

DP No. 12/2018

**Strength in numbers; Does Horizontal Consolidation affect General Practice
Performance in England?**

Jo Blanden

j.blanden@surrey.ac.uk

Nikos Chatzistamoulou

n.chatzistamoulou@surrey.ac.uk, chatzistamoulou@gmail.com

School of Economics, University of Surrey, GU2 7XH, United Kingdom



School of Economics, Faculty of Arts and Social Sciences,
University of Surrey, Elizabeth Fry Building 04 AD 00,
Guildford, GU2 7XH, Surrey, UK. T: +44(0)01483686623,
E-mail: deliveringbetter@surrey.ac.uk,
Web: <https://www.surrey.ac.uk/better-for-less>



Abstract

This paper is the first to investigate horizontal consolidation between GP practices with a view to trying to trace its impact on practice performance. We document that the general practice industry has experienced a turbulent period, from 2013 through 2016, with the number of practices declining whereas at the same time, there has been an increase in the share of the practices that are part of a practice group. Larger practices are most likely to become members of a practice group. However, consolidated and unconsolidated practices exhibit significant differences in practice characteristics, funding and performance. Analysis of a short panel covering 80% of English practices reveals that the overall QOF achievement score of consolidated GPs is 5-10 percent of a standard deviation higher in consolidated practices compared to those who have not joined a group. Patient satisfaction seems to be unaffected by market status, at least in the short run. There is evidence that QOF scores rise when practices consolidate but this is entirely driven by the growth in full-time equivalent GPs (practice size) that is linked to consolidation. The limitation of our hand-collected data is that it does not give precise information about the actual type of agreement between the parties that being consolidated implies. However our exploratory findings pave the way for further research in this area.

Keywords: General Practice, Mergers, Practice Size, Payments, Quality, Patient Satisfaction

JEL Classification codes: C23, D22, I11, I30, L11

Acknowledgments

The authors would like to thank The Leverhulme Trust (RL-2012-681) for the financial support through the research project “Better for Less: Improving Productivity in the Public Services”. The authors would also like to thank the advisory group of the project as well as the participants of the 12th European Health Economics Association conference held in Maastricht, The Netherlands in July, 11-14 2018 for useful comments and suggestions on earlier versions of this paper.

Conflict of interest & Ethical consideration

The authors declare that there is no conflict of interest. This study was reviewed using the University of Surrey’s ethics procedures and was found to have no ethical concerns.

1. Introduction and Motivation

General Practices (GPs) are at the forefront of the National Health Services (NHS); they are the first port of call for patients and the gatekeepers for other services. In recent years more and more is expected of GPs, and resources have failed to keep pace. On the demand side patient expectations have risen (Kings Fund, 2016 pressures) as have those of politicians, with the Conservatives pledging 7 day access to GP services in their 2015 Manifesto.¹ GPs have become more accountable to both through the requirements of the Quality of Outcomes Framework (QOF) and the Clinical Care Commission (CCC). In addition, improved medical technology and enhanced preventative practices have raised the cost of looking after patients. On the supply side the funding for GPs has been falling as a share of total NHS spending (Kings Fund, 2016) while spending on the NHS overall between 2009–10 and 2015–16 had the lowest five year increase since the NHS was created (Stoye, 2017), as well as facing increasing competitive pressure as restrictions on GP location and patient choice.

Kelly and Stoye (2014) find that practice size grew from 2004-2010 and that larger practices perform better across a range of measures. It therefore seems reasonable to infer that the growth in practice size is in part a reaction to the pressures discussed above, even though the figures from Kelly and Stoye precede their most acute manifestations. Anecdotal evidence indicates that the primary care industry has experienced a wave of horizontal consolidation, where practices join forces, in various ways, to deliver shared services. Specifically, the Pulse² reported that 93 practices were involved in mergers in the first five months of the financial year 2014, compared to 80 in the previous year. GP consolidation in the form of networks or sharing some sort of collaborative agreement (federations) is considered as the future of the primary care (Goodwin et al., 2011). Therefore, as a coping mechanism, GPs seem to rely on the forward momentum that *strength in numbers* yields. However, limited systematic information on the timing and the profile of the participants in a merger in primary care has been readily available for GPs, and this can partly explain the lack of evidence on the prevalence and effects of consolidation in this part of the NHS while we know even less about their impact on practice performance outcomes.

This paper is the first to attempt to understand the level and trend in horizontal consolidation activity among GPs in England and to explore the influence between horizontal consolidation and practice performance. Our paper builds on the picture presented in Kelly and Stoye (2014) by outlining more recent trends in practice size and examining the influence between

¹ <https://www.kingsfund.org.uk/publications/articles/government-pledge-seven-day-services>

² <http://www.pulsetoday.co.uk/hot-topics/stop-practice-closures/sharp-rise-in-gp-mergers-as-smaller-practices-struggle-to-stay-above-water/20007879.article>

consolidation, practice growth and outcomes. As we do not have any quasi-experimental variation in either of these important variables, our analysis is exploratory rather than strictly causal, nonetheless our short panel allows us to use difference models to eliminate some of the impact of unobserved heterogeneity in a way that is not possible for [Kelly and Stoye \(2014\)](#).

Our paper is the first in the international literature to consider horizontal consolidation activities for GPs, although there has been some consideration of the topic for the wider healthcare market in the US. [Gaynor and Haas-Wilson \(1999\)](#) discuss the changes and consolidation trends in health care markets documenting an undeniable trend, although like us they cannot be precise about the exact form of consolidation. [Kletke et al., \(1996\)](#) mention that the portion of physicians working for a hospital or other managed care organizations has increased by almost 10 percentage points from 1991 through 1995 while and [Japsen \(1997\)](#) documents a rise in physician mergers and acquisitions between 1995 and 1996 (126 to 218) study vertical mergers between hospitals and family physicians. Therefore, consolidation in healthcare proves to be a non-negligible issue as it is linked to the performance of the health system and patient wellbeing.

Competition and mergers between hospitals have been studied extensively. Studies on the impact of competition on the quality of services ([Kessler & McClellan, 2000](#); [Gaynor, 2004](#); [2007](#); [Propper et al., 2004](#); [2008](#); [Cooper et al., 2011](#)) provide mixed evidence, casting doubts on the benefits of competition. Another segment of the literature has benefited from detailed data on the profile of the merging entities, allowing for a pre- and post-merger analysis to determine the overall effect of mergers on competition, patients' welfare and quality of services ([Fulop et al., 2005](#); [Gaynor et al., 2012](#); [Collins, 2015](#)).

We develop the analysis of consolidation effects on practice performance by using two alternative performance measures. The QOF score is recorded by the regulator while the overall experience with the practice comes from a patient survey. We focus on those to consider the impact of consolidation from both sides of the GP market. We base our analysis on hand-collected data from the NHS choices web portal which indicates if an individual practice is part of a practice group, matching this with information for practices on quality, patient satisfaction and financial flows. We might anticipate that practice capacity and consolidation will be beneficial for GPs as larger units have greater access to the necessary resources (e.g. technology access, diversify the staff mix), however the effect on alternative outcomes remains to be explored.

Our analysis reveals a shrinking trend in the GP market consistent with the study of [Kelly and Stoye \(2014\)](#), showing increasing consolidation activity and steadily increasing average payments per practice within the period. As anticipated, these trends are accompanied by more practices entering into formal agreements with each other, where this activity is concentrated

among the larger existing practices. Pooled cross sectional models reveal that both consolidation and (larger) practice size lead to better outcomes in the QOF, but exert no and moderate effects respectively in terms of patient satisfaction. A trade-off in the form of an inverse U-shaped relationship between performance and size is documented. In the medium-run, however, positive changes in practice size boost performance.

Our study faces a number of limitations. First, we know very little about the internal process of consolidation. The data we use does not enable us to match together the practices that are forming a group and therefore trace the consequence of consolidation for the new entity (if formed). Also, consolidation does not necessary imply a merger, perhaps due to ethical protocols regarding the patient records sharing among the merging entities, therefore practices might join forces under a different arrangement allowing for more continued independence. Second, we have relatively few variables to enable us to understand the mechanisms that influence or drive consolidation decisions. Therefore, despite our use of panel data and focus on changes in status our results may not be free from omitted variable bias. It is very clear that better data could enable a fuller appreciation of the causes and consequences of consolidation activity among GPs but this initial analysis highlights some important trends, and indicates an area ripe for further research.

The papers unfolds as follows. Section 2 describes the data and the market status variable collection by matching the address and postal code of the practice, Section 3 presents the methods, Section 4 describes the GP industry and discusses the results of the consolidation effect on practice performance outcomes in the short- and medium-run as well while Section 5 concludes the paper.

2. Data

We devise a unique dataset by collecting, matching and harmonising data from complementary databases. The dataset benefits crucially from hand-collected data on market status, as such data is not officially maintained at present

Panel A of Table A1 (in Appendix) displays the variables along with a brief description and the sources we relied on to compile the final dataset including 8,262 general practices across England over four financial years³, from 2013/14 through 2016/17. That is, 32,091 observations in the panel dimension. 94% of practices are observed over the whole period while the remaining 6% represents other patterns included for representativeness. On average, we account for almost 80% of the general practice universe across England (Section A1, Table A2 Appendix). Panel B of Table A1 provides descriptives for the basic variables.

We categorize the variables into three blocks. The characteristics of the practice, the practice funding and the practice performance outcomes⁴. Data on market size, practice size, practice funding and quality achievement scores, was collected through the NHS Digital and data on patient satisfaction was collected through various editions of the General Practice Patient Surveys. Data on market status was hand-collected through the NHS Choices portal.

Market size is the number of registered patients with each practice, practice size is the number of full time equivalent (FTE) doctors in each practice capturing the capacity of the practice and market status captures the type of each practice. Practice funding (in £) is captured by the global sum payments each practice receives from the NHS England for the services it provides to the local population. It accounts up to 60% of the total funding a practice receives and is calculated by the multi-faceted Carr-Hill formula, considering many aspects of the practice catchment area, patient characteristics and including a market forces factor as well. Practice performance is measured as the quality set by the regulator (QOF achievement score) and by the patient (patient satisfaction) respectively.

³ The data for the financial years have been coded in the way that each financial year represents the year it starts (i.e. 1st of April of that year, 1st of Apr to 31st of Mar is how the financial year lasts), so the financial years 2013/14, 2014/15, 2015/16 and 2016/17 have been coded as 2013, 2014, 2015 and 2016 respectively.

⁴ As an additional practice outcome, the number of total written complaints by area (medical, administrative and other complaints) attached to the practice level provided by the NHS England, was also considered. However, the frequency of non-missing values (62.73%) compromises its representativeness in the sample, as opposed to QOF values (93.78%) and to patient satisfaction (98.7%), and therefore has not been included as an outcome in the main analysis. However, results can be found in Table A6 in the Appendix. Data on written complaints is provided by the NHS Hospital and Community Health Service and Family Health Service .can be found at <https://digital.nhs.uk/catalogue/PUB30080> .

2.1 Tracking the market status of the general practice

The research design to identify the market status is as follows. Using the practice address and postal code, we record the market status of the practices in the sample through the NHS Choices web portal. More precisely, the latter contains information on several aspects of the practice profile. The most relevant information to identify the market status is provided by the field labelled “Other branches”. This indicates whether a practice is part of a practice group, however it neither names consistently the other members of the group nor informs about the underlying form of agreement scenario between the practices i.e. merger, acquisition, take over, partnership, federation, in spite of being in the same practice group. Nonetheless, this variable is useful for indicating which practices have been involved in consolidation activity of some type.⁵

We need to note that many terms have been used to describe the case when more than one practice joins forces under a single group (e.g. mergers, acquisitions, consolidation, federations, partnerships networks, collaborations, joint ventures, alliances). There are differences though (Section A2, in Appendix). We adopt the generic term consolidation to identify that a particular practice has been recorded as part of a practice group. Ultimately, we identify three types of practices, the consolidated i.e. those recorded as part of a practice group (17.25% of the sample), the unconsolidated (81.72%) and those that are permanently closed ones (1.03%).

Another point that deserves clarification is the timing of the market status recording. The necessary but reasonable assumption is that the date of the last update reported on the NHS Choices site corresponds to the last time there was a change in the market status. Although it is possible that in some cases the actual timing has been mismeasured. To limit this possibility, dates were cross-referenced with the other practices in the group, where these are known. We capture a snapshot of the market status nonetheless, capturing variation over time by the last known update provided on the webpage and by the cross-referencing process. As has already been mentioned, information on the other members of the group is insufficiently complete to allow analysis at group level; so we cannot trace the combined fortunes of practices that consolidate.

⁵ It was confirmed by the responsible authority (HSCIC-Exeter Database; NHS Digital) that official data on mergers and information on the merging practices is not maintained by the NHS at the general practice level.

2.2 Assessing the performance of the general practice

The aim is to study whether practice performance has been affected by market status. As is common in the literature, we measure practice performance by the QOF achievement score (Gaynor et al., 2012; Santos et al., 2017) and patient satisfaction levels (Cleary & McNeil, 1988; Ford et al., 1997). The correlation coefficient between the two quality indicators is very low (.034), indicating that they capture alternative aspects of the general practice performance indeed.

The QOF is an annual voluntary scheme (however, most practices have enrolled) first introduced in 2004 as part of the new GP contract. It is a universally accepted framework that incentivises performance by rewarding the quality of services provided (Sutton et al., 2010; Harrison et al., 2014). The QOF is formed of three sub-domains (clinical quality, public health, and public health additional services), based on indicators that are reported to NHS England by GP Practices and subject to audit. The precise indicators vary from year to year so to minimise noise across the sub-fields, and although we consider the sub-domains as well, we focus on the overall achievement score (from 0 to 1, in percentage points).

Our patient satisfaction measure comes from GP patient surveys running periodically after 2007. For the years we consider, there have been four waves, in December 2013, January 2015, January 2016, and July 2016. Patient satisfaction corresponds to the patient-reported measure capturing a good (and a poor) overall experience with the practice⁶. We focus however on the good overall experience and include the latter for the sake of completeness. As this measure is collected through delivered questionnaires, it has been adjusted via weighting by the responsible authority to show results as if all patients had responded due to relatively high attrition rate attached to such kind of surveys. However, patient experience is multi-dimensional and as Carr-Hill (1992) mentions developing and analysing patient satisfaction surveys is a complex task. In this setting and given the relative scarcity of patient reported outcomes about the perceived performance of the practice, it serves us as it sheds light on how well GPs interact with patients. As a final remark, up until 2014 there was a patient experience domain in the QOF which was discontinued later on while in 2013 there was hardly variation in that as most practices, if not all, achieved the maximum number of points. Using data from patient surveys ensures that the patient side is still considered.

⁶ Questionnaires are distributed to the registered patients to answer about their "Overall experience with the practice". There are 5 possible answers, Very Good, Fairly Good, Neither, Fairly Poor, Very Poor which represent the frequency of patients' answers. Then the first & last two categories are summed up to form the overall good and poor experience which is used as a proxy to patient satisfaction levels. Due to relatively high attrition rates attached to the survey, weighting has been performed as if all distributed questionnaires had been filled i.e. as if all patients had responded.

3. Research strategy

The analysis is developed as follows. First, we describe the general practice market and the profile of the practices based on market status. We discuss these descriptive statistics in Section 4.1.

Then, we explore the main research question, *whether market status exerts a significant influence on the performance of the general practice.*

We specify and estimate the following empirical model to explore the drivers of practice performance:

$$PracticePerformance_{it} = \alpha_0 + \beta_1 MarketStatus_{it-1} + \boldsymbol{\gamma} Controls + \varepsilon_{it} \quad (1)$$

where practice performance corresponds to the overall QOF achievement score, its sub-domains (actual quality) and patient satisfaction levels (perceived quality, good experience) of the i -th practice in year t ,

$MarketStatus_{it-1}$ is a binary variable indicating whether the practice has been recorded as part of a practice group the year before, while one lag allows time for the effects to be felt and reduces the potential for reverse causality. Control variables, include the practice-based global sum payments the year before. As payments are revised annually, lags have been used to rule out reverse causality issues as well as to treat autocorrelation. Practice size (number of FTE GPs) captures practice capacity while lagged values reflect how contemporaneous practice performance is affected by past changes in practice size. Clinical commissioning group fixed effects and year effects are included to control for trends over time and differences between areas.

Consolidation status is not random, and may be correlated with unobserved aspects of the GP practice that are also correlated with performance, generating a spurious influence between consolidation and outcomes. We have explored the possibility of using instrumental variables (such as funding changes) to deal with this problem, but did not find any suitable candidates. We test the robustness of our results by employing the long differences estimator. The latter is defined as the difference between the last and the first period so that changes in consolidation status are related to changes in performance. This rules out the influence of time invariant heterogeneity, but cannot deal with correlations between the decision to consolidate and trends in performance.

Both outcomes and predictors have been standardized to downsize measurement scale effects. Idiosyncratic shocks are captured by the disturbance term ε_{it} while $\alpha_0, \beta_1, \boldsymbol{\gamma}$ are the parameters to be estimated. We discuss the results in Section 4.2.

4. Discussion and results

4.1 Describing the general practice industry

Table 1 below provides an overview of the general practice market in England and illustrates many of the trends that have been noted by the press⁷. More precisely, we show that the total number of general practices is shrinking⁸ and the number of the FTE⁹ GPs reduces following the declining trends of the previous decade, as recorded by [Kelly and Stoye \(2014\)](#).

Recent evidence from the Care Quality Commission ([CQC, 2016](#)) supports our findings. The registered population steadily increases over the period, following the pattern of the previous decade ([Kelly & Stoye, 2014](#)), indicating that each practice serves more patients as time goes by.

Total payments from the NHS to individual practices increase as the global sum, experiencing a massive increase of 55%, while payments from the QOF reduced. QOF payments used to incentivize higher quality ([Propper et al., 1998](#); [Sutton et al., 2010](#); [Feng et al., 2015](#)), however, findings are aligned with recent evidence arguing that GPs earn less from QOF and funds switched to global sum as a measure to constrain secondary care admissions ([Hawkes, 2014](#)).

Table 1 Description of the general practice industry in England

Variables	Year				Change 2013-16
	2013/14	2014/15	2015/16	2016/17	
Total no. GPs	40,322	39,866	35,130	37,431	-7.17%
Total no FTE GPs	35,042	34,813	27,909	28,833	-17.72%
No of practices	8,162	8,084	7,981	7,864	-3.65%
Registered population (weighted) (1,000s)	56,100	56,600	57,400	58,700	4.43%
FTE GPs per (weighted) patient	0.625	0.615	0.625	0.491	-21.44%
FTE GPs per practice	4.29	4.31	4.41	3.6	-16.08%
Weighted patients per practice (1,000s)	6.9	7	7.2	7.5	8.70%
Total payments (1,000s)	7,970,000	8,230,000	8,370,000	8,880,000	11.42%
Global sum payments (1,000s)	2,050,000	2,280,000	2,680,000	3,180,000	55.12%
QOF payments (1,000s)	1,030,000	744,000	704,000	691,000	-32.91%

Note 1: Monetary values are in constant 2016/17 prices using UK's Gross Domestic Product deflators.

Note 2: For the rest .18% of the practices in the sample, the contract type was unknown and those have not been considered.

⁷ The Telegraph (2014), <http://www.telegraph.co.uk/news/health/news/10778519/Decline-of-the-traditional-family-doctor-revealed.html> and the Guardian (2014), <https://www.theguardian.com/society/2014/jun/14/gp-numbers-fall-recruitment-crisis-bites>

⁸ However, this decrease does not necessarily imply that existing practices exit the primary care sector, it might be attributed to the dissolution of some practices and the formation of larger groups instead or a combination of both.

⁹ This measure is results from the fraction of total hours worked by the general practitioner to the full time working week of 37.5 hours. This convention makes the aggregation of hours of full and part-time doctors by practice or area. A FTE value of 0.5, indicates a doctor who works half the time and so on ([Kelly & Stoye, 2014](#)).

4.2 Focusing on consolidation activity and trends

First we describe the intensity and trend in consolidation activity. Table 2 below presents the proportion of practices in our sample that are found to be ‘consolidated’ by our definition in each year. Overall, almost one in five practices is recorded as part of a practice group while the vast majority of practices remain unconsolidated.

Consolidation activity exhibits an increasing trend over time, consistent with our expectations from more informal sources. In 2013/14, 13 percent of practices were consolidated compared with one in five in the more recent years. The number of permanently closed practices increases over time, as in [Kelly and Stoye \(2014\)](#), who also document a reduction in the number of practices in England for the period 2004-2010. A plausible explanation for this intense wave of closures could be the financial pressure GPs face.

Table 2 Consolidation activity

Year	Consolidated	Market status		Total no. of practices
		Unconsolidated	Permanently Closed	
2013/14	12.79% 1,039	87.08% 7,074	.14% 11	8,124
2014/15	16.86% 1,358	82.63% 6,656	.51% 41	8,055
2015/16	19.98% 1,592	79.13% 6,306	.79% 71	7,969
2016 /17	19.49% 1,529	77.87% 6,108	2.64% 207	7,844
Over the period	17.25% 5,518	81.72% 26,144	1.03% 330	

Source: Own construction

Note: Numbers correspond to frequencies.

4.2.1 Describing the profile of the general practices

Based on the characteristics of the practice, the practice funding and the practice performance outcomes, we now focus on describing the profile of practice by market status and practice size category over the period (Table 3).

More precisely, there are significant¹⁰ differences between unconsolidated and consolidated practices in every aspect of the practice, except for patient satisfaction. On the one hand, consolidated practices appear to be bigger, with more GPs and longer patient lists. They are better funded (both in global sum and quality payments). On the other hand, unconsolidated practices perform better in terms of patient satisfaction, however the difference is non-significant. The last column refers to practices that changed their market status to ‘consolidated’ from the first to the last period, i.e. it captures flows to consolidation. The profile of those practices is similar to that

¹⁰ Statistical significance is determined by t-tests.

of the consolidated ones, if anything they are slightly better funded and better performing, although not as large. These features might indicate a positive selection into consolidation. Our differenced models will help us to confirm this point by looking at changes in outcomes when practices integrate.

Shifting the attention to practice size categories, for consistency, we follow the convention of Kelly and Stoye (2014) in splitting them into 4 groups; single handed, small-medium, medium-large and large¹¹. The general practice industry over the period is mostly comprised by small-medium unconsolidated practices. However, 30% of the consolidated practices are large practices.

Finally, although it is reasonable that consolidated practices have larger capacity (here in terms of FTE GPs), due to limited information on the number and composition of the GP group, we cannot argue that consolidation itself is generating this difference in size.

Table 3 Profile of practices by consolidation status

	Unconsolidated throughout	Consolidated throughout	Became Consolidated
Percentage of practices	81.72% 26,144	17.25% 5,518	6.78% 528
Characteristics of the practice			
Registered population	6,694 (3,935)	10,043 (5,714)	10,423 (5,961)
Practice size	3.94 (2.79)	5.72 (3.91)	5.53 (3.65)
Practice funding			
Total payments	964,981 (607,538)	1,537,143 (902,661)	1,615,159 (962,862)
Global sum payments	308,827 (326,122)	435,423 (467,957)	519,803 (504,477)
QOF payments	92,990 (65,194)	137,473 (90,244)	125,725 (77,017)
Total payments per patient	145.960 (3.332)	146.515 (3.295)	151.37 (.00)
Practice performance outcomes			
Overall QOF score	.948 (.076)	.960 (.066)	.968 (.089)
Patient satisfaction	.532 (8.212)	.403 (10.735)	.413 (9.966)
Practice size categories			
Single-handed	89.99% 3,093	10.01% 344	2.64% 11
Small-medium	88.84% 8,428	11.16% 1,059	4.79% 119
Medium-large	82.29% 8,069	17.71% 1,736	6.57% 166
Large	70.08% 4,910	29.92% 2,096	11.81% 175

Note 1: Permanently closed practices account for the 1.03% of the sample and have not been included.

Note 2: Numbers correspond to frequencies while parentheses correspond to standard deviations and standard error respectively.

Note 3: Stars indicate significance at 1% ***, 5% **, 10% *.

¹¹ The categorization is based on the number of FTE GPs and is as follows. A practice is single-handed if FTE GPs ≤1, small-med if 1 < FTE GPs ≤3, med-large if 3 < FTE GPs ≤6 and large if FTE GPs >6.

4.3 Exploring the effect of market status on practice performance

Tables 4 and 5 below present the estimation results for pooled multivariate models as well as those of the long differences.

Focusing on Table 4A, consolidation exerts a positive and significant influence on QOF scores, overall and by sub-category as well (Model 1). Practice size (in FTE GPs) exerts a significant influence on quality levels (Model 2), while it lessens the effect of consolidation. We also notice that global sum payments matter as well overall, however the effect is present only when we do not control for practice size across the sub-domains. That being said, the effect of practice capacity is greater for the clinical domain, probably due to the fact that the indicators included (cardiovascular, respiratory, long term diseases, mental health, musculoskeletal) require more frequent consultations with the GP, so capacity is crucial compared to the others which include indicators (smoking, obesity, fertility) that are up to the patient's way of life.

Recent evidence by [GPOne](#)¹² (2017) supports the narrative that a bigger practice is associated by higher rating from the Care Quality Commission. Moreover, there is evidence that larger practices achieve a higher QOF score compared to the smaller ones ([Kelly & Stoye, 2014](#)). Therefore, it is possible that practices join a practice group to grow in size pursuing higher performance ([Given, 1996](#)). This is supported by the magnitude and significance of the market status and practice size respectively.

However, it is also possible that after the consolidation (especially in the medium-run), management decisions are oriented towards the reduction of operating costs by altering the staff composition of the practice. Therefore, it becomes apparent that the staff composition also matters to the performance of the practice. Data constraints however do not allow for including other practice staff (nurses, pharmacists, trainees, registrars) in the specifications.

Also, an inverse U-shaped relationship is documented between performance and practice size. At first glance, this could imply that a large practice size, given the size of the premises, has a negative effect on performance, probably due to diminishing marginal labour productivity.

The literature has also highlighted the role of funding in performance improvement ([Sutton et al., 2010](#); [Feng et al., 2015](#)) and so has recent evidence ([GPOne, 2017](#)). Therefore, controlling for the major funding stream a practice receives is an integral part of the analysis. As mentioned, we control for the global sum constituting 60% of the practice funding. The latter accounts for many aspects of the practice characteristics, which would be neglected otherwise. More precisely, global sum payments act a performance boost for general practices, probably due to the financial security those yield.

¹² <http://www.health21.org.uk/2017/06/06/gp-quality-linked-to-staffing-levels/>

Table 5A presents the results considering patient satisfaction as an alternative outcome of practice performance. We show that consolidation is not associated with better patient satisfaction. However practice size exerts a positive and significant influence on patient satisfaction. This could be partly attributed to the fact that we use practice related characteristics to explain a practice outcome which is patient-reported and not the result of a formal system recording it. Although a plausible explanation could be found in the preference set of the patients, e.g. it is not particularly convenient to travel for different services, modelling patient choice is out of the scope of this paper. We use this evaluation only as a practice outcome to explore whether it is affected by the set of variables we consider. An inverse U-shaped relationship between performance-size is documented in this case as well. The global sum appears to be a significant driver of the patient experience, probably because it strengthens the ability of the practice to cope with the composition of the list as it is a multi-faceted index (Carr-Hill, 1992) encapsulating aspects related to the characteristics of the registered patients as well as information for the GP operating environment considering the market forces factor.

Our reduced form approach gives rise to concerns regarding the causality of our results. In an attempt to partially address this, the long differences estimator (calculated as the difference between last and first period) was employed. Such an approach provides a better understanding of the ability of practices to absorb and adjust to changes in the medium run, and rule out any effects of time-invariant heterogeneity.

In the medium run, consolidation does not seem to be a game-changer in terms of performance improvement, at least not on its own. It is possible that the short time window might obscures the effect of consolidation as more time is needed for a firm to internalize the benefits of a change in management. However, what changes relatively quickly is the changes in capacity which accompany consolidation, leading to improvements in performance and this is the main message of this medium run results. This highlights the key role of practice size in performance enhancement. Although payments are of vital importance to the viability of the GP, findings indicate that in the medium run, the effect on practice performance is particularly moderate. However, we have to acknowledge that due to data limitations, many aspects that might affect practice performance have not been taken into consideration and therefore conclusions should be drawn cautiously (Panels 4B & 5B).

Overall, although the underlying mechanisms affecting the practice outcomes are heterogeneous, practice size *per se* as well as changes in practice capacity matter across outcomes. The extent of each however is obviously different. We have to acknowledge that the analysis could be benefited by a larger set of controls such as the age of the practice, the size of the facility,

number of examining rooms, number of partners in the merger, details on the staff composition, investment in diagnostic equipment, which at the moment is not available. Even through the above simple specifications, the significance of the practice size emerges, indicating that it is more likely for larger practices to achieve better outcomes. However, this presentation is only illustrative and should not be thought of a stylized result of the primary health care industry. Further investigation is required to draw robust conclusions.

On a final note, for the UK case, the size of the patient list registered to the primary care organization has also been highlighted as an important aspect of performance, however it is argued that there is not an optimal size attached to every case (Bojke et al, 2001). Rather, the authors argue that *organizational structures and alliances* may be utilized to achieve higher performance for each function through different sizes. In that sense, consolidation could be used to achieve higher performance (as we showed) as through a greater practice size, a longer list size can be supported. Indeed, the correlation between list size and practice size is high (.818). Therefore, the effect of a longer list size has a positive and significant effect on the practice outcomes considered (see A4.2 & A4.3 in Appendix) while the effect of a longer list size in the long differences considerations appears to be inconclusive probably because as Bojke et al. (2001) mention, optimal list size varies based on the scale of functions of the PCO and other factors of the environment of operations.

Table 4 Estimation results; Quality Achievement score

Panel A. Pooled models								
Quality Achievement Score								
Practice characteristics	Overall QOF score		Clinical quality score		Public health score		Public health AS score	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Market status _{<i>it-1</i>}	.054*** (.020)	.003 (.020)	.039** (.019)	-.010 (.019)	.061*** (.021)	.019 (.020)	.044** (.018)	-.002 (.018)
Practice size _{<i>it-1</i>}	-	.250*** (.022)	-	.240*** (.020)	-	.215*** (.020)	-	.237*** (.022)
Practice size ² _{<i>it-1</i>}	-	-.133*** (.023)	-	-.126*** (.020)	-	-.113*** (.020)	-	-.128*** (.021)
Financial flows								
Global sum _{<i>it-1</i>}	.068*** (.008)	.019** (.008)	.057*** (.008)	.010 (.008)	.049*** (.008)	.008 (.009)	.041*** (.009)	-.004 (.009)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CCG fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	21,937	21,886	21,892	21,842	21,885	21,835	21,885	21,835
R²	.123	.141	.155	.175	.146	.156	.131	.146
Panel B. Long Differences								
Practice characteristics	Quality achievement score		Clinical quality score		Public health score		Public health AS score	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Market status _{<i>i</i>}	.099 (.062)	.052 (.037)	.029 (.050)	.045 (.045)	.055 (.044)	.052 (.045)	.104*** (.037)	.098*** (.037)
Practice size _{<i>i</i>}	-	-.033** (.016)	-	-.035* (.019)	-	-.065*** (.019)	-	-.052*** (.019)
Financial flows								
Global sum _{<i>i</i>}	.076*** (.021)	-.004 (.012)	-.013 (.016)	-.018 (.015)	.009 (.013)	.013 (.013)	.015 (.011)	.015 (.012)
Obs	7,258	6,733	7,213	6,726	7,205	6,725	7,205	6,725

Note 1: Parentheses correspond to robust standard errors clustered at general practice level. CCG stands for the Clinical Commissioning Group each practice belongs to. Constants have been included in all models.

Note 2: Stars indicate significance at 1% ***, 5% **, 10% *.

Table 5 Estimation results; Patient satisfaction

Panel A. Pooled models				
Patient satisfaction				
	Good overall		Poor overall	
Practice characteristics	Model 1	Model 2	Model 1	Model 2
Market status _{<i>it-1</i>}	-.001 (.012)	.001 (.001)	-.025 (.016)	-.028* (.016)
Practice size _{<i>it-1</i>}	-	.011** (.004)	-	-.007 (.011)
Practice size ² _{<i>it-1</i>}	-	-.007** (.003)	-	.001 (.010)
Financial flows				
Global sum _{<i>it-1</i>}	.007** (.003)	.002 (.001)	.015** (.006)	.011* (.006)
Year effects	Yes	Yes	Yes	Yes
CCG fixed effects	Yes	Yes	Yes	Yes
Obs	22,878	22,762	22,816	22,764
R²	.011	.011	.022	.022
Panel B. Long Differences				
	Good overall		Poor overall	
Practice characteristics	Model 1	Model 2	Model 1	Model 2
Market status _{<i>i</i>}	.002** (.001)	.000+ (.000+)	-.064 (.051)	-.056 (.053)
Practice size _{<i>i</i>}	-	.001*** (.000+)	-	-.001 (.024)
Financial flows				
Global sum _{<i>i</i>}	.002 (.002)	.000+ (.000+)	-.005 (.020)	-.003 (.018)
Obs	7,559	6,818	7,559	6,818

Note 1: Parentheses correspond to robust standard errors clustered at general practice level. CCG stands for the Clinical Commissioning Group each practice belongs to. Constants have been included in all models.

Note 2: Stars indicate significance at 1% ***, 5% **, 10% *.

5. Conclusions

Given the sector's importance in driving the performance and reducing costs in the NHS we know surprising little about the operation of GP practices. This paper is the first to record consolidation trends at the general practice level in England and explore consolidation's effect on practice performance using QOF scores and patient satisfaction.

Since historical and official records on GP consolidation patterns is not readily available, this is the first attempt to investigate the effect of the market status on the performance of 8,262 general practice in England from 2013/14 through 2016/17.

We contribute to the literature by bringing market status into the discussion of GP performance improvement using hand-collected data as official records on consolidation at general practice level do not exist at the moment. The NHS Digital, the GP Patient Surveys and the NHS Choices portal was used to compile the final dataset. Departing from an exploratory descriptive analysis to highlight the patterns in the data, we move to multivariate models and the long differences estimator to rule out any reverse causality and unobserved heterogeneity to explore the effect of market status on practice performance.

Findings indicate that consolidated and unconsolidated practices exhibit significant differences regarding the characteristics of the practice, the practice funding and the practice performance outcomes such as the overall QOF score and patient satisfaction. The majority of general practices are relatively small firms that remain unconsolidated, consolidated practices appear to have a stronger profile compared to the unconsolidated ones while the ones enrolled in a practice group are found to be better off overall. Moreover, we find that market status exerts a significant influence on practice performance but not across all of the outcomes considered. In the medium-run, consolidation does not seem to matter much as other organisational factors seem to matter more, especially changes in practice capacity through which further improvements in performance could be achieved.

References

- Biørn, E., & Godager, G. (2010). Does quality influence choice of general practitioner? An analysis of matched doctor–patient panel data. *Economic Modelling*, 27(4), 842-853.
- British Medical Association, accessible via <https://www.bma.org.uk/>
- Bojke, C., Gravelle, H., & Wilkin, D. (2001). Is bigger better for primary care groups and trusts?. *British Medical Journal*, 322(7286), 599-602.
- Carr-Hill, R. A. (1992). The measurement of patient satisfaction. *Journal of public health*, 14(3), 236-249.
- Christianson, J. B., Carlin, C. S., & Warrick, L. H. (2014). The dynamics of community health care consolidation: Acquisition of physician practices. *The Milbank Quarterly*, 92(3), 542-567.
- Cleary, P. D., & McNeil, B. J. (1988). Patient satisfaction as an indicator of quality care. *Inquiry*, 25-36.
- Collins, B. (2015). Foundation trust and NHS trust mergers. The King's Fund. Available at <https://www.kingsfund.org.uk/publications/foundation-trust-and-nhs-trust-mergers>
- Cooper, Z., Gibbons, S., Jones, S., & McGuire, A. (2011). Does hospital competition save lives? Evidence from the English NHS patient choice reforms. *The Economic Journal*, 121(554).
- Crosson, B., Propper, C., & Perkins, A. (2001). Do doctors respond to financial incentives? UK family doctors and the GP fundholder scheme. *Journal of Public Economics*, 79(2), 375-398.
- Department of Health. (2006). Our Health, Our Care, Our Say: A New Direction for Community Services. Cm 6737. London, Stationery Office.
- Feng, Y., Ma, A., Farrar, S., & Sutton, M. (2015). The Tougher the Better: an economic analysis of increased payment thresholds on the performance of General Practices. *Health Economics*, 24(3), 353-371.
- Ford, R. C., Bach, S. A., & Fottler, M. D. (1997). Methods of measuring patient satisfaction in health care organizations. *Health care management review*, 22(2), 74-89.
- Fulop, N., Protosaltis, G., King, A., Allen, P., Hutchings, A., & Normand, C. (2005). Changing organisations: a study of the context and processes of mergers of health care providers in England. *Social Science & Medicine*, 60(1), 119-130.
- Gaynor, M., & Haas-Wilson, D. (1999). Change, consolidation, and competition in health care markets. *Journal of economic perspectives*, 13(1), 141-164.
- Gaynor, M. (2004). *Competition and quality in health care markets: what do we know, what don't we know?* Paper commissioned by the Federal Trade Commission. mimeo, Department of Public Policy, Carnegie Mellon University, Pittsburgh.
- Gaynor, M. (2007). Competition and quality in health care markets. *Foundations and Trends® in Microeconomics*, 2(6), 441-508.
- Gaynor, M., Laudicella, M., & Propper, C. (2012). Can governments do it better? Merger mania and hospital outcomes in the English NHS. *Journal of health economics*, 31(3), 528-543.
- General Practice Patient Survey, accessible via <https://www.gp-patient.co.uk/>
- Given, R. S. (1996). Economies of scale and scope as an explanation of merger and output diversification activities in the health maintenance organization industry. *Journal of health economics*, 15(6), 685-713.
- Goddard, M. and Ferguson, B. (1997). Mergers in the NHS: Made in heaven or marriages of convenience? Nuffield Trust.
- Goodwin, N., Dixon, A., Poole, T., & Raleigh, V. (2011). Improving the Quality of Care in General Practice. Report of an independent inquiry commissioned by The King's Fund. Accessible via https://www.kingsfund.org.uk/sites/default/files/improving-quality-of-care-general-practice-independent-inquiry-report-kings-fund-march-2011_0.pdf
- Harrison, M. J., Dusheiko, M., Sutton, M., Gravelle, H., Doran, T., & Roland, M. (2014). Effect of a national primary care pay for performance scheme on emergency hospital admissions for ambulatory care sensitive conditions: controlled longitudinal study. *Bmj*, 349, g6423.
- Hawkes, N. (2014). GPs earn less from QOF points as thresholds for some indicators rise. *British Medical Journal*, 349 doi: <https://doi.org/10.1136/bmj.g6541>
- Japsen, B. (1996). Another record year for dealmaking. Activity among medium-size companies fuels continued drive toward consolidation. *Modern Healthcare*, 26(52), 37-8.
- Kann, I. C., Biørn, E., & Lurås, H. (2010). Competition in general practice: prescriptions to the elderly in a list patient system. *Journal of health economics*, 29(5), 751-764.
- Kelly, E. & Stoye, G. (2014). Does GP Practice Size Matter? The relationship between GP practice size and the quality of health care. Institute for Fiscal Studies. Available at <https://www.ifs.org.uk/publications/7445>

- Kessler, D. P., & McClellan, M. B. (2000). Is hospital competition socially wasteful?. *The Quarterly Journal of Economics*, 115(2), 577-615.
- Kletke, P. R., Emmons, D. W., & Gillis, K. D. (1996). Current trends in physicians' practice arrangements: from owners to employees. *JAMA*, 276(7), 555-560.
- Mays, N., Tan, S., Eastmure, E., Erens, B., Lagarde, M., & Wright, M. (2014). Potential impact of removing general practice boundaries in England: a policy analysis. *Health policy*, 118(3), 273-278.
- Medical Accountants LTD. Expert Advisers to the healthcare sector, accessible via <http://www.bw-medical.co.uk/>
- National Health Services Choices official site, accessible via <https://www.nhs.uk/pages/home.aspx>
- National Health Services Digital official site, accessible via <https://digital.nhs.uk/>
- National Health Services Employers official site, accessible via <http://www.nhsemployers.org/>
- Propper, C., Wilson, D., & Söderlund, N. (1998). The effects of regulation and competition in the NHS internal market: the case of general practice fundholder prices. *Journal of Health Economics*, 17(6), 645-673.
- Propper, C., Burgess, S., & Green, K. (2004). Does competition between hospitals improve the quality of care?. Hospital death rates and the NHS internal market. *Journal of Public Economics*, 88(7), 1247-1272.
- Propper, C., Burgess, S., & Gossage, D. (2008). Competition and quality: evidence from the NHS internal market 1991-9. *The Economic Journal*, 118(525), 138-170.
- Santos, R., Gravelle, H., & Propper, C. (2017). Does quality affect patients' choice of doctor? Evidence from England. *The Economic Journal*, 127(600), 445-494.
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological methodology*, 13, 290-312.
- Sutton, M., Elder, R., Guthrie, B., & Watt, G. (2010). Record rewards: the effects of targeted quality incentives on the recording of risk factors by primary care providers. *Health economics*, 19(1), 1-13.

Appendix

In order of appearance in the main text of the paper.

Table A1 Data presentation

Panel A. Variables and Sources			
Variable	Brief description	Source	
Characteristics of the general practice			
Market size	Registered (weighted) patients at the practice (number)	NHS Payments to General Practice England, QOF files)	Digital (NHS Staff files)
Practice size	Full Time Equivalent (FTE) doctors at the practice (number)	NHS Digital files)	(NHS Staff files)
Market status	Integrated, Non-integrated, Permanently closed (categorical variable)	Own construction through NHS Choices site	
Practice funding			
Global sum	Global sum payments to individual providers (£ pounds)	NHS Payments to General Practice files)	Digital (NHS Staff files)
Practice performance outcomes			
Actual quality	Overall QOF score and sub-domains; Clinical, Public Health, Public Health additional services (AS) (% points)	NHS Digital	
Perceived quality	Patient satisfaction per weighted patient (% points)	GP Patient Surveys & Reports	
Panel B. Descriptive statistics of the main variables			
Variable	Mean	St. Dev.	Obs
Market size (weighted)	7,235	4,492	31,623
Practice size	4.25	3.09	29,789
Overall QOF score	.95	.08	30,095
Good Patient satisfaction (weighted)	.39	11.09	31,674
Global sum payments	329,088	358,008	30,955

Note 1: Monetary values are in constant 2016/17 prices using UK's Gross Domestic Product deflators.

Note 2: Weighted data has been adjusted to show results as if all patients had responded.

A1. GP universe

In order to ensure the representativeness of our sample in the universe of general practices, we need to know the number of all the general practices in England. The Table A2 below, presents the total number of practices in the GP practice prescribing in relation to the number of practices we account for, by source.

It is evident that we account for almost 80% of the practices in England which strengthens the findings of the analysis. The missing 25% is most likely attributed to non-participation to the QOF framework, attrition rate to the GP surveys, practice dissolution, exit or other reasons why practices have not been visible to any of the databases.

Table A2 Proportion of general practice accounted across sources, 2013/14-2016/17

	Year	2013	2014	2015	2016	Period average
GP surveys¹³	All practices	9,935	9,921	9,908	9,790	
	Observed	7,929	7,922	7,972	7,779	
	Accounted	79.80%	79.85%	80.46%	79.46%	79.89%
QOF	Observed	7,921	7,779	7,619	7,393	
	Accounted	79.73%	78.41%	76.90%	75.51%	77.63%
	Total Payments	Observed	8,060	7,959	7,841	7,763
	Accounted	81.12%	80.22%	79.13%	79.30%	79.94%
Staff data	Observed	7,997	7,880	7,674	7,454	
	Accounted	80.50%	79.43%	77.45%	76.14%	78.38%
	Complaints by area	Observed	7,288	7,905	7,126	N/A
Accounted		73.36%	79.68%	71.92%	-	74.99%
Average coverage across data sources						78.31%

Note: Databases which have not released the latest version of the data are displayed with N/A.

¹³ GP patient surveys and reports (Weighted data has been adjusted to show results as if all patients had responded. Unweighted data shows the actual results. Please note there are changes to the unweighted profile of patients responding to the survey which will impact on unweighted results from January 2016). Waves: **December 2013** Fieldwork: Jan-Mar 2013 and Jul-Sep 2013, **January 2015** Fieldwork: Jan-Mar 2014 and Jul-Sep 2014, **January 2016** Fieldwork: Jan-Mar 2015 and Jul-Sept 2015, **July 2016** Fieldwork: July –Sept 2015 and Jan – March 2016.

A2. Discerning among consolidation scenarios

Mergers and acquisitions differ in the sense that a true merger creates a new business whereas in acquisitions one firm takes over the less strong one and gets bigger. Both will use the legal mechanism of going into a partnership, and will almost always be referred to as a merger.

Mergers and consolidation also differ, with the former implying that at least one of the organizations has been absorbed by the other while the latter refers to the case where a new organization has been formed following the dissolution of at least two organizations ([Gorrard & Ferguson, 1997](#)). Consolidation also includes the GP networks and federations (some sort of collaborative agreement between the parties) and considered as the future of the primary care ([Goodwin et al., 2011](#)). Given the phasing out of Minimum Practice Income Guaranteed (MPIG), small practices should first opt for the federation option instead of the merger. Therefore, all mergers are partnerships but not all partnerships are mergers ([Medical Accountants LTD, 2016](#)).

Other practices go by the label of being part of a super practice falling into the domain of partnership forming a parent company e.g. Limited Liability Partnership to deal with management issues (Guidelines, [NHS England, 2016](#)). In both cases, practices share similar benefits whereas differences are found only in management structure.

Federations and super-practices are also distinct, with the former preserving its autonomy and flexibility while the latter is the result of a full merger.

A3. Regional dispersion of practices

To get an idea about the regional dispersion of general practices, we explore the consolidation activity across the four regions in England, as shown in Table A3 below.

Panel A presents the consolidation activity by region and by market status, for the period of study, i.e. cells correspond to row percentages. For instance, of all the consolidated practices in London for the period of study, only 7.97% of them were recorded as being part of a practice group. Regarding the consolidated practices, the south of England seems to exhibit the greater consolidation intensity, whereas the primary care market in London seems to be quite segregated as the vast majority of the practices remains unconsolidated. All in all, for the period of study, the unconsolidated practices across England represent 82.47% of the GP universe.

Panel B shows the number of registered (weighted) patients per practice by market status across England. Consolidated practices, appear to be fewer than the unconsolidated ones, although, serve more patients, across England. This is probably due to the fact that those have access to increased capacity.

Concluding, consolidated practices are fewer, across England, compared to the unconsolidated ones but associated on average with longer list sizes.

Table A3 Regional dispersion by market status for the period of study

Panel A: Consolidation activity across regions		
	Consolidated	Unconsolidated
London	7.97%	92.03%
	455	5,252
Midlands & East of England	18.65%	81.35%
	1,723	7,514
North of England	17.64%	82.36%
	1,666	7,776
South of England	23.68%	76.32%
	1,658	5,345
Total	17.53%	82.47%
	5,502	25,887
Panel B: Registered patients by region and market status		
	Consolidated	Unconsolidated
London	8,687	5,959
	(4,748)	(3,503)
	448	5,204
Midlands & East of England	10,233	6,830
	(6,103)	(3,972)
	1,698	7,469
North of England	10,019	6,526
	(5,802)	(3,964)
	1,646	7,731
South of England	10,276	7,632
	(5,379)	(4,025)
	1,642	5,308

A4. Additional results

A4.1 Practice size categories as a regressor

Table A5 Estimation results with practice size categories

Panel A. Pooled models				
Practice characteristics	Quality achievement score		Patient satisfaction	
	Model 1	Model 2	Model 3	Model 4
Market status _{<i>it-1</i>}	.054*** (.020)	-.009 (.018)	-.001 (.012)	.001 (.001)
Small-med	-	.195*** (.029)	-	.024** (.011)
Med-Large	-	.357*** (.029)	-	.024** (.011)
Large		.451*** (.030)		.024** (.011)
Financial flows				
Global sum _{<i>it-1</i>}	.068*** (.008)	.010 (.007)	.007** (.003)	.001 (.001)
Year effects	Yes	Yes	Yes	Yes
CCG fixed effects	Yes	Yes	Yes	Yes
Obs	21,393	21,886	22,878	21,619
R²	.189	.141	.011	.018

Note 1: Parentheses correspond to robust standard errors clustered at general practice level. CCG stands for the Clinical Commissioning Group each practice belongs to. Constants have been included in all models.

Note 2: Stars indicate significance at 1% ***, 5% **, 10% * while “+” refers to a very small number.

A4.2 Total complaints by area as a practice outcome

Table A6 below presents the estimation results for an additional practice outcome which has not been included in the main analysis due to the frequency of missing values (around 40%). Overall, Panel A depicts a similar picture where practice size matters but a U-shaped relationship is documented instead of an inversed one as in other outcomes. This highlights the heterogeneous mechanisms behind the alternative practice outcomes. Interestingly, changes in the market status are associated with changes in performance, but this is not the case for changes in practice size which appears to be non-significant as opposed to the other outcomes considered. However, this is not a stylized result, as the sample size is smaller compared to the other outcomes.

Table A6 Total Complaints by Area estimations

Panel A Pooled models		
Practice characteristics	Model 5	Model 6
Market status _{<i>it-1</i>}	.294*** (.033)	.078*** (.026)
Practice size _{<i>it-1</i>}	-	.340*** (.054)
Practice size ² _{<i>it-1</i>}	-	.145** (.066)
Financial flows		
Global sum _{<i>it-1</i>}	.213*** (.015)	.067*** (.014)
Year effects	Yes	Yes
CCG fixed effects	Yes	Yes
Obs	14,432	14,401
R²	.139	.367
Turning point	-	1.17
Panel B Long Differences		
Practice characteristics	Model 5	Model 6
Market status _{<i>j</i>}	.174*** (.055)	.176*** (.055)
Practice size _{<i>j</i>}	-	.017 (.064)
Financial flows		
Global sum _{<i>j</i>}	-.008 (.074)	-.008 (.074)
Obs	4,994	4,972

Note 1: Parentheses correspond to robust standard errors clustered at general practice level. CCG stands for the Clinical Commissioning Group each practice belongs to. Constants have been included in all models.

Note 2: Stars indicate significance at 1% ***, 5% **, 10% * while “+” refers to a very small number.

A4.3 List size as a regressor

Table A7.1 Estimation results including list size

Panel A. Pooled models								
Practice characteristics	Overall QOF score		Clinical quality score		Public health score		Public health AS score	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Market status _{<i>it-1</i>}	.054*** (.020)	-.015 (.021)	.039** (.019)	-.023 (.020)	.061*** (.021)	-.012 (.019)	.044** (.018)	-.012 (.019)
List size _{<i>it-1</i>}	-	.131*** (.010)	-	.116*** (.011)	-	.107*** (.012)	-	.107*** (.012)
Financial flows								
Global sum _{<i>it-1</i>}	.068*** (.008)	.013 (.008)	.057*** (.008)	.009 (.008)	.049*** (.008)	-.003 (.010)	.041*** (.009)	-.003 (.010)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CCG fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	21,937	21,937	21,892	21,892	21,885	21,885	21,885	21,885
R²	.123	.135	.155	.167	.146	.139	.131	.139
Panel B. Long Differences								
Practice characteristics	Quality achievement score		Clinical quality score		Public health score		Public health AS score	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Market status _{<i>i</i>}	.099 (.062)	.089 (.064)	.029 (.050)	.037 (.051)	.055 (.044)	.055 (.044)	.104*** (.037)	.112** (.038)
List size _{<i>i</i>}	-	.081 (.056)	-	-.065 (.041)	-	.004 (.035)	-	-.063** (.031)
Financial flows								
Global sum _{<i>i</i>}	.076*** (.021)	.066** (.021)	-.013 (.016)	-.005 (.016)	.009 (.013)	.009 (.014)	.015 (.011)	.023* (.012)
Obs	7,258	7,258	7,213	7,213	7,205	7,205	7,205	7,205

Note 1: Parentheses correspond to robust standard errors clustered at general practice level. CCG stands for the Clinical Commissioning Group each practice belongs to. Constants have been included in all models.

Note 2: Stars indicate significance at 1% ***, 5% **, 10% * while “+” refers to a very small number.

Table A7.2 Estimation results including list size

Panel A. Pooled models				
Patient satisfaction				
	Good overall		Poor overall	
Practice characteristics	Model 1	Model 2	Model 1	Model 2
Market status _{<i>it-1</i>}	-0.001 (.012)	-0.016 (.014)	-0.025 (.016)	-0.029* (.016)
List size _{<i>it-1</i>}	-	.027** (.011)	-	.007 (.007)
Financial flows				
Global sum _{<i>it-1</i>}	.007** (.003)	-0.004 (.005)	.015** (.006)	.012* (.007)
Year effects	Yes	Yes	Yes	Yes
CCG fixed effects	Yes	Yes	Yes	Yes
Obs	22,878	22,878	22,816	22,816
R²	.011	.013	.022	.022
Panel B. Long Differences				
	Good overall		Poor overall	
Practice characteristics	Model 1	Model 2	Model 1	Model 2
Market status _{<i>i</i>}	.002** (.001)	.001 (.001)	-0.064 (.051)	-0.062 (.051)
List size _{<i>i</i>}	-	.006** (.003)	-	-0.011 (.037)
Financial flows				
Global sum _{<i>i</i>}	.002 (.002)	.001 (.001)	-0.005 (.020)	-0.003 (.020)
Obs	7,559	7,559	7,559	7,559

Note 1: Parentheses correspond to robust standard errors clustered at general practice level. CCG stands for the Clinical Commissioning Group each practice belongs to. Constants have been included in all models.

Note 2: Stars indicate significance at 1% ***, 5% **, 10%