Waiting Times for Hospital Admissions: the Impact of GP Fundholding

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Abstract

Waiting times for hospital care are a significant issue in the UK National Health Service. The reforms of the health service in 1990 gave a subset of family doctors (GP fundholders) both the ability to choose the hospital where their patients were treated and the means to pay for some services. One of the key factors influencing family doctors' choice of hospital was patient waiting time. However, without cash inducements, hospitals would get no direct reward from giving shorter waiting times to a subset of patients. Using a unique data set we investigate whether GP fundholders were able to secure shorter waiting times for their patients, whether they were able to do so in cases where they had no financial rewards to offer hospitals, and whether the impact of fundholding spilled over into shorter waiting times for all patients.

JEL Classification: Public sector labour markets (J450), Analysis of health care markets (I110)
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Non Technical Summary

The length of time patients have to wait for hospital treatment is a significant policy issue in the UK. Reducing these waits was one objective of policy reforms introduced into the UK National Health Service in 1990. As part of these reforms, some family doctors, called GP fundholders, were given budgets to buy a specified range of services. Services for their patients falling outside this range, as well as services used by non-fundholders' patients, were covered by budgets given to health authorities.

It was argued that hospitals would compete for income from fundholders by offering their patients shorter waits. There is ongoing debate about whether this happened. Hospitals were likely to gain financially from attracting new fundholder business. However, the extent to which hospitals were actually able to gain by offering quicker treatment was probably constrained by their internal organisation.

There is also debate over whether, if there was any gain in terms of reduced waiting times, this was achieved only for fundholders' patients or was shared by all patients. In other words, did the scheme have any spillovers? There are two possible types of spillover from the fundholding scheme: first, reductions in waits for the patients of non-fundholders; and secondly, reductions in waits for fundholders' patients in areas of treatment for which fundholders did not pay.

We examine these issues, using data on over 100,000 hospital admissions from the 58 general practices in one health authority over four years. We use an econometric model (a "difference-in-difference estimator") to control for differences in the characteristics of general practices and patients, and for any pre-existing differences in the waiting times of practices that became fundholders compared with those which did not.

Our results show that, for those types of treatment that GP fundholders paid, GP fundholders' patients' waits were on average about 8% shorter than non-fundholders' patients. These results vary across specialities, with the greatest reductions in waits achieved in orthopaedics, in ophthalmology, in gynaecology and in a set of "other" specialities. The first three comprise those specialities with the longest average waiting times, and include procedures with high profile long waits such as hip replacements and procedures to treat cataracts.

Some of the reduction in waiting time for GP fundholders' patients was achieved by general practices changing the hospital to which they referred patients. On becoming fundholders, practices were likely to change the hospital to which they referred patients, in those specialities where they achieved significant reductions in waiting times.

Fundholders' patients did not, however, have shorter overall waits for those treatments for which fundholders did not pay. In most specialities there was no significant different in average waiting time between the patients of fundholders and non-fundholders, with the exception of gynaecology (where fundholders' patients had shorter waits) and in the set of "other" specialities (where fundholders' patients had longer waits).

Across all treatments and all specialties, the results show that there was no overall reduction in the average waiting time for fundholders' patients compared with non-fundholders' patients.

In conclusion, our results show that the GP fundholding scheme did reduce waiting times for some patients: for those of fundholders having a hospital procedure in a specialty with a long average wait, paid for by their general practice. There was, however, no overall effect on fundholders' waiting times, and the gains did not spillover to non-fundholders' patients. These results suggest that the incentives created by GP fundholding were not catalysts for general changes within hospitals. From this we conclude that incentives focused narrowly on one part of a system may not be an efficient means of reforming the system as a whole.

1.   Introduction

Waiting times for National Health Service (NHS) hospital services have been a major political issue in the UK for several decades. They were a focus of government policy in the 1980s, yet remained long for routine hospital procedures. In 1991, for example, 120,000 people had been waiting at least 12 months and 50,000 people at least 24 months for hospital procedures (Tudor-Edwards 1997).

Reducing waiting times was one of the objectives of the major UK government health policy reform of the early 1990s, the introduction of the NHS Internal Market. The General Practitioner (GP) fundholder scheme was an important part of this reform. It involved giving some family doctors budgets to buy a specified range of services for their patients, including those routine hospital procedures with long average waiting times. Services for fundholders' patients falling outside the specified range, and all of the services used by patients of non-fundholding doctors were bought by a separate group of buyers: health authorities. The reforms were designed to give hospitals an incentive to offer lower waiting times as they competed with each other for business, particularly from fundholders who were believed to be likely to be more reactive buyers than health authorities.

From its inception there was debate about the impact of fundholding (Goodwin 1998). Some commentators were concerned that it would lead to a "two tier" service, with GP fundholders having advantages enabling them to get quicker hospital treatment for their patients (Coulter 1992). By contrast, supporters of the scheme argued that any changes wrought by fundholders would spillover to benefit patients of other doctors (Glennerster et al. 1994). There is very little evidence to support either claim. The strongest piece of quantitative evidence is provided by Dowling (1997) who found that after their doctor entered the scheme, fundholders' patients in one area of the UK had lower waits for certain procedures than non-fundholders' patients. If there were spillovers this difference in treatment times would be less likely.

This paper examines the impact of the GP fundholder scheme on hospital waiting times for over 100,000 elective hospital admissions in the UK over a period of four years. We examine whether fundholders were able to secure for their patients faster treatment, and whether they obtained faster treatment for all procedures or only for those they paid for directly. The data used is all hospital admission data relating to one UK area, from 1993-1997. To these data we matched data on patient and family doctor characteristics, which allows us to control for observed characteristics of the patients and doctors, and to examine the impact of self-selection into the fundholding scheme. To estimate the impact of the scheme we employ a difference-in-difference estimator, utilising the fact that we observe family doctors prior to and after their entry into the scheme, and that not all family doctors became fundholders.

We find that, on the one hand, GP fundholders' patients waited less than non-fundholders' patients for treatment for which GP fundholders paid directly. Significant relative reductions were achieved in those specialties in which waiting times for hospital treatment were longest. On the other hand, any spillover effects to other treatments or patients appeared to be limited. There was no fall in waits for procedures that fundholders did not pay for: in fact some rose. And there appears to have been little effect on average waits. In terms of whether the ability to choose or the finance to pay for this choice is the determinant of changed behaviour, it appears that it is the latter. Waits fell where GP fundholders paid for shorter waiting times, and not for other procedures or for the patients of non-fundholding family doctors.

Section 2 of the paper gives background information on the GP fundholder scheme, and the incentives family doctors and hospitals had to reduce waiting times. Section 3 presents the econometric method, Section 4 the data and Section 5 the results. The paper concludes with a discussion of the results.

2. General practice and hospital behaviour with respect to waiting time

Individuals are able to gain access to UK hospital services through a number of routes. Urgent cases gain direct admission as "emergencies"; less urgent cases gain access as "elective" patients. The process of gaining access to elective services is initiated by a referral from a family doctor (the patients' GP) to a hospital outpatient clinic, run by a hospital physician or surgeon (known as a consultant). At the clinic, the consultant decides whether hospital treatment is necessary, and if so whether the individual needs emergency or elective access. Elective cases are placed on a waiting list for hospital treatment. There are, therefore, typically two different stages to a wait: first, the wait for an outpatient appointment; and secondly, the wait for treatment. In this paper we examine the second stage only.

In 1990 the UK NHS underwent fundamental reform, with the introduction of an internal market designed to give incentives for organisations and for individuals to improve efficiency. In the internal market, the functions of buying and selling health care were separated. Buyers were given budgets, with which they purchased health care from hospitals on behalf of their local population. Two main classes of buyer were created: health authorities and a self-selected group of family doctors (General Practitioners or GPs), called GP fundholders. The reforms gave GPs choice, and GP fundholders the ability to pay for this choice for a subset of treatments.

Family doctors act as gatekeepers into NHS hospital services, with the exception of some emergency services. Family doctors run organisations known as general practices. Under the fundholding scheme, general practices could chose whether or not to hold a budget. Those practices which did were known as GP fundholders.

The fundholding scheme ran from 1991 to 1999. The scheme was voluntary, and practices joined in different years over the scheme's life. By its end, nationally about half of all general practices were fundholders. GP fundholders held a budget from which they were expected to pay for only particular, specified types of care, including a specified subset of all procedures that an elective hospital patient might have. These included common elective procedures, and accounted for about 70% of all elective admissions. GP fundholders placed contracts for these procedures with hospitals. These contracts commonly included information about price and some dimensions of quality including, in some instances, waiting times (Glennerster et al. 1994). The contracts were likely to link payment to activity, with GP fundholders basically paying hospitals for each case treated.

Health authorities were the other budget holding organisation in the internal market. Their budgets had to cover all care for non-fundholders' patients as well as care for fundholders' patients not covered by the fundholding scheme. The latter included hospital emergency services as well as the remaining elective procedures. Emergency services typically accounted for about one third of all admissions. Health authorities usually made what were called "block contracts" with hospitals. These had a weaker link between payment and activity than GP fundholders' contracts.

We might expect GPs to be motivated by a desire to reduce waiting times if they act on behalf of their patients. The simplest model of GP behaviour assumes that GPs derive utility from leisure and income: more complex models add the health (or utility) of their patients as another argument (Scott and Vick 1999). If patient health/utility is not a direct argument, the behaviour of GPs is still constrained by the number of patients in their practice, since GPs' remuneration depends in part on the number of patients they have on their practice list. Thus, regardless of whether GPs directly care about patients' health/utility or not, GPs' behaviour will be affected by patient health/utility. However, the extent to which patient preferences affected GP behaviour in the NHS internal market and, in particular, how important patient waiting time was in determining GP behaviour is difficult to assess. There was relatively little competition for patients between GPs, so GPs who did not reduce waiting times probably did not lose patients. On the other hand, patients did care about waiting times (hence the government policies) and therefore, *ceteris paribus,* GPs would want their patients to get faster treatment. GPs certainly received detailed information about waiting times, in a form allowing them to relate this to specialties, to hospitals, and to procedures. There is evidence that waiting time was important to GPs and affected their choice of referral destination (Earwicker and Whynes 1998).

There is also evidence that one of the reasons practices chose to become fundholders was concern about their patients' waiting times (Glennerster et al. 1994).

While GPs in general, including fundholders, might have gained utility (if not income) from a reduction in waiting times for (all) their patients, their ability to bring about reductions in waiting times depended on the responses of hospitals to the fundholder scheme. A GP referred a patient to hospital for treatment: it was the decision of the hospital when that patient was treated (Martin and Smith 1999).

The fundholder scheme, by giving fundholders a budget to buy hospital care, was meant to influence hospital behaviour and there are several arguments to suggest that hospitals had some incentive to shorten waiting times for GP fundholder patients. First, there is evidence that competition between hospitals was possible in the internal market. Propper (1996) found that less than 10 percent of hospitals had no competitor within a 30 minute travel distance radius. This competition meant hospitals could lose business and so income. Second, NHS hospitals were subject to regulatory controls on the use of surpluses and losses. They were not allowed to carry forward a surplus or loss across financial years. As over 70 percent of costs are fixed within a year, the no-carry forward rule made hospitals vulnerable to relatively small fluctuations in income and meant they had a reason to attract extra business. Third, hospitals faced two kinds of buyers: health authorities and GP fundholders. The bulk of hospital sales were to health authorities, who generally were reluctant to move contracts between hospitals. Fixed costs were primarily apportioned to health authority contracts. Under these arrangements, fundholder procedures represented marginal business and, provided the price paid by the fundholder was above marginal cost, sales to GP fundholders were sales on which hospitals could make a (within year) surplus. So, reducing waiting times for cases for which fundholders paid for the care was likely to have a direct payoff in terms of increased revenue, given GPs' desire to reduce their patients' waits. But reducing waits for all fundholders' patients would have direct financial benefit only if fundholders were able to "bundle" their contracts, in other words, if they were able to make credible threats to move all of their patients, including those having non-fundholder procedures, to other hospitals. This was certainly feasible, since under the rules of the internal market, money from health authorities was supposed to follow GP referrals. Similarly, reducing waits for non-fundholder patients covered by block health authority contracts would bring no direct financial benefits to hospitals, unless they were unable to distinguish between fundholders' and non-fundholders' patients.

To attract fundholder business hospitals might be willing to give fundholders' patients quicker treatment. The extent to which they were, in practice, able to do this depended on the internal organisation of the hospital (Morga and Xavier 1999). Although hospital managers could identify fundholders' patients, consultants have traditionally owned waiting lists and therefore selected

patients for treatment (Frankel and Wise 1993, Light 1997). The extent to which hospital consultants responded to hospital management calls to reduce waiting lists, or indeed to alter any of their behaviour, is little studied. Hospital consultants might resist such calls if they involved additional effort, or if consultants did not wish to compromise their traditional autonomy with respect to selecting patients from waiting lists, perhaps because they wished to control the intake of patients needed for research and teaching. They may also have resisted in those specialties with both long waits and in which private care is a viable alternative to NHS care. Many NHS consultants also offer private care, and there is widespread belief that their private practice benefits from long waits (Tudor Edwards 1997). However, a survey carried out by Beecham (1994) suggests that at least some trusts actively overcame resistance: 42% of trusts in her survey were offering special deals to fundholders, using as mechanisms exclusive surgical lists and special accelerated admission arrangements.

Previous literature

There was widespread belief that GP fundholders would be able to force trusts to lower waiting times for their patients. The evidence is, however, limited and equivocal (Goodwin, 1998). Most of the evidence about differential waiting times relates to waits for out-patient appointments (Black et al. 1997, Kammerling and Kinnear 1996, Perrett 1997). Qualitative analysis by Corney (1999) showed that fundholding made no difference to the perceived waiting time for hospital treatment. Ellwood (1997) argued that fundholders used their leverage to reduce waits at existing hospitals, whereas qualitative work by Glennerster et al. (1994) shows that fundholders used their ability to 'exit', moving to hospitals with shorter waits. Glennerster et al. did show that fundholders were more aggressive contractors than health authorities, and that their contracts were more likely to contain the type of detail enabling detailed performance monitoring. The most rigorous direct quantitative evidence to date is the study by Dowling (1997), which analysed waiting times for hospital care in one health authority (East Sussex). He found that fundholders' patients had significantly shorter waits than non-fundholders' patients. In contrast to an earlier study conducted by the Audit Commission (1996) which found no difference in waits, Dowling used a more precise definition of waiting time. In general, there is evidence from The Netherlands and the US that incentives do matter with respect to changing waiting times (Brouwer and Hermans 1999, Baker and Brown 1999).

There have been no quantitative investigations of whether gains by fundholders spilled over to other patients. Glennerster et al. (1994) use case studies to show how hospitals were forced to make organisational changes in order to respond to the needs of fundholders, and argue that in general a more responsive organisational structure has arisen. Indirect evidence that gains by fundholders spilled over is provided by Hamilton and Bramley-Harker (1999), who found that overall waiting

times for surgery to correct hip fractures (fractured neck of femur) have fallen since the NHS reforms, although they do not examine the impact of fundholding. In the US context, Baker and Brown (1999) show that changes introduced by HMOs are drivers for general organisational change within delivery organisations, and are imitated by other insurers.

Our study adds to this literature a rigorous quantitative analysis of the impact of GP fundholding on hospital waits, controlling for a range of factors that might affect waiting times, such as patient or general practice characteristics. We are able to examine spillover effects of two kinds: spillovers to fundholders' patients having non-fundholding procedures; and spillovers to the patients of non-fundholders having either type of procedure.

3. Econometric strategy

We implement our tests of the impact of fundholding on patient waiting times using essentially a difference-in-difference methodology. This methodology involves examining the difference in the variable of interest (waiting times) between practices that are fundholding and practices that are not, controlling for any changes contemporaneous with the introduction of fundholding. In the treatment literature, the group who are fundholders are referred to as the 'treated', the group who are not as the 'control'. We implement this approach in a regression framework in order to control for changes in observable variables and to account for the fact that fundholders became fundholders at different points in the four year window for which we have data. The basic regression we estimate is:

$$(1) \qquad w_{ijt} = a_0 + a_1 X_{it} + g + g + g + d\,After_{jt}*GPFH_j + e_{ijt} \,, \; i=1,...,N, \; j=1,...,J, \; t=1,...,4$$

where w_{ijt} is the (log) waiting time of patient i from practice j in year t, X_{it} is a set of controls which measure the morbidity of the patient, g, g and g are medical speciality of treatment, year and general practice fixed effects, $GPFH_j$ is a dummy variable with value 1 if the practice is a fundholder and 0 otherwise, $After_{jt}$ is a dummy variable for being a fundholder ($After_{jt}$ equals 1 if practice j has become a fundholder by time t) and e_{ijt} is white noise error.

This methodology controls for fixed differences between practices which became fundholders and those which did not via the practice fixed effects. The year dummies control for changes in waiting times that affect all general practices. Our estimate of the impact of fundholding is d the coefficient on the interaction term: changes in waiting times specific to practices after they became fundholders. One implication of the fact that practices entered the fundholding scheme at different times is that the 'control' group is not restricted to practices that never became fundholders. The control group is all practices at time t who have not yet become fundholders, even if they will become fundholders later.

One issue that needs to be addressed is the possible endogeneity of fundholding. Fundholding was a voluntary scheme. The general practices which opted to become fundholders may have been different from those which did not. Research has shown that the prescribing behaviour of those who became fundholders differed from those who remained out of the scheme (Whynes et al. 1995), and that early wave fundholders had lower levels of hospital referrals than other practices (Croxson et al. forthcoming). We therefore wish to allow for differences in waiting times between practices caused by factors other than the fundholder scheme. In the present case, those practices which became fundholders might always have had lower waiting times. This is probably less likely than differences in other behaviour between fundholders and non-fundholders, as waiting times were set by hospitals rather than by general practices. Hospitals had no way of distinguishing fundholders from non-fundholders prior to entry into the scheme (or prior to the preparatory year) and had no incentives to give shorter waiting times before a fundholder entered the scheme (or before the preparatory year). However, the inclusion of general practice fixed effects in (1) allows us to control for fixed differences in waiting times. If fundholders always had longer waits this will be absorbed into the individual effects: only the effect of the change in status will be picked by in δ.

More problematic is that general practices may have opted to become fundholders on the basis of waiting times. In other words, the timing of when a practice became a fundholder may have been related to length of wait. If there is an association between patient waiting times and the decision of when to become a fundholder this will bias the estimated impact of being a fundholder. To allow for this we test for endogeneity of $After_{jt} * GPFH_t$.

We estimate (1) separately for those procedures for which fundholders paid and for those for which they did not pay, in order to determine whether fundholding status (the ability of general practices to choose their hospital) or payment for care (applicable to fundholding procedures only) had the impact on waiting times.

As tests of robustness we estimate two extensions to the basic model. First, we investigate whether there is a differential response to the scheme for general practices who entered the scheme at different dates. The specification given in (1) constrains the impact of fundholding to be the same for all years once the practice entered the scheme. But practices entered the scheme at different times. So we estimate an effect for each year of fundholding, which can be distinguished from aggregate change over the four years of the sample, and we omit a group of practices who were already fundholders at the beginning of the four year data window. Second, we also estimate (1) using the data collapsed by fundholder and year.

To further investigate the response to fundholding we examine the response controlling for hospital of treatment, and estimate model (1) separately by speciality to control for patient heterogeneity and to examine whether different specialities within hospitals responded differently to the scheme. The speciality is an important component of hospital organisation. In addition, average waiting time differs considerably across speciality (Frankel and Wise 1993). We might therefore expect first, differential pressure by general practices on specialities, with particular pressure on specialities with long waiting lists, and secondly differential responses across specialities since waiting times are partly determined by the behaviour of individual consultants operating within their own speciality.

4. Data

The data we use are from the Contract Minimum Data Set (CMDS). The CMDS and its derived data sets e.g. the national Hospital Episodes Statistics (HES) contain information about every hospital episode in the UK since the creation of the internal market in 1990. We use four years of data from one health authority, North West Anglia Health Authority (NWA). The CMDS for this authority is a record of all hospital admissions for individuals resident in the geographical area covered by NWA. (There are approximately 100 health authorities in the UK: each resident of the UK falls under one). Each admission is classified by details of the date and type of admission and discharge, the speciality, the diagnosis, the patient's general practice, and the patient's age, sex, and postcode. We use data relating to admissions from all the general practices within NWA during the four financial years 1993/4 to 1996/7.

As shown in the appendix, this gives almost 350,000 records for 324,000 admissions. Of these 48% were elective admissions and 36% were emergencies. The remainder comprised maternity-related admissions and transfers from other hospitals. 296,500 records could be associated with a general practice in NWA[1].

We omitted from the dataset records without a valid hospital code or waiting time. During this process we removed those with infeasibly long waits, the longest 0.25% of waits, comprising patients waiting longer than 744 days for admission. As shown in the appendix, this left a dataset comprising 138,800 elective admissions.

Within the CMDS dataset 39 specialities are defined. The boundary between some specialities is unclear and defined differently in the two hospitals in our sample, so we grouped together General

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[1]Those records that could not be associated with a practice were evenly distributed across speciality, hospital, and admission method.

Medicine and Care of the Elderly as Integrated Medicine, and General Surgery and Urology as Surgery, and also grouped together specialities where the number of admissions into each was small.

Elective admissions are classified as having an admission method in one of three alternative categories: as a "waiting list" admission, as a "booked" admission, or as a "planned" admission. Individual hospitals are monitored by central government on waiting times in the first two categories. The last comprises admissions in a "planned sequence of care", and patients on this list are of a different type to those in the first two. Our analysis is therefore confined to patients in these two categories.

Patients with a waiting time of zero were excluded from the analysis, since there was no way of determining whether these were missing values, or whether these patients really did not wait for any time at all. As shown in the Appendix, these adjustments left a dataset comprising 103,603 admission records.

There were 58 general practices in NWA with admissions in each of the four years covered by our data. Table 1 shows the fundholding status of these practices over the sample period. The patient and GP characteristics of the general practices which were fundholding at any point in the sample period are compared to those of the non-fundholder practices in Table 2. The table shows that fundholders on average were located in more deprived parts of the district, had more patients and more doctors, and were more likely to have doctors aged over 60. It shows that across all practices the average waiting time for all procedures was 94 days, and that the procedures covered by the scheme had, on average, longer waits (100 days) than those falling outside the scheme (74 days). Patients waited for slightly shorter periods if their practice was fundholding: 100 days compared to 102 days for fundholder procedures, and 72 compared with 77 days for non-fundholder procedures.

5. Results

5.1 The basic results

In this section we examine whether becoming a fundholder had any impact on the time patients waited for hospital treatment. We distinguish between procedures that GP fundholders paid for, and procedures that they did not pay for. In the absence of spillovers we would expect little or no association between the timing of fundholding and waiting times for the latter procedures.

In Table 3 we present estimates of the time patients waited for treatments that were paid for by fundholders. The dependent variable is the log of the individual patients' waiting time in columns 1

through 4, 6 and 7, and the annual average waiting time by practice in column 5. Each regression in Table 3 includes year, general practice and speciality fixed effects. We estimate robust standard errors.

Column 1 shows the impact of patient characteristics and of being a fundholder on waiting times. The impact of being a fundholder on waiting times is negative: patients from practices that were fundholders waited less than other patients. Column 2 separates the effect of being a fundholder into two parts: an effect in the year in which the practice entered the scheme, and an effect in each year thereafter. The results show that lower waiting times were achieved in both the year in which the practice entered the scheme and in subsequent years, but the two coefficients are not significantly different from each other[2].

Column 3 tests for endogeneity of being a fundholder $(After_{jt}*GPFH_j)$. We use an augmented regression test suggested by Davidson and MacKinnon (1993, 236-242). To carry out this test, the model of interest (equation (1)) is augmented with the predicted values of each endogenous variable, where the predicted values are derived from a regression on all exogenous variables (including instruments for the endogenous variable). In the case of one endogenous variable, the test statistic is the t-test on the predicted value. A linear probability model was used to predict $After_{jt}*GPFH_j$. As instruments we used time varying characteristics of the general practice (list size, number of GPs in practice, age of GPs and distance to hospitals to which the practice referred[3]). The last row of column 3 gives the F test for these instruments. The results suggest that OLS is a consistent estimator for the model: the coefficient on the predicted value of $After_{jt}*GPFH_j$ is not significant at conventional levels.

We observe hospital admissions for a four year window from April 1993 to May 1997, but the fundholder scheme operated from 1991 to 1999. So there is a set of practices that are always fundholders in our data (those that became fundholders in years 1 and 2 of the scheme). Since the scheme was self-selecting, it is possible that early fundholders were different. To examine the impact of this group, column 4 presents the estimates of the model without the patients of these general practices. The coefficient on being a fundholder remains negative and well defined, and the point estimates are statistically the same as those in columns 1 to 3. From this it appears that the fundholder effect is not simply due to the shorter waits of patients of these early fundholders[4].

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[2] The models in Columns 1 and 2 were also estimated using a Cox model of time to treatment. The results were very close to those reported here.

[3] This varies since patterns of referrals vary over time, as GPs use different hospitals or have patients requiring different treatments.

[4] The rest of the table supports the fact that this group do not account for all the difference between fundholders and non-fundholders. The coefficient on the year in which practices become a fundholder in column 2 is negative, and we do not observe the first two waves of fundholders in the year in which they became fundholders in our data, so this estimated coefficient is not due to this group. However, including this group may affect the estimate of being a

To allow for the fact that there are fewer general practices than observations in the data[5], we re-estimate the model aggregating data to practice and year level, so the unit of observation is the average (log) wait for practice j in year t (column 5). This aggregation to practice level reduces the amount of information in the data. The coefficient on becoming a fundholder is again negative and of a similar sign to that of the other columns in the table. However, it is only significant at the 10 percent level.

The results in Table 3 indicate that waiting times also varied by speciality, by year and by general practice. The table also indicates that patients who lived in more deprived areas waited slightly longer, whilst older and female patients waited less[6].

From the evidence in Table 3 it appears that fundholding reduced waiting times for patients of fundholding practices, when those patients received treatments for which fundholders paid. Table 4 examines the impact of fundholding on waits for other elective procedures. Each column of the table re-estimates the corresponding column of Table 3. The results indicate that, if anything, the impact of fundholding on waiting time for non-fundholder procedures was to raise waiting times for fundholder patients. Columns 1 and 2 suggest waiting times of patients whose general practices were fundholders were up to 15% higher than the patients of non-fundholders, although the results of column 3 indicate that this coefficient may be upwardly biased.

5.2 Differential responses by speciality

The estimates in Tables 3 and 4 constrain the impact of fundholding to be the same across specialities. However, there are reasons to expect the response to fundholding to differ across speciality. First, the waiting times for different specialities varied, and there is qualitative evidence that fundholders put greater effort into reducing waits in those specialities where the average wait was longest (Glennerster et al. 1994). Second, hospitals in the UK tend to be organised by speciality. One speciality might have been able and willing to respond to fundholders' demands (and payments) to reduce waiting times: another might not. Third, there is considerable patient heterogeneity across speciality.

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fundholder after the initial year in Column 2 and the overall estimate of the impact of being a fundholder in Column 1.

[5] This may mean the standard errors on the coefficient estimates of δ will be too small.

[6] The deprivation finding may represent an area effect. This may be correlated with the impact of fundholding, as practices located in different areas became fundholders at different times. To test the effect of this, columns 1 and 2 were re-estimated constraining the effect of patient area deprivation to be zero. This had no significant impact on the estimated effect of fundholding.

Tables 5 and 6 present the impact of fundholding by speciality, where Table 5 shows fundholder procedures and Table 6 shows non-fundholder procedures. The specialities are ordered, left to right, by mean length of waiting times for fundholder procedures in 1993/4. The estimated model is that given in Column 1 of Table 3, but only the coefficients on being a fundholder are presented in the table.

The results in Table 5 show that the reduction in waiting times for fundholder procedures is the result of shorter waits in the three specialities with longest waiting times in 1993/4 and in the "other specialities" set. In the two specialities with shortest waits, waiting times for fundholders' patients rose. The specialities in which fundholders had most impact in lowering waiting times for their patients were orthopaedics, ophthalmology, gynaecology and the "other specialities" set. Public concern over waiting times for procedures in the first three specialities was high: these specialities include procedures with highly publicised long waits such as joint replacements and procedures to rectify cataracts[7]. Perhaps more importantly, as these specialities are relatively large, the waiting times for the procedures carried out within these specialities would make a significant contribution to the total waiting list of the hospital. Total waiting lists were an important target on which hospitals were monitored during the period covered by the data. In these specialities, the concerns of patients, general practices and hospital managers would have coincided: all would gain from a decline in lists.

Table 6 shows that the response of hospitals to fundholders for procedures for which they did not pay was, in most specialities, close to zero. There were two exceptions: length of waiting time fell for non-fundholder procedures in gynaecology, and rose in the "other specialities" set. As this set accounted for the largest proportion of non-fundholder procedures, in non-fundholder procedures the overall impact of the scheme was to increase the waiting times of fundholders' patients.

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[7] We estimated the model in equation (1) separately for waiting times for those having procedures to rectify cataracts, and for those having hip replacements and knee replacements. The results show that waits were significantly shorter for GP fundholder patients having cataract-related procedures and hip replacements, but not for those having the less common knee replacements.

5.3 How might lower waiting times have been achieved?

In Tables 3 and 4, the final two columns respectively control for hospital effects and hospital*year interactions. Controlling for hospital* year interactions reduces the estimate of the effect of the scheme on waiting times for fundholder patients. These results suggest that one of the ways in which fundholders might have achieved lower waiting times was to change their referral patterns. All general practices in the sample predominantly used one or both of two hospitals, but they had access to a number of others. The GP fundholder scheme gave GP fundholders both the ability to choose hospitals and, for fundholder procedures, the budget to pay for these at a rate higher than the marginal cost. So GP fundholders might have used the scheme to switch referrals to hospitals offering "better deals". The location of treatment of non-fundholder procedures, as noted above, was also chosen by the practice, but payment was made by a block contract from the health authority, which did not necessary pay above marginal cost.

To examine this, we look at the admission patterns for those fundholders who changed fundholding status during the observation window. Table 7 presents the percentage of admissions that were to 'non-primary' hospitals, where primary is defined as either of two hospitals that together accounted for over 80% of admissions from each general practice. The table shows the admission patterns for fundholders prior to and after becoming a fundholder, for both fundholding and non-fundholding procedures.

The first three rows show that fundholders increased their percentage of admissions for GP fundholder procedures to non-primary hospitals after becoming fundholders. By contrast, the final three rows show that there was a reduction in the proportion of non-fundholder procedures admitted to non-primary hospitals after becoming fundholders[8]. Rows 4-9 of the table split the fundholder procedure admissions into two groups. Rows 4-6 are admissions to those specialties where GP fundholders have significantly lower waiting times: orthopaedics, ophthalmology, gynaecology and "other". Rows 7-9 show the admissions for fundholder procedures to all other specialties. The figures indicate that, for fundholding procedures, hardly any admissions for those specialties in which GP fundholders did not have lower waiting times were to non-primary hospitals, and becoming a fundholder made no difference to this. On the other hand, the proportion of admissions to non-primary hospitals in specialties where GP fundholders achieved substantial reductions in waits for fundholding procedures rose, in some cases considerably, after becoming a fundholder. We also examined the patterns of movement for practices that were never fundholders over the sample period[9]. The results show shifts away from primary providers for fundholder procedures, and no change in tendency to use non-primary providers for non-fundholder procedures.

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[8] It is important to note that the health authority had contracts with all of the hospitals examined in Table 7.
[9] Results available from the authors.

These results indicate that one of the ways GP fundholders achieved lower waiting times was by switching hospitals. We would not necessarily expect to see large movements, as general practices might wish to stay at local hospitals for reasons other than waiting times, and a hospital might respond to the threat of withdrawing of business by reducing waiting times.

We have so far assumed that the fall in waiting times is due to action by GP fundholders to persuade hospitals to lower waiting times for their patients. But the decline in waiting times may be due to other behaviour by GP fundholders. One possible candidate is patient selection. The introduction of budgets was generally argued to give GP fundholders an incentive to select patients likely to be less expensive (Glennerster et al. 1994). GP fundholders' budgets were set on the basis of their referrals in the year before they became a fundholder, which gives an incentive to get rid of more expensive patients after becoming a fundholder (Croxson et al. forthcoming).

To examine whether patient selection occurred, we examine the severity of patients sent to hospital pre- and post-fundholder status, for the fundholding practices. Note this is not the same as an examination of patient selection, but we do not have access to data enabling us to examine this directly. Our data contains information on only those patients referred for treatment in the NHS. Table 8 presents mean patient age and gender, for GP fundholders before and after they became fundholders. The table shows little evidence of any change in patient characteristics post-fundholding.

It may be the case that fundholders select in the run up to becoming a fundholder, so we examined the data year by year to see if there was any evidence of a trend in age, gender or deprivation of the patients of fundholder practices[10]. No such trend was evident: all practices, including fundholders, appeared to have some ageing of their practice populations, but there were no significant differences between practices or years in the age structure of the patients receiving NHS treatment.

5.4   The net effect of the scheme

It appears that GP fundholders reduced their patients' waiting times in certain key specialties for procedures that they paid for. But they did not appear to have been able to get similar reductions in waiting times for procedures for which they did not pay. This raises the question of whether there was any overall impact of the scheme on waiting times for fundholder patients. Table 9 presents the estimates of model (1) for all treatments, in other words pooling across both GP fundholder procedures and non-fundholder procedures. The table gives results for all specialties together (column 1) and then for each of the specialties. It shows only the estimated coefficient on being a GP

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[10] Results available from the authors.

fundholder, but the models were estimated controlling for patient age, patient gender, patient deprivation, year, hospital and speciality in column 1; and with the same controls but without speciality dummies in the other columns. The results indicate that within the specialties in which there were large falls in waiting times for fundholder procedures, waits for all procedures fell; within the specialties in which waits for fundholder procedures rose, waits for all procedures rose. But, overall, there was no significant impact of becoming a fundholder on the time fundholders' patients waited for treatment.

6. Conclusion

This paper has used a unique and large data set covering all admissions to hospital in one area of the UK to study the responses of primary care physicians to a budgetary scheme which gave a subset of doctors the ability to choose where their patients were treated and to pay for a subset of this care. Our results indicate that where these doctors paid for their patients' care, they were able to secure reductions in waiting times for their patients relative to all other patients. The magnitude of the reduction was about 8%. On the other hand, where they could only choose hospitals but not pay for the care, they were rarely able to reduce the time their patients had to wait for treatment. The net effect of the scheme on the time the patients of these doctors had to wait for hospital treatment is small and not significantly different from zero.

This paper contributes to the ongoing debate about the welfare effects of the NHS reforms in general, and of the GP fundholding scheme in particular. Our results indicate that the scheme led to some improvement in the quality of service provided, but only for a limited set of patients and a limited set of treatments.

Waiting times are the outcome of both family doctor and hospital behaviour. Our results suggest that hospitals offered shorter waits only when they could achieve a direct revenue gain. In other words, fundholders' impact related directly to their ability to pay. Attracting additional income from marginal fundholder business gave hospital managers a direct financial incentive to reduce waiting times in particular areas. That this was achieved in only specific specialities and procedures suggests that, contrary to the arguments advanced by supporters of the scheme, in respect of waiting times fundholding did not have a general spillover effect. The incentives created by GP fundholding do not appear to have been catalysts for general changes within hospitals.

Under the scheme fundholders had incentives to select patients (to cream-skim). While our data does not allow us to explore this very deeply, it does suggest that the observed morbidity of patients fundholders sent to hospital for treatment did not change once they became fundholders. Our results

do show that fundholders might have achieved some of the reduction in waiting time by changing referral patterns. At least some fundholders moved some activity from their usual hospitals to others after becoming fundholders. They were more likely to do this for fundholding procedures than for non-fundholding procedures. The hospitals to which fundholders moved activity had strong incentives to obtain extra business. They were either experiencing financial difficulties or were perceived as being vulnerable to changes in referral patterns (for example, they had substantial tertiary activity, a group argued to be particularly vulnerable in the internal market). The amount of movement, however, was not large. So our results are not inconsistent with either Glennerster et al. (1994) who argued that fundholders achieved gains by moving hospitals or Ellwood (1997) who argued that gains were achieved within existing hospitals.

The internal market and GP fundholder scheme were abolished from 1999. The new regime which replaces it retains the separation between buyers and sellers, with buyers having freedom to buy care where they wish for their local population. General practices have been combined into budget-holding groups that are larger than fundholding practices, and have budgets that cover all care. Waiting lists continue to be long and a source of patient concern. The results in this paper suggest that GPs do respond to patient concern over waiting time, and can get hospitals to produce shorter waiting times where they pay for this care and form only a subset of the buyers. Under the new scheme GPs have finance to pay for all care, which might mean shorter waiting times overall. However, under the new system, individual practices no longer operate on their own, so introducing a potential free-riding problem within the new groups that might limit their effectiveness. Moreover, under the new system there will be no procedures or practices falling outside the scheme and able to be treated differentially by hospitals. More generally, our results also suggest that incentives focussed narrowly on one part of a system may not be an efficient means of reforming the system as a whole.

APPENDIX

Table A1. Details about admissions in the dataset

	Number of records
All records (all Finished Consultant Episodes)	349,887
All admissions (First episode Finished Consultant Episodes)	323,955
All admissions April 1 1993 – March 31 1997	322,826
All elective admissions April 1 1993 – March 31 1997	153,464
All emergency admissions, April 1 1993 – March 31 1997	116,571
Admissions with defined practice codes, from NWA general practices, April 1 1993 – March 31 1997	296,552
Elective admissions with valid hospital codes, practice code, waiting times (with longest 0.25% trimmed), April 1 1993 – March 31 1997.	138,878
Elective admissions in the categories 11 and 12	117,729
Elective admissions with a positive waiting time, in 11 and 12.	103,603

The characteristics of the health authority

The North West Anglia Health Authority (NWA) covers about 1200 square miles, and includes two main urban centres, Peterborough and King's Lynn, as well as a number of small towns and a substantial rural area. Population characteristics vary considerably within the district. Using the Jarman index as a measure of deprivation, some electoral wards appear very deprived: seven wards fall within the 10% most deprived electoral wards in England.

The definition and construction of the variables

The NHS financial year runs for the twelve months from 1 April. Admissions are recorded in the Contract Minimum Dataset (CMDS) only after a patient has been discharged: this means that, in any one financial year, there will be records for patients admitted before its start but discharged during that year, and patients admitted but not recorded as discharged will not be included. We controlled for this by excluding from the dataset patients discharged after 1 April 1993 but admitted before that date, and by including records for patients who were discharged after 31 March 1997 but admitted earlier.

Data in the CMDS is recorded by episodes (called Finished Consultant Episodes), and any one admission might have associated with it a number of different episodes, as a patient is passed between different hospital consultants. We used only the records associated with first episodes to focus on admissions.

The information used to construct the independent variables was derived from the CMDS, the census, and from other information held at the health authority. Median GP age was constructed using the GP's date of birth. The number of GPs in each practice is derived from a daily count at each practice.

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Table 1. Number of Fundholders in NWA, 1993/4 to 1996/7

	1993/94	1994/95	1995/96	1996/97
Total number of fundholders in this year (% of total GPs in NWA)	12 (20%)	14 (24%)	17 (29%)	25 (43%)
Number becoming fundholders in this year (% of total GPs in NWA)	8 (14%)	2 (3%)	3 (5%)	8 (14%)

Table 2. Summary Statistics

	All practices	General practices which became fundholders during period	General practices that were not fundholders at any point during the period
	Mean (se)	Mean (se)	Mean (se)
Deprivation of patients treated	12 (21.6)	14.7(22.7)	7.9 (18.8)
Age of patients treated	48.7 (22.7)	48.4 (22.7)	49.2 (22.6)
% of treated patients who were female	.54	.54	.54
Patients in practice	9966 (4913)	11660 (4740)	7428 (3988)
No. GPs in practice	5.1 (2.5)	5.9 (2.5)	4.0 (1.9)
Proportion of GPs over 60	.03	.06	0
Waiting time for all procedures (days)	93.7(109)	92.5 (109)	95.6 (109)
Waiting time for fundholding procedures (days)	100 (110)	99.6 (110)	101.5 (110)
Waiting time for non-fundholding procedures (days)	74.3 (102)	72.4 (100)	77.2 (103)
Number of observations	101014	60573	40441

Table 3. Fixed effects regression: fundholding procedures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sample	All practices	All practices	All practices	Without the first two waves of fundholders	Obs. pooled by year and practice	All practices	All practices
Once a GP fundholder After*GPFH	-.084** (.025)	-	-.086** (.025)	-.067** (.026)	-.15* (.068)	-.084** (.025)	-.059* (.026)
Year became a GP fundholder	-	-.078** (.026)	-	-	-	-	-
Year(s) after becoming a GP fundholder	-	-.109** (.031)	-	-	-	-	-
Predicted once a GP fundholder	-	-	-.46 (.36)	-	-	-	-
Patient deprivation	.001* (.0003)	.001* (.0003)	.001* (.0003)	.0004 (.0002)	-.023* (.01)	.001* (.0003)	.001* (.0003)
Patient age	-.004** (.0002)	-.004** (.0002)	-.004** (.0002)	-.004** (.0003)	.01 (.009)	-.004** (.0002)	-.004** (.0002)
Patient gender	-.036** (.01)	-.03** (.01)	-.03** (.01)	-.022* (.01)	-.16 (.49)	-.03** (.01)	-.03** (.01)
Constant	4.00** (.04)	3.91** (.04)	4.2** (.22)	3.9** (.03)	2.8** (.9)	3.90** (.04)	3.8** (.04)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Speciality effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Practice effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital effects	No	No	No	No	No	Yes	Yes
Hospital*year effects	No	No	No	No	No	No	Yes
R	0.09	0.09	0.09	.09	0.74	0.09	0.09
N	75399	75399	75290	65220	228	75399	75399
F test for identifying variables at first stage (d.f)	-	-	61.95 (4, 75211)	-	-	-	-

Robust standard errors in parentheses. ** $p<0.01$ *$p<0.05$

Table 4. Fixed effects regression: non-fundholding procedures.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sample	All practices	All practices	All practices	Without the first two waves of fundholders	Obs. pooled by year and practice	All practices	All practices
Once a GP fundholder After*GPFH	.155** (.049)	-	.078 (.049)	.14** (.05)	.15 (.10)	.081 (.05)	.03 (.05)
Year became a GP fundholder	-	.13** (.049)	-	-	-	-	.064 (.049)
Year(s) after becoming a GP fundholder	-	.26** (.065)	-	-	-	-	.16* (.065)
Predicted once a GP fundholder	-	-	7.6** (.51)	-	-	-	-
Patient deprivation	.0001 (.0005)	.0001 (.0005)	.0001 (.0005)	.0004 (.0006)	-.015 (.008)	.0001 (.0005)	.0002 (.0005)
Patient age	-.0047** (.0005)	-.0047** (.0005)	-.004** (.0005)	-.004** (.0005)	-.001 (.006)	-.004** (.0005)	-.004** (.0005)
Patient gender	.082** (.019)	.081** (.019)	.095** (.02)	.10** (.02)	.75* (.32)	.098** (.019)	.091** (.019)
Constant	3.64** (.05)	3.6** (.05)	3.6** (.04)	3.6** (.05)	3.2** (.30)	3.5** (.05)	3.6** (.05)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Speciality effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Practice effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital effects	No	No	No	No	No	Yes	Yes
Hospital*year effects	No	No	No	No	No	No	Yes
R	0.14	0.14	0.17	.16	0.76	0.17	0.18
N	25608	25608	25558	22450	213	25608	25608
F test for identifying variables at first stage (d.f)	-	-	23.11 (4, 25479)	-	-	-	-

Robust standard errors in parentheses. ** $p<0.01$ *$p<0.05$

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Table 5. Fixed effects regression by speciality: GP fundholder procedures

Speciality	Ortho-paedics	Opthal-mology	Gynae-cology	Surgery	Other specialities	Ear, Nose & Throat	General Medicine/ Care of the Elderly
Once a GP fundholder After*GPFH	-.21** (.01)	-.35** (.13)	-.17** (.06)	.12** (.03)	-.45** (.08)	.13** (.04)	.13* (.08)
Patient characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Practice effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital effects	No	No	No	No	No	No	No
R	0.04	0.18	0.35	0.06	0.09	0.05	0.26
N	3061	731	2870	4843	11572	1842	689
Median/mean wait in 93/94	126/156	86/140	64/90	46/90	45/91	41/74	29/53

Robust standard errors in parentheses. **p<0.01 * p<0.05

Table 6. Fixed effects regression by speciality: non-GP fundholder procedures

Speciality	Ortho-paedics	Opthal-mology	Gynae-cology	Surgery	Other specialities	Ear, Nose & Throat	General Medicine/ Care of the Elderly
Once a GP fundholder After*GPFH	.02 (.01)	.48 (.30)	-.42** (.14)	.04 (.12)	.33** (.07)	0.17 (0.16)	.026 (.13)
Patient characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Practice effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital effects	No	No	No	No	No	No	No
R	0.04	0.18	0.35	0.06	0.09	0.05	0.26
N	3061	731	2870	4843	11572	1842	689

Robust standard errors in parentheses. **$p<0.01$, *$p<0.05$

Table 7. Percentage of admissions which are to 'non-primary' hospital by fundholder status, for general practices which changed status during the sample period (1994, 1995 and 1996).

	Row No.	Year in which became GP fundholder	Percentage of admissions from the practices that are to non-primary hospitals		Total admissions
			Before becoming a fundholder	*After becoming a fundholder*	
All Fundholder procedures	1	1994	1.19	3.47	4775
	2	1995	1.34	4.80	2770
	3	1996	2.13	4.34	6575
Fundholder procedures in specialties where GP fundholders had significantly lower waiting times	4	1994	2.42	7.06	2169
	5	1995	2.79	9.50	1236
	6	1996	4.31	7.74	2913
Fundholder procedures in specialties where GP fundholders did not have significantly lower waiting times	7	1994	0.29	0.36	2607
	8	1995	0.36	0.29	1534
	9	1996	0.60	0.80	3662
Non-fundholder procedures	10	1994	34.7	22.49	2395
	11	1995	22.05	12.61	1098
	12	1996	12.49	8.02	2390

Table 8. Age and gender of patients receiving NHS treatment

	Mean Age	% Female	Mean Standardised mortality of patient area	Mean standardised morbidity ratio of patient area
Fundholder practices before fundholding	46.5 (22.6)	.54	96.4 (6.5)	94.9 (8.2)
Fundholder practices after fundholding	49.4 (22.5)	.54	93.1 (6.3)	100.4 (5.9)
Non fundholder practices	49.2 (22.6)	.54	92.4 (9.1)	90.0 (10.5)

Standard errors in parentheses

Table 9. Fixed effects regression: All procedures by speciality

	All specialities	General Medicine / Care of the Elderly	Ear, Nose & Throat	Gynae-cology	Opthal-mology	Ortho-paedics	Surgery	Other
Once a GP fundholder After*GPFH	-.022 (.023)	.10 (.07)	0.12* (0.05)	-.19** (.07)	-.38** (.07)	-.15* (.06)	.11** (.04)	-.01** (.06)
R	0.09	0.10	0.05	0.14	0.12	0.03	0.04	0.13
N	101007	8836	9906	14741	9510	11490	30331	16193

Robust standard errors in parentheses, ** $p<0.01$ *$p<0.05$