Presenting author: E Adrion (University of Edinburgh)

Title: Health Insurance Market Concentration and Health Plan Quality: Findings from the U.S. Medicare Advantage Programme

Abstract: The U.S. Medicare programme provides health insurance coverage to adults over 65 and the permanently disabled. Under traditional Medicare, the government reimburses providers directly. However, Medicare beneficiaries may choose instead to receive their benefits through a private managed care plan (known as Medicare Advantage (MA)). The MA programme now covers 35% of beneficiaries at an annual cost of $190 billion.

Proposed mergers and acquisitions among major U.S. health insurers have attracted widespread media attention in recent years. Insurers argue that consolidation leads to lower prices through increased bargaining power in negotiations with providers. However, patient advocates argue that mergers adversely impact patients via higher cost sharing and a reduced focus on quality and innovation.

Despite the ubiquity of arguments around the value of competition, few studies have assessed the impact of insurer market concentration on plan quality. This study examines the intersection between insurer market structure, provider market structure, plan quality and premiums in MA. Data were drawn from publicly-available administrative datafiles and other secondary data sources. Descriptive analyses examine trends in market concentration from 2008-2017. Generalized linear regression models examine plan quality and premiums as a function of market structure for 2011.

In recent years, the MA market has become increasingly concentrated, with the majority of beneficiaries living in counties dominated by few insurers. MA plans that tend to operate in more concentrated MA markets have a higher probability of having a high-quality health plan rating. Operating in more concentrated MA markets was also found to be associated with higher premiums. Among plans operating in very concentrated MA markets, high-quality MA plans are associated with premiums as much as two times higher than those associated with lower quality plans.

Federal policies directed at enhancing insurer competition should consider implications for plan quality, which may

Presenting author: Y Akosa Antwi (Johns Hopkins University)

Title: Does Physician Reimbursement Affect Treatment? Evidence from Restricting Balance Billing in California

Abstract: Balance billing is the practice of charging an insured patient for the portion of their medical bill that their health insurer refuses to pay. In the United States (US), patients typically receive a balance bill when they seek emergency care with an out-of-network provider. Emergency care providers argue that balance billing is necessary to make up for underpayment by insurers, while insurers have accused emergency providers of price gouging. National estimates of balance billing is about $1 billion annually.

The considerable financial risk balance billing may impose on patients has spurred some states in the US to ban it. However, if an outright ban decreases the reimbursement received by such providers, it may adversely affect the quantity and quality of emergency care they provide to out-of-network patients; a possibility supported by recent evidence that financial incentives could affect physician resource use and consequently the quantity and quality of care they provide.

We develop a simple theory of physician behavior with and without balance billing; and test the predictions of our model using the ban on balance billing for emergency medical services in California. Using data on emergency visits from 2003 to 2011, we do not find a statistically significant effect of banning balance billing on direct measures of quantity and quality of care, such as number of procedures, length of stay, and mortality. We, however, find a statistically significant effect of restricting balance billing on patient transfer to other short-term general hospitals. Overall results suggest a financial transfer from emergency providers to patients and possible health insurers.

Presenting author: T Allen (University of Manchester)

Title: Under pressure: The hidden costs of resource constraints in health care

Abstract: Objective: To analyse resource constrained physicians' responses to increased pressure in terms of their choice of putting effort into providing health care that is aligned or non-aligned with patients' demand.

Methods: We develop a theoretical model of physician agency that distinguishes between effort that is aligned with patients' short-term preferences and effort that is non-aligned with these preferences but improves societal welfare or the long-term interests of patients. We test the model's predictions empirically using a unique balanced longitudinal survey of English GPs linked to their prescription rates. We use panel data regression analysis with GP fixed effects to control for unobserved time invariant heterogeneity in GP behaviour.

Materials: 1) prescribing records published at the practice-month level from 2010 to 2017, and 2) four waves of a longitudinal survey of English GPs from 2010, 2012, 2015 and 2017. The linked and balanced sample consists of 440 GPs in each survey year. GPs' resource constraints is measured by three self-reported indicators: 1) pressure from demand from patients, 2) pressure due to insufficient time for doing the job justice, and 3) whether the practice is looking to recruit. We measure the effect of resource constraints on GPs' aligned vs. non-aligned behaviour using two indicators: 1) prescription of broad-spectrum antibiotics, and 2) prescription of non-steroidal anti-inflammatory drugs (NSAIDs).

Results: Broad-spectrum antibiotics are prescribed more frequently when GPs experience increased pressure. GPs reporting pressure due to patient demand have a 0.35 percentage point higher prescription rate of broad-spectrum antibiotics than those reporting no or little pressure from patients. Practices that are actively recruiting have a 0.21 percentage point higher prescription rate than practices that are not recruiting. There was no statistically significant impact on prescription rates of pressure related to insufficient time. For NSAIDs, pressure is not statistically significantly related to prescription behaviour.

Presenting author: M Arnold (CHE, University of York)

Title: Distributional impact of the Malawian EHP

Abstract: INTRODUCTION
Malawi used cost-effectiveness methods as an analytical tool to support the development of the health sector strategic plan. The analytical framework prioritised interventions for inclusion in the essential health package (EHP) based on maximising overall population health subject to budget restriction. Health inequalities is also a policy concern in designing an EHP, for example the reduction of difference in healthy life expectancy between socioeconomic groups. Distributional cost-effectiveness analysis (DCEA) prioritises interventions based on health inequality impact combined with overall population health. It requires stratification of interventions' health and cost impact between population groups who differ in healthy life expectancy. We investigate the availability of evidence that allows for stratification of intervention benefits by wealth status and urban versus rural residence. From this first exploration of the potential distributional impact of the EHP, we consider implications for the distribution of health opportunity costs in Malawi.

DATA AND METHODS
We use two recent surveys, the Demographic Health Survey and the Integrated Household Survey, that link disease prevalence and care seeking with urban versus rural residence and asset ownership. We use the international wealth index to provide a common index across both surveys. The baseline distribution of healthy life expectancy between groups is informed using an approach applied in Ethiopia based on under-five mortality. The stratified direct health benefits for the 106 EHP interventions are added this to determine how the EHP might change the distribution. We estimate the impact of removing a 'typical' intervention and a marginal intervention from the EHP, as two potential distributions of health opportunity costs in Malawi.

EXPECTED RESULTS
This analysis will inform the scope for undertaking distributional analyses within Malawi. It is a first step in enabling the extension of the existing analytical framework to reflect equity considerations in health benefits package design.

Presenting author: M Asaria (LSE)

Title: The Impact of Management on Hospital Performance

Abstract: Objectives: There is a prevailing popular belief that expenditure on NHS management is wasteful, diverts resources from patient care, and distracts medical and nursing staff from getting on with their jobs. There is little evidence to support this narrative or counter-claims. To contribute to a more informed debate we explore the impact that management has on hospital performance.

Conceptual Framework: We synthesise a range of theories of how management is conceptualised from the economic literature and set out alternative theoretical models describing the interaction between regulators, managers and hospital staff.

Analytic Methods: We translate our theoretical models into empirical econometric specifications and use these to simultaneously estimate the impacts of management on a range of performance measures. We consider different conceptualisations of managerial input, explore managerial scale returns across different performance dimensions and consider trade-offs across dimensions.

Data: Performance variables are constructed from trust accounts, Hospital Episode Statistics, and Care Quality Commission scores. Measures of managerial input are constructed from NHS Electronic Staff Records and NHS Staff Survey data. We control for a range of hospital characteristics including size, patient case-mix and staff turnover.

Results: Our preliminary findings suggest that the level of management input is positively correlated with hospital performance and that this correlation is stronger in hospitals where the quantity of management input is complemented by good management practice. We find a non-linear relationship between management input and the different aspects of hospital performance from which we estimate optimum levels of management input.

Conclusion: Our analysis is based on cross-sectional data. The next stage of this research is to estimate a longitudinal model to help unpick the causal impact of management on performance and isolate markers of good

Presenting author: P Clarke (University of Oxford)

Title: Moving beyond the threshold: Using a competitive mechanism alongside economic evaluation to allocate health care resources

Abstract: The use of thresholds to determine whether health care interventions are cost-effective is widely used, but has many critics. After briefly reviewing the relevant literature we propose a new approach to health care resource allocation that combines economic evaluation techniques with system of auctions to set prices for health care products funded by payers.

Research allocation decisions would involve three stages:

Evaluation: which uses evidence on costs and outcomes to map a price-ICER function to define the incremental cost-effectiveness ratio for a wide range of prices for a health care product or service.

Competition: In second stage producers wanting to supply products or services would bid in auction markets to set a competitive supply price.

Allocation: Health care resources would then be allocated by combining information on the prices offered and price-ICER functions of multiple products using a common outcome (e.g. QALYs). Cost-effectiveness league tables would be used to allocate a fixed budget. Funds would be allocated to the most cost-effective interventions in a dynamic process in which producers would be able to adjust prices over-time in repeated auctions.

The study concludes with a discussion of key elements of optimal auction design to implement this proposal and how it might be implemented in practice.

Presenting author: M Deidda (University of Glasgow)

Title: Methodological challenges of conducting economic evaluations alongside natural experiments: the Healthy Start Voucher case study

Abstract: Background: An important challenge in non-randomized studies is the reduction in selection bias, due to observable and unobservable confounding. Existing economic evaluations alongside Natural experiments (NEs) rarely explore the sensitivity of cost-effectiveness results to the approaches used to reduce this selection bias.

Aim: The aim of this study is to explore the methodological challenges related to the identification of the causal effect and cost-effectiveness of a public health intervention, when using a NE framework, in relation to the strategies used to reduce selection bias.

Methods: The economic evaluation of the Healthy Start Voucher (HSV), a means tested voucher scheme aimed at providing low-income families with access to appropriate nutrition, is used as a case study. The short-term cost effectiveness of HSV using breastfeeding initiation (BI) as the effectiveness outcome and associated impacts on healthcare and societal costs is assessed. Recipients of HSV are compared to two comparison groups (eligible but not claiming (E); nearly eligible (NE)). Several statistical designs are tested to deal with observed and unobserved confounding: Propensity Score (PS) methods (nearest neighbor PS matching; inverse probability of treatment weighting (IPTW)); Regression Discontinuity design (RDD). Further statistical challenges included relatively small number of control individuals and multiple assignment criteria.

Results: All PS methods work well across the several comparison groups in terms of reducing covariate imbalance. PS matching shows that HSV is a dominated intervention over a 10 months' time horizon. HSV recipients compared to E: incremental costs: £536 (CI: 135; 937); incremental BI -0.06 (CI: -0.01; -0.018). These results are consistent across comparison groups, but not across PS methodologies. Different RDD strategies yield to inconsistent conclusions regarding cost-effectiveness of HSV.

Conclusions: Results were generally not consistent across methods used. Multiple analysis strategies are recommended to overcome biases inherent in each method, exploring sensitivity to multiple sources of bias.

Presenting author: P Dixon (University of Bristol)

Title: The causal effect of adiposity on inpatient hospital costs: Two-sample Mendelian Randomization analysis of the UK Biobank cohort

Abstract: Background: High adiposity as measured by body mass index (BMI) is associated with increased healthcare costs. However, almost all evidence of this association is based on observational research prone to bias because of reverse causation, measurement error, and residual confounding.

Methods: We used genetic variants as instrumental variables (IVs) – a method known as Mendelian Randomization – to obtain causal estimates of the effect of BMI on inpatient hospital costs. These variants – pieces of the genetic code that differ between individuals – are precisely measured, independent of confounders and are not affected by reverse causation. We estimated IV models of the marginal causal effect of BMI using 79 variants robustly associated with BMI in genome-wide association studies. The association of these variants with inpatient costs was modelled using data from UK Biobank, a large prospective cohort study (n=502,617) linked to records of inpatient hospital care. We assessed potential violations of the instrumental variable assumptions, particularly the exclusion restriction via pleiotropy (i.e. variants affecting costs through paths other than BMI) using median-based IV methods (more precise IVs contribute more weight to the median IV estimate), and mode-based IV models (which clusters IVs into groups based on similarity of causal effects). We investigated potential non-linear effects by stratifying on the BMI distribution.

Results: The marginal effect of an additional unit of BMI on costs in observational analysis was £13 (99%Confidence interval:£13-£15), and in causal Mendelian Randomization analysis £23 (99%CI:£16-£30). This effect attenuated under median and mode-based IV approaches, but effect sizes remained larger than observational estimates. There was weak evidence of modest non-linear effects.

Conclusions: This paper is the first to use genetic variants in a Mendelian Randomization framework to estimate the causal effect of BMI (or any other disease/trait) on healthcare costs. The novel methods and results are likely to be of wide interest.

Presenting author: J Dowie (LSHTM)

Title: From 'equity-sensitive' clinical practice guidelines to equity-inclusive person-as-citizen decision support

Abstract: It has been suggested by a GRADE group that equity considerations be introduced into clinical practice guidelines. Extensive reference is made to the relevant GRADE processes for developing the latter, including its Evidence to Decision (EtD) Framework, as opposed to the Summary of Evidence. We explore whether the EtD framework is compatible with person-centred care, viewed ethically and legally under the 'reasonable patient' standard. Emerging with doubts, we propose an alternative for potential use in clinical and commissioning decisions. An equity criterion is introduced into preference-sensitive, multi-criterial decision analytic support for person/citizen-centred decision making in resource-constrained settings. In the Generic Rapid Evaluation Support Tool (GREST), it is rated by the number of population QALYs lost (North-East decisions) or gained (South-West decisions) in moving from Old to New. Claxton's NHS Willingness to Pay per QALY is the numeraire. Equity is weighted relative to five other criteria in the personalised GREST, as part of decision support at the clinical, or clinical commissioning, level. The equity criterion weight can be set to zero, leaving GREST as a straightforward decision support tool. Assuming the QALY redistribution is to random anonymous others, North-East decisions in favour of New will increase inequity, South-West decisions decrease it. A fully-operational but demonstration-only version of the North-East quadrant tool is available on open access, as proof of concept and method. GREST is explicitly proposed as a 'fast and frugal' template, implementations of which are to be evaluated empirically against the existing way of making the same decision within practice constraints, not by normative standards for developing decision aids. Clinical practice recommendations are incompatible with person/citizen-centred care, since this requires individually preference-sensitive point-of-decision support tools for the reasonable patient. Recommendations - not the summaries of evidence underlying them – distract attention and divert resources from the development of such person-centred tools.

Presenting author: S Dwyer (NHS Improvement)

Title: Estimating the impact of concentrating emergency and elective activity across hospital sites on trust level performance

Abstract: Background: The idea of concentrating emergency (hot) and elective (cold) care onto separate hospital sites – a hot-cold split – has received increased attention as a means of improving patient care and hospital performance since the first purpose-built emergency care hospital in England opened in Northumbria in 2015. However, the literature quantifying the impact of a hot-cold split remains limited, in part because of the difficulty of systematically measuring the extent to which emergency and elective care is split across hospital sites.

Aim and approach: This paper offers the first generalised empirical evidence of the impact of hot and cold splits. Using a patient-level dataset covering the English NHS acute secondary care system, we construct innovative trust level indices of the distribution and concentration of emergency and elective activity across sites of a trust. These indices capture the varying degrees of hot-cold split across the sector and allow us to explore how this split relates to trust-level characteristics such as the number of and distance between sites.

We estimate the effect of hot-cold split on a variety of measures of hospital performance including performance against the 4-hour A&E target, cancelled operations, RTT performance (elective waiting times) and length of stay. We employ a variety of methods including trust fixed effects to control for unobservable factors at the trust level that may affect the extent of a hot-cold split and drive hospital performance.

Results: Our preliminary results suggest small but positive benefits of a hot-cold split on A&E performance, cancelled operations and length of stay and no effect on RTT performance. We suggest that a policy encouraging hot-cold splits should expect benefits at least as great as estimated here, as our estimates derive from all trusts not just those that consciously decided to concentrate emergency or elective care as a driver for change.

Presenting author: G Erreygers (University of Antwerp and University of Melbourne)

Title: Defining and Measuring Health Poverty

Abstract: The aim of the paper is twofold: first we elaborate how the concept of 'health poverty' can be defined and measured, and second we apply the methodology to study health poverty in a variety of cases. Although not entirely new, the notion of health poverty is seldom used – in contrast to the notion of income poverty. In our view a particular poverty concept focusing on health is useful and relevant, especially for public health policy. The measurement of health poverty allows us to gain insights into different sorts of health deprivation in society as a whole, and in specific subgroups.

Perhaps the main reason why there exist relatively few studies on health poverty is that in comparison to income, health is multifaceted and therefore much harder to measure accurately. The first choice to be made is that of the health variable which will be taken into consideration. We will look at three different variables, all of which are assumed to have ratio-scale properties. This means that we can calculate the distance of everyone's health achievement from a given threshold level and compare the differences between individuals. We are then in a position to measure health poverty by means of the now widely adopted Foster-Greer-Thorbecke (FGT) class of poverty indicators. In our application we look at poverty with respect to cardiovascular risk, general health status, and life expectancy. As far as we can see, this approach has never been followed before.

The FGT class of poverty measures includes a poverty aversion parameter. Different values of the parameter will be assumed in order to assess three aspects of poverty (incidence, intensity and inequality, known as the three I's of poverty measurement). Moreover, the FGT class is additively decomposable, which makes it possible to gauge the contribution of poverty within specific subgroups to overall poverty.

Presenting author: L Fernandes (CHE, University of York)

Title: Peer pressure in surgery: how colleagues determine a physician's treatment style

Abstract: Introduction: Variation in treatment choices for similar patients is substantial and of great concern to policy makers. Some of this variation can be explained by demand-side factors, such as patient medical requirements, but a substantial proportion originates with the provider of care. We study how a physician's practice environment, especially the observed behaviour of their clinical peers, drives their choice of treatment approach. We focus on hip replacement, where both cemented and uncemented prostheses are common, despite clinical recommendations in favour of the former.

Data: We employ patient-level administrative data from all publicly-funded hip replacement surgeries in England between 2008 and 2014. These data include information on patient characteristics, clinical information and details on the admission pathway, including identifying information about the physician in charge of delivering care.

Empirical Analysis: We construct employment histories for physicians to identify those who move from one hospital to another during the study period (movers). We use a difference-in-differences model to estimate how the treatment choices of movers change as a response to an exogenous shock in their practice environment. The practice environment is defined as the risk-adjusted rate of cemented hip replacements for all physicians in the hospital, omitting the moving doctor's own cases. We test for endogenous migration of physicians into hospitals with practice environments that are more in line with their own practice style.

Results: There is a total of 375,051 cases of hip replacements in our sample, performed by 3,680 physicians practicing in 519 public and private institutions. We have identified 151 (4%) physicians as movers. After the move, physicians' treatment choice changes on average by 0.40 percentage points for each percentage point change in the practice environment. There is no evidence that moving physicians select their new employers based on practice environment.

Presenting author: E Fichera (University of Bath)

Title: Do consumers respond to "sin taxes" heterogeneously? New evidence from the tax on sugary drinks using longitudinal scanner data

Abstract:

Background: The WHO considers the rise of obesity and non-communicable diseases as a major public health concern. Government policies such as taxes of sugar-sweetened beverages (SSBs) may help people to make better choices. The economic rationale of these policies is to internalise externalities. In May 2017, the regional parliament of Catalonia introduced a piece-wise tax on SSBs similar to the U.K. one whose rate depends on the amount of sugar contained in a defined list of beverages.

Data: We use longitudinal supermarket scanner data on all beverage purchases in a supermarket chain from May 2016 to April 2018. Our main dataset includes over 1M households and 301 stores in Catalonia and Spain.

Methods: We estimate Difference-in-Differences (DiD) models exploiting time (before/after) and spatial variation (Catalonia/Spain) in the introduction of the SSB. We incorporate DD methods into: i) models of quantity of beverages and amount of sugar bought; ii) an Almost Ideal Demand System (AIDS). We control for prices, total expenditure, spell (household-store) fixed effects. Additional models use a battery of instruments for unit prices. We also test for common pre-trends between Catalonia and Spain, spillover and anticipation effects, and stockpiling of beverages.

Preliminary findings: Households reduce their expenditure on medium and high sugared pops and milkshakes. They increase their expenditure on relatively healthier beverages such as water, veggies/teas, isotonic and energy drinks. As individuals mix pops and liquors, households reduce their expenditures on liquors/Vermouth because the price of pops has increased. They then shift their expenditure on wine. Households reduce purchase of sugar in medium and high sugared pops and milkshakes. Our results are robust to a battery of robustness checks changing model specifications and using different instruments. We find larger reduction in expenditure shares of pops, juices and milkshakes for younger and relatively wealthier households.

Presenting author: R Flemming (Ludwig-Maximilians-Universität München)

Title: The Influence of Centralized Physician-Networks in the Ambulatory Sector on Hospital Admissions

Abstract: In the German statutory health insurance, covering 90% of the population exists no regular gatekeeping system in the ambulatory care sector and thus no formal coordination among physicians. This lack of coordination might lead to less continuity of care especially for chronically diseased patients and an increased rate of potentially avoidable hospitalizations. The aim of the study is to identify empirical networks of physicians who treat the same patient population. Based on the rate of ambulatory care sensitive hospitalizations we analyze whether an informal organization among physicians with one physician in a central (gatekeeping) position impacts upon outcomes and could thus favor the efficient ambulatory care.

Administrative data of patients with diagnosed heart failure from the national AOK health insurance in Germany from the year 2010 and 2011 was analyzed. In line with existing studies, pairs of outpatient physicians treating the same patients are used to construct networks. With a modular-based optimization algorithm, communities consisting of distinct physicians are derived and characterized based on the number of edges and vertices. A multilevel negative binomial regression is applied to estimate the influence of the network-structure and composition on the hospitalization rates controlling for the patients' personal characteristics.

1834 networks with 11742 physicians caring for 86375 patients were identified. 33% of the networks had a centralized structure. The average numbers of physicians and patients per network were 6 and 38 respectively. The raw hospitalization rates per network varied between 0 and 73 with an average of about 8 hospitalizations per 100 patients. The regression analysis showed that a centralized network-structure has a negative effect on the hospitalization rates.

The results indicate that even with an informal centralized organization of collaboration among physicians the health care outcomes could be positively influenced. These findings suggest a beneficial role of gatekeeper in the ambulatory care sector.

Presenting author: D Glynn (CHE, University of York)

Title: Informing early access and research decisions without full economic modelling

Abstract: Background: Deciding which treatments to provide early access to and which treatments to research further requires trade-offs. Value of information methods provide a coherent and explicit framework to make these trade-offs when issuing guidance on new technologies (Only in Research, Approval with Research, Approve, or Reject). Methods do not currently exist to inform the judgements required without a full economic modelling. This represents a barrier to coherent decision making as full economic modelling may not be feasible due to time constraints or legal prohibitions on the use of quality adjusted life years (QALYs).

Objective: We demonstrate how the assessments required for research and early approval decisions can be informed without a full economic model. This approach is based around uncertainty in the primary outcome. Differences between treatments which are not captured directly by the primary outcome are captured indirectly by requiring a minimum clinical difference (MCD) in the primary outcome before practice should change.

Methods: Using the MCD method, the value of early access to a technology and the value of additional evidence are explored through the application of the seven point checklist from Claxton et al., (2012) to the case studies of early pharmacological thromboprophylaxis (PTP) for traumatic brain injury.

Results: The case study demonstrates that the assessments required are feasible to carry out without full economic modelling. This method can highlight the scientific and social value judgements made when granting early access to new treatments or commissioning further research.

Conclusions: The methods outlined here demonstrate that substantial cost savings or improvements in side effect profile may be required if early access is to be granted to new technologies which do not offer substantial gains in primary outcome effectiveness. The appropriate guidance also depends on whether the private or public sector can be expected to fund additional research.

Presenting author: E Gonzalo-Almorox (Newcastle University)

Title: The effect of care home closures on the quality of care homes nearby

Abstract: Ensuring an adequate provision of care-home places is essential for preserving the access as well as the quality of long term care for older and more dependent population. This paper is the first to present evidence for the English care homes market on the causal effect of care home closures on other care homes in the market. In a market with non-regulated prices, as the English care homes market, the effect is a priori ambiguous. To identify the effect of care home closures I use an instrumental variables strategy on public administrative data released by the Care Quality Commission that exploits the fact that care homes closures may be the result of a business strategy from their care provider group. Long term care providers owning several care homes across the country may decide to consolidate and reduce their capacity, expressed by the number of care homes in the care group, to preserve their financial situation and carry on with their care services. I show that incumbent care homes increase the probability of downgrading their quality after the closure of a care home nearby. The effect is moderate and decreases over time and also when closing care homes are further away. I explore several explanations for this finding investigating mechanisms based on the frequency of quality inspections carried out by the regulator on care homes within the same market and alternative destinations where residents may go after the event of closure. I find some evidence of an increase on the number of emergency admissions on the nearest healthcare centre to the closed care home. Furthermore, the quality inspections carried out in the care homes nearby also increase.

Presenting author: Y Gu (University of York and Macquarie University)

Title: Modelling healthcare costs: A semiparametric extension of generalised linear models

Abstract: Econometric modelling of healthcare costs serves many purposes: to obtain key parameters in cost-effectiveness analyses; to implement risk adjustment in insurance systems; and to examine the impact of risk factors such as smoking and obesity. Modelling healthcare costs is challenging because the cost data are typically non-negative, heavy tailed and highly skewed.

The methods may be classified by three features. The first is whether to transform the costs. The second feature is how to accommodate zero costs; for policy makers the outcome of interest is typically the unconditional outcome that includes the zero values. The third feature is whether to use parametric or semiparametric methods. The majority of current methods are parametric even though some of them can be very flexible. An ideal approach for modelling healthcare costs would be based on untransformed costs, accommodating zero costs in an appropriate way, and be flexible. Being flexible and less parametric is particularly important as it is less likely to lead to model misspecification and biased estimates. However, this needs to set against the risk of over-fitting.

To address these issues, we develop a semiparametric single-index model based on the generalised linear model framework. Both the conditional mean and conditional variance functions are assumed unknown and estimated non-parametrically. An iterative estimation procedure is proposed, alternating parametric and nonparametric estimation steps. We also show that the estimated functions can be calibrated parametrically which would facilitate policy analyses such as examining the marginal effects of key covariates.

Extensive simulations are undertaken to examine the performance of the new estimator in comparison to several traditional approaches. We also intend to apply the model to investigating the relationship between childhood obesity and healthcare costs using the Longitudinal Study of Australian Children data and linked records from Medicare.

Presenting author: S Hill (Newcastle University)

Title: Is there a future for cost-benefit analysis when evaluating public health interventions?

Abstract: Introduction: NICE recommends considering health and non-health benefits within economic evaluations of public health interventions, specifically the use of cost-benefit analysis (CBA). However, few CBAs of public health interventions exist in the peer reviewed literature.

This paper discusses the challenges associated with conducting a CBA of a brief alcohol intervention for Year 10 students. Feedback on the CBA from public health decision-makers is used to consider implications for health economists presenting CBAs and other forms of economic evaluation findings to such an audience.

Methods: The benefits side of the CBA came from a contingent valuation (CV) survey conducted in a representative sample of the UK population. The outcomes data used to develop CV survey vignettes, and the cost data for the CBA, came from the NIHR funded SIPS Jr High trial.

The results of the CBA were presented to 15 public health decision-makers who were asked to provide feedback on the evidence provided to them.

Results: The CBA was conducted on a UK societal level and a local authority level. The net social benefits for each analysis were approximately £2 billion and £185,000, respectively.

The CBA was not well received by decision-makers; the main objection being mistrust in the calculation of a monetised benefit for the CBA. However, some merits of the method were expressed e.g. presenting the results as a "bottom-line".

Discussion: The paucity of CBAs of public health interventions means potential users are unfamiliar with its use. Other challenges were a lack of consensus on how to aggregate and present results so they are most useful to end-users and the lack of comparable evaluations for use during decision-making. The feedback on the CBA indicates

Presenting author: T Iizuka (University of Tokyo)

Title: Is preventive care worth the cost? Evidence from mandatory checkups in Japan

Abstract: Using unique individual-level panel data, we investigate whether preventive care is worth its cost in the context of mandatory health checkups in Japan, focusing on the risk for diabetes mellitus (DM). To identify the cost effectiveness of preventive care, we apply a regression discontinuity (RD) design, which exploits the fact that the health of individuals just below and above a clinical threshold is similar, whereas treatments differ according to the checkup signals they receive. For health outcomes, we use physical measures obtained from routine checkups, such as FBS, HbA1c, and BMI. Moreover, we apply a risk prediction model to our data to predict the impact of a health signal on the 5-year risk of mortality for the individual. By assuming a value of statistical life year, we quantify the monetary value of any improvement in health.

We find that, first, surpassing the lower, "pre-diabetes" threshold significantly increases utilization as measured by DM-related physician visits and outpatient spending, indicating that health signals can potentially promote preventive care. Second, however, we find no evidence that the additional care improves physical health measures. Thus, there is no evidence that DM-related preventive medical care is cost effective (or even effective) around this threshold. These results suggest that the current "pre-diabetes" threshold may need to be reexamined from the perspective of cost-effectiveness.

Third, at the higher, "diabetic type" threshold, we continue to find no evidence for the general population. However, focusing on high-risk individuals, we find that the "diabetic type" signal improves health outcomes. A risk prediction model further indicates that the cost-per-life saved due to reduced blood sugar is comparable to the conventional estimate of the value of statistical life at this margin, indicating that the signal-induced spending is cost effective. These results suggest that targeting high-risk individuals after a checkup is essential.

Presenting author: N Jacob (CHE, University of York)

Title: The Effect of Changes in Mode of Commuting on Health

Abstract: The average commuter in the UK spends almost an hour travelling to and from work, thereby accounting for a large proportion of an individual's daily time use. One of the important choices made working individuals is the mode of travel between work and home. This paper investigates the impact of mode choice on various measures of health outcomes, including self assessed health. Our empirical strategy exploits changes to the mode of commute occurring between time periods, t-1 and t, to identify responses on health outcomes observed at t+1, using data from the Understanding Society. Individuals who change modes are matched with those whose mode remains constant. Literature has generally found that active means of commuting such as walking and cycling contribute to higher levels of physical and mental well-being as compared to using motor transport. We find an increase in good health (SF12IND) at t+1, for women who switch from car to active travel and an increase in physical health (SF12PCS) at time t. In contrast, men who switch from active travel to car or public transport are shown to experience a significant reduction in their mental health (SF12MCS) at t+1. Moreover, we only observe a higher GHQ when they change from public to active transport at time t.

Presenting author: D Kopasker (University of Aberdeen)

Title: Skill Mix and Patient Outcomes: A Multi-country Analysis of Heart Disease and Breast Cancer Patients

Abstract: A key focus of recent health care workforce reform has been extending existing roles and creating new health professions. However, little is known of the influence on outcomes from this variation in labour inputs within hospital production functions. This paper provides cross-sectional evidence of associations between the composition of care delivery teams with different process, health care use, and medical outcomes. Using primary data capturing clinical pathway-specific measures of skill mix we show that variations in labour inputs within the breast cancer and heart disease care pathways are associated with both positive and adverse outcomes. Uniquely, the analysis focuses on both specific care pathways and individual hospitals, thus controlling for a source of heterogeneity in health systems that has been under-investigated in previous studies. Additionally, stratifying our analysis by country (England, Scotland, and Norway) enables us to identify the impact of skill mix within different institutional settings. Our measure of skill mix is novel since it is based on task components and compares the relative input of physicians and nurses. The results illustrate the scope for substitution of task components within care pathways as a viable method of health care reform.

Presenting author: S Kristensen (Imperial College London)

Title: Paying for Quality in Health Care: Does Incentive Power Matter?

Abstract: Objectives: To test the effect of incrementally increasing the power of an incentive scheme implemented in a Danish region from 0.5% of the regional hospitals' budgets in 2012 to 1.5% of the budget in 2016. We analyse the effects of the incentive scheme, focusing on changes in trends in performance as incentive power increased.

Methods: We analyse 7,448,726 episodes from 4,539,961 patients treated at 5 intervention hospitals and 21 control hospitals from 2010-2016, aggregated to hospital-month level from the Danish National Patient Registry. We estimate changes in trends between incentive power periods at hospitals in the intervention region and compare these changes to changes in trends at hospitals in 4 control regions using controlled segmented regression. Risk-adjusted outcomes are those incentivised by the region (hospital acquired infections (HAIs), pressure ulcers, 30-day mortality) and a set of non-incentivised outcomes (day case activity, length of stay, 30-day readmission rates, ambulatory care sensitive admissions and production value per episode).

Results: Preliminary analysis suggests that, in the first years, trends in HAIs increased compared to pre-intervention trends in both intervention and control hospitals. HA pneumonia decreased in intervention hospitals compared to the pre-intervention period, while constant in control hospitals. Increase in incentive power from 0.5% to 1% was not associated with any significant change in incentivised outcomes in intervention hospitals, but the increase to 1.5% was associated with a decrease in HAIs

Conclusions: The initial low powered incentive scheme implemented to improve the quality of care in a Danish region was associated with little improvement in outcomes. Some improvements emerged as the power of the incentive scheme increased, although this change did not affect all incentivised outcomes and could also be due to a learning effect.

Presenting author: C Kronenberg (University Duisburg-Essen)

Title: New(spaper) evidence on the relationship between business cycles and suicides

Abstract: Suicides hurt families and the economy with an annual cost of $69 billion in the USA. The literature typically finds that suicides are countercyclical in contrast to most other health outcomes. Thus if the economy improves the number of suicides tend to go down and vice versa. If this was a causal finding, governments should heavily invest into suicide prevention during recessions and reduce that investment in good times. However, the majority of the empirical evidence is based on association studies from the 20th and 21st century. This is the first work to extend this literature to the 19th century. Shifting the time horizon, limits the possible confounding effects of health insurance, labor market protections and mental health care on the relationship between the state of the economy and suicides, as they were either not existent or in their infancy. Furthermore, regular business cycle movements are somewhat predictable by individuals. We thus use the value of gold and silver discoveries as an economic shock, while previous worked used GDP or the unemployment rate to proxy business cycles.

Given that no suicide records exist for the 19th century, we build an index of newspaper suicide mentions by dividing the number of suicide mentions through the total number of newspaper pages available for a given year and state.

Preliminary results confirm previous findings that suicides are countercyclical. Gold discoveries did not universally lead to wealth and thus provide an opportunity to explore the effect of an economic shock on its winners and losers. Therefore, future steps include looking at Chinese, Mexican and Native American miners who were met with varying degrees of animosity. Exploring the effect on them is an avenue to study the effect heterogeneity of gold discoveries on suicides.

Presenting author: E Kuznetsova (UCL)

Title: Does Healthy Immigrant Effect Hold for Political Immigrants? Evidence from the Collapse of the USSR

Abstract: Empirical studies prove the existence of so-called 'healthy migrant effect': immigrants arrive being healthier than their native counterparts but immigrants' health deteriorates over time faster than natives' health. We aim to explore the existence of this effect in Russian immigrants, who arrived after the collapse of the Soviet Union. These immigrants are ethnically Russian and immigrate due to political reasons. Immigrants are not different from natives with respect to language proficiency and education. This allows us to isolate the effect of immigration on health abstracting from unobserved characteristics (health perception, language proficiency etc.). We compare their health assimilation with that of economic immigrants, who arrived before 1989.

We exploit Russian Longitudinal Monitoring Survey, its panel component from 2010 to 2016. We specify three cohorts of individuals: native-born, economic and political immigrants. We control for two processes: aging of immigrants and natives and the increasing duration of immigrants' stay in Russia. We apply correlated random effects (CRE) linear probability model as well as CRE probit model as a robustness check.

Political and economic immigrants are similar to natives with respect to education and income level, however are different in other characteristics such as age, marital, employment status and nationality. We find support of HIE in the economic immigrant subsample and a partial support of the effect in the political immigrant subsample. In political immigrants, young age of arrival and country of origin have a protective effect on assimilation process because they are associated with healthy assimilation. The greatest deterioration is experienced by political immigrants, who arrived in Russia between 31 and 40 years of age.

We use the collapse of the Soviet Union as a quasi-experiment and show that political immigrants have a different assimilation process from economic immigrants that are commonly studied in the existing literature.

Presenting author: V Lazuka (Lund University)

Title: It's a long walk: Lasting effects of the openings of maternity wards on labour market performance

Abstract: Studies showing that large-scale public health interventions in early life have lasting consequences are scarce and remain silent about the mechanisms. In 1931-1946, the Swedish state reformed the childbirth institutional system that led to the openings of the new maternity wards and to the gradual decline in home deliveries assisted by midwives. Maternity wards offered improved childbirth conditions, including hygiene, instruments and medications, health monitoring after birth, and the rest to the mother.

This paper aims at answering the following research questions: What are the long-term economic effects of access to better health services at birth? Whether the effects differ by type of maternity hospital, and what role does a distribution of early-life health technology play in it? The early-life experiment occurs at birth and 10 days after, and it is rare to be able to consider such precise time windows of treatments.

The register-based individual-level data on the total population of Sweden provides information on economic outcomes for around 290,000 individuals, born during the implementation of the health reform and observed in ages 37–64, and on their parents. With regard to treatment, this paper employs data on characteristics of the reform from multiple archival sources. This paper employs a difference-in-differences method and extensively utilizes geo-coded information.

The results first finds that the reform substantially reduced neonatal mortality in short term. It then shows sizable long-term effects of the introduction of maternity wards versus a home childbirth system amounting 2.8–6.1% for labour income and 9.1–19.7% for disability pension in adulthood. Beneficial effects on health are the main channel through which economic effects operated (up to 14.4%), although there are significant effects on schooling among women. Both large-scale and local maternity wards produce similarly strong effects, explained by an equal distribution of early-life health technology.

Presenting author: A McCarthy (Northumbria University)

Title: Economic Evaluation of New Models of Care: "Quick Wins" or Robust Methods

Abstract: In January 2015, the NHS invited individual organisations and partnerships to apply to become 'vanguards' for the new care models programme, one of the first steps towards delivering the NHS Five Year Forward View and supporting improvement and integration of services. Support in the form of extra funding was allocated to each successful vanguard annually from 2015 until 2018 in order to complete the redesign of services. NHS England monitored the progress of the vanguards through "an intensive local evaluation program" that sought to seek evidence on what worked in order to rapidly share and encourage spread to other parts of England.

We report on an economic evaluation of an Enhanced Health in Care Home vanguard in the North East of England using interrupted time series to identify changes in underlying trends of key metrics and resource use from an NHS costing perspective. Count data regarding A&E admissions, non-elective admissions, outpatient appointments and bed days was analysed. Results are presented and contrasted based on evaluations both over the short term (12 months pre and 18 months post intervention) as a consequence of NHSE's deadlines for local vanguard evaluations and over a longer period facilitating the collection of additional data points (23 months pre and 34 months post intervention). The results of both evaluations differ widely.

We argue that health economic evaluations of the new care models and service reconfigurations of this nature must be underpinned by robust methodologies over an appropriate time horizon that allows for changes in culture and practice to be embedded. In particular, NHSE 's desire for 'quick wins' creates a tension between rigorous evaluation and 'good enough' evidence leading to potentially erroneous policy decisions and a misallocation of resources.

Presenting author: S McNamara (University of Sheffield)

Title: Is aversion to inequalities in health reference-dependent? A pilot study

Abstract: Distributional cost-effectiveness analysis (DCEA) is founded on the idea that the public's aversion towards inequalities in health can be expressed by a QALY-based Social Welfare Function – a function that formalises equity-efficiency trade-offs in a single metric. In this paper, we challenge this notion using Kahneman and Tversky's work on reference-dependence – the observation that the value people place on a change in an outcome depends on the reference points they hold for that outcome. We hypothesise that health inequality aversion is reference-dependent, and that the reference points we hold for health are likely to differ depending on the types of health problem under consideration, interacted with the age of the individuals impacted by those problems. As a result, we anticipate the public's aversion to an inequality in health will be inconsistent with the QALY-model, and will differ depending on the type of incremental health gain utilised in an inequality aversion elicitation exercise. In this paper, we present results of a face-to-face, mixed-methods, pilot study of a choice-experiment designed to test this hypothesis. The primary aim of the pilot was to evaluate participant understanding of the choice-experiment, and subsequently, the feasibility of fielding at scale. Twenty non-academic university employees participated; each (1) undertook a person-trade-off (PTO) exercise designed to elicit aversion to an inequality of a given QALY magnitude using two alternative forms of gain of equal QALY magnitude – life-extension, and relief of severe pain; (2) answered intensive feedback questions designed to explore participant's rationales for their selections, the reference points they hold for different types of health, and their understanding of the tasks undertaken. Due to the study objective, no hypothesis testing of the PTO exercise was undertaken, and analysis was restricted to those questions capable of providing insight into participant understanding of the exercises undertaken. This is work in progress.

Presenting author: S Moler Zapata (LSHTM)

Title: Estimating the marginal productivity of public health care expenditure in Indonesia: a dynamic panel data approach

Abstract: Many low- and middle-income countries (LMIC) worldwide have embarked on their path towards Universal Health Coverage (UHC). While the impacts of the accompanying increase in public health spending are well documented in terms of reducing catastrophic expenditures and increasing utilisation, the evidence on the causal effect public health expenditure on health outcomes is scarce, and mainly relies on cross-country estimates.

This paper contributes to the literature by estimating the marginal productivity of public health spending in Indonesia, exploiting the decentralised nature of the Indonesian health care system, where health care budget setting is shared between the district, province and central levels. Our identification strategy relies on differential changes in province level health expenditure over 2004-2012, a period of gradually increasing health insurance coverage and public health expenditure. The main outcome is under-5-mortality rate (U5MR), a health indicator that has exhibited significant improvements over this time period.

We construct a province-year panel dataset of health expenditure, U5MRs, and indicators of economic development and health needs. To account for endogeneity of healthcare spending, we apply instrumental variable panel data approaches, exploiting tax and oil revenues of the provinces as instruments. In our preferred specification, a dynamic panel regression that captures the cumulative lagged effects of health expenditure, a 1% increase of public health expenditure results in a 0.27% decrease of U5MR (p<0.1).

Indonesia has set out the ambitious goal of achieving UHC by 2019, resulting in the world's largest single payer health care system. As the national health insurance scheme already faces major fiscal challenges, it is even more vital that Indonesian health policy makers take cost-effectiveness into consideration when allocating resources. Our estimate of spending elasticity provides an important input into the estimation of health opportunity cost ("cost-effectiveness threshold") for Indonesia.

Presenting author: M Morciano (University of Manchester & University of East Anglia)

Title: Market concentration, supply, quality and prices paid by Local Authorities in the English care home market

Abstract: We investigate the impact of conditions favouring high market concentration (C) on supply (S), price (P) and quality (Q) in the local care home markets for older people in England.

The instrumental variables approach is often used to address the 'endogeneity' of C. We argue that this approach will not identify the underlying market structure and that it is implausible to claim that a causal impact of C on outcomes can be achieved in this way. This is a more fundamental issue than conventional doubts about instrument validity – it is unclear what a 'causal impact' would mean when market concentration and other outcomes are jointly determined in a market equilibrium, and there is no unambiguous sense in which market concentration 'causes' outcomes to be what they are.

We take a more realistic approach by assuming that the nature of the equilibrium in a local market is determined by the basic (exogenous) characteristics of that market. Instead of asking: "what is the causal impact of C on outcomes?", we ask the much clearer question: "what is the impact on S, P and Q of the exogenous area characteristics that tend to produce high levels of C?". While answers to the former are problematic in an equilibrium setting, straightforward econometric analysis provides clear answers to the latter question.

Using administrative data at Local Authority (LA) level, we found a large significant impact of the conditions that tend to favour higher concentration on equilibrium supply (-24%) and prices (+20%), in particular in the market of non-nursing services (-58% and +33%). The effect on quality is smallest and significant only for the non-nursing care-home market (+12%).

There are important policy implications for English LAs' abilities to discharge their responsibilities to promote an adequate supply of care home places at affordable costs and sufficient quality.

Presenting author: R Moreno Serra (University of York)

Title: Evaluating the Impact of Civil Conflict on Child Health: Evidence from Colombia

Abstract: Internal armed conflicts have become more common and more physically destructive since the mid-20th century. Although these conflicts constitute a global problem, poorer countries have been disproportionately affected, with devastating consequences for health and development. Since 1958 an estimated 220,000 people have died in Colombia due to the civil conflict and more than six million (13% of the population) have been forcibly displaced. The aim of this paper is to investigate the consequences of the long-term internal conflict for child health in Colombia, as well as the possible pathways for such consequences related to patterns of access to health services.

We use data from the Demographic and Health Surveys and the Unified Registry of Victims for the years 1987-2010. With an individual-level dataset, we estimate the effect of different levels of conflict intensity on height-for-age z-scores (HAZ) and the probability of stunting (defined as HAZ < -2) among under-five year olds, measures that indicate past (incl. pre-birth) changes in nutritional and health conditions beyond the short term. Our identification strategy stems from the temporal and geographic variation of conflict intensity across birth cohorts and municipalities. We control for unobserved, time-invariant heterogeneity of municipality characteristics and common trends by using municipality and cohort fixed effects, in addition to observable predictors of child health that may be correlated with conflict. Assuming a linear relationship between a continuous measure of conflict intensity and the probability of stunting, we find that living in a municipality with a relatively higher conflict intensity (by 10 victimisations/1,000 pop.) leads to a statistically significant 1.8% points increase in the probability of stunting. This corresponds to 15% increase from a baseline prevalence of 11%, comparable to effects estimated in African conflict settings.

Next steps include using instrumental variables to control for endogenous shocks in conflict intensity. Our ongoing analyses will contribute to the understanding of how conflict dynamics have cumulative health impacts.

Presenting author: A Oxholm (University of Southern Denmark)

Title: Time to revisit the agency theory and expand our thoughts on what motivates physicians? A nudge to health economists

Abstract: Background: Health economists aim to design policies that encourage physicians to provide high quality care in a cost-effective way. Typically health economists use agency theory to predict how physicians respond to these policies. However, empirical studies show that many schemes lead to heterogeneous and unintended responses, indicating that the theory fails to predict physicians' reactions.

Aim: Our aim is to expand the standard principal-agent framework to create a better understanding of physicians' heterogeneous responses to interventions.

Methods and results: We use the standard principal-agent framework, which ordinarily assumes that physicians gain utility from extrinsic motivational components (such as profit) that serve their own interests, as well as from an altruistic component, reflecting that physicians also derive utility from helping patients. We expand the physicians' utility function by including two additional components. First, we assume that physicians may derive utility from being a good agent to the payer (i.e. the public or private insurer). Including this motivational component, which we refer to as public service motivation, is in line with the theory of double agency in health care. Previous studies acknowledge physicians' double agency role, but do not include it as a component in the physicians' utility function. Second, we include an intrinsic motivational component, reflecting that physicians derive utility from the enjoyment of their work, regardless of any reimbursement or benefits to their principals. Finally, we present how these components are measured empirically, and present ideas for how they can be used for policy making.

Conclusion: We propose a more nuanced view on physicians' utility function by introducing several motivational components that affect their supply of health care. This expansion of the principal-agent framework can be used to improve the understanding of heterogeneity in physician behaviour, thereby creating more effective health care policies.

Presenting author: S Paling (NHS Improvement)

Title: Exploring the factors associated with winter A&E performance in England using routinely collected daily data

Abstract: Background: In England, performance against the four-hour standard for accident and emergency (A&E) waiting times has been deteriorating since 2010/11. Since shorter waiting times are associated with improved patient outcomes, this standard - which aims to reduce waiting times - is of interest to the public and policymakers. However, existing academic research is limited by either using annual data, very short time periods or a small number of trusts. Daily data for all trusts recently became available through a national data collection (SITREP), which captures key information on A&E departments. The daily data displays greater variability than monthly data, so is more pertinent to address questions of operational response.

Methods: Our study uses daily data on 138 type 1 A&E departments in England over 90 days between December 2016 and February 2017 sourced from SITREP and the Hospital Episode Statistics. We use a range of panel data methods to estimate A&E performance.

Results: We find a statistically significant non-linear relationship between bed occupancy and A&E performance against the four-hour standard. A full hospital, with 100% bed occupancy, had 8% lower A&E performance than a hospital at 85% occupancy, all else equal. A higher proportion of patients with hospital stays over 21 days had a significant negative association with A&E performance, suggesting hospitals' bed flexibility may have an additional effect. On the demand side, we find a significant negative association between the volume and volatility of admissions and A&E performance. Our findings are robust to a series of estimation techniques, including fixed effects and fractional response models.

Conclusions: This research highlighted that the relationship between A&E performance and bed occupancy is non-linear, and that patient mix has an effect additional to that of the beds occupied. These findings can help (and have already helped) to inform policymaking to improve A&E performance.

Presenting author: M Perry-Duxbury (Erasmus University Rotterdam)

Title: Cured today, ill tomorrow: including future unrelated medical costs in the NICE decision framework

Abstract: NICE guidelines specify that unrelated medical costs (UMCs) in life-years gained should be excluded from economic evaluation, while implicitly suggesting that unrelated health benefits should be included. This asymmetric treatment of costs and benefits favours life extending interventions particularly those targeted to populations with higher multi-morbidities. While the incorporation of UMCs into intervention ICERs has been discussed to some extent in the literature, there has been much less discussion about the inclusion of UMCs in estimates of health opportunity costs. The aims of this paper are to illustrate: (1) how ICERs and empirical supply-side threshold estimates could be adjusted to account for UMCs; and (2) how this would change the relative weight given to different types of interventions.

We combined various data sources to construct estimates of per capita NHS spending by age, gender and proximity to death and developed a framework for adjusting these estimates for costs of disease. Using cause-deleted life tables we illustrate how the resulting estimates of unrelated NHS spending could be combined with previously calculated disease related cost estimates to update ICERs as well as estimates of the threshold.

Preliminary results show that both ICER and threshold calculations are impacted by including UMCs. The magnitude of this impact is dependent on the degree of life extension the intervention provides and the level of comorbidity in the recipient population. For instance, re-estimated ICERs for typical cancer and cardiovascular interventions increased by approximately £31,000 and £2,000 per life-year respectively. Accounting for UMCs also somewhat increased our empirical threshold estimates.

We conclude that the reallocation of healthcare resources that would result from accounting for UMCs would improve the efficiency of the health system in terms of total health produced for a given budget and would favour interventions that worked to reduce multimorbidity over those that target single diseases.

Presenting author: M Quaife (LSHTM)

Title: Predicting the unpredictable? Using discrete choice experiments in economic evaluation to characterise uncertainty and account for heterogeneity

Abstract: Cost-effectiveness estimates in economic evaluations (EEs) are subject to uncertainty and heterogeneity. Average costs and benefits of a particular treatment or technology may belie uncertainty in parameter estimates or differ for patients with different characteristics.

Some parameters are more uncertain or heterogeneous than others. An important parameter for EEs of technologies which prevent disease is uptake, a critical component of use and coverage. Yet uptake can be both hard to predict before a product is introduced (leading to parameter uncertainty) and highly heterogeneous. Even when a mean value is known, the plausible range of uncertainty around this value may not be.

Where revealed preference data is unavailable, stated preference (SP) data can be used to characterise parameter uncertainty and heterogeneity in models. Using an example of a new HIV prevention product, this paper provides a practical guide for the integrated use of SP data in EEs, detailing required steps, and discussing extensions and limitations of the approach.

First, we address parameter uncertainty, describing how predictions are made from SP data. We demonstrate how sampling uncertainty in SP models can be used to characterise parameter uncertainty in EEs. We show how SP results compare to other methods of eliciting uncertainty bounds.

Second, we propose methods of modelling heterogeneity. Using SP data to model HIV prevention product uptake among condom users and non-users, we show how averages can be misleading – demonstrating it is the who rather than how much that matters when modelling uptake. We demonstrate how latent class models can be used to identify population subgroups based on preferences, and characterised by observable, targetable factors. We also show how SP data could inform equity analyses.

Finally, we discuss the limitations of the proposed approach, compare with other alternatives, and identify

Presenting author: L Rachet Jacquet (CHE, University of York)

Title: The causal effect of volume on health gains from hip replacement surgery: Evidence from England

Abstract: Larger hospitals are assumed to provide better quality of care, due to greater surgical experience and/or more standardised processes of care. Despite a large literature on a positive volume-outcome association, the evidence of a causal effect of surgical volume on quality remains scarce. Understanding whether this association is causal is highly relevant in the context of policies that aim to concentrate care or increase hospital competition.

The objective of this paper is to investigate the causal effect of hospital and surgeon (consultant) volume on health improvements for elective hip replacement patients in the English NHS.

Patient-reported outcome measures (PROMs) and routine administrative data for 2015/16 are linked together at the patient level for all hospitals in England. Patients report their pain and functioning shortly before and six months after the surgery. We use the Oxford Hip Score (OHS), a hip-specific instrument of health status and functional status, as our measure of surgery quality.

We regress post-operative OHS on volume and control for hospital characteristics. We adjust for patient case-mix with the medical and socioeconomic variables reported in the administrative hospital data. Importantly, we also control for the PROM pre-operative health and hip functional status, thus ensuring that biases due to unobserved patient severity are unlikely. We address the reverse causality issue that arises from hospital demand's responsiveness to quality by constructing a measure of hospital volumes that is exogenous to quality. To obtain these predicted exogenous volumes, we estimate a patient-level multinomial logit model of hospital choice where distance to hospital is the main driver of choice.

Our preliminary results at the hospital level suggest that volumes do not increase quality of care measured by post-surgery PROMs, once we account for volume endogeneity. Similar analyses will be conducted to further study the effect of surgeon volumes on health care outcomes.

Presenting author: S Roberts (King's College London)

Title: Using "Big Data" and Discrete Event Simulation methods to evaluate the Offender Personality Disorder Pathway for the English prison service

Abstract: Prison and forensic health has lagged behind the National Health Service both in terms of investment, innovation and in application of economic evaluation methodologies. Over the last 20 years significant investment has been made by the Ministry of Justice to manage and treat offenders with personality disorders, the latest of which is the Offender Personality Disoder (OPD) pathway. This pathway provides enhanced monitoring of offenders who are either diagnosed as having personality disorders (PD) or show traits of PD, tailoring their supervision to these traits to provide a more nuanced level of supervision. In addition, the pathway contains high intensity residential treatment programmes in prisons around the country, that offenders can be streamed into for treatments lasting up to 5 years.

For my thesis, I am developing a 'test of concept' discrete event simulation model of the OPD pathway as it currently operates in the England and Wales prison and probation services. The aim is to show the benefits health economic methods can bring to the justice service and provide guidance and support to decision makers when making large investment decisions.

In this paper I cover the methodological development of the OPD pathway model, detailing how I used offender level datasets provided by Her Majesty's Prison and Probation Service (HMPPS) in tandem with discrete event simulation modelling methods to estimate the projected short, medium and long term costs and outcomes of behaviour change programmes at both a service and societal level.

Presenting author: J Robles-Zurita (University of Glasgow)

Title: The value of diagnostic information with endogenous uptake behaviour

Abstract: In health economics, the importance of parameterising user uptake of health interventions has been pointed out. This is especially important when the specific characteristic of new interventions could affect uptake behaviour and, at the same time, changes in uptake rates affect the characteristics of the optimal intervention. In this research, the focus is given to the economic problem of choosing a test to be used in a screening program where people are categorized into low or high risk for developing a health condition. The problem consists of choosing the test, represented by a combination of specificity and sensitivity, that maximizes value. In the most extended diagnostic information analysis, the uptake is independent of the economic decision. However, in practice it seems realistic to assume that the choice of a test will affect the level of uptake. At the same time, the level of uptake will affect the economic decision in a dynamic process. The objective of this study is to explore the effect of considering uptake as endogenous to the economic decision in the framework of the analysis of the value of diagnostic information. A simulation-based analysis is used to study the effect of endogenous uptake behaviour on the result of economic evaluation of the health intervention. In order, to account for uptake behaviour the expected utility model of individual decision making under risk will be considered. An alternative behavioural model will analyse the results when individuals are allowed to depart from expected utility theory.

Presenting author: J Rudolfsen (University of Tromsø)

Title: Explaining variations in utilization rates: Interaction across competing diagnosis-related groups (DRGs)

Abstract: Background: It is well documented that regional variation in healthcare utilization rates are ubiquitous and persistent. The challenge is to explain the 'unwarranted' part of observed variations, i.e. variations that do not reflect any corresponding variations in needs. Total DRG-production between Norwegian hospital regions does not differ significantly, while variation for specific treatments do. In this paper, we investigate the degree of variation within a sub-group of treatment that the same clinical specialty is responsible for. The paper is motivated by the following research question: Can the observed regional variation in one specific DRG be explained by variations in the general treatment capacities for orthopedic surgeries (i.e. complementarity), or do we observe contrasting variations across similar DRGs (i.e. substitutes)?

Data and Methods: The paper is based on unique data from the Norwegian Patient Registry, and the National Quality Register for Back Surgery (NORSPINE) in the period 2010 - 2015. Data from Statistics Norway allows us to make age and gender adjusted surgery rates for the treatments of interest: spinal stenosis; lumbar disc herniation; meniscus, and; shoulder surgery. All treatments are financed by the government, all patients have the same path to treatment, and nearly all treatments are performed by orthopedic surgeons.

We use a SUR-model to estimate possible substitution and/or complementary elasticities. For spinal stenosis and lumbar disc herniation, we consider whether variation in need (measured by EQ-5D) might also explain variations in utilization rates.

Results: (Very) Preliminary results seem to indicate that lumbar disc herniation and spinal stenosis are complimentary, and that meniscus and shoulder surgery are complementary. If grouping the conditions into 'back surgery' and 'joint surgery', the trend indicates that the conditions are substitutes. Further analyses are in progress.

Conclusion: Total capacity devoted to orthopedic surgery is the main driver behind regional variation.

Presenting author: C Sampson (Office of Health Economics)

Title: Drop dead: is anchoring at 'dead' a theoretical requirement in health state valuation?

Abstract:

By convention, values for generic preference-based measures are anchored at 1 = full health and 0 = dead. Consequently, stated preference methods used to value health states often involve consideration of the state 'dead' or 'death'. Using dead as an anchor implies that states worse than dead must be assigned negative values, which continues to be problematic despite considerable efforts devoted to developing new methods. This paper challenges the assumption that anchoring health state values at 'dead = 0' is a necessary condition for values to be used in QALY estimation.

We consider five propositions, using narrative reviews of the literature and conceptual explication of the problem: i) anchoring at 'dead' is not required by theories of scale measurement and utility; ii) anchoring at 'dead' is not required by extra-welfarism; iii) anchoring at 'dead' is not required by the interpretation of extra-welfarism as health maximisation; iv) 'dead' exhibits properties that are problematic for anchoring; and v) there are alternative states to 'dead' that exhibit favourable properties.

Anchoring 0 at dead is not a requirement of the theoretical foundations of health status measurement or cost-utility analysis. The use of dead as an anchor is unnecessary and undesirable because of the methodological and conceptual issues it causes. We describe alternative approaches, including a worked example of how these could be used in QALY calculations.

There is strong support for each proposition. Anchoring health state values at dead was an arbitrary choice made early in the development of health state valuation methods. While it is important that, for economic evaluation, dead should equal 0 and dead people should generate no QALYs, anchoring dead at 0 is not a necessary condition for this. There is a clear case for asserting that health economists should 'drop dead' from health state valuation tasks.

Presenting author: M Sculpher (CHE, University of York)

Title: We now have estimates of the marginal productivity of the NHS: so what?

Abstract: Research published in 2015 used NHS and other datasets to quantify the impact of marginal changes in NHS expenditure on health. This was grounded in econometric estimates of the impact of changes in NHS expenditure on mortality in clinical areas where this was feasible. Further modelling extrapolated estimates to the full range of specialties and quantified the surrogacy between mortality and a wider measure of health expressed as QALYs. These empirical estimates of marginal productivity or health opportunity cost were funded to guide NICE's 'cost-effectiveness threshold', but also provide evidence to inform a range of resource allocation decisions.

This research has now been extended in a number of ways. These include re-estimation using more recent waves of data and alternative methods of handling endogeneity; an assessment of where marginal health effects fall in terms of disease, age and gender; the impact of marginal changes in spend on health inequalities and net production; the health impacts of large budget impacts; and how judgement elicitation from experts can inform the choice of plausible assumptions regarding extrapolation and surrogacy.

But what does this mean for economic evaluation and how it is used to inform resource allocation decisions? Addressing controversies and misunderstandings, this paper describes the role for this evidence. Firstly, it considers the appropriate estimate given the uncertainty in the econometrics and the assumptions used in extrapolation and surrogacy. Secondly, the paper outlines how estimates of marginal productivity can inform decisions at a national and local level and promote transparency and accountability, distinguishing between evidence on marginal productivity and value judgements reflected in decision making 'thresholds'. Finally, the paper describes a future programme of national and international research in this area to enhance the impact and relevance for economic evaluation.

Presenting author: K Sinha (Macquarie University)

Title: Distributional analysis of the role of breadth and persistence of multiple deprivation in the health gradient measured by biomarkers

Abstract: This paper analyses the relationship between health and socioeconomic status accounting for the role of breadth and persistence in deprivation. Adopting a holistic approach to multidimensional deprivation, we construct measures of absolute and relative deprivation. Using these measures and a range of nurse measured biomarkers, we analyse the relationship between socioeconomic status and health employing the unconditional quantile regression. Using British Household Panel Survey (1999 - 2008) and Understanding Society surveys, we find multidimensional deprivation to explain the gradient across the distribution of biomarkers (BMI, C-reactive protein and HbA1c) beyond income, with the size of this gradient to be substantially larger for individuals with high risk biomarker values. Interestingly, we find the observed gradient to be dominated by persistence of deprivation across time than by prevalence of deprivation across multiple domains. Shapley decomposition of overall deprivation reveals persistent deprivation in education and consumer durables to explain a larger part of deprivation. We also find limited evidence of relative deprivation on our set of biomarkers with exception of BMI and heart rate.

Presenting author: I Skarda (CHE, University of York)

Title: Microsimulation for Lifecourse Economic Evaluation: A Framework and Application to Early Years Policy

Abstract: We present and illustrate a framework for lifecourse economic evaluation of public health and social policies using birth cohort microsimulation. Cost-benefit analysis typically estimates health and social benefits separately. Lifecourse microsimulation can provide more insightful estimates by allowing for the individual-level clustering and causal interaction between health and social outcomes over the lifecourse. It can also provide detailed information about distributional impacts on inequality in lifetime consumption, health and wellbeing.

We use life-stage-specific equations to model a set of causal pathways known to link early life circumstances and skills formation to diverse later life outcomes. Equations from age 0 to 14 are based primarily on general population survey data from the Millennium Cohort Study from 2000 to 2014. Later life outcomes into working age and retirement are simulated using equations based on diverse sources of evidence, and we use the 1970 British Cohort Study as a face validity check on outcomes up to age 46. We illustrate the framework by evaluating different options for offering publicly funded training to parents of young children at risk of conduct disorder.

Previous findings suggest negligible long-run benefits for adult earnings and health despite short-run public cost savings in childhood. However, using our microsimulation framework to allow for heterogeneity, clustering and interaction, we find substantial benefits for particular individuals and subgroups.

We conclude that economic evaluation based on microsimulation can provide useful insights for policy-makers interested in the long-term prevention of costly health and social problems that accumulate and interact over the lifecourse.

Presenting author: M Taylor (York Health Economics Consortium)

Title: Parameter interaction and correlation in probabilistic sensitivity analysis: it really does matter, but what can we do?

Abstract: OBJECTIVES: In probabilistic sensitivity analysis (PSA), it is typical to see distributions assigned to all (relevant) parameters in a model. However, attention is only usually paid to estimating covariance or interactions between only a small number of parameters. This paper explores the impact of interaction (and non-interaction) assumptions on the outcomes of PSA.

METHODS: A simple eight-state Markov model was developed, with corresponding input parameters for transition probabilities, costs and utilities for all health states. A range of alternative approaches to parameter correlation were taken, ranging from zero correlation to extreme cases such as 'full dependent interaction'. These were applied to a range of different structural assumptions in the model (for example, rather than a single input parameter for 'monthly cost of health state X', individual parameters were created for 'cost of physician visits', 'cost of tests', 'cost of drugs', 'cost of hospital visits', etc) and all were varied independently and with covariance. The impact of all permutations on the shapes of the PSA scatter plot and CEAC was recorded.

RESULTS: The analysis demonstrates that, if a specific input parameter is broken down into several components which are varied independently, then it is likely that the variation in each parameter will cancel out the effect of the changes in the other parameters, suggesting a false level of certainty in the PSA's results. In the example used, the likelihood of an intervention being cost-effective varied from 53% to 84% depending on the approach to correlation, even when the same input parameters were used in each case.

CONCLUSIONS: This analysis demonstrates that modellers can, counterintuitively, create 'false' confidence in PSA results by including more parameters or increasing the granularity of other inputs. A number of recommendations are provided for the critical appraisal of probabilistic model outputs.

Presenting author: A Turner (University of Manchester)

Title: Initial impacts of health and social care devolution in Greater Manchester: effects on primary care prescribing

Abstract: Background: In April 2016, control over spending on health and social care services in Greater Manchester (GM) was transferred from the UK government to a new partnership board comprising local authorities, CCGs, and NHS providers. The Partnership set out ambitious plans to improve population health, reduce health inequalities, and address a funding deficit predicted to reach £2bn/year by 2020/21, through a focus on prevention, early intervention, and the integration of health, social and community care services.

Aim: This study aimed to provide the first evidence on the success of health and social care devolution in GM. We examined effects on primary care prescribing, which has been specifically targeted by the Partnership in the short-term.

Data & Methods: We used information on practice list size and patient characteristics from 6,391 English GP practices linked with monthly practice-level data on total prescribing volume and expenditure, and quality indicators relating to antibiotics, hypnotics, non-steroidal anti-inflammatory drugs (NSAIDs), and branded (vs generic) drugs, derived from the GP Practice Presentation Level Dataset. Difference-in-differences methods were used to compare changes in prescribing between the 36 months pre-devolution and 20 months post-devolution in GM GP practices, with these same changes in the rest of England. The generalised synthetic control method was additionally used to control for unobservables which were time-varying and/or had time-varying effects. Westfall-Young corrections were used to account for multiple hypothesis testing.

Results: We found that devolution led to small, statistically significant reductions in prescribing volume and expenditure, but led to small deteriorations in prescribing quality, with the prescribing of broad-based antibiotics and branded drugs both increasing.

Discussion: Devolution had mixed effects in the short-term. Investigations over the longer-term and on a wider set of outcomes are required before conclusions can be drawn on the overall success of health and social care

Presenting author: F Vadean (University of Kent)

Title: Determinants of staff turnover and vacancies in the social care sector in England

Abstract: Staff recruitment and retention are generally known to be influenced by low pay, low job satisfaction and lack of opportunities for career advancement in people's current jobs, and better job opportunities offered by other employers (or industries). Yet, little is known about the determinants of the current substantial turnover and vacancy rates among long-term care staff in England. Recent data shows that turnover in the long-term industry in England reached almost 30 percent, and is highest among frontline staff. At the same time, about 6.6 percent of long-term care jobs in England are vacant with employers having difficulties particularly in recruiting and retaining younger people. The main aim of this study is to assess whether individual, organisational and work environment factors are affecting turnover and vacancy rates of long-term care staff in England.

We are using data from the National Minimum Data Set for Social Care (NMDS-SC), the main source of social care workforce intelligence in England, covering more than 22,000 establishments and over 700,000 workers. We use a range of econometric methods to determine the effects of individual, organisational and regional factors on turnover and vacancy rates.

While turnover and vacancy rates are related to factors that are out of the control of social care providers (and commissioners), e.g. local labour market (i.e. unemployment rates), the type of services demanded (i.e. domiciliary care, dementia/MH) or higher job mobility among younger employees, our results also show that there are a number of employment related aspects that may be used to improve recruitment and retention like, for example, employing staff on permanent instead of zero-hour contracts and fostering a healthy and safe work environment.

Presenting author: A Wilding (University of Manchester)

Title: Is it really 'Grim up North'? The causes and consequences of inequalities on health and wider outcomes

Abstract: Background: The existence of inequalities in health between the North and the Rest of England is well documented, but the consequences for wider socioeconomic outcomes are not known. Productivity in the North is 13% lower than the UK average and improving the North's health may narrow this gap. A key policy tool to improve the health of the North is through NHS budgets.

Objectives: To analyse the effects of health and health care spending on wider outcomes, and to analyse the effect of health care expenditure on health.

Methods: Fixed effects models were estimated on longitudinal data over the period 2004 to 2017 containing information on inter alia economic activity, wages, productivity, and population health at Local Authority District level (N=326 per-year). For health care spending we obtained data on budget allocations at PCT/CCG level and mapped these to LADs. We estimated the effect of NHS budget allocations on health and then on wider economic outcomes using two-stage least squares.

Results: Reducing the proportion of working age people who report a long term health problem by 1 percentage point increases median pay by £43 per week in the North compared to £41 per week in the Rest of England. It will additionally increase the employment rate in the north by 0.5pp compared to 0.1pp in the Rest of England. Increasing NHS budgets by 1% increases employment by 0.2pp in the North yet has no significant effect in the Rest of England.

Discussion: Improving budget allocations in the North of England has increasing marginal returns compared to the Rest of England, and the effect on employment outcomes is desirable for policy makers. The improvements in health and employment outcomes have simultaneous effects for individuals, and have the potential to improve productivity of the North to the national average.

Presenting author: L Wilson (University of Sheffield)

Title: The Effect of Alcohol Tax Duty Changes on On-Trade Retail Prices. How Do Retailers Respond?

Abstract: Background and Aims: Alcohol duty increases have been used as a government policy in helping tackle harmful alcohol consumption. However, the effectiveness of suchpolicies rely heavily on alcohol retailers passing such increase on to the consumers (also referred to as "pass-through"). This study provides updated evidence of alcohol tax pass-through on UK excise duty and VAT changes to the on-trade sector for different alcoholic beverages across the price distribution.

Setting: January 2007 to December 2017 inclusive, United Kingdom.

Design and Measurements: Panel data quantile regression analysis estimating 9 excise duty changes, 3 sales tax changes on on-trade UK alcohol prices. We use product-level quarterly panel data for 776 alcoholic products across 7 different outlet types (Hotel, Independent Pub, Managed Pub, Non Managed Pubs, Proprietary Club, Restaurant, and Sports/Social Club). Products were analysed in 7 broad beverage types (Beer, Cider, RTDs, Spirits, Wine, Sparkling Wine, and Fortified Wine).

Findings: for all 7 broad beverage categories, we find evidence to suggest that there exists substantial differences in tax pass-through across the price distribution. At the lowest points of the price distribution we find elements of undershifting for the cheapest 25% of products across all outlet locations. Additionally, at the higher end of the distribution, excise tax increases are overshifted, such that prices are higher than expected. We decompose our findings further and analyse pass-through separately for each outlet type. Our results suggest considerable heterogeneity in pass-through in each location type.

Conclusions: Alcohol retailers in the United Kingdom appear to respond to changes in excise tax rates by altering their level of pass-through depending on the price and product type. Retailers appear to undershift cheaper beverages and subsidise this loss in revenue with an overshift in more expensive products.

Presenting author: B Zamora (Office of Health Economics)

Title: Exploring Variations in the Opportunity Cost by Clinical Area: Results from a Feasibility Study in England

Abstract: NICE assesses the effectiveness and cost effectiveness of new medical technologies on behalf of the NHS to support an efficient allocation of resources. 2015 seminal paper by Claxton et al. estimated an average cost effectiveness threshold for the English NHS measuring the marginal effect of changes in healthcare budget on mortality reduction across different clinical areas (PBCs: 'programme budget categories').

The aim of this study is to provide further empirical evidence on the relationship between health outcomes and health expenditures in England by (1) extending the analysis to include new health outcomes, and (2) examining the relationship between mortality and health expenditures along the mortality distribution.

Data Envelopment Analysis (DEA) is applied to multiple health outcomes and health expenditure data from 151 Primary Care Trusts (PCTs) in England across seven PBCs. Quantile Regression (QR) is applied to mortality outcomes and health expenditure data for six PBCs and compared with results from the preferred outcome specification models estimated by York team in the project "Re-estimating health opportunity costs in the NHS". Finally, we compare the ranking of PCTs according to DEA efficiency scores and outcome elasticities estimated in the QR approach.

Results provide evidence about the heterogeneity across PCTs and PBCs regarding the way health resources are used to improve outcomes. In general, efficient PCTs tend to have lower absolute levels of mortality elasticity to health expenditure than inefficient PCTs.

This study provides empirical evidence that (1) estimates of the opportunity cost of introducing new technologies based on average performance of efficient and less efficient commissioners are biased down and subject to great variation, and (2) different PCTs might have different production functions. Our findings challenge the assumption that there is a common production function for all providers that underlies a common threshold.

PhD student poster session

Author	Title
R Atkins (University of Manchester)	Parental education and non-cognitive skills in children: evidence from a schooling reform
K Dawson-Townsend (University of Lucerne)	Social participation patterns of older adults and associations with health and well-being: Evidence from panel data in Switzerland
K De Corte (LSHTM)	Harnessing an iterative survey design with data adaptive model estimation to predict individual decision-making based on stated and revealed preferences: the case of blood donation
A Kernohan (Glasgow Caledonian University)	Uveitis and utilities: Using a chained standard gamble to elicit utility values for temporary acute inflammatory eye disease.
C Kohli-Lynch (Wits University)	Effectiveness and Cost-Effectiveness of Implanon in South Africa
R Kovacs (LSHTM)	Too busy? Caseload and the quality of healthcare in Senegal
N McMeekin (University of Glasgow)	A methodological framework for developing conceptual models in economic evaluation
J O'Halloran (University of Southern Denmark)	Can we pay soon-to-retire GPs to work more? An analysis of the effect of "goodwill payments" on GP behaviour
A Reichert (CHE, University of York)	Improving access to services for psychotic patients – does implementing a waiting time target make a difference?
F Sailer (UCL)	Including end users in a decision model development process – A case study using a multi-sexually transmitted infection health economic model
N Silva-Illanes (University of Sheffield)	Do workers with obesity suffer a wage penalty in Chile?