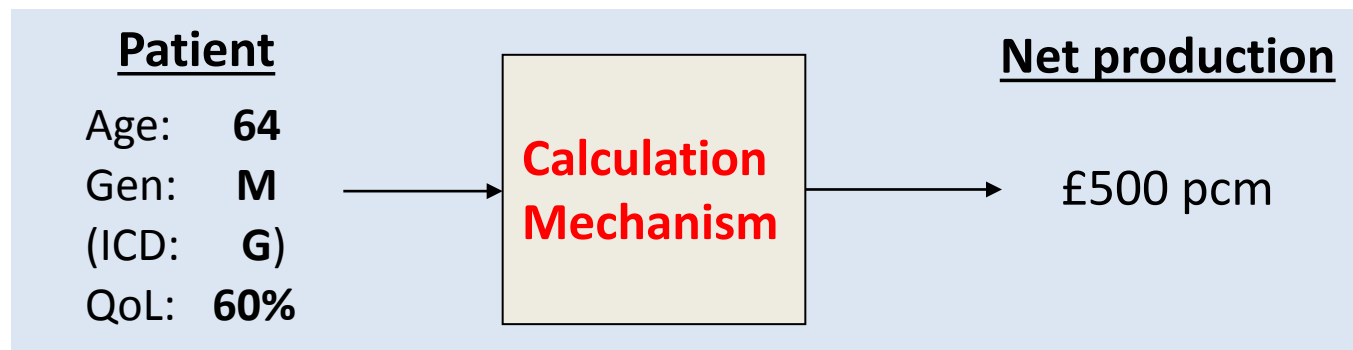
NB this is *additional to* value of health itself

Next steps

- Use with real interventions and conditions
- Improve underlying models
 - Paid production: new data; add “presenteeism” effect
 - Formal social care – important, and currently very crude

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