Affordability as a positive concept: Analysing how households meet the costs of care across communities and between conditions

Steve Birch

Affordability of health care is a central factor in policies on funding health care, particularly in low and middle income countries and is considered in the context of the relative size of treatment costs and household capacity to pay. Researchers measure levels of catastrophic health care expenditures by setting an arbitrary threshold percentage of a household’s income or expenditure. However this is fundamentally normative indicating that a household ought to be able to find health care costs affordable if they are below the catastrophic threshold. Recent studies have highlighted despite health care expenditures exceeding such thresholds, some households manage to cope with this cost burden, including some households with relatively low socio-economic status, while others below the catastrophic threshold become impoverished.

We adopt an alternative positive approach by considering how households meet the costs of health care in terms of the sources of funds used. Households that borrow money or sell assets in order to pay for health care are more vulnerable than households who meet payments without such strategies. The potential problems of borrowing money or selling assets to fund care are likely to differ according to the type of condition being treated. Acute conditions require only short term funding while chronic conditions involve an ongoing cost burden. Hence funding through borrowing or asset sales is less likely to be sustainable for chronic conditions as borrowing limits are reached or assets depleted.

We study the affordability of public sector health services for obstetric care, tuberculosis (TB) treatment and antiretroviral treatment (ART) for HIV-positive people, in two urban and two rural sites in South Africa. Data were collected in exit interviews with over 300 patients for each condition at treatment facilities in each site (total sample over 3,600). Direct costs for service use at the time of the interview, as well as other health related costs incurred during the preceding month were assessed, as were a range of indicators of ability-to-pay. We analyse the determinants of borrowing and asset sales as means of meeting the costs of receiving care using logistic regression.

Differences between the urban and rural areas are consistently significant. Costs are higher and socio-economic status lower in the rural areas with a greater proportion of households in rural areas selling assets and borrowing money, and the amount borrowed being greater in rural areas. Although costs for obstetric care were higher in absolute terms, they are infrequent and households using such care had a higher socio-economic status on average than for the other conditions. Hence fewer households using obstetric care borrowed money, although they borrowed larger amounts, than households with ART and TB patients. Households in receipt of disability grants were significantly less likely to sell assets or borrow money.
How do financial incentives to improve the quality of care lead to better patient outcomes?

Yiu-Shing Lau, Thomas Mason, Matt Sutton

Background: Several countries have introduced financial incentives for providers to improve the quality of care they deliver. Such Pay-for-Performance (P4P) schemes typically reward improvements in specific process measures of the quality of care and result in small improvements in these measures. They may not result in significant improvements in patient health outcomes because the expected direct health effects of the incentivised measures are small and/or because providers exclude many patients from the reported measures. Alternatively, they may result in significant outcome improvements if the incentives lead to positive spillovers onto unmeasured quality dimensions for the included patients and/or onto the quality of care for excluded patients.

We consider a P4P scheme introduced in one region of England in 2008 that incentivised 28 process measures for five health conditions and has been shown to have led to substantial improvements in health outcomes. We analyse how these gains relate to the improvements in process quality reported by participating providers using a unique patient-level linked dataset. Specifically, we examine whether the outcome gains are attributable directly to the improvements in the quality of care delivered at individual patient level and/or indirectly at organisational level.

Aim: To examine whether the improvements in health outcomes associated with introduction of P4P can be linked to improvements in the quality of care received at patient and/or organisational level.

Data: Six datasets linked at individual level containing a rich set of provider, area and patient characteristics derived from hospital care records, twenty-eight process measures of quality, Patient Experience Measures (PEMS) and various health outcomes including Patient Reported Outcome Measures (PROMs), emergency readmissions and mortality. Our final sample consists of over 130,000 individuals spanning nine quarters from 2008-2010.

Methods: Using linear and binary models, we regress health outcomes at patient level on patient characteristics, measures of the quality of care received by each patient (including whether individual patients were excluded from the reported measures), and the same quality measures aggregated to organisational level. We include fixed effects for provider Trusts and time periods to control for secular trends and unobservable heterogeneity between providers.

Results: Some of the process quality measures are significantly associated with better health outcomes at patient level but the magnitudes of the estimated coefficients are too large to represent clinically plausible direct consequences of these process measures. The same measures aggregated to organisational level are more important in explaining variations in individual patient outcomes.

Conclusion: Our findings suggest that these financial incentives to improve quality did not lead to improved patient outcomes through their direct effects on the process measures that were incentivised. Instead, this P4P scheme appears to have led to improved patient outcomes by inducing positive spillovers in terms of wider improvements in care quality across unmeasured dimensions and improvements in care for all patients.
Diagnosing financial problems for the State – an analysis of the impacts of different health problems on public finances

Will Whittaker

Health problems have a direct effect on the individual, but also exert financial pressures on the State through their impact on the taxes levied on labour participation, entitlements to welfare benefits and demand for health and social care services. These financial impacts will become more important in the forthcoming period of austerity. Each source of financial burden requires different policy solutions, for example changing tax and welfare entitlement rules, labour market regulations and service planning. Previous research (Gertham et al, JPopE, 2005) suggests that the State responded to increased financial pressure imposed by an ageing population by reducing service provision rather than raising additional tax revenue. While there is evidence on how particular health problems affect labour market participation and/or productivity and service utilisation, little is known about the impacts of the range of health problems on public finances. In this paper we analyse the effects of 12 health problems on State income and expenditure. To our knowledge this is the first paper to estimate a comprehensive set of financial impacts of a range of health problems on the State and how these have changed over time.

We use panel data on 15,000 individuals from eighteen waves of the British Household Panel Survey (BHPS) (1991-2009). We measure State income using information on the amount of tax and National Insurance paid. Financial costs to the State are measured using total benefit income received and the estimated costs of State-provided health services (GP visits, outpatient attendances and inpatient stays, costed using the Personal Social Services Research Unit Costs of Health and Social Care). We consider 12 health problems, the ability to observe the presence of all morbidities simultaneously in the dataset enables us to disentangle the separate effects of each health condition and consider the effects of multiple morbidities. We estimate separate models for net contributions (State income minus costs), State income, and State costs (financial and in-kind separately) to see whether different health conditions have different impacts on State finances.

We estimate each model separately by gender. The longitudinal structure of the BHPS data permits the use of fixed-effects modelling to account for the importance of unobservable heterogeneity. For men, we find that depression is the most costly health problem. This is the result of lower tax/National Insurance contributions rather than higher financial and in-kind benefits received. This contrasts with chest, heart and blood, and arms and legs problems which were all associated with high costs to the State, driven by higher financial State benefits and inkind service use than lower taxes paid. For women, depression was also the most costly health problem, this however, was due to higher financial benefits received than lower tax contributions.

In each model, accounting for co-morbidity and individual heterogeneity reduces the estimated financial impacts of each condition. We also find that the level and sources of financial impacts of each condition vary over time and suggest ways in which the State may prioritise its efforts to reduce the financial impact of health conditions in future.
Modelling capacity for more resource-intensive services - An application of Discrete Event Simulation to Flexible Sigmoidoscopy for colorectal cancer

Mark Harrison, Ian Jacob, Matt Sutton, John Radford and Andrew Renehan

**Background:** Flexible sigmoidoscopy (FS) has been shown to be a cost-effective screening option for a population based colorectal cancer screening programme. However, decision-makers have been reluctant to introduce FS, favouring alternative strategies including faecal occult blood testing. This is due in part to the uncertainty over whether the UK healthcare system has sufficient capacity to deliver this screening option in a timely manner because FS is resource intensive, requiring significant quantities of labour and hospital site resources. The aim of this study was to provide information to assist local decision makers to plan the capacity required to deliver a FS screening service including demands for other health care resources derived from the use of this screening programme.

**Methods:** A capacity model, using Discrete Event Simulation, was constructed to represent a constrained health system in which simulated screening participants in the Greater Manchester region of the United Kingdom would await a FS screening appointment when resources became available. The model had a time horizon of 10 years and was developed using the simulation software SIMUL8. The availability of resources was determined by the number of screening appointments per day (7, 14, 21) and the number of screening locations (single regional, 3 sub-regional, 12 district). Nine scenarios were considered which represented combinations of three options for the number of sites and three options for the number of appointments offered per day at each site. For each scenario estimates of the proportion of the eligible population that accept the invitation to screening who are successfully screened were produced, along with the number of patients discharged to different destinations following FS screening (e.g. immediate treatment, pathology services and further screening), waiting times and usage of key inputs (FS suite and the staff).

**Results:** In total over the 10 years of the modelled screening programme it was expected that 440,586 people be eligible and invited for screening and that 253,500 people would accept the offer of FS screening. A single regional FS facility could not meet the expected demand for screening (maximum number screened 47,577 (95% CI 47,154, 47,999)). Two of three sub-regional FS facilities could meet expected demand if they were able to offer 21 appointments per day. With twelve district facilities, demand is met by offering 14 appointments per day in half of the centres and 7 appointments per day in the remaining centres. The current configuration of the modelled service, however, leads to significant under-use of the FS equipment and the staff running the service under most scenarios. In extreme cases, where staffs are close to fully occupied, unacceptable levels of overtime would be required from the key staff. Further work will optimise the operation of the clinic.

**Conclusions:** This simulation work has identified the key considerations and capacity restraints for the establishment of a Greater Manchester FS screening service, and to provide guidance for the design of optimal screening services.
Can differences in Patient Reported Outcome Measures be attributed to providers?

Silviya Nikolova & Matt Sutton

Background/Aims: Since April 2009, Patient Reported Outcome Measures have been collected from all patients receiving four procedures in England before and after undergoing treatment. Once case-mix adjusted, differences between providers are being interpreted as indicators of variations in the quality of care. These provider variations are being used to benchmark providers and there are proposals that provider achievements of outcomes may be linked to payment.

The changes in outcomes that are observed reflect the effects of a wide range of factors, including observable and unobservable patient variables and the contributions of health care providers other than the hospital providing the procedure of interest. Adjustment of the outcomes using observable measures of case-mix may not be sufficient for residual differences between hospitals to be attributable to variations in care quality.

This problem of attribution is similar to the problems faced by labour economists in the analysis of variations in wages between employees and between employers. Econometric models that control for unobservable employee-level heterogeneity have been developed to isolate the effects of employer heterogeneity on wages. We consider the applicability of these concepts and models to Patient Reported Outcome Measures.

Data: We use three data-sets containing PROMs that have different properties in terms of the health conditions, the interventions, the types of providers and the number of patient follow-up observations.

Methods: We estimate four regression models in each dataset adding sequentially (i) dummy variables for providers, (ii) individual-level characteristics, and finally (iii) dummy variables for individuals using a three-way error component model. We focus on the extent of observed variation that can be attributed to providers under different data and model structures.

Findings: We find that hospital variation, as a share of total provider variation, for one-off surgical procedures is smaller compared to medical treatment of rheumatic diseases over three years, and mental health over 18 years. At the same time, the amount of total is explained by providers is small. Results from the three-way error component model show that time-invariant provider effects account only for 0.2% of total variation.

We find that provider variation is reduced by allowing for observable case-mix, particularly baseline health. The three-way error component model results clearly demonstrate that person-level heterogeneity is most important in explaining provider-level variation accounting for 39.2% of total variability in patient health outcomes.

We also observe that more patient observations per provider (i) improve the precision of statistical inference and (ii) big hospitals are approximately the same in terms of quality of medical care.

Conclusions: Even when case-mix adjusted for observables, variations across providers in Patient Reported Outcome Measures that are collected shortly before and shortly after treatment may be poor signals of variations in provider quality.
Health interventions, health shocks and individual health investments: An Economic Analysis of the English Old Population.

Eleonora Fichera & Matthew Sutton

This paper extends the research on the relation between State and self-investments in Fichera and Sutton (2011) to a longitudinal setting using the English Longitudinal Study for Ageing (ELSA). In this original work, we found positive unplanned effects of State intervention on the individual lifestyle choices but were forced to rely partially on the type of health shock as an instrument for the endogenous level of State investment. Use of a longitudinal dataset and policy experiments allows us to distinguish the effects on lifestyles of health shocks from the effects on lifestyles of State investments.

We first develop a model where health investments depend on the level of self-investments and State interventions. The health production function depends on such investments, health shocks and existing health conditions. The utility the agent derives from consumption of goods and health depends on her level of risk aversion and attitudes towards health. We distinguish three cases depending on the occurrence of a health shock and existing health conditions and we find that the effect of State interventions on health behaviour is ambiguous as agents display heterogeneity in the degree of risk aversion and attitudes towards health that are correlated with the health shocks and existing health conditions.

Given the ambiguity of the theory, the effect of policy interventions on health behaviour is an empirical question. We use data from five waves of the ELSA (1998, 2002, 2004, 2006 and 2008). This survey contains rich individual data on socioeconomic circumstances, health conditions, risk attitudes, and health behaviours such as smoking, diet and physical exercise. Proxies for the level of State intervention are obtained from individual level data on receipt of prescription drugs and, through a link to the general practice with which the individual is registered, practice-level rates of lifestyle advice, health monitoring and drug prescription.

In addition, we exploit the introduction of new policies during the study period. The DH published a “National Service Framework” for CHD in 2001 and one for old people in 2002 proposing that those with diagnosed CHD or at high risk of developing it should receive advice about how to stop smoking, how to reduce other modifiable factors, advice and treatment to control blood pressure and drugs prescription. In 2004 the Quality and Outcomes Framework for general practitioners provided financial incentives for the achievements of indicators including prescription and advice to CHD patients. We use the dates of introduction of these policy interventions as natural experiments. After matching individuals with and without CHD on the basis of critical risk factors, we confirm evidence of complementarity between State and self-investments as in Fichera and Sutton (2011). In other words, the change in health behaviour is attributable to the increased NHS interventions for old people with CHD rather than only to the occurrence of health shocks.

The policy implications of this paper are that the effectiveness of health interventions for primary prevention may actually ease the NHS budget at a time of increased financial constraints.

Reference

To pay or not to pay for performance?

Søren Rud Kristensen

Background: Contract theory suggest that the optimal size of a piece rate should depend on the correlation between the principal’s uncontractible objective and the available performance measure to ensure efficiency. Lower powered incentives should be used for performance measures that are weekly correlated with the uncontractible objective.

In a health care setting, this result has implications for the choice of the pay for performance (P4P) (high-powered) or target setting (low-powered) for incentivising hospital performance.

Aim: To assess the effectiveness of P4P and target setting in 1) increasing the uncontractible goal of increasing patients feeling of safety during their hospital visit, 2) hospitals gaming behaviour, and 3) a questionnaire based proxy for the principal’s uncontractible goal.

Data: We exploit the existence of a cross section of two measures of the uncontractible objective of increasing patients feeling of safety during a hospital stay. Both measures are related to the hospital wards’ ability to provide patients with a case manager. One performance measure relies on 500 hospital wards’ self-reported performance on the scheme, the other relies on patient reported performance based on questionnaire data from 83,000 patients.

Methods: We specify 3-level random intercept models of a) patients’ probability of reporting to having a case manager, b) hospital’s gaming behaviour defined as higher performance on the hospital reported than on the patient reported indicator, and c) questions related to patient’s overall satisfaction with their stay and feeling of safety at discharge. In all models we control for patient-characteristics.

Findings: Pay for performance for hospital reported performance increased performance on the hospital reported performance indicator but had no effect on the patient reported indicator or hospitals wards’ gaming behaviour. Interestingly, setting targets for the hospital reported performance indicator did increase performance as measured by the patient reported indicator and did not induce gaming. Preliminary results indicate that neither target setting nor P4P increased patients feeling of safety upon discharge—the questionnaire question closest to the third party’s true objective for the performance scheme.

Conclusion: Lower powered incentives such as target setting may sometimes be preferred to higher-powered incentives such as P4P, but neither can guarantee fulfilment of an uncontractible objective when they are linked to an indicator that has little correlation with this objective.