



Economics in Tooth and Jaw: extracting performance from dentists

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Overview

- **The system and its problems** (private and public dental services in the UK, how the NHS pays dentists, problems in the NHS, 'dumping' patients, treatment 'treadmills' over-treatment and stinting, equity issues)
- **Some economics of dental services** (physician 'agency', payment systems, demand side cost-sharing and the impact on treatment)
- **Data resources** (public accountability and management information)
- **What the data tell us** (what dentists do – and how they do things differently, how they respond to different payments)
- **Policy issues** (new contracts for old, where are we going – where have we been)

NHS Dentistry

- Focus on 'high street' dentistry
- NHS is (still) the major funder/purchaser
 - Contracts with independent contractors Self-Employed General Dental Practitioners (GDPs)
 - A variety of contracts (GDS Contract, PDS Contract)
 - In Scotland also employs dentists – Salaried *GDPs*

NHS Dentistry

- Unlike most other health services there is demand-side cost sharing
 - Patients exempt for a number of reasons, age, income status, health conditions
 - Non-exempt typically pay 80% of the 'NHS Price' of their treatment (subject to an upper limit) but do not pay towards the general running costs of the system

NHS Dentistry

- The public perception
 - ‘Disappearing’



- Being replaced by ‘expensive’ private care
- Abandoning people to their own fate

Man pulls out own teeth with pliers

Oct 19, 2007

A man has described how he pulled out seven of his own teeth because he was told to wait for an appointment to see an NHS dentist.

Taxi driver Arthur Haupt used pliers and a technique he had learned in the army to carry out the DIY dentistry. He said he was forced in agony into taking the drastic action because he was given a three-week wait by staff at his local NHS dental surgery and couldn't afford the £75-a-tooth treatment he was quoted by a private practice.



NHS Dentistry

- Some Facts:
 - In both Scotland and England about 50% of adults and 70% of children have been seen by an NHS dentist in the last 18 months. The former has fallen a little since 1995, the latter has risen.
 - Conventional wisdom is that NHS dentists treat 50% of the adult population ... but
 - Are these the same who used services in the previous 18 months?

NHS Dentistry

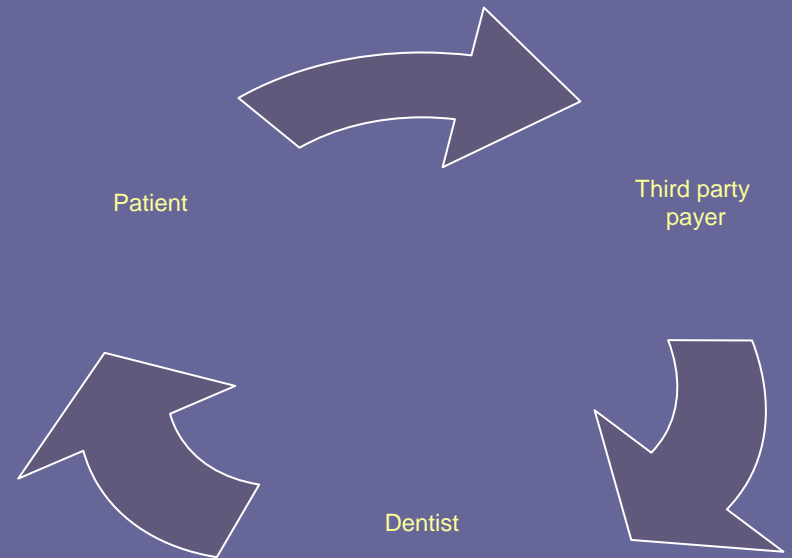
- Overall utilisation of dentists is increasing in UK (using BHPS)
- Private sector is expanding (fast in percentage terms) but is small
 - there are about 90,000 patients registered with Denplan in Scotland – up from 50,000 in 1999 – compared with 2,400,000 NHS registrations
 - Evidence, again from Denplan, that oral health of those registering privately is improving over time – partly due to population health, but mostly due to selection (i.e. NHS is dealing with least healthy)

NHS Dentistry

- Some facts about oral health
 - Fairly crudely measured
 - Caries in children
 - Existence of teeth for adults
 - ‘Health’ of 12-14 year olds improving
 - ‘Health’ of 5 year olds constant
 - ‘Health’ of adults improving
 - Well defined social gradient – high ‘DEPCAT’
= poor health

Economics in tooth and jaw

- Conventional supply and demand not very useful
 - Fixed (administratively set) prices
 - Non-retradeable service (dental care)
 - Asymmetric information
- Suggests agency models
 - But who is a principal and who an agent



Economics in tooth and jaw

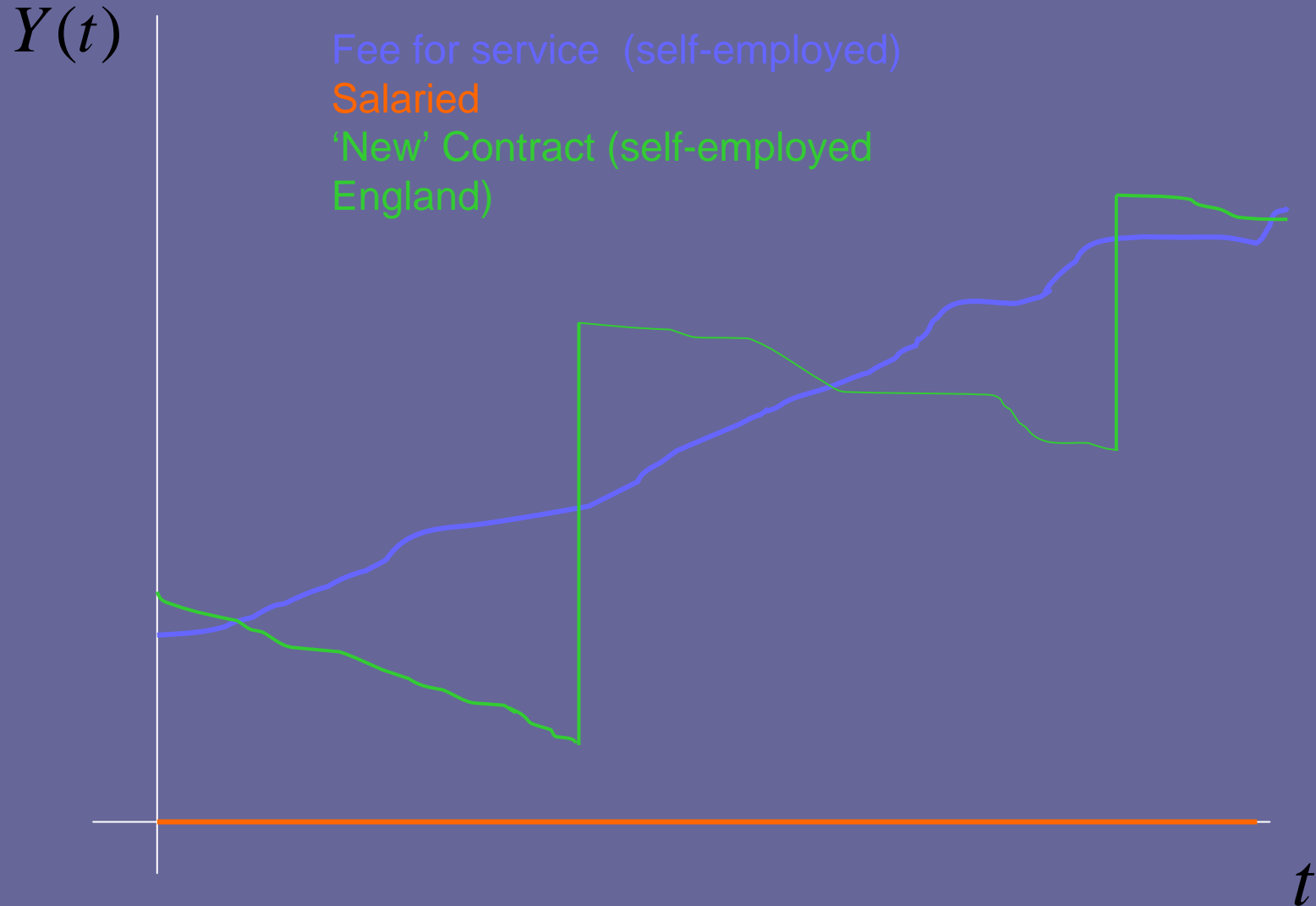
- The dentist as a monopoly supplier – take-it-or-leave-it offers
 - So how much treatment, to who and depending on what?
- A model of treatment ‘intensity’
 - Look at intensive margin rather than frequency (probability) of attendance (extensive margin)



Economics in tooth and jaw

- Treatment intensity: t
- Utility of dentist: $U(Y(t), t)$
- Net Income from treatment $Y(t)$
- Payment functions
 - Fee for service (self-employed) $p(t) - c(t)$
 - Salaried (employed) 0
 - 'New' Contract (self-employed England) $\begin{cases} Y_0 - c(t) : t < t_1 \\ Y_1 - c(t) : t_1 \leq t < t_2 \\ Y_2 - c(t) : t \geq t_2 \end{cases}$
- Constraints $t \leq \bar{t}_P$

Economics in tooth and jaw



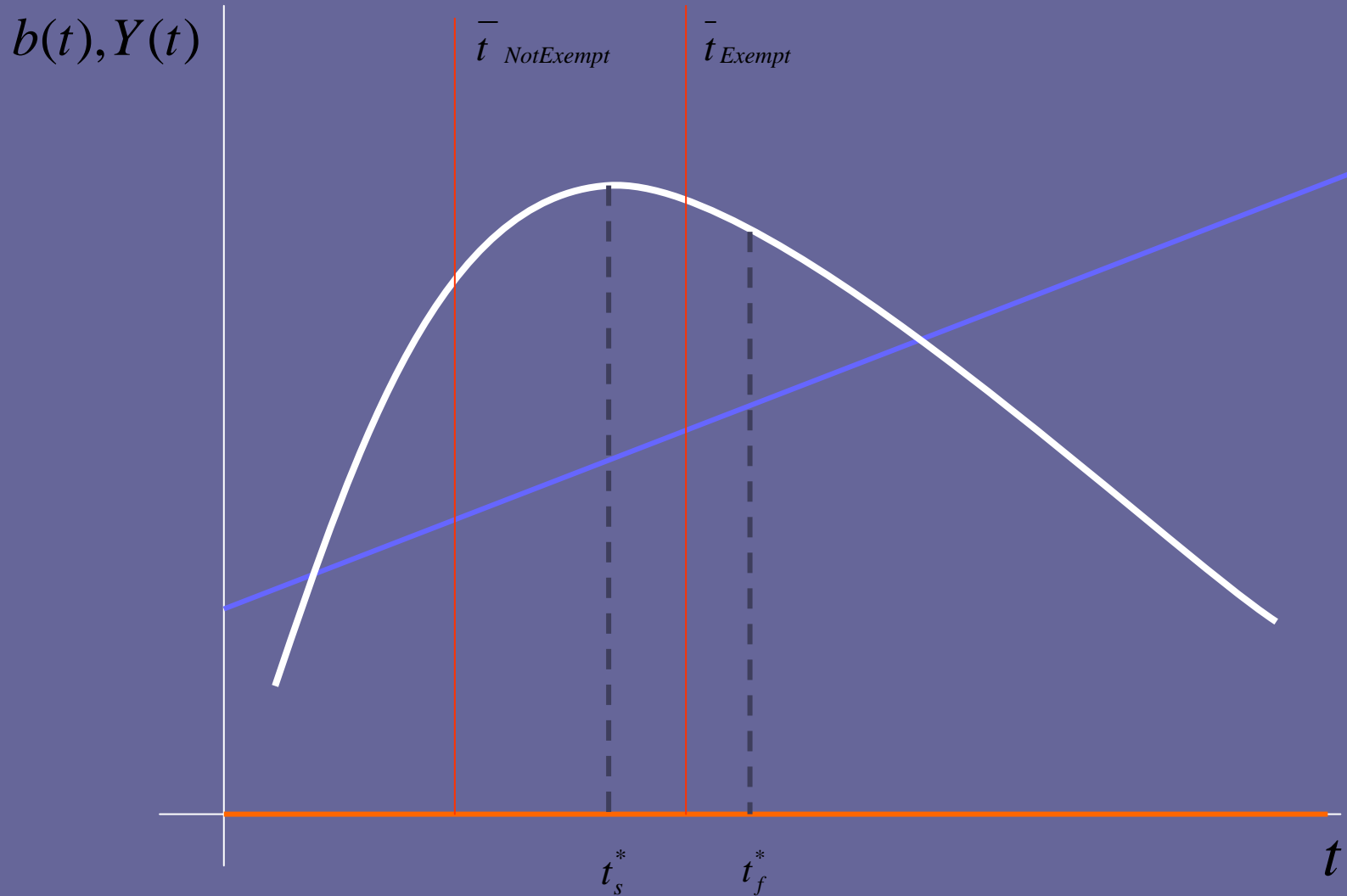
Economics in tooth and jaw

- Consider a simple case
 - Additive utility

$$U(Y(t), t) = b(t) + Y(t)$$

- Piecewise linear Net Income

Economics in tooth and jaw



Economics in tooth and jaw

- Payment function affects decisions through $Y'(t)$
- Moderated through a constraint
 - Plausibly depends on patient's co-payment, so demand side cost sharing impacts on 'dentist agency'
- Model works in context of a given dentist (altruistic/selfish/high productivity/low productivity) and a given type of patient (good health/poor health/rich/poor)
 - So empirically need to think about multi-level unobserved heterogeneity

Data

- Payments out of public funds
 - Monopsony purchaser
 - Need for accountability
- Very large administrative data resource for Scotland -- the
 - Management Information and Dental Accounting System MIDAS
 - Covers last 10 years
 - Potentially provides details of approximately 4 million courses of treatment per year

Data

- Jointly with Colin Tilley NHS Education Scotland, engaged in a process of collating, organizing, describing and analysing these data.
- For each *course of treatment* (termed a ‘claim’) we know:
 - The dentist, how they were paid (and some other characteristics)
 - The patient, some of their characteristics and potentially a link to their NHS number
 - The full details of all of the items that made up the treatment

Data

- Random sampling can be used to obtain (if required) very large numbers of observations.
 - The current research concerns :
 - 1,455,271 Claims
 - Involving 2,969 different dentists
 - Treating 240,777 different patients
 - Where 1,430,535 of these claims were made under FSS and
 - 24,736 of the claims relate to work undertaken by salaried dentists.
- Results reported today relate to smaller (but not small) samples
 - typically 53,000 to 400,000 claims

Data

- Similar payment systems operate in England, Wales and Northern Ireland
 - These have not yet been analysed.
- For England and Scotland we have identified the claims made by approximately 100 recently qualified dentists who we can compare

Learning from the data

- A simple policy issue: what does “50% having been treated” actually mean?
 - Could be
 - 50% of population seeing an NHS dentist regularly
 - 100% seeing a dentist very irregularly
 - Using the administrative individual-level data we can answer this

Learning from the data

- Patterns of use (1 = treated, 0 = not treated) 1997-2002 random sample of 40,000 adults
- A Markov model suggests 80% of Scottish adults actually access NHS dentists

% of sample	Pattern
	97 98 99 00 01 02
16.3	111111
8.7	100000
6.4	010000
6.2	000001
4.9	001000
4.6	000010
4.3	000100
48.5	Other Patterns

Learning from the data

- How does remuneration affect what dentists do?
 - Focus on intensity (measured by value) of treatment
 - Does FFS increase intensity?
 - If so, for who?
 - Look specifically at ‘active’ courses of treatment (about 70% of all claims)

Learning from the data

- Descriptive Statistics

	Treatments by FFS dentists	Treatments by Salaried dentists
Value of Claim	£42.17	£39.09
Proportion of treatments which were exempt	0.25	0.25
Proportion of male patients	0.43	0.41
DEPCAT	3.86	3.61
Number of days since last course of treatment	222	276

Learning from the data

- Econometric models
 - Controls for patient characteristics, treatment types, environment (area / DEPCAT)
 - Allow for heterogeneity of dentists (sorting into remunerations category –e.g. high productivity might prefer FFS) (FE / RE)
 - Interact contract type with controls
 - Allow for multi-level (RE for patients and dentists)

Learning from the data

- Summary of Findings

- So FFS increases treatment but only for *exempt* patients
- Demand side cost sharing impacts on physician agency

TREATMENTS BY FFS Dentists	Impact on treatment intensity
Patient Exempt	+ 25% significant in <i>all</i> models

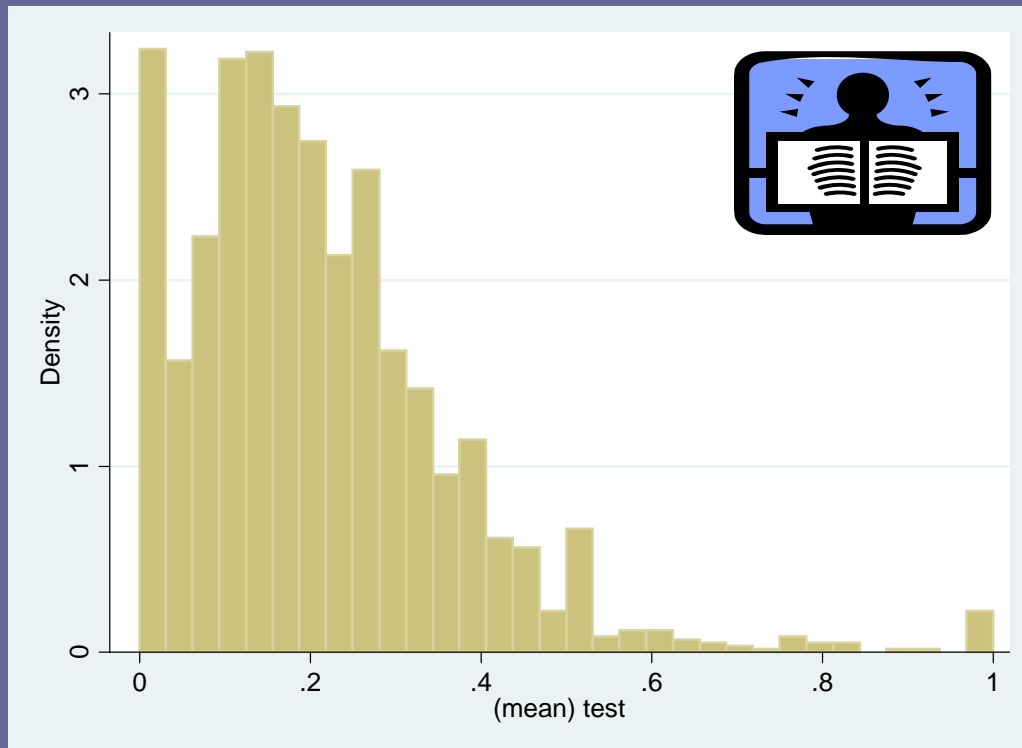
ALL TREATMENTS	Impact on treatment intensity
FFS	NS (ambiguous sign)
Patient Exempt	+ 5%-7% but not significant
Interaction of FFS and Exemption	+ 12.5% to 13% significant in <i>all</i> models and <i>all</i> samples

Learning from the data

- Exempt patients get more treatment but what kind?
- Consider specifically diagnostic investigation (X-Rays)

Learning from the data

- Incidence of X-rays varies a lot from dentist to dentist



Learning from the data

- Econometric models
 - Probit (incidence of an X-ray)

	Impact on Probability of X-Ray
Patient Exempt	NEGATIVE
Dentist FFS	POSITIVE
Interaction of FFS and Exempt	NEGATIVE

- Can be repeated for other diagnostic treatments

Learning from the data

- All Change – the new dental contract in England
 - Theory suggests : reduce treatment within each band and shift between bands (i.e. move patients at top of a band into the next payment category).
 - Data offers possibility of using one system (Scotland) as a control to assess impact of this policy ‘treatment’

Learning from the data

- Analysis of data on dentist basis
 - Number of treatments per month
 - In which band treatments fall either actually (England) or hypothetically (Scotland)
- Fixed effects regression to examine impact of contract change by interacting jurisdiction (Scotland vs. England) and contract introduction dummies

Learning from the data

- Preliminary results:
 - New contract increased number of treatments per dentist (by 8%)
 - But reduces treatments by FFS dentists and increases treatments by PDS dentists
 - New contract reduces the likelihood of ‘low’ band treatments and increases probability of ‘high’ band treatments
 - There is evidence of the kind of “up-banding” that can be easily rationalised in the simple economic model

Policy Issues

- Administrative data are often under-exploited but shed light on important questions – e.g. how extensive is the ‘access’ problem
- Administrative data interpreted using economic models are a good source for policy evaluation.
- Natural experiments across the jurisdictions in the UK allow tests of economic models

Policy Issues

- In dentistry the interaction between remuneration and demand side cost sharing seems important (and is neglected)
 - Important implications for how policy affects different individuals (FFS -> more treatment for exempt individuals but less diagnosis)
- New forms of remuneration appear to be having a large impact on what dentists do.