

The impact of system reform on commissioning in the NHS*

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Abstract

Aims: Recent NHS policy initiatives (patient choice, payment by results (PbR)) have aimed to increase the ability of patients and commissioners to “shop around” amongst secondary care providers. We analyse trends in the concentration of elective admissions (1997/8-2007/8) to test for effects of these policies.

Data and Methods: Data from Hospital Episode Statistics is used to construct measures of concentration of admissions (number of hospitals used, share of the main provider, Herfindahl index) at primary care organisation level. Panel data difference in difference methods are used to investigate effects of the reforms including the phased introduction of payment by results across different types of admissions. We also explore the “switching” of admissions between providers.

Results: Concentration fell after the introduction of payment by results policy. After 2002/03, the number of providers used increased, while the share at the main hospital and the Herfindahl index decreased. The proportion of admissions to new hospitals is greater than the proportion of admissions at hospitals dropped. This result is consistent with the decreasing trend in concentration. The impact of choice is less clear and appears in some circumstances to increase concentration.

Conclusions: There was a decrease in the level of concentration in commissioning for elective care after the system reforms of 2002/3.

1 Introduction

The policy role of commissioning is the strategic purchasing of health care services to secure the best quality care and health outcomes for local populations, within a fixed budget. As part of the reintroduction and extension of an internal market it has been given a central role in the NHS reform programme announced in 2000 (DH, 2000). Initiatives such as Payment by Results (PbR) and patient choice were intended to increase the ability of patients and commissioners to “shop around” amongst

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secondary care providers. Policies also sought to encourage new types of NHS providers (Foundation Trusts) and entry by private sector providers.

We consider the impact of some of these policy initiatives – PbR, patient choice and Foundation Trusts (FTs) - on the pattern of commissioning as measured by referrals for elective care. The policy background is described briefly in section 2, the data and methods are given in sections 3 and 4. Section 5 describes the results and section 6 concludes with some observations and issues for discussion.

2 Policy Background

In April 2002, the Department of Health (DH) in England outlined plans for a new system of financing hospitals called Payment by Results. The new payment system uses a nationally fixed case-mix based tariff, which reimburses hospitals for the amount and type of care provided at prices defined in terms of Healthcare Resource Group (HRG) spells of hospital stay.³ The price that the hospital receives for providing an HRG spell varies according to whether that spell is elective (non-emergency) or not, and reflects the differences in costs associated with different types of patients (DH, 2004a).⁴ The price paid to providers, though not the price paid by commissioners, was also adjusted for regional variations in wages and other costs of delivery.⁵

PbR is being rolled out to different HRG groups progressively over time (Table 1). In 2003/04, the national tariffs applied only to 15 HRGs.⁶ From 2004/05, PbR was extended to a further 33 HRGs. From 2005/06, PbR was phased-in over four years for the remaining elective HRGs in a series of 25% adjustments (DH, 2003). We use these 3 groups of HRGs in our analysis to explore the impact of PbR.

³A spell of activity is a hospital stay from admission to discharge. Most spells have one consultant episode. Where a spell consists of multiple episodes, the dominant episode determines the HRG code.

⁴ A single tariff exists to reimburse trusts for each HRG for day-case and inpatient elective care (DH, 2002b). Tariffs have also been introduced to reimburse hospitals for the provision of outpatient services. The tariff for these is defined by speciality and, in the main, is paid per attendance (DH, 2005). In 2005/6, an attendance-based tariff (for three categories of patient) was also introduced for accident and emergency care (DH, 2004b).

⁵ The DH centrally funded the difference between provider and purchaser prices. From 2008/9 onwards the amount paid by PCTs has reflected provider cost differences due to geographical input price variations.

⁶ These HRGs had already been deemed important for delivery of national targets, and PbR further reinforced this political focus (DH, 2002).

The expansion of patient choice has been a major plank of health reform (DH, 2003). There are several strands to the policy, but the focus is on choice of provider (hospital not physician) for elective care. Choice policy has been phased in, with a choice of 4 providers from April 2006, and since April 2008, commissioners (Primary Care Trusts – PCTs) have been obliged to offer most patients a choice among providers (hospital, not physician) at the time of first referral by a GP, including any NHS hospital in the country and many private sector providers. Initiatives such as “Choose and Book” and “NHS Choices” provide resources to support choice with comparative information on providers and electronic booking systems.

Foundation Trusts (FTs) were created by the Health and Social Care Act in 2003 and gave NHS hospital trusts the opportunity to become independent not-for-profit public benefit corporations. Whilst remaining in the public sector, they were granted greater autonomy from central control and a range of financial and other freedoms. These include greater financial flexibility (they do not have to break even and are allowed to retain surpluses); they can invest in buildings and new services; they manage their own assets; and they can recruit and reward staff with higher salaries, although many of these freedoms have also been extended to NHS Trusts. This reform was part of the general strategy to shift away from a centrally managed system. Applying for FT status is voluntary, but success is dependent on performance – only those trusts performing well (gaining three stars, the top rating, in the Healthcare Commission’s performance rating system) are allowed to apply. The number of FTs has increased (Table 1) and in October 2008 there were 107, of which 31 were mental health trusts. The ultimate aim is for all NHS Trusts to convert to FT status, but progress so far has not been as fast as originally envisaged.

The organisation and budgetary arrangements for commissioning have also been changed and it is now the responsibility of 152 PCTs. From 2005/6 a form of GP purchasing, known as Practice Based Commissioning (PBC) was introduced to take commissioning as close to the patient as possible. PBC gives indicative budgets to the general practices within a PCT, carved out from the PCT budget. GPs are expected to take greater responsibility for the financial consequences of their referral decisions and to commission services that suit their patients, re-designing such services where necessary. PBC is also viewed as a major tool in managing demand through the use of

financial incentives to control activity, as under GP fundholding between 1990/1 and 1997/8.

The four areas of reform outlined above support, in principle, the development of commissioning. The choice agenda is supported both by the PbR system which seeks to ensure money is directed wherever patients choose to go and by greater availability of, and newer types of, providers. FTs have the freedom to be more responsive to commissioners by offering new or enhanced services.

We investigate the impact of PbR, patient choice, and FTs on the referral behaviour of Primary Care Organisations (PCOs) to determine if they are being more active as purchasers, as reflected in less concentrated use of providers and increasing switching amongst them. We do this by calculating commissioning concentration measures at PCO level, for all HRGs and for the three sub-sets of HRGs under PbR separately. We also explore the “switching” of admissions between providers and the impact of choice and foundation trusts. We exploit the phased introduction of some of the policies through panel data difference-in-difference methods.

3 Data

Episodes and providers

We use data from Hospital Episode Statistics (HES) on first episodes for elective (inpatient) admissions during the 11 financial years from 1997/8 to 2007/8. The providers included are NHS trusts (acute or multi-service hospitals) and independent healthcare providers.¹ Mental health trusts and hospitals providing community healthcare or services for people with learning disabilities are excluded. Figure 1 shows the number of providers and elective admissions over the period 1997/8 to 2007/8, by type of provider and by year. There were extensive mergers amongst NHS hospital up to 2002/3, but subsequently provider numbers have been stable. The number of private providers has grown since 2003/4, as has the number of private sector elective admissions for NHS patients.

¹ The private providers included in HES are independent providers contracted to treat NHS patients. In this study, these providers are identified by the specific site of treatment, while NHS trusts are identified by the organisation responsible for providing the care.

Table 2 shows the share of elective admissions by NHS and private sector providers in year 2007/8, distinguishing 3 groups of HRGs/conditions: (a) the first 15 HRGs covered by PbR policy in 2003/4; (b) the second (additional) group of 33 HRGs covered in 2004/5; and (c) all other HRGs where PbR was phased in from 2005/6 onwards. The table shows that the first and second groups of HRGs account for larger shares of private sector output (40%) than of NHS provider output (20%).

The number of acute sector FTs increased from 25 to 68 between 2004/5 to 2007/8 and it accounted for 71% of NHS patient elective admissions.

Patient choice

We use data from a series of National Patient Choice (NPC) surveys between May 2006 and December 2008 to measure the proportion of patients offered choice. Samples of adult patients referred by a GP for a first outpatient appointment were asked if they had been offered a choice of hospitals.² For each PCT we calculate the weighted average proportion of patients offered choice over this period. From 2006/7 to 2007/8, the average ranged between 20% and 71% across PCTs.

4 Methods

We use six PCO level measures of commissioning for the period 1997/8-2007/8, calculated for ‘frozen’ 1997/8 HAs, ‘frozen’ 2004/5 PCTs and ‘frozen’ 2006/7 PCTs to allow for boundary changes.³ This allows us to control for the changes in the size of the PCOs during the period under study.

Concentration measures

Our concentration measures are

$$NumProv99_{it}$$

² Exclusions were those with urgent referrals, patients attending cancer services under the 2 weeks maximum waiting time, antenatal patients and individuals referred to rapid access chest pain clinics or mental health specialties. Patients at independent sector providers were included from November 2006. http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/StatisticalWorkAreas/Statisticalhealthcare/DH_086298.

³ In 1997/8, there were 100 HAs which became 303 PCTs in 2003/4 and from October 2006 there have been 152 PCTs with average populations of around 330,000.

The number of hospitals used by patients in population i in period t that account for 99% of total admissions. We truncate the measure at the 99th percentile since calculation of the total number of hospitals was sensitive to use of hospitals with a very small number of admissions from population i . Reductions in the truncation point down to 95% made little further difference to the analysis.

$$MainShare_{it} = \max_j x_{ijt} / \sum_k x_{ikt}$$

is the share of admissions for population i at hospital j which had most elective admissions from the population in year t . The *MainShare* variable gives an indication of how important the largest hospital is for the i 'th population.

$$Herfindahl_{it} = \sum_j (x_{ijt} / \sum_k x_{ikt})^2$$

is the Herfindahl index for population i in period t and varies between 1 (only 1 provider used) and $1/n_{it}$ where n_{it} is the total number providers used.

Switching measures

The number of hospitals, the share of the largest hospital and the Herfindahl index make no allowance for the volatility of market shares as they do not depend on the identity of hospitals used in any given year. A population could have the same measures in two years with the same set of hospitals or with an entirely new set. We measure how active commissioners are in moving their business amongst hospitals, using three *switching* measures based on changes in the identity of hospitals used by populations from year to year. The first two measures allow for mergers amongst providers as the identity of hospitals used may change because of mergers, with no change in actual patterns of the use. This was only really an issue for analysis prior to 2002/3 as most mergers had already taken place by then.

$$AddShare_{it+1} = \sum_{k \in N_{it+1}} x_{ikt+1} / \sum_{j \in P_{it+1}} x_{ijt+1}$$

is the share of elective admissions for population i in year $t+1$ at hospitals who were used for the first time in year $t+1$. N_{it+1} is the set of hospitals at $t+1$ which were new to the purged list and P_{it+1} is the set of all hospitals used by patients in unit i in year $t+1$.

$$DropShare_{it+1} = \sum_{k \in D_{it+1}} x_{ikt} / \sum_{j \in P_{it+1}} x_{ijt+1}$$

is the ratio of the sum of elective admissions for population i in year t at hospitals who were used in year t but not in year $t+1$ to total admissions in year t . D_{it+1} is the set of

hospitals on the purged list who were used by population i in year t but not in year $t+1$.

$AddShare_{it+1}$ and $DropShare_{it+1}$ will not in general be equal. For example, a commissioner might drop one large hospital and increase use at all other existing hospitals without using any new ones (i.e. hospitals never before used).

$$ChangeShare_{it+1} = \frac{1}{2} \sum_j \left(\frac{x_{ijt+1}}{\sum_k x_{ikt+1}} - \frac{x_{ijt}}{\sum_k x_{ikt}} \right)^2$$

sums the squared difference between the shares of elective admissions at hospitals used by patients in population i between years t and $t+1$. The measure can also be written as

$$ChangeShare_{it+1} = \frac{1}{2} [H_{it+1} + H_{it}] - \sum_j \left(\frac{x_{ijt+1}}{\sum_k x_{ikt+1}} \cdot \frac{x_{ijt}}{\sum_k x_{ikt}} \right)$$

where the first part is the average of the Herfindhal indices in t and $t+1$, and the second part is akin to a covariance or correlation measure for the shares of admissions at hospitals used by patients in population i in the two years. A lower correlation implies a higher degree of switching between providers. If there is no switching the $ChangeShare$ measure is zero.

Regression models

We estimate difference-in-difference (DID) regression models of the PCO level commissioning measures:

$$y_{it} = \beta_0 + \beta_1 HRG_{1i} + \beta_2 HRG_{2i} + \lambda C_i + \sum_{t=1}^{11} \omega_t D_t + \sum_{t=1}^{11} \phi_{1t} HRG_{1i} D_t + \sum_{t=1}^{11} \phi_{2t} HRG_{2i} D_t + \sum_{t=1}^{11} \phi_t C_i D_t + \varepsilon_{it}$$

where y_{it} is the commissioning measure, HRG_{1j} is an indicator for the first 15 HRGs covered by PbR; HRG_{2j} is an indicator for the second group of 33 HRGs covered by PbR, C_j is the average patient choice, and D_t is a year dummy for year with the baseline year set to 2002/3. We use pooled OLS to estimate the models. The effects of

PbR (and choice) policy are identified by comparison of the interaction coefficients ϕ_{1t} (and ϕ_t) for years before and after the relevant policy came into effect.

In the Equation above, we make no allowance for the introduction of Foundation Trusts. In future work, we plan to allow for Foundation Trust effects by including measures of the importance of Foundation Trusts for each PCT.

5 Results

Concentration measures

Figure 2 shows the trends in concentration for ‘frozen’ 1997/8 HAs, ‘frozen’ 2004/5 PCTs and ‘frozen’ 2006/7 PCTs for all HRGs from 1997/8 to 2007/8. The three measures all show that the concentration of admissions increases up to 2002/3 and then declines. The trends are very similar for all frozen geographies so that the reduction in concentration since 2003/4 is not an artefact of geography.

Figure 3 shows the Herfindahls for ‘frozen’ 2006/7 PCTs in 1997/8, 2002/3 and 2007/8. Darker shades indicate higher concentration levels.

Switching measures

Table 3 has summary statistics for the switching measures. Between years 1998/9 and 2002/3, the share of admissions dropped from hospitals is greater than the share sent to new providers (i.e. not used by the PCT in the previous year). This is consistent with the increasing trend in concentration and suggests that purchasers tended to shift patients from dropped hospitals to existing hospitals, rather than introducing hospitals previously not used. However, trend was reversed between 2002/3 and 2007/8 as the share of admissions dropped from hospitals is lower than the share sent to new hospitals. These results suggest that commissioners were actively using providers they had previously not used.

There is no obvious temporal trend in the *ChangeShare* switching measure, although we find some trends in the “*correlation*” between shares of admissions over years, which increases in 1997/8-2003/4 and then declines.

Regression results

Table 4 reports results from the pooled OLS estimates of the impact of PbR and patient choice on the concentration measures.

Underlying trends. The year coefficients in Table 4 show the trends in changes in concentration relative to the baseline year 2002/3 for HRG3. We have examined elsewhere the reasons for the trend increase in concentration to 2002/3 (Dusheiko et al, 2008) and suggested that it was due to mergers of providers and the abolition of fundholding in 1998/9.

From 2002/3, concentration seems to have decreased for HRG3. The number of providers used increased by 3.7 from 2002/3 to 2007/8. There were downward trends in the share at the main provider (by 0.093 from 2002/3 to 2007/8) and the Herfindhal (by 0.11 from 2002/3 to 2007/8).

The trends in the *DropShare* and *ChangeShare* year coefficients suggest that purchasers' willingness to move admissions amongst providers fell up to 2002/3 and then increased, though there was no obvious trend in *AddShare*.

Figure 4 plots the trends in the estimated differences in the commissioning measures between HRG groups derived from the regression estimates reported in Table 4. We report results only at 'frozen' 2004/5 PCT, since this level has more variation in the choice variable. Results using the other geographies are very similar.

Payment by Results effects. The first column in Table 4 reports the results for the number of hospitals used. The coefficient on HRG1 indicates that in 2002/3 the number of hospitals used for patients with HRG1 conditions was significantly lower than the number of hospitals used for patients with HRG3 conditions. This is to be expected as there are very many fewer admissions and conditions in the HRG1 group than in the baseline HRG3 group.

The plot of the difference between NumProv for HRG3 and HRG1 in Figure 6 is derived by taking the sum of the estimated coefficients on HRG1 and the relevant

interaction of the year and HRG1 indicators. After the introduction of the PbR policy for HRG1 in 2003/4, the negative difference between HRG1 and HRG3 conditions increases to 2005/6. From 2005/6, when the national tariffs started to be rolled out to the HRG3 group, the difference between NumProv HRG3 and HRG1 declines.

The coefficient on HRG2 in Table 4 indicates that in 2002/3 the number of hospitals used is, unsurprisingly, significantly lower than the number of hospitals used by patients with HRG3 conditions. Figure 6 shows that the introduction of PbR for HRG2 in 2004/5 reverses the previous decline in difference between HRG3 and HRG2 until 2006/7, when PbR is applied to the HRG3 group as well.

The plots of the trends in the differences between HRG3 and HRG2 for the Herfindahl and MainShare also suggest that PbR has had an effect on concentration. In 2002/3 the Herfindahl and MainShares for HRG1 and HRG2 are larger than for HRG3 because of the smaller number of patients and conditions they cover. These differences increase after the introduction of PbR policy and then decline as PbR is rolled out to increasingly affect HRG3. These results suggest that PbR policy had the effect of increasing concentration. But note that none of estimated interaction terms in Table 4 are statistically significant and the effects are quite small relative to the means of the concentration measures.

The last columns of Table 4 report the results for our switching measures. In 2002/3, purchasers sent a higher proportion of HRG1 and HRG2 patients to hospitals they had not used in the previous year compared with HRG3 patients. This is to be expected because there are fewer patients in HRG1 and HRG2, so that switching a patient has a bigger proportionate effect than for HRG3. When the PbR was applied to HRG1 in 2003/4 and 2004/5 the difference increases: relative to HRG3, purchasers exposed to PbR use more new providers and drop more old providers. When PbR starts to affect HRG3 the difference in behaviour is reduced. The same pattern is visible for HRG2 compared with HRG3.

The coefficients on the interactions of the coefficients on HRG1 and HRG2 with the year dummies after 2002/3 do not show any obvious effects of PbR.

Patient choice effect. The last rows in Table 4 report the estimated impact of patient choice on the commissioning measures. After the introduction of patient choice in 2006/7, we find an increase in the concentration of commissioning and a decrease in switching in the areas where the proportion of patients with offered choice is higher. In contrast to PbR, the estimated effects of patient choice are generally statistically significant.

6 Discussion

One of the difficulties in evaluating the impact of specific reforms in the NHS is that they are inter-related, they have often been introduced universally and simultaneously and many have multiple, and sometimes competing, aims. It is therefore difficult to identify with confidence which elements of the reforms are responsible for the changes in outcomes of interest. In this study, we have focused on some of the key policies that appear in principle to be mutually reinforcing, supporting the notion of more active purchasers operating within a more diverse and pluralistic market. We take advantage of the phased introduction of the policies and the existence of panel data, in an attempt to overcome the shortcomings of observational data.

This is work in progress. The results reported are provisional and tentative. Overall, we find evidence of a more diverse provider side with use of larger numbers of providers, including the private sector, and we can observe that commissioners are actively switching referrals between providers. There is some weak evidence that PbR and patient choice have, to some degree, increased rather than reduced concentration. However, the effects of PbR were small and statistically insignificant.

An increase in concentration due to PbR and patient choice does not necessarily imply that policy is not having beneficial effects. A fixed tariff means that purchasers' decisions may therefore be driven by aspects of quality. PbR may have strengthened the role of patients' preferences in the commissioning decisions of purchasers as it provides commissioners with a relatively transparent and easy mechanism for switching referrals. Higher concentration following the introduction of patient choice may also be driven by patients' preferences for hospitals offering higher quality care in the form of shorter waiting times for instance or their preferences for hospitals

closer to home. If higher levels of concentration were the result of inertia on both the supply and demand side, then we might be concerned that the system reform policies were not having an impact on the old-style monolithic NHS. But if the preferences and decisions of patients and commissioners are based on good evidence of better quality or more convenient care, then we should not be concerned that money is following the patients in a way that ultimately tends towards higher levels of concentration.

We will be refining the analysis to see if firmer conclusions can be drawn:

(a) We have made no allowance for the introduction of Foundation Trusts in the statistical analysis and plan to use measures of the extent to which different PCTs use them.

(b) Our measure of the extent of patient choice is time invariant. We plan to use data which will allow the construction of measures which vary over time as well as across PCTs.

(c) Our work makes no allowance for the introduction of practice based commissioning. This may be reasonable since it was not widespread in the period up to 2007/8. However the delegation of commissioning from PCTs to practices or consortia of practices will potentially have a greater effect in the subsequent years which we will be adding to our analysis.

(d) The use of pooled OLS is valid only if there are no unobservable PCO level effects correlated with the explanatory variables. It is possible that these effects are correlated with the measure of choice we have used and will be correlated with measures of FT utilisation we plan to introduce. We will use panel data methods to allow for PCO effects and will consider whether we need to allow in addition for serial correlation in the errors.

References

Dusheiko M, Goddard M, Gravelle H, Jacobs R, 2008, Explaining trends in concentration of healthcare commissioning in the English NHS, *Health Economics*, 17: 907–926.

Department of Health, 2000, *The NHS Plan: a plan for investment, a plan for reform*, Department of Health, London.

Department of Health, 2002a, *Reforming NHS financial flows: Introducing Payment by Results*, Department of Health, London.

Department of Health, 2002b, *A guide to Foundation Trusts*, Department of Health, London.

Department of Health, 2003, *Payment by Results: preparing for 2005*, Department of Health, London.

Department of Health, 2004a, *NHS Reference costs 2003 and national tariffs 2004*, Department of Health, London.

Department of Health, 2004b, *Implementing Payment by Results. Technical Guidance 2005/06* (version 1.0), Department of Health, London.

Department of Health, 2005, *Implementing Payment by Results. Technical Guidance 2005/06* (version 2.0), Department of Health, London

Figure 1. Number of providers and elective admissions, by type of providers and by year

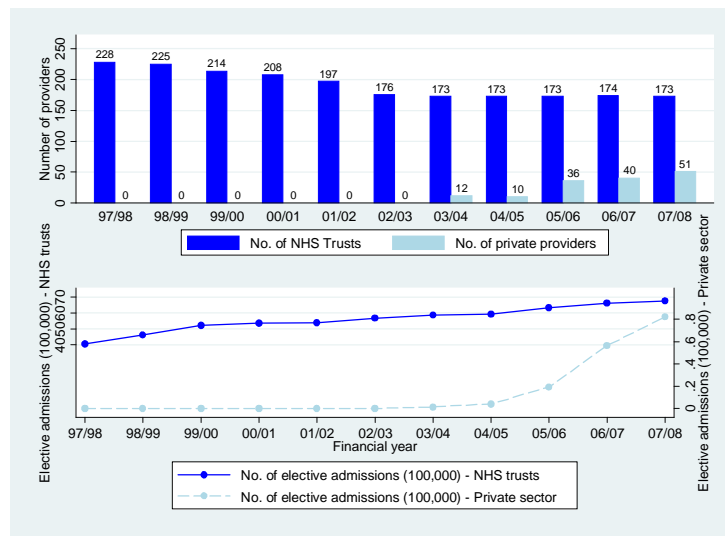


Figure 2. Commissioning patterns for all HRGs

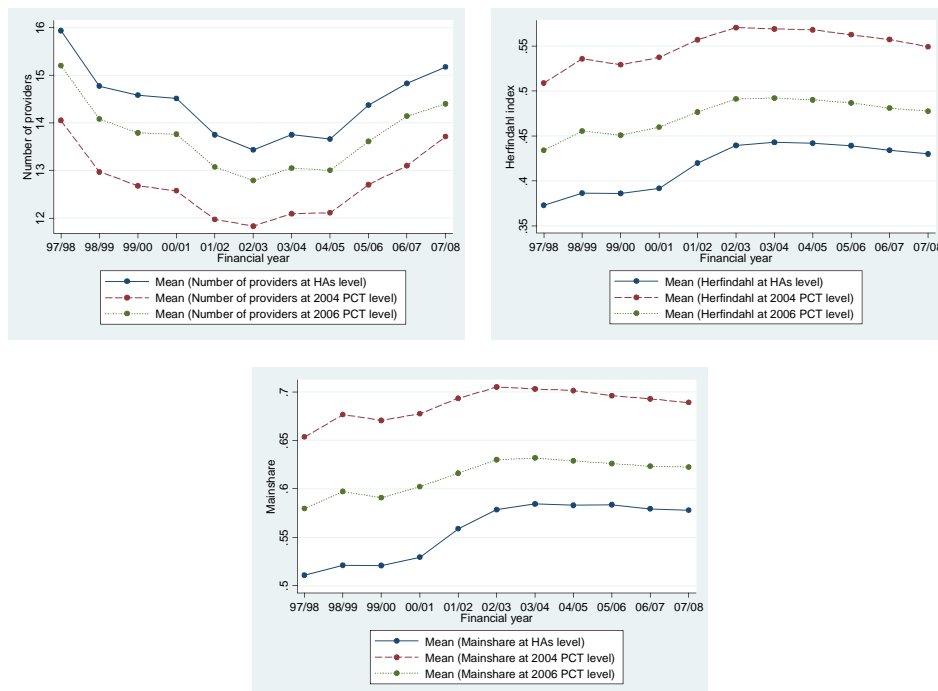


Figure 3. Herfindahls in 'frozen' 2006/7 PCTs in 2002/3 and 2007/8

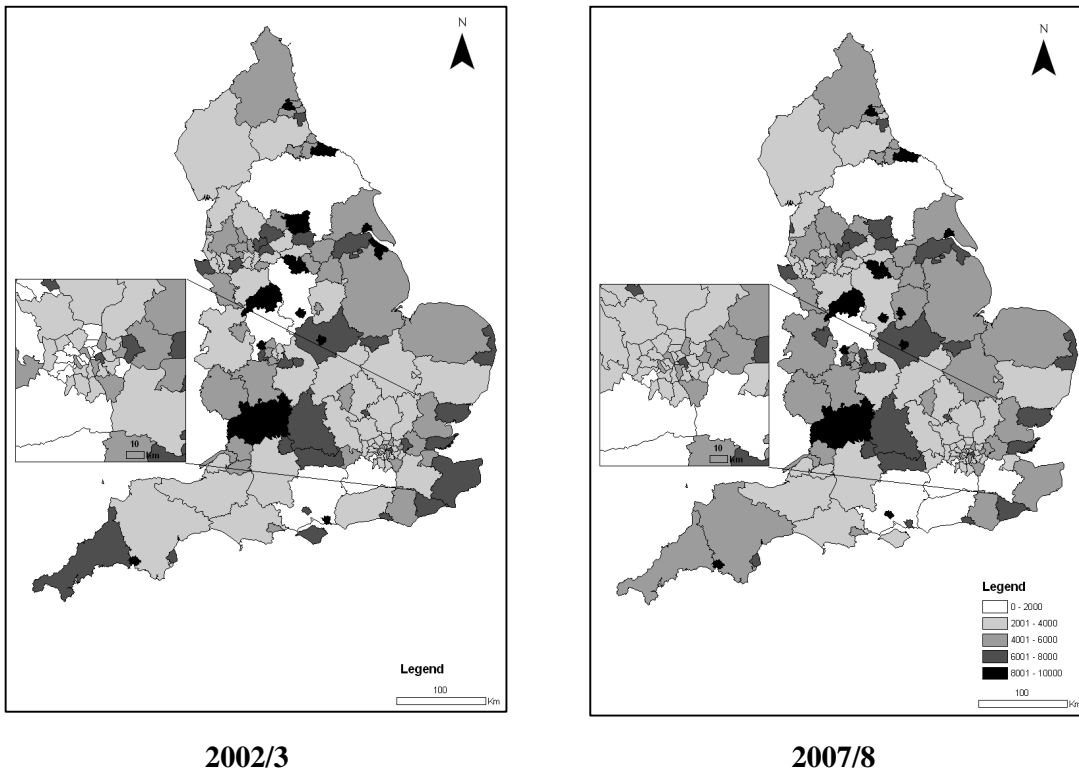
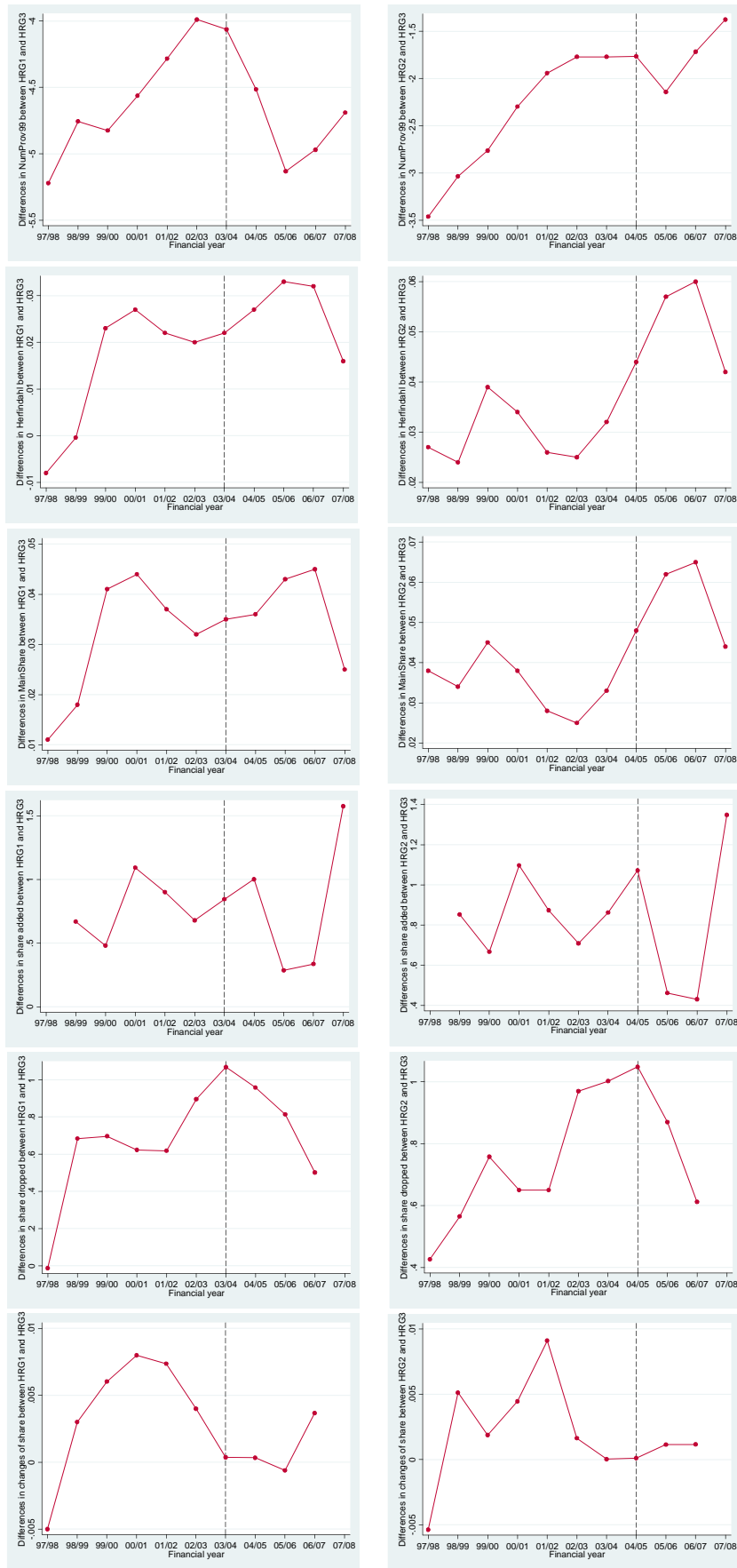


Figure 4. Trends in differences in commissioning measures for HRG1, HRG2, HRG3



HRG1-HRG3

HRG2-HRG3

Table 1. Implementation of reforms

Apr 2003	Apr 2004	Apr 2005	Jan 2006	Apr 2006	Apr 2007	Apr 2008
First 15 HRGs under PbR	Second 33 HRGs under PbR	Tariff 25% for remaining HRGs		Tariff 50% for remaining HRGs	Tariff 75% for remaining HRGs	All Trusts reach 100% PbR price
	First 25 FTs authorised	Further 7 FTs authorised		Further 27 FTs authorised	Further 30 FTs authorised	Further 26 FTs authorised
			Eligible NHS patients offered choice of 4 providers			All NHS patients offered free choice of any provider that meets NHS standards

Sources: Audit Commission of Healthcare Commission; Street A. and M. Miraldo (2007).

Table 2. Elective admissions (%) in 2007/8, by type of provider and by HRG subset

	HRG1	HRG2	HRG3	All HRGs
NHS Trusts	603,993 (0.09)	686,401 (0.10)	5,451,287 (0.81)	6,741,681
Private providers	18,502 (0.23)	13,904 (0.17)	49,603 (0.60)	82,009

Table 3. Switching measures: summary statistics

		'Frozen' 2004/05 PCTs (<i>n</i> = 303)			
		Mean	St.dev.	Min	Max
AddShare	1998/9	0.0400	0.1081	0.0002	0.7630
	1999/00	0.0756	0.1860	0.0004	0.9982
	2000/1	0.0321	0.1100	0.0001	0.9154
	2001/2	0.0652	0.1915	0.0002	0.9965
	2002/3	0.1148	0.2604	0.0003	0.9948
	2003/4	0.0338	0.1146	0.0003	0.8574
	2004/5	0.0278	0.0847	0.0002	0.6058
	2005/6	0.0354	0.0828	0.0002	0.5055
	2006/7	0.0714	0.1859	0.0002	0.9847
	2007/8	0.0095	0.0196	0.0003	0.1471
DropShare	1997/8	0.1246	0.2554	0.0005	0.9958
	1998/9	0.0714	0.1788	0.0002	0.9944
	1999/00	0.0501	0.1556	0.0003	0.9272
	2000/1	0.0863	0.2087	0.0003	0.9963
	2001/2	0.1054	0.2443	0.0002	0.9981
	2002/3	0.0271	0.1022	0.0002	0.8752
	2003/4	0.0135	0.0367	0.0003	0.3288
	2004/5	0.0136	0.0373	0.0002	0.2772
	2005/6	0.0203	0.0614	0.0002	0.5753
	2006/7	0.0245	0.0718	0.0003	0.6052
ChangeShare	1997/8	0.0661	0.1684	7.21e-06	0.8398
	1998/9	0.0466	0.1405	3.81e-06	0.7775
	1999/00	0.0384	0.1309	1.49e-06	0.7204
	2000/1	0.0619	0.1758	1.31e-06	0.8221
	2001/2	0.0640	0.1852	1.91e-06	0.9341
	2002/3	0.0125	0.0735	1.01e-06	0.5810
	2003/4	0.0010	0.0031	2.32e-06	0.0412
	2004/5	0.0009	0.0026	7.75e-07	0.0253
	2005/6	0.0143	0.0841	1.37e-06	0.7177
	2006/7	0.0044	0.0236	5.16e-06	0.3195
Correlation	1997/8	0.4563	0.2503	2.47e-06	0.9608
	1998/9	0.4859	0.2393	0.000921	0.9650
	1999/00	0.4947	0.2401	0.000015	0.9664
	2000/1	0.4852	0.2524	0.000230	0.9704
	2001/2	0.4996	0.2572	0.000275	0.9703
	2002/3	0.5573	0.2181	0.002956	0.9674
	2003/4	0.5676	0.2035	0.166889	0.9650
	2004/5	0.5643	0.2058	0.163777	0.9657
	2005/6	0.5455	0.2189	6.35e-05	0.9604
	2006/7	0.5487	0.2101	0.063397	0.9504

Table 5. Regression results

	NumProv99	Herfindahl	MainShare	ln(AddShare)	ln(DropShare)	ln(ChangeShare)
1997/98	1.862* (2.54)	-0.0971** (-3.10)	-0.0794** (-2.83)		1.906*** (6.82)	0.0639*** (3.30)
1998/99	1.154 (1.58)	-0.0625* (-1.99)	-0.0495 (-1.76)	0.0592 (0.21)	1.234*** (4.43)	0.118*** (6.08)
1999/00	0.645 (0.88)	-0.0733* (-2.34)	-0.0551 (-1.96)	0.282 (1.00)	0.900** (3.22)	0.0781*** (4.04)
2000/01	0.398 (0.54)	-0.0198 (-0.63)	-0.0125 (-0.44)	-0.561* (-1.98)	0.738** (2.65)	0.0821*** (4.24)
2001/02	0.0838 (0.11)	0.00593 (0.19)	0.0104 (0.37)	0.0289 (0.10)	0.402 (1.44)	0.0292 (1.51)
2003/04	0.276 (0.38)	-0.00180 (-0.06)	-0.000678 (-0.02)	-0.625* (-2.21)	0.227 (0.82)	0.0181 (0.93)
2004/05	0.339 (0.46)	-0.00414 (-0.13)	-0.00240 (-0.09)	-0.703* (-2.48)	0.244 (0.88)	0.0184 (0.95)
2005/06	1.192 (1.63)	-0.0198 (-0.63)	-0.0167 (-0.59)	0.124 (0.44)	0.269 (0.97)	-0.0347 (-1.79)
2006/07	3.748*** (4.28)	-0.167*** (-4.45)	-0.141*** (-4.20)	-0.688* (-2.03)	1.865*** (5.61)	0.0276 (1.19)
2007/08	3.712*** (3.88)	-0.115** (-2.82)	-0.0934* (-2.54)	-0.592 (-1.62)		
HRG1	-3.990*** (-10.32)	0.0319 (1.93)	0.0196 (1.32)	0.679*** (4.54)	0.896*** (6.07)	0.00430 (0.42)
HRG2	-1.769*** (-4.58)	0.0255 (1.54)	0.0254 (1.71)	0.709*** (4.75)	0.970*** (6.59)	0.00163 (0.16)
HRG1_1997/98	-1.231* (-2.25)	-0.0211 (-0.90)	-0.0278 (-1.32)		-0.908*** (-4.33)	-0.00901 (-0.62)
HRG2_1997/98	-1.693** (-3.10)	0.0125 (0.53)	0.00193 (0.09)		-0.543** (-2.60)	0.00676 (0.47)
HRG1_1998/99	-0.766 (-1.40)	-0.0136 (-0.58)	-0.0202 (-0.96)	-0.00985 (-0.05)	-0.213 (-1.02)	-0.000814 (-0.06)
HRG2_1998/99	-1.267* (-2.32)	0.00766 (0.33)	-0.00120 (-0.06)	0.143 (0.67)	-0.405 (-1.95)	0.00350 (0.24)
HRG1_1999/00	-0.835 (-1.53)	0.00959 (0.41)	0.00312 (0.15)	-0.199 (-0.94)	-0.200 (-0.96)	0.00203 (0.14)
HRG2_1999/00	-0.993 (-1.82)	0.0194 (0.83)	0.0136 (0.65)	-0.0421 (-0.20)	-0.212 (-1.02)	0.000239 (0.02)
HRG1_2000/01	-0.574 (-1.05)	0.0116 (0.49)	0.00665 (0.32)	0.412 (1.95)	-0.273 (-1.31)	0.00362 (0.25)
HRG2_2000/01	-0.528 (-0.97)	0.0128 (0.55)	0.00946 (0.45)	0.388 (1.84)	-0.320 (-1.54)	0.00282 (0.20)
HRG1_2001/02	-0.294 (-0.54)	0.00495 (0.21)	0.00177 (0.08)	0.221 (1.04)	-0.278 (-1.33)	0.00336 (0.23)
HRG2_2001/02	-0.175 (-0.32)	0.00279 (0.12)	0.00115 (0.05)	0.165 (0.78)	-0.320 (-1.54)	0.00747 (0.52)
HRG1_2003/04	-0.0726 (-0.13)	0.00258 (0.11)	0.00263 (0.13)	0.165 (0.78)	0.171 (0.82)	-0.00363 (-0.25)
HRG2_2003/04	-0.0132 (-0.02)	0.00804 (0.34)	0.00702 (0.33)	0.153 (0.72)	0.0312 (0.15)	-0.00159 (-0.11)
HRG1_2004/05	-0.525 (-0.96)	0.00355 (0.15)	0.00698 (0.33)	0.323 (1.52)	0.0611 (0.29)	-0.00366 (-0.25)
HRG2_2004/05	0.00330 (0.01)	0.0228 (0.97)	0.0191 (0.91)	0.363 (1.72)	0.0775 (0.37)	-0.00152 (-0.10)
HRG1_2005/06	-1.142* (-2.09)	0.0108 (0.46)	0.0126 (0.60)	-0.394 (-1.86)	-0.0830 (-0.40)	-0.00462 (-0.32)
HRG2_2005/06	-0.373 (-0.68)	0.0374 (1.60)	0.0324 (1.54)	-0.247 (-1.17)	-0.101 (-0.49)	-0.000494 (-0.03)
HRG1_2006/07	-0.980	0.0126	0.0117	-0.343	-0.395	-0.000337

	(-1.79)	(0.54)	(0.56)	(-1.62)	(-1.90)	(-0.02)
HRG2_2006/07	0.0528	0.0401	0.0348	-0.278	-0.358	-0.000477
	(0.10)	(1.71)	(1.66)	(-1.32)	(-1.72)	(-0.03)
HRG1_2007/08	-0.700	-0.00726	-0.00380	0.895***		
	(-1.28)	(-0.31)	(-0.18)	(4.29)		
HRG2_2007/08	0.393	0.0195	0.0169	0.639**		
	(0.72)	(0.83)	(0.80)	(3.07)		
Choice	-2.042	-0.195***	-0.166***	1.859***	1.084*	0.0836*
	(-1.62)	(-3.61)	(-3.43)	(3.81)	(2.26)	(2.51)
Choice_1997/98	0.909	0.105	0.0917		-0.595	-0.0255
	(0.51)	(1.37)	(1.34)		(-0.87)	(-0.54)
Choice_1998/99	0.192	0.0828	0.0702	-1.913**	-0.768	-0.237***
	(0.11)	(1.08)	(1.03)	(-2.75)	(-1.13)	(-5.02)
Choice_1999/00	0.630	0.0856	0.0577	-1.204	-1.517*	-0.150**
	(0.35)	(1.12)	(0.84)	(-1.75)	(-2.22)	(-3.18)
Choice_2000/01	0.999	-0.0433	-0.0450	-1.034	0.502	-0.0936*
	(0.56)	(-0.57)	(-0.66)	(-1.50)	(0.74)	(-1.99)
Choice_2001/02	0.233	-0.0571	-0.0625	-2.107**	1.602*	0.0620
	(0.13)	(-0.75)	(-0.91)	(-3.05)	(2.35)	(1.31)
Choice_2003/04	-0.205	-0.00149	-0.00525	-0.470	-1.136	-0.0837
	(-0.11)	(-0.02)	(-0.08)	(-0.68)	(-1.67)	(-1.78)
Choice_2004/05	-0.101	-0.00306	-0.00909	-1.385*	-1.269	-0.0850
	(-0.06)	(-0.04)	(-0.13)	(-2.00)	(-1.87)	(-1.80)
Choice_2005/06	-0.598	0.0213	0.0108	-1.871**	-0.665	0.106*
	(-0.34)	(0.28)	(0.16)	(-2.71)	(-0.98)	(2.25)
Choice_2006/07	-5.061**	0.375***	0.315***	0.815	-3.282***	-0.0976
	(-2.65)	(4.57)	(4.29)	(1.10)	(-4.51)	(-1.93)
Choice_2007/08	-3.991	0.252**	0.210**	-1.729*		
	(-1.92)	(2.84)	(2.63)	(-2.18)		
Constant	12.47***	0.638***	0.760***	-5.211***	-6.034***	-0.0166
	(24.11)	(28.80)	(38.22)	(-26.06)	(-30.67)	(-1.22)
Observations	9999	9999	9999	8092	8071	9090
R-squared	0.1522	0.0296	0.0282	0.0657	0.0845	0.0537

Z statistics in parentheses. ***1% significance level; **5% significance level; *10% significance level.