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# **Investigation of Competition under fixed prices**

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# Forward: Form of the report

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The research consists of a series of papers which address the research question outlined in the original specification (given in the Annex).

We begin with an executive summary which highlights our findings and recommendations. This is followed by an extended abstract for each of the papers contained in this research report. These extended abstracts outline the research question, the methodology used, the data, the findings and the limitations of each paper.

We then list all the outputs from the research. These outputs take a number of forms. In addition to the research papers included in this final report there are also a published journal paper, contributions to books, seminar and conference presentations and press reports.

Following this we include full versions of all the original research papers. We also include two relevant review articles (both forthcoming) as they are useful summaries of what is known about competition in the NHS market at the date of writing. We do not include other outputs such as academic presentations as they are based on the research papers included here in the final report. We also do not include two book chapters as they contain material which is already presented in this report.

In the Annex we present the original research proposal and the justification for the, relatively minor, deviations from this original research specification.

## Acknowledgements

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# Executive summary

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## Research aims

The overall aim of this research was to provide evidence on the operation of competition in England following the introduction of the policies to stimulate choice and competition. These policies were 'Choose and Book' and the setting of fixed prices for hospital care, 'Payment by Results'. Trialled initially (PbR for a subset of NHS trusts, and Choose and Book through a number of choice pilots), both were fully operational by 2006.

Within this broad aim our research had a number of supplementary aims. These included to provide evidence on the extent to which competition was taking place, to examine the effect of competition on quality of hospital care, to look at different services, to examine the robustness of the system with respect to anti-competitive behavior and to suggest measures of impact that could be useful in the monitoring and regulation of competition locally and nationally. The overall research methodology was based in economic analysis, utilized modern econometric techniques to try to establish causal relationships where possible, and exploited a wide range of sources of existing administrative data using GIS techniques to match these data where required.

## The approach and findings

To meet these aims we undertook a series of linked research projects.

We began with technical analysis of how best to measure competition in the English hospital markets, examining a range of measures that have been proposed in the literature and collecting as much data as possible to do this. We found that there was not suitable data on the private sector to allow us to include them in such measures so we focused on NHS providers. Our analysis showed that whether competition was defined at the total activity level or the product level (e.g. hip replacement) was relatively unimportant. However, different methods of calculating competition will give different results. Measures based on patient flows method are preferable to most others.

We then examined whether competition is possible in England and whether there had been any change in the amount of competition in the English NHS between 2003 and 2009. We found that English hospital markets are, by overall industrial standards, highly concentrated. But this is common for hospital markets. English NHS hospitals are, in fact, in markets with similar concentration to hospitals in the USA. So there is potential for competition. The nature of health care means this is spatially distributed, so NHS hospitals located in urban areas face more potential competition than those in rural areas. We also found evidence that the pro-competition policy had changed market concentration. Between 2003 and 2009 markets had become less concentrated, with the main change occurring between 2003 and 2007. Hospitals which experienced the largest increase in competition were located both in urban areas and also in the suburban fringes round these areas in most health care markets. This suggests that there is potential for competition to affect outcomes.

To test this, we looked first at patterns of demand. We first showed that hospitals which were 'higher quality', as measured by lower mortality rates and shorter waiting times just before the full roll out of PbR and Choose and Book, received more patients, who travelled further and were drawn from more neighbourhoods after the policy than hospitals which were of lower quality on these

measures. We also showed, in another paper which focused only on Coronary Artery Bypass graft patients, that after the reforms, patients who were sicker were more sensitive to quality outcomes and patients from more deprived neighbourhoods were more sensitive to waiting times.

Having established that demand changed, we then examined whether this had any impact on hospital outcomes between financial years 2003 and 2007. We examined a large set of outcomes including measures of activity and productivity (total admissions, the composition of admissions, staffing and its composition, total expenditure at the NHS trust level and admissions per staff member), measures of waiting times and length of stay, and measures of the quality of care (primarily death and readmission rates, adjusted for case mix). We used a difference-in-difference design to control for the fact that hospitals which are potentially more exposed to competition are located in different areas of the country. This design compares the change in outcomes pre- and post-policy for those hospitals exposed to the policy with those that were not.

We found that quality, as measured by AMI and all cause death rates, fell more in hospitals exposed to competition than those that were not. We also found that these hospitals experienced a greater fall in length of stay. There was, however, no larger increase in total expenditure in these hospitals. These results were robust to controls for other policy and possible other confounders. This suggests a positive impact of the policy - quality rose and length of stay fell without an overall increase in expenditure.

In an extension we examined whether these quality results remained robust to looking at the financial years 2008 and 2009. Unfortunately the data we used to measure quality – the data published by NCHOD – is still not available (at the time of writing in December 2011) for 2009. We therefore constructed our own measures from HES for all cause and heart attack mortality, but we stress that these are not identical to the NCHOD data as the latter include out of hospital deaths whilst the former do not. Our analyses for 2009 are therefore preliminary.

We find that changes in market concentration continue in the period 2008 and 2009, such that patient flows to acute hospitals mean the average hospital faces more competition. But the changes in 2008 and 2009 are small compared to those between 2003 and 2007, suggesting that most of the change happened immediately round the introduction of Choose and Book. In terms of outcomes, the fall in all cause death rates between the pre and post policy period remains into 2009. The fall in AMI death rate is present in 2008 but not in 2009. However, until the NCHOD data is available for 2009 we cannot put much weight on the latter result. The fall in length of stay also remains. Thus, in broad terms, the quality gain and the reduction in length of stay continue into financial year 2009. The difference pre and post policy is similar in all the years we examine, suggesting that the impact of the choice policies did not increase (nor decrease) after 2007.

These 'difference-in-difference' analyses do not provide an answer to the question of how exactly these changes came about. To shed light on this, we undertook a study of the relationship between competition and management quality in the NHS. This research was additional to the original proposal. The quality of NHS management was measured using an internationally validated survey instrument by a team at the London School of Economics in 2006. We used these results to first look at whether measures of management quality were associated with better performance in the NHS. We examined a range of measures of performance used in regulating health care providers, covering mortality outcomes, waiting times, financial performance, regulator (the Health Care Commission)

rankings. We found that better management quality was associated with better performance on all these measures. We then examined whether better management was associated with greater competition. To test this, we used a statistical approach designed to control for the fact that hospital competition is associated with population density and urban location. We found that competition leads to better management. This suggests that one way that the reforms improved outcomes was through better management.

Having found that competition appeared to have some beneficial effects, we then examine whether mergers, which are potentially damaging to competition, have positive or negative effects in the NHS. Whilst recent policy has encouraged choice and competition, a different policy was pursued between 1997 to around 2003 with respect to dealing with poor financial viability of NHS hospitals. This policy – less clearly articulated perhaps – was to deal with poor performance by merging NHS trusts. Between 1997 and 2003 around half the acute trusts in England were involved in a merger with another trust. Mergers reduce capacity and so reduce the potential for competition. For health care system design and market regulators, it is therefore important to establish whether there are benefits from these mergers.

We examined the impact of mergers between NHS acute trusts between 1997 and 2006. We examined post merger performance on measures of activity, financial performance, waiting times and clinical quality. We found that mergers reduced capacity - total admissions and total staffing fell by about 10% four years after the merger. But the merger brought no benefits in terms of higher productivity as measured by the ratio of activity to staffing. In addition, the reduction in capacity had a knock on effect on waiting times, which rose. There were no changes and hence no benefits of the mergers in terms of clinical quality.

### **The key take home messages**

- Competition under fixed prices appears to have a positive effect on quality and length of stay without any increase in total acute hospital trust expenditure.
- This is in contrast to findings from the 1991 internal market which found that competition reduced quality but also reduced waiting times. In this market prices were not fixed and quality was not made public. This suggests that if prices are fixed and quality is made public, competition in the English NHS has benefits.
- Better management is associated with higher competition, so improvements in management may be one route by which these gains were achieved.
- Increased competition did not seem to have negative equity effects
- Merger activity will reduce competition. As mergers between acute trusts appear to bring relatively little gain, further mergers between acute hospitals should be examined very carefully by the appropriate market regulators.

### **Recommendations for further research**

- We know relatively little about the mechanisms by which these changes have occurred. We have evidence that better management may be responsible for some of these changes, but this link between hospital management and performance needs to be analysed at a deeper and more extended level. In particular, it would be useful to examine quantitative data across a range of NHS provider and purchaser organisations.

- This research has looked at a range of outcomes. But we know less about the relationship between competition and important intermediate measures, such as patient satisfaction, patient safety or staff satisfaction. These are important for the quality of care and for patients and should be examined.
- Further research is needed to unpick whether the positive impact of competition compared to the 1990s internal market comes from greater information (on quality and activity) or from fixed prices. This is key for the provision of advice on the need for extensive price regulation and for the form of that price regulation.

# Extended abstracts of the research papers

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## A. The impact of competition with fixed prices on quality, measures of activity and expenditure

To examine this we undertook two pieces of research. The first, entitled “Death by Market Power”, covers the period tightly defined around the introduction of PbR into all acute trusts and covers 2003/4-2007/8. The advantage of this tight definition is that we minimise the potentially confounding from other policies which were taking place at the same time. In an extension we examined the robustness of our findings to adding in data for 2008/9 and 2009/10 (the latter for a subset of outcomes).

**Paper title: Death by Market Power: Reform, Competition and Patient Outcomes in the National Health Service (Gaynor, Moreno-Serra, Propper)**

### Aim

- To examine the impact of the introduction of Choose and Book coupled with fixed prices under the PbR regime on acute hospital quality, staffing, measures of activity and expenditure.

### Methodology

- We examine acute hospital performance just before (2003/4) and just after (2007/8) the introduction of Choose and Book and fixed prices under PbR.
- We present a simple theoretical model that allows us to understand how competition might operate in the setting of the reform we study. The limited theoretical literature on competition and quality in health care markets (see Gaynor 2006, for a review) suggests that competition will increase quality in markets with regulated prices provided that this price is above marginal cost. The intuition is as follows. Price is regulated, so firms compete for consumers on non-price dimensions, i.e. ‘quality.’ If the regulated price is set above marginal cost at some baseline level of quality, then firms will increase quality to try to gain market share. This will continue until profits are zero. But these models do not explicitly deal with the fact that hospitals are multi-product firms and supply services where little competition is possible (emergency care) and markets where competition is much more possible (elective care). Our model explicitly addresses this issue. It shows that greater choice should increase the (quality) elasticity of demand for elective care faced by hospitals, which should intensify competition in that sector. In addition, the shift from selective contracting to fixed prices should focus competition on quality (conditional on fixed prices greater than marginal costs). Further, competition in the market for elective care will spillover and improve quality for emergency patients.
- We compare the performance of hospitals located in areas which have more potential for competition with those located in areas which have less potential for competition. However, while the pro-competitive policy was national, the intensity of the competition induced by the reforms will vary according to pre-reform market structure, which is a function of the geographical configuration of patient location and hospital sites. In some places population density results in a market structure which permits a high degree of choice. In others, population density is low and hospitals are located in highly concentrated markets with few competitors. As a consequence, post-policy a hospital in an unconcentrated market faces

more exposure to the policy change than does a hospital in a highly concentrated market. We exploit this variation in potential competition across time and space to identify the impact of competition.

- Potential for competition is defined on the basis of a market concentration index, the HHI. We estimate both using actual HHI and predicted HHI. Both are based on patient flow for (all) elective admissions from the patients small area (MSOA) to acute hospitals. The actual HHI measure uses the actual patient flows. The predicted HHI measure uses predicted flows from a simple model of patient choice. The purpose of using the predicted HHI is to break the link from quality to the measure of competition, which could cause a bias in the estimates.
- We examine a large range of performance measures, including deaths following emergency admission for heart attacks (AMI), all cause death rates, death rates following fractured neck of femur, readmission rates, length of stay for all procedures, staffing patterns and total hospital expenditure.
- We undertake a difference-in-difference analysis, so that we compare the performance of hospitals potentially exposed to competition after and before the policy with those less exposed to competition over the same period.
- We undertake a large range of robustness checks, which include changing the definition of the competition measure, testing for the effect of possible policy confounders including the cardiac care networks, controlling for case mix changes and changes in economic activity which may change patient health.
- We compare our estimates with those of other studies for the UK and the USA.

#### Data

- HES data is used to construct length of stay and waiting times. For clinical outcomes we use NCHOD constructed data on clinical outcomes which is matched to ONS data, so include all deaths post discharge as well as those in hospital. Other DH sources of data such as trust financial returns (for the finance data) and staffing data. Local wages are from the Annual Survey of Hours and Employment (ASHE), at local authority level. To take into account changes over time in the treatment of STEMI patients we use the time varying performance indicators collected by MINAP.
- Dates covered: 2003/4 and 2007/8

#### Results

- After the introduction of Choose and Book and PbR, hospitals which performed better pre-policy in terms lower waiting times and lower mortality rates following emergency admission for AMI experienced a large increase in admission, attracted more patients from further away and attracted patients from more local areas (MSOAs). This suggests that Choose and Book changed the flow of patients at the margin, such that hospitals which had better performance in 2005 attracted more patients
- Hospitals located in potentially more competitive areas experienced a greater fall in death rates post emergency AMI admissions and from all cause admissions post policy than those that were located in areas where the potential for competition was lower.
- Hospitals located in potentially more competitive areas experienced a greater reduction in length of stay (around 12%) post policy than those that were located in areas where the potential for competition was lower.
- There were no changes in staffing levels, staffing mix, or other measures of quality (we examined all the NCHOD measures of clinical quality at a hospital level), or for total expenditure associated with exposure to competition

- The results were robust to controls for case mix, economic activity at local level, and the treatment of AMI patients. To take into account changes over time in the treatment of STEMI patients we use the time varying performance indicators collected by MINAP.
- The estimated short run effect on quality, as measured by death rates following emergency AMI admission, is relatively small but similar to effect found in some studies from the USA and another studies from the UK. Such small short term effects are to be expected: large effects would raise concerns that the results were not the results of the Choice policy and PbR.

#### Limitations

- The data are quantitative, so we do not know exactly how hospitals changed their behaviour to achieve better outcomes.
- These gains are for a short period and may not persist over a longer period

#### Paper title: A comparative analysis of the impact of patient choice in the years 2007, 2008 and 2009 (Katharina Hauck and Carol Propper)

#### Aim

- To examine whether the effects found for 2007/8 persist into 2008/9 and 2009/10. This paper replicates and extends our original 2003 to 2007 study on the impact of competition on hospitals outcomes with updated data for 2008 and 2009. A replication can offer powerful insights into whether the results are stable across additional time periods, and whether the reform had any delayed impacts.

#### Methodology

- A difference in difference design that is a replication of the study above using but uses data for the two later years. We use 2003/4 as the pre-policy year and either 2008 or 2009 as the post policy year.

#### Data

- We use HES to construct length of stay measures
- We use NCHOD data for clinical outcomes and clinical process measures. NCHOD data on death rates include post discharge deaths so are preferable to those that do not include these deaths. NCHOD data on outcomes for 2009/10 will not be available until late January 2012 so the replication for NCHOD outcomes only goes up to 2008/9.
- Because we have no NCHOD data for 2009/10 we also calculate within hospital deaths following all admissions and also following emergency admissions for individuals aged 55+ from HES. These cover the period 2007, 2008 and 2009 so can be compared across years. However, they do not include out of hospital deaths so are less preferable.

#### Results

- Patterns of patient flow are such that hospital markets are less concentrated (more competitive) post reform. The main change is between 2003 and 2007, though there is a little further change in the two years post-2007.
- We find that quality of care, as measured by all cause admissions death rates and deaths following emergency AMI admissions fall more in hospitals exposed to competition in 2008 compared to 2003. These results are very similar to those for 2007.
- In 2009 we can only use the HES data and these indicate that death rates following all admission also fell more in hospitals located in more competitive markets.

- However, the results for AMI do not confirm this, but these are preliminary as they do not include post discharge deaths that are included in the NCHOD data.
- We examine a range of other indicators of quality from NCHOD which cover readmission rates. There is some indication that readmission rates may have risen for hospitals which are in more competitive markets. However these are only for one type of admission and readmission rates may be positively correlated with death rates.
- The fall in length of stay continues in both 2008 and 2009 and the magnitude is of a similar order to the fall between 2003 and 2007.
- In summary, the replication confirms that the reform decreased mortality rates for all causes, in all three years post reform. The same effect is present for AMI mortality rates in both 2007 and 2008, but it is not clear whether this persists into 2009.
- We do find that the reform increased readmission rates, but think this may be a corollary of the fall in death rates.
- We find that LOS decreased as an effect of the reform, a results which is stable across all years.
- We find no effect on waiting times or on MRSA rates in any of the years
- In terms of a time trend we do not find strong evidence that the impact of the reform is ramped up in 2008 and 2009. The patterns of market concentration and our difference-in-difference estimates of the effect of the reforms on outcomes remain relatively unchanged between 2007 and 2009. This suggests that the reaction to the introduction of these reforms was quite quick and that policy change post 2007 did not ramp up this response.

#### Limitations

- The lack of NCHOD data for 2009 limits what we can show for this year

## B. The effect of mergers

### Paper title: Can governments do it better? Merger mania and hospital outcomes in the English NHS

#### Aim:

- To examine the effect of the mergers between NHS trusts on activity, quality and financial performance

#### Methodology

- Between 1997 and 2003 approximately half the acute NHS trusts were involved in a merger with another trust. We exploit the large scale of this activity to examine the effect of a merger on performance up to 4 years after the date at which the two (or more) trusts began operation as a single unit. We examine performance on a number of dimensions including the level of admissions and the proportion of admissions that were emergency admissions, staffing and staff composition, financial surplus, waiting times and a set of measures of clinical quality. We use a difference in difference design, in which we compare the change in performance of the trusts which merged (the treated group) from 2 years before the merger date to four years after with the performance over the same years for trusts which never merged (the control group) . To allow for the fact that trusts which merge may be different to those that do not, we used propensity matching to define the control group.

#### Data

- HES data from 1997-2006, matched at trust level to DH data on staffing, DH data on trust financial returns, NCHOD clinical outcomes indicators.

#### Results

- In our sample of 223 acute hospitals in England in 1997, 112 had merged between 1997 and 2006. The median hospital market went from 7 to 5 hospitals.
- Hospitals which merged were prior to merger, smaller than never-merged hospitals. They had fewer admissions, staff, and total beds and (significantly) lower operating expenditure. They had a significantly smaller share of expenditure on agency but also a smaller share of expenditure on qualified staff. They had lower productivity, defined as admissions per staff member. In terms of clinical and quality indicators, there was no strong indication that merged hospitals were performing less well in terms of clinical quality prior to merger. Hospitals which merged are more likely to be in areas with lower wages and poorer health, reflecting the fact that capacity in inner city areas is high for historic reasons.
- Hospitals which are in, or close to constituencies that were marginal in the 1997 election are less likely to merge
- Merger results in a fall in the number of admissions and in total staffing. There is no change in the composition of admissions. There is a little evidence that the share of agency staff rises more post merger.
- Other than this removal of capacity, we find little evidence that performance improves due to merger. Post merger, financial performance declines, labour productivity does not change, waiting times for patients rise and there is no indication of an increase in clinical quality.
- Mergers which take place in areas in which there were relatively few hospitals *before* the merger took place are less likely to lead to a reduction in activity and are less likely to reduce elective admissions than other mergers. This has a knock on effect on waiting times, and these rise less than for mergers in less concentrated markets.

- There is no indication that mergers in areas where there were relatively few hospitals before the merger took place do any better in controlling the growth of hospital deficits or any indication that they have better clinical outcomes post merger.
- As reduction in capacity is generally one of the desired outcomes of hospital mergers in England, this suggests that reconfiguration in already concentrated markets will be less effective in bringing about this outcome

#### Limitations

- The quantitative nature of the analysis means we are unable to explore in detail whether the reason for the merger affects the outcomes.
- We are not able to examine in detail the effect of reconfiguration of services that may follow a merger.

## C. The Impact of Competition on Management Quality in the NHS

### Paper title: The Impact of Competition on Management Quality: Evidence from Public Hospitals

#### Aim:

- To measure the quality of management in NHS hospitals using an internationally validated management quality measure
- To examine whether management quality is associated with better outcomes in NHS hospitals
- To examine whether the competitiveness of the local market of the hospital is associated with better management quality

#### Methodology

- The association between management quality and outcomes was examined by means of linear regression of the measures of quality, staffing, financial performance, and health care ratings (each measure separately) on measurement quality measure (and its subcomponents), including controls for hospital size, teaching status and local need for health care
- The relationship between competition and management quality was examined using an instrumental variable method to establish causality. Competition was instrumented with the the political marginality of the catchment area of the hospital and two stage least squares estimates were undertaken. The intuition behind this instrument is that hospitals are less likely to be merged in areas where there are a high proportion of marginal constituencies. This provides variation in the number of hospitals that are potential competitors and this variation is exogenous under the assumption that marginality affects the probably of closure but not of the resources given to the hospital.

#### Data

- Management quality was measured with a survey instrument developed by Bloom and Van Reenen in conjunction with McKenzie (Bloom and Van Reenen 2008) for 2006
- Measures of hospital performance for the period 2001-2006 were taken from the HCC web site, from Trust financial returns, from DH data on staffing, from HES data for AMI and all cause death rates and from the HCC web site for waiting times.
- Measures of market competitiveness were defined in terms of the number of competitor hospitals within a given radius of each hospital. Specifications where competitiveness was defined in terms of the HHI based on elective patient flow were also used in robustness checks
- Measures of political marginality of the hospital catchment area, defined as the winning party having less than a marginality of a x% (where x was defined as 5% in the main analyses, but allowed to vary in robustness checks) were constructed using British Election Survey data for 1997, 2001 and 2005.

#### Results

- We find that management quality - measured using a new survey tool - is strongly correlated with financial and clinical outcomes (such as survival rates from emergency heart attack admissions).
- We find that higher competition is positively correlated with management quality. One more rival hospital increases management quality by 0.4 standard deviations and increases heart-attack survival rates by 9.5%.
- Why should competition improve management practices in hospitals? Having more local hospitals gives greater choice for General Practitioners and so provides greater competition

for hospitals. Hospitals are keen to win patient referrals as this has private benefits for senior managers (e.g. better pay and conditions), and reduces the probability that they will be fired.

- A second possible mechanism is yardstick competition: with more local hospitals CEO performance is easier to evaluate because yardstick competition is stronger. The UK government actively undertakes yardstick competition, publishing summary measures of performance on all hospitals and punishing managers of poorly performing hospitals by dismissal (Propper et al, 2010).

#### Limitations

- The quantitative nature of the data means that we do not explore how managers bring about improvements in productivity in response to greater competition.

## D. Changes in the demand for Coronary Artery Bypass Graft Surgery post choose and book

[Paper title: Free to Choose? Reform and Demand Response in the British National Health Service \(available from author\)](#)

### Aim

- The aim of this piece of research was to examine whether patient demand changed for elective Coronary Artery Bypass Graft Surgery (CABG) surgery pre and post choose and book
- Economic models of competition with regulated prices generally show that competition leads to increased quality. This result hinges on the demand that firms face becoming more responsive in the non-price (quality) dimension of the product as the number of firms in the market increases. But there is little empirical evidence on whether this is indeed the case.
- Patient choice and Choose and Book provides an opportunity to test whether demand is more sensitive to quality (i.e. more elastic) after an increase in competition as the reforms increased the competition that suppliers faced and the fixed prices meant that purchasers and providers should have focused on quality improvements. This increase in demand sensitivity may not come just from patients, but also from doctors acting on behalf of patients. CABG referrals are essentially referrals by cardiologist to cardiac surgery teams/units/surgeons. Choose and Book may be used as a way of changing patient travel patterns by cardiologists and other specialists to reduce patient waiting times and/or give patients better quality treatment.
- There is a concern that greater patient choice may damage equity. By focusing on one particular procedure (CABG) we can look at this in detail (for this procedure).

### Methodology

- We first examine travel patterns pre and post choose and book to see if there is evidence that demand is more sensitive to quality (measured in terms of (lower) death rates following CABG surgery)
- We then estimate a model of choice of hospital as a function of distance to hospital, waiting times and quality of hospital. We examine whether responses to these hospital characteristics vary by the co-morbidity of the patient and their Socio-economic position (as measured by the index of multiple deprivation of their local area, the MSOA).
- In technical terms, we estimate a multinomial logit model, allowing for different preferences for these hospital characteristics pre- and post-reform in a very flexible way. Econometrically we have to deal with the fact that unobservedly better hospitals might attract more patients as well as more severely ill ones. We therefore instrument both waiting times and mortality rates in order to obtain unbiased estimates.

### Data

- HES data for period 2003/4-2007/8. ONS data for the index of multiple deprivation at MSOA level. Severity of patients is measured by number of co-morbidities recorded in HES.

### Results

- The reform did not change the responsiveness of the average patient to quality or waiting times
- But we find the impact of the reform varies across patient type. First, more severely ill patients (as measured by the number of co-morbidities) become more sensitive to quality in the post-reform time period. Secondly, lower income patients are more sensitive to waiting times after the expansion of choice.

- The reform therefore had a stronger impact on those patients that are most in need of making an informed choice. The matching of sicker cases to better hospitals has improved due to the reform. The worry that the reform might only benefit more educated, higher income household therefore seems, in the case of CABG, to be unfounded.

#### Limitations

- The study is only for one procedure, CABG.
- We cannot distinguish between patient choice and cardiologist or GP choice. However, this will always be the case for a procedure such as CABG where an expert (the cardiologist) provides the patient with diagnosis, some treatment and recommendation of location for further treatment.

## E. Comparison of measures of market concentration in the UK health care context

These are two technical papers which evaluate different measures of market concentration. Market concentration is the technical term for market power (i.e. lack of competition). Here we give an extended abstract which covers both papers.

### Aim

- Measuring competition (or its obverse, market concentration) requires two steps. The first is to define the relevant market. The second is to measure the extent of concentration within this market. The overall aim is to compare different methods of doing both these steps.
- We prepared two companion technical papers whose objectives are to provide technical guidance on this matter and to:
  - To compute and compare different methodologies used to define hospital (trusts) markets in an English setting
  - To compute these for both all admissions and for admissions for a set of specific procedures chosen for the relevance to the choice and competition agenda
  - To examine the extent to which choice of method of market definition or choice of procedure within method substantively alters the estimated measure of market concentration
  - To provide guidance as to which measures are useful in an English context for hospital market definition

### Methodology

- We examine all *methods* of computing hospital markets that have been previously used in the literature. We provide results for all but focus in particular on three methods:
  - Fixed radius (FR) method
  - Variable radius (VR) method
  - Patient flow (PF) method
- We examine two main *measures* of the level of competition within a hospital's market:
  - The number of competitors (N)
  - The Herfindahl-Hirschman Index (HHI)
- We compute these for 6 types of admission, which can be thought of as *products*. These are:
  - All electives (all HRG v3.5 codes)
  - Cataracts (HRG v3.5 codes: B13)
  - Coronary artery bypass grafts (CABGs) (HRG v3.5 codes: E04)
  - Hip replacements (HRG v3.5 codes: H80, H81)
  - Emergency AMIs (HRG v3.5 codes: E11, E12)
  - Maternities (Method of admission codes: 31 & 32)
- We examine stability over the years 2003/4-2006/7
- In a supplementary paper for 2003/4 only (technical note II) we also compute and compare a wider range of measures of market concentration including the Elzinga-Hogarty measures of market concentration. This is widely used in competition cases, but is less favoured for health care markets in the USA.
- Detailed methods are spelt out in the technical notes. For readers not familiar with these methods, Technical Note: II provides an introduction.

### Data

- HES 2003/4-2006/7

### Results

1. From [Technical note I: Comparing measures of hospital markets in England across market definitions, measures of concentration and products](#)
  - The different measures of concentration are positively correlated across the three methods and the magnitude of these correlations are fairly large.
  - The patient flow definition of a market is more sensitive to changes over time and is therefore preferred to the variable radius and fixed radius definitions which show many hospitals being monopolies over the entire period.
  - *Within* method the correlations between products are very strongly positive. Thus, hospitals that face high competition for one product face high competition for all products. Therefore it does not matter too much at present which products (e.g. hip replacements, maternity or cataracts are used in the measures of concentration). This may change over time.
  - Even with the patient flow method, variance partition coefficients indicate that the level of competition faced by hospitals is stable over the time period
  
2. From [Technical Note II: Hospital competition measures – In depth comparison for 2003/04 only](#)
  - For each product, the competition measures are positively and moderately correlated between methods
  - For each method, the competition measures are positively and fairly strongly correlated between products
  - HHI competition measures based on fixed and variable radius and the actual and predicted Elzinga Hogarty methods all describe a substantial minority of hospitals as being perfect monopolies (i.e. HHI = 10000). This makes all these methods unsuitable for use as a measure of local hospital concentration as they do not discriminate sufficiently between hospitals.
  - The Elzinga Hogarty (E-H) in general defines markets as covering a large geographical area. Thus for a given location of hospitals across geographical space, this definition produces markets which are characterised as being relatively competitive. Further, the apparent level of competitiveness using this measure is considerably greater than when using any other definition of a hospital market. This is similar to international evidence for health care markets using the E-H measure and fits with the criticism in the international literature that argues that the E-H measure leads to markets being erroneously defined as competitive.
  - HHI competition measures based on actual and predicted patient flow methods give very similar results

# Outputs

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## Working papers

Gaynor, M Moreno-Serra, R Propper, C (2010) Death by Market Power: Reform, Competition and Patient Outcomes in the National Health Service. NBER Working paper 16164; CMPO discussion paper 10/242

Bloom, N, Propper, C, Seiler, S and Van Reenen, J (2010) The Impact of Competition on Management Quality: Evidence from Public Hospitals. NBER Working Paper 16032

Gaynor, M, Propper, C and Seiler, S Free to Choose? Reform and Demand Response in the British National Health Service (mimeo, London School of Economics)

Gaynor, M, Laudicella, M and Propper, C (2011) Can governments do it better? Merger mania and hospital outcomes in the English NHS. NBER Working Paper 17608

## Technical papers

Technical note I: Comparing measures of hospital markets in England across market definitions, measures of concentration and products

Technical Note II: Hospital competition measures – In depth comparison for 2003/04 only

Hauck and Propper (2011) A comparative analysis of the impact of patient choice in the years 2007, 2008 and 2009

## Published outputs to date

Propper, C. (forthcoming). Competition, Incentives and the English NHS. *Health Economics*

Propper, C and Dixon, J (2011) The Impact of competition between hospitals in Mays N, Dixon A, Jones L (eds) *Understanding New Labour's Market Reforms of the English NHS* London: Kings Fund.

Gaynor, M, Moreno Serra, R, Propper, C. (forthcoming). Can competition improve outcomes in the NHS? *Journal of Health Services Research and Policy*

Propper, C and Leckie, G (2011). Increasing competition between providers in health care markets: the economic evidence in Glied, Sherry and Smith Peter (eds) *The Oxford Handbook of Health Economics*. OUP: Oxford.

Propper, C, Wilson, D. (2010). Competition and choice: the place of markets in connecting information and performance improvement, in Walshe, K, G Harvey and P Jas (eds): *Connecting Knowledge and Performance in Public Services: From Knowing to Doing*, Cambridge: Cambridge University Press.

## Presentations 2009 onwards

### Academic seminars

Royal Economic Society conference, 2009, *"Management in UK hospitals"*  
 CMPO seminar at Bristol University, 2009, *"Management in UK hospitals"*  
 Conference on Public Services and Worker Motivation, 2009, *"Management practice in NHS Hospitals"*  
 Portuguese Health Economics conference Keynote presentation, 2009, *"Management Practices in English hospitals"*  
 Nottingham University dept of economics seminar, 2009, *"Incentives in Healthcare: The impact of waiting times targets on English hospitals"*  
 London Health Economics Group, 2010 *"Management practices in English"*  
 Amsterdam Free University, Dept of Economics seminar, 2010, *"Death by Market Power: Reform and Quality in the NHS"*  
 CMPO conference on Management in public services, 2010, *"The Impact of Competition on Management Practices in Public Hospitals"*  
 London Health Economics Group, 2010, *"The Impact of Competition on Management Quality: Evidence from Public Hospitals"*  
 University of York Health Strategy Forum, 2010, *"Supplier competition and Quality"*  
 NBER Conference, 2010, *"Death by Market Power Reform, Competition and Patient Outcomes in the National Health Service"*  
 19th European Workshop on Econometrics and Health Economics conference, 2010, *"Death by Market Power Reform, Competition and Patient Outcomes in the National Health Service"*  
 Cranfield School of Management - public sector performance roundtable, 2010, *"Research into the impact of competition in public services"*  
 University of Manchester Economics seminar, 2010, *"Monopoly Power Kills: Reform and Competition in the NHS"*  
 CHERE, UTS, Sydney, 2010, *"Death by Market Power: Reform, Competition and Patient Outcomes in the National Health Service"*  
 CMPO Seminar, University of Bristol, 2011, *'The impact of mergers on NHS hospital performance'*  
 Melbourne Institute, Melbourne Australia, seminar, 2011, *"Death by Market power"*  
 UEA Department of Economics seminar, 2010, *"Monopoly Kills: Competition and Reform in the English NHS"*  
 University of Minnesota - Carlson School of Management seminar, 2011, *"Death by Market Power Reform, Competition and Patient Outcomes in the National Health Service"*  
 LSHTM department of Health Reform and Evaluation Programme meeting, 2011, *"Competition in the NHS"*  
 NBER Conference, 2011, *"Free to choose? Reform and demand response in the British National health service"*  
 20th European Workshop on Econometrics and Health economics, 2011 *"Can governments do it better? Merger mania and hospital outcomes in the English NHS"*

### **Policy seminars and conference**

NIHR Health reforms Evaluation seminar, 2009 *"Does Market Power Kill?"*  
 Kings Fund, conference on Evaluation of Health System Reforms, 2010, *"Does Market Power Kill?"*  
 CCP seminar, 2010, *"Death by market power: reform, competition and patient outcomes in the NHS"*  
 'Choice and Competition in Public Services seminar ' hosted by OFT, 2010 *"Choice and competition can bring to public service markets"*  
 HM Treasury's Public Services and Growth Economists Group seminar, 2010 *"Does Competition Improve Hospital Outcomes?"*  
 Department of Health Seminar to the Heads of Economics in the OECD, 2010, *"The impact of management on outcomes in health care"*  
 Value for money seminar hosted by National Office of statistics, 2010, *"Improving value for money and productivity – increasing productivity in the NHS"*.

Nuffield Trust Competition Policy seminar, 2011, *'Is competition a force for good in hospitals?'*  
Department of Health Seminar to the Economics Group, 2010, *"Death by market power: reform, competition and patient outcomes in the NHS"*  
UCLP - After the Light Bulb: an Innovation Diffusion Workshop, 2011, *"Is Competition Useful as a Way of Increasing Innovation and its Diffusion in the NHS? Lessons from the Rest of the Economy"*  
Public Economics UK Conference, Oxford, 2011, *"Health care reform"*.  
Nuffield trust and Monitor roundtable, 2011, *"The impact of competition and organizational integration on cost and quality"*  
Dept of Health Seminar, 2011, *"Investigation of competition in the NHS"*, *"Can governments do it better? Merger mania and hospital outcomes in the English NHS"*

### **Press coverage 2009 onwards**

The Lancet, Nov 2011, 'The debate on the effect of competition on the NHS'  
The Guardian, Sep 2011, 'What MPs must know before they vote to wreck the NHS'  
The Guardian, June 2011, 'Don't rubbish my research, Competition does improve the NHS'  
Wall Street Journal, June 2011, 'Good Prognosis for Health'  
Financial Times, May 2011, 'Quality is critical to make improvements, not competition'  
The Times, May 2011, 'Some healthy rivalry may be just the tonic we need'  
Financial Times, May 2011, 'A much maligned reform of hospital is working'  
GP Magazine, May 2011, 'Competition in the NHS'  
Health Service Journal, May 2011, 'Benefits lost as C-word remains a taboo'  
Financial Times, March 2011, 'Price competition in the NHS'  
The Guardian, February 2011, 'Measures aimed to improve quality in the NHS'  
Financial Times, March 2011, 'Cameron's NHS reform is no health revolution'  
The Guardian, January 2011, 'Price competition'  
The Globe and Mail, January 2011, 'In Britain, Not All Competition is Healthy'  
Financial Times, January 2011, 'Research stokes criticism of Lansley plans'  
Independent, December 2010, 'A manifesto for NHS civil war'  
Independent, November 2010, 'The effect of competition is to save lives without raising costs'  
Health Investor, November 2010, 'Unhealthy competition'  
The Times, October 2010, 'OFT carries out exploratory operation on private hospitals'  
Financial Times, July 2010, 'A healthy dose of competition will help the NHS pull through'  
Financial Times, July 2010, 'Lansley defends choice within NHS'  
The Financial Times, July 2010, 'GPs' control of cash 'will bypass reform'  
Health Investor, June 2010, 'Competitive pressure in the primary care sector'  
Health Policy Insight, June 2010, 'Secondary care perspective on commissioning reforms'  
The Times, April 2010, 'Promises, promises, but what will the NHS gain?'  
The Financial Times, January 2010, 'Competition in NHS makes hospitals better, study says'

# Research Papers and Other Key Outputs

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The papers are presented in the following order.

## **A. The impact of competition with fixed prices on quality, measures of activity and expenditure**

Death by Market Power: Reform, Competition and Patient Outcomes in the National Health Service  
(*Gaynor, Moreno-Serra, Propper*)

A comparative analysis of the impact of patient choice in the years 2007, 2008 and 2009 (*Katharina Hauck and Carol Propper*)

## **B. The effect of mergers**

Can governments do it better? Merger mania and hospital outcomes in the English NHS  
(*Martin Gaynor, Mauro Laudicella, Carol Propper*)

## **C. The Impact of Competition on Management Quality in the NHS**

The Impact of Competition on Management Quality: Evidence from Public Hospitals  
(*Nicholas Bloom, Carol Propper, Stephan Seiler, John Van Reenen*)

## **D. Changes in the demand for Coronary Artery Bypass Graft Surgery post choose and book**

Free to Choose? Reform and Demand Response in the British National Health Service  
(*Martin Gaynor, Stephan Seiler*)

## **E. Comparison of measures of market concentration in the UK health care context**

Technical notes I and II: Comparing measures of hospital markets in England across market definitions, measures of concentration and products

## **F. Other papers**

Gaynor, M, Moreno Serra, R, Propper, C. (forthcoming). Can competition improve outcomes in the NHS? *Journal of Health Services Research and Policy*

Propper, C and Dixon, J (2011) The Impact of competition between hospitals in Mays N, Dixon A, Jones L (eds) *Understanding New Labour's Market Reforms of the English NHS* London: Kings Fund.