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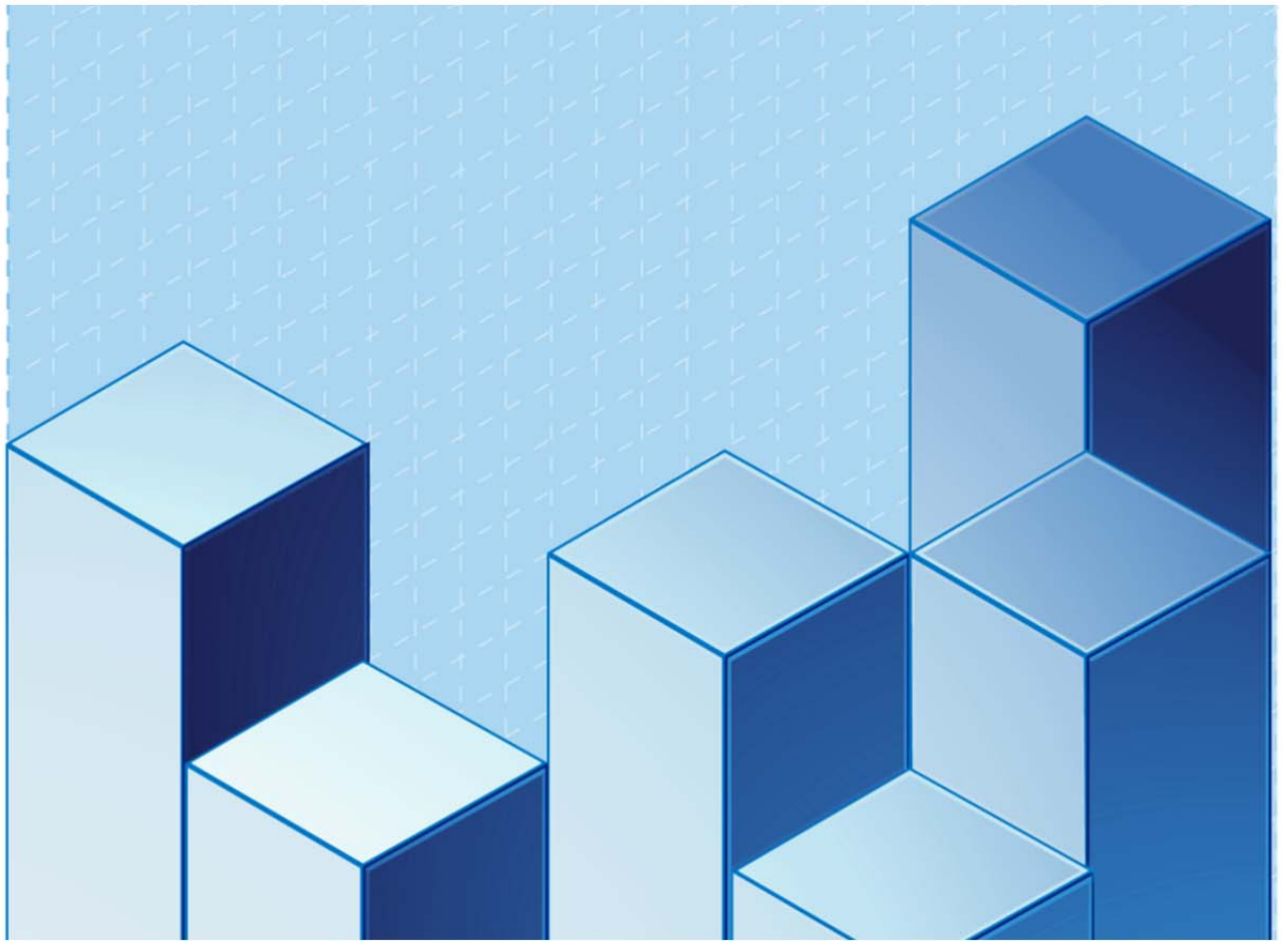

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Abstract

This paper explores the relationship between organisational capital and hospital performance in England, for the period 2010/11 to 2013/14. We construct measures of investment in organisational capital for NHS Acute Trusts (as hospitals in England are managed by Trusts) and investigate whether investment in this form of intangible asset is related to Trust performance. We measure investment in organisational capital in terms of payments to managers, in line with the approach developed by Corrado, Hulten and Sichel (2005, 2009). Squicciarini and Le Mouel (2012) argue that, particularly in public services, occupations other than managers also contribute to organisational capital. Our data allow us to identify both general managers and clinical managers, and we therefore include both types of manager within our measure of organisational capital.

We find that, in aggregate, investment in organisational capital in NHS Trusts has been increasing over the period of our analysis. This has been driven primarily by increases in organisational capital in terms of clinical managers; while the number of clinical managers has been increasing, on average, the number of general managers has remained relatively stable over this period. There is however considerable variation across NHS Trusts in the proportion of total staff in management roles. The relationship between organisational capital and Trust performance varies depending on the performance measure used. When Trust performance is considered in terms of cost-weighted output, we find little evidence of a relationship with investment in organisational capital, once controlling for other factors. There is however some evidence of a positive relationship between investment in organisational capital and cost-weighted output based on inpatient activity alone. This association is driven by investment in organisational capital in terms of clinical managers, rather than for general managers. The analysis also provides some evidence of a statistically significant relationship between investment in organisational capital and Trust performance in terms of mortality, with higher levels of investment in organisational capital in terms of clinical managers associated with better outcomes in terms of mortality. Our analysis provides tentative evidence that investments in organisational capital may matter for NHS Trust performance in England. Furthermore, given that statistically significant results typically focus on organisational capital in terms of clinical managers, the study provides further support for the argument that it is important to consider not only general managers in any analysis of organisational capital, but to also consider the broader contribution made by other professionals, at least within hospital settings.

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1. Introduction

This paper explores the relationship between organisational capital and hospital performance in England. As such, this paper is complementary to the analyses for Germany and Hungary which are also being undertaken as part of the SPINTAN project (see Schulz and Beckmann, 2016, and Hüttl and Nagy, 2016, for further details).

Organisational capital is widely acknowledged as an important component of intangible investment. However, there is less consensus on how organisational capital should be measured, particularly within the public sector. Furthermore, there are also practical difficulties in doing so, given available data.

Our analysis for England focuses on publicly funded hospitals only, that is hospitals which are part of the National Health Service (NHS). More specifically, as hospitals in England are managed by NHS Acute Trusts, our unit of analysis is the Trust level, rather than the hospital level.

This paper constructs measures of organisational capital for English NHS Trusts and investigates whether investment in this form of intangible asset is related to Trust performance. We begin by setting out our approach to measuring organisational capital in Section 2. Section 3 describes the data used in our analysis. Section 4 presents descriptive statistics on investment in organisational capital. Our model specification is set out in Section 5, and our results are presented in Section 6. Section 7 concludes.

2. Approach to measuring organisational capital

In this section we set out our approach to calculating investment in organisational capital. Broadly speaking, we measure investment in organisational capital in terms of payments to managers, in line with the approach developed by Corrado, Hulten and Sichel (2005, 2009). Squicciarini and Le Mouel (2012) argue that, particularly in public services, occupations other than managers also contribute to organisational capital. Evidence presented in an earlier review on the location and implementation of organisational change in English NHS hospitals is consistent with this finding that other occupations are also likely to be engaged in the creation of organisational capital in this context (O'Mahony, Beghelli and Stokes, 2015).

Our data allow us to identify both general and clinical managers, and we therefore include both types of manager within our measure of organisational capital. Clinical managers, as defined in the NHS Occupation Code Manual are "those who have overall responsibility for budgets, manpower or assets or who are held accountable for a significant area of work and who have little or no clinical contact" (Health and Social Care Information Centre (HSCIC), 2013). However, they must be clinically qualified, for example, a Nurse Manager must be a qualified nurse. Managers who do not need to be clinically qualified are counted as general managers.

In our analysis, we include those specifically working in clinical management roles, that is:

- Nurse managers
- Scientific, therapeutic and technical (STT) managers
- Ambulance managers

We refer to the above as our narrow definition of clinical managers. However, we also include staff in other occupations that are likely to contribute to organisational capital (which we refer to as our broader definition of clinical managers), specifically:

- Nurse consultants
- Modern matrons
- STT Consultant therapists
- Consultant scientists

Because these roles also involve clinical contact, we do not assume that all their time is spent on management activities; in the absence of any better information, we make an assumption that management responsibilities account for 20 per cent of their time.

Doctors also contribute to the production of organisational capital; however, while data are available on the number of doctors by broad occupational group, data on the number in management or leadership roles is not available. Based on a survey of NHS Trusts, Dickinson et al. (2013) find that the percentage of medical consultants involved in formal leadership roles ranged between 10 and 20 per cent in the majority of Trusts. We assume in our analysis that 20 per cent of consultants in each Trust are involved in leadership roles.

Our final measure of investment in organisational capital therefore comprises general managers, clinical managers (both narrowly and broadly defined), and consultants. As well as exploring the relationship between this overall measure of organisational capital and hospital performance, we also consider separately organisational capital relating to general managers, and organisational capital relating to clinical managers (also including consultants). This allows us to explore whether the organisational capital embedded in both types of managers shows the same relationship with hospital performance.

In order to estimate investment in organisational capital it is also necessary to make an assumption regarding the amount of management time that is spent on tasks relating to the creation of organisational capital. In line with the assumptions used by Corrado, Hulten and Sichel (2005, 2009), we assume that 20 per cent of time relating to management is spent on activities that relate to organisational capital.

A further complication arises in measuring investment in organisational capital in this context, in that while we have information on the number of full-time equivalent staff by NHS Trust, data on wages are only readily available at national, not at Trust level, for broad occupational groups. We therefore have to assume average wages by occupation are the same across NHS Trusts. Furthermore, the breakdown by occupation is not the same as in the data identifying the number of staff in each occupational group, so we have to make some further assumptions. For general managers, an average wage is available (based on the average wage of senior and non-senior managers), and similarly, data is available on the average wage of consultants. We do not have information on the average wage of clinical managers; we use the average wage of a qualified nurse as a proxy for this (which in practice is likely to be an underestimate given nurse managers are likely to earn a higher salary than many other nurse occupations). All wages are converted to real terms using the GDP deflator.

Ideally we would like to consider the stock of organisational capital, in addition to investment. However, this would require a longer time series of data on the number of managers, and unfortunately these data are only available from 2010/11. Constructing such a measure is further complicated by the fact that there have been a number of mergers and other changes in NHS Trusts over time, making it difficult to construct a consistent time-series at Trust level. All analysis in this paper focuses therefore on measures of investment in organisational capital.

3. Data

As noted earlier, NHS hospitals are managed by NHS Acute Trusts. While Acute Trusts often have multiple sites, most of the data used in our analysis is only available at Trust level. We only include those Trusts which appear in all years of our dataset, which covers the period 2010/11 to 2013/14. We begin our analysis in 2010/11 as the detailed occupational data required to calculate our measures of intangible investment are only available from 2010 onwards.

A small number of Trusts (around 10) are excluded from our analysis due to mergers during the time period of our analysis. Nineteen of the Trusts are Acute Specialist Trusts; these are excluded from our analysis given the typically different nature of activities carried out within these Trusts. Our resulting dataset contains information for 139 NHS Acute Trusts.

Our dataset is compiled from a number of different data sources, as summarised in Appendix Table A.1. The measures of hospital performance, and the control variables used in our analysis, are described in more detail in Section 5.

The majority of data used in this analysis relate to all activity conducted by the hospital Trusts. However, we do additionally explore output measures based on inpatient activity alone. Our measures of patient characteristics (such as the proportion of patients by age and gender) are also based solely on inpatients; here we assume that these characteristics would be reflective of the patient population as a whole. Finally, it is worth noting that while most of our data sources relate to financial years (April to March), this is not the case for all data sources, as identified in the final column of Table A.1. Where data are not based on financial years we assign data to the closest possible year (for example, data collected in September 2010 would be assigned to the financial year April 2010 to March 2011).

4. Investments in organisational capital

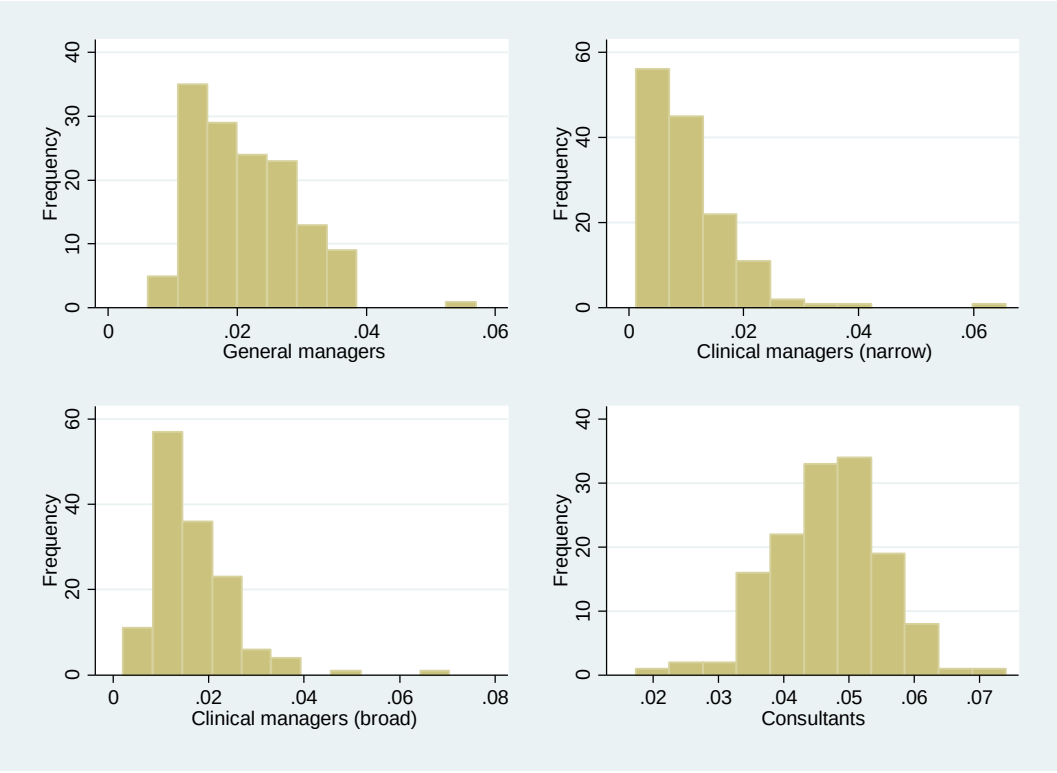
Table 1 shows the average number of staff in our sample of NHS Acute Trusts for those occupations which we identify as contributing to organisational capital. On average, the number of general managers (which combines senior and other managers), has changed little over this period. In contrast, the average number of clinical managers has increased, whether we consider the narrow or broader definition, as has the average number of consultants.

Table 1: Average number of employees in occupations contributing to organisational capital, NHS Acute Trusts

	General managers	Clinical managers – narrow definition	Clinical managers – broad definition	Consultants
2010	99.2	41.8	72.6	200.3
2011	98.1	43.1	73.7	208.9
2012	98.0	46.2	76.8	218.7
2013	99.2	48.1	78.0	227.6

The table above shows the average number of managers of each type by Trust, but there is considerable variation by Trust, which does not solely reflect differences in the total number of staff employed. In 2013, for example, the percentage of total staff who were general managers ranged from 0.6 per cent to 5.7 per cent (top left hand chart, Figure 1).

Figure 1: Variation in proportion of managers by NHS Acute Trust, 2013



Once we construct our measures of investment in organisational capital, we find that average investment in organisational capital has been increasing over time (Table 2). This is unsurprising given we have seen above that the number of staff employed in these occupations has been increasing over this period, at least on average.

Table 2: Average investment in organisational capital (£, real terms)

	Average investment in organisational capital
2010	2,038,710
2011	2,053,525
2012	2,090,762
2013	2,137,112

5. Model specification

We estimate the following:

$$Y_{it} = \alpha + \Sigma\beta_j L_{jit} + \Sigma\gamma_k K_{kit} + \pi INT_{it} + \Sigma\delta_n Z_{nit} + e_{it}$$

where i denotes NHS Trust, Y is a measure of output, L is labour input, K are other inputs, INT is intangibles investment and Z are control variables.

As discussed in Section 2 above, our data permit a division into general managers and clinical managers:

$$INT = INT^G + INT^C$$

Throughout we estimate separate cross-sectional models for each year of our analysis, as well as a pooled analysis for all years.

We explore hospital performance using two alternative outcome measures:

1) Cost weighted output index
2) Summary Hospital-level Mortality Indicators (SHMIs)

We describe each of these measures in more detail below. We also experimented with the use of waiting times as a performance measure, which have formed a key target in the NHS in recent years. However, the results were very sensitive to choices around exclusion of outliers; we therefore do not report the results from these models as we do not consider them to be reliable.

Cost weighted output index

We first measure Trust performance using a cost weighted output index. This aggregates different forms of hospital activity using unit costs. While this approach has its limitations, it is the approach recommended by Eurostat (2001), in the absence of information on prices, and is in line with the approach undertaken in earlier cross-country comparisons of health sector output and productivity (Hüttl et al., 2012).

Activities are classified by Healthcare Resource Group (HRG). HRGs are standard groupings of clinically similar treatments which use common levels of healthcare resources.[1] As there have been

[1] http://www.hscic.gov.uk/hrg

changes to the HRG classification in each year of our analysis, it was necessary to aggregate some types of activity in order to construct reasonably comparable groups over time. We then use national average unit costs in order to weight activities, so that our output measure is not affected by variation in unit costs across Trusts (which can often vary considerably at Trust level especially where the amount of activity carried out in a particular Trust is relatively low). Information on both activities and unit costs by HRG are published in the NHS Reference Costs (see for example, Department of Health, 2014).

In constructing our cost-weighted output measures, we use costs from 2010 for all years, so that differences do not reflect changes in costs over time. We use a measure covering (almost) all hospital activity[2], as well as a measure that covers inpatient activity alone. In all models, our output measure is logged.

Summary Hospital-level Mortality Indicators

Summary Hospital-level Mortality Indicators (SHMIs) are available for each NHS Trust and give the ratio between the number of patients who die following hospitalisation at the Trust and the number that would have been expected to die, given the characteristics of the patients treated at the Trust (this is calculated using statistical models on the basis of factors such as age, gender and condition). This measure is available for all non-specialist Trusts; and refers to all deaths that occur either within hospital or within 30 days of discharge (for further details see HSCIC, 2014a; HSCIC, 2016). The SHMI takes a value of 1 if the actual number of deaths is equal to the expected number of deaths; a value of greater than 1 indicates the actual number of deaths is greater than the expected number of deaths, while a value of less than 1 indicates there were fewer deaths than expected. In practice, given the number of expected deaths is inevitably an estimate, a range of observed deaths are considered to be within the range of expected deaths. Trusts which fall above or below this range are classified by HSCIC as having a higher or lower SHMI than expected respectively.

Labour and capital input

Our models also include measures of both labour and capital input. Our principal models use the total number of full-time equivalent staff (logged) as our measure of labour input. We also experimented with using a wage-weighted measure of labour input, and separating labour input by broad occupational group, but this made no substantial difference to our results.

Some data on capital investment relating to estates and facilities are available from the Estates Returns Information Collection (HSCIC, 2014b), which includes capital investment for new build, capital investment for improving existing buildings and capital investment for equipment. We control for the total capital investment in these categories (logged) in our analysis, converting expenditure to real terms using the GDP deflator. Comprehensive data on material costs at NHS Trust level in a consistent format do not appear to be readily available. It is possible to obtain information on operating expenditure of some NHS Trusts, however, in recent years this has been collected in different formats depending on whether Trusts have Foundation Trust status, and thus the data are not strictly comparable across different types of Trust.

[2] We use data for all activities as reported in the NHS Reference Costs (see for example, Department of Health, 2014).

Control variables

We also control for a number of additional factors that may influence hospital performance:

- Hospital size: measured by the number of beds
- Proportion of female patients
- Proportion of patients aged 75 or above
- Proportion of admissions that are emergencies
- Measures of deprivation: unemployment rate in the local area, and the proportion of the local population educated to degree level or above
- Whether the Trust is a Teaching hospital
- Whether the Trust has Foundation Trust status (Foundation Trusts have greater autonomy)
- Average length of stay
- Proportion of qualified nurses in total staff

We also experimented with the inclusion of other control variables, in particular measures of the prevalence of major diseases (such as cancer and coronary heart disease) in the local area. However, the inclusion of these additional controls made no substantial difference to the results. Given this, and the relatively small number of Trusts in our analysis, we omitted these controls from our final models in order to keep our models relatively parsimonious.

6. Results

6.1 Cost weighted output

We begin by exploring the correlation between our measures of investment in organisational capital and cost weighted output before the inclusion of any control variables; Table 3 presents the results of regressing the CWOI on our measures of investment in organisational capital for each year of our analysis period.

The upper panel of the table presents the results of using a single measure of total investment in organisational capital; here we see a positive and significant association between investment in organisational capital and the CWOI in each year. In the lower panel of the table, we distinguish between investment in organisational capital that relates to general managers, and investment in organisational capital that relates to clinical managers. Here we see that it is the investment in organisational capital in terms of clinical managers that is the key driver of the association seen in the upper panel; investment in organisational capital in terms of clinical managers is positively and significantly associated with the CWOI in each year. In contrast, while investment in organisational capital in terms of general managers also shows a positive association, this is only statistically significant in 2010-11 and a much reduced magnitude relative to clinical managers.

Table 3: CWOI and investment in organisational capital, regression results, excluding controls

	2010-11	2011-12	2012-13	2013-14
Investment in OC: all managers	0.790***	0.697***	0.742***	0.780***
	(0.041)	(0.044)	(0.044)	(0.042)
N	139	139	139	139
r2	0.731	0.650	0.672	0.715
Investment in OC: general managers	0.121***	0.069	0.056	0.046
	(0.044)	(0.050)	(0.053)	(0.051)
Investment in OC: clinical managers	0.669***	0.635***	0.686***	0.730***
	(0.044)	(0.051)	(0.054)	(0.050)
N	139	139	139	139
r2	0.803	0.724	0.739	0.789

Notes: Standard errors in parentheses. ***indicates statistically significant at the 1 per cent level, ** indicates statistically significant at the 5 per cent level, * indicates statistically significant at the 10 per cent level.

Table 4 shows the results once incorporating the control variables discussed earlier, again presenting results based on separate cross-sectional regressions for each year, with the final column also showing the results from running a pooled cross-sectional model. Here we see that following the inclusion of controls, no statistically significant relationship remains between either of the measures of investment in organisational capital and the CWOI. In terms of investment in organisational capital in terms of clinical managers, a positive association remains in most years, but the coefficients are now much smaller in magnitude compared to the model without controls, and the relationship is no longer statistically significant. For investment in organisational capital in terms of general managers, the coefficients show a slight negative relationship once controlling for other factors, but again this is not statistically significant.

In terms of other notable relationships, the total number of staff is positively and significantly associated with the CWOI in all years and in the pooled model. The same is also true of the proportion of all staff who are nurses; the CWOI was higher where a greater proportion of staff were nurses. The CWOI was also higher in Trusts where a greater proportion of admitted patients were aged 75 or above, perhaps reflecting the greater amount of hospital activity for patients in this age group. There was also a positive and statistically significant association between the unemployment rate of the local area and the CWOI, perhaps reflecting greater activity in more deprived areas, although this finding is difficult to interpret with precision as the population of patients treated at a hospital may well differ from the population living in the local area. There was also some evidence of a significant relationship between average length of stay and the CWOI, with lower output where the average length of stay was greater; however, this association was only statistically significant at the 10 per cent level in the pooled model.

Table 4: CWOI and investment in organisational capital, regression results, including controls

	2010-11	2011-12	2012-13	2013-14	Pooled
Investment in OC: general managers	0.001	-0.008	-0.020	-0.008	-0.008
	(0.022)	(0.038)	(0.036)	(0.029)	(0.024)
Investment in OC: clinical managers	-0.040	0.050	0.040	0.074	0.033
	(0.040)	(0.067)	(0.061)	(0.051)	(0.045)
Total staff	0.989***	0.776***	0.860***	0.796***	0.841***
	(0.055)	(0.084)	(0.077)	(0.055)	(0.046)
% nurses	1.839***	1.646***	1.877***	2.195***	1.779***
	(0.317)	(0.587)	(0.487)	(0.389)	(0.256)
Number of beds (reference: 600 or more)					
Less than 400	-0.044	-0.105	-0.022	-0.141***	-0.091*
	(0.043)	(0.064)	(0.062)	(0.046)	(0.048)
400-599	-0.021	-0.021	-0.018	-0.048	-0.037
	(0.027)	(0.045)	(0.041)	(0.030)	(0.023)
% female	0.356	1.131*	-0.093	0.764	0.532
	(0.390)	(0.665)	(0.605)	(0.469)	(0.365)
% aged 75 plus	0.811***	0.976**	0.919**	0.798**	0.890***
	(0.263)	(0.471)	(0.415)	(0.320)	(0.207)
% emergency admissions	-0.334**	-0.127	-0.203	-0.217	-0.239
	(0.152)	(0.284)	(0.267)	(0.193)	(0.168)
Mean length of stay	-0.053***	0.018	-0.055**	-0.038*	-0.032*
	(0.017)	(0.028)	(0.024)	(0.019)	(0.018)
Unemployment rate of local area	0.004	0.003	0.007	0.012***	0.008**
	(0.004)	(0.007)	(0.006)	(0.005)	(0.003)
% population with degree or above	-0.001	-0.001	0.002	0.002*	0.001
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Teaching hospital	-0.087***	-0.035	-0.037	-0.022	-0.043
	(0.031)	(0.053)	(0.049)	(0.037)	(0.029)
Foundation Trust	-0.002	-0.000	-0.008	-0.010	-0.007
	(0.017)	(0.031)	(0.027)	(0.021)	(0.018)
Capital investment	-0.006	0.009	0.006	0.001	0.002
	(0.008)	(0.012)	(0.015)	(0.014)	(0.006)
2011					0.053***
					(0.014)
2012					0.020*
					(0.012)
2013					0.017
					(0.013)
Constant	11.125***	10.813***	11.263***	10.591***	11.041***
	(0.519)	(0.933)	(0.848)	(0.643)	(0.533)
N	139	139	139	139	556
r2	0.963	0.876	0.907	0.947	0.919

Notes: Standard errors in parentheses. ***indicates statistically significant at the 1 per cent level, ** indicates statistically significant at the 5 per cent level, * indicates statistically significant at the 10 per cent level.

In alternative specifications we experimented with replacing the total number of staff with a wage-weighted measure of labour input instead, and also separating labour input by broad staff type (qualified nursing staff, total medical staff (doctors), support to clinical staff, qualified scientific, therapeutic and technical and qualified ambulance staff, and total administrative staff). However, in all specifications there were no statistically significant relationships between our measures of investment in organisational capital and the CWOI (the full regression results are reported in Appendix C, Tables C.1 and C.2).

Our intangibles measures are highly correlated with the measure of total labour input. When the labour input measure is omitted from the models, our measure of investment in organisational capital based on clinical managers is positively and significantly associated with the CWOI in all years and in the pooled analysis. Our measure of organisational capital based on general managers also shows a positive association with the CWOI but this is only statistically significant in the model for 2010-11. We tried replacing our measure of total staff with a measure of all staff excluding those in occupations used in the creation of organisational capital, but when doing so there was generally no statistically significant relationship between our measures of investment in organisational capital and the CWOI, with the exception of the analysis for 2013-14, when a positive and statistically significant relationship was apparent (Appendix C, Table C.3).

The analysis above focuses on cost-weighted output constructed on the basis of all hospital activity (or, at least, all hospital activity as covered by the NHS Reference Costs Database, which is the vast majority of hospital activity). We also considered the CWOI based on inpatient activity alone.[3] Before the inclusion of any other controls, we can see in Table 5 that the relationship between our measures of investment in organisational capital and the CWOI based on inpatient activity are very similar to those seen for all activity reported above.

[3] Inpatient activity, or admitted patient care, accounts for a sizeable proportion of hospital activity and expenditure: in 2013/14 for example, admitted patient care accounted for 41 per cent of all reported costs in the NHS Reference Costs (Department of Health, 2014).

Table 5: Inpatient CWOI and investment in organisational capital, regression results, excluding controls

	2010-11	2011-12	2012-13	2013-14
Investment in OC: all managers	0.749***	0.711***	0.727***	0.725***
	(0.045)	(0.047)	(0.049)	(0.048)
N	139	139	139	139
r2	0.669	0.623	0.618	0.624
Investment in OC: general managers	0.116**	0.046	0.011	-0.038
	(0.051)	(0.053)	(0.058)	(0.057)
Investment in OC: clinical managers	0.634***	0.674***	0.719***	0.760***
	(0.050)	(0.055)	(0.059)	(0.056)
N	139	139	139	139
r2	0.733	0.708	0.705	0.732

Notes: Standard errors in parentheses. ***indicates statistically significant at the 1 per cent level, ** indicates statistically significant at the 5 per cent level, * indicates statistically significant at the 10 per cent level.

In contrast to the results for the CWOI based on all activity, once we include the same set of control variables, in the pooled cross-section analysis we see a positive relationship between investment in organisational capital relating to clinical managers (although this is only statistically significant at the 10 per cent level) (Table 6). This relationship is also apparent in 2012-13 and 2013-14, but is negative and significant in the first year of our analysis (2010-11). The relationships between the other control variables and the inpatient CWOI show similar patterns to those observed for the CWOI based on all hospital activity.

Table 6: Inpatient CWOI and investment in organisational capital, regression results, including controls

	2010-11	2011-12	2012-13	2013-14	Pooled
Investment in OC: general managers	0.008	-0.003	-0.035	-0.048	-0.012
	(0.027)	(0.033)	(0.041)	(0.043)	(0.029)
Investment in OC: clinical managers	-0.085*	0.058	0.136*	0.175**	0.090*
	(0.050)	(0.059)	(0.070)	(0.076)	(0.048)
Total staff	1.004***	0.759***	0.568***	0.527***	0.670***
	(0.069)	(0.073)	(0.087)	(0.083)	(0.075)
% nurses	1.912***	1.464***	0.629	0.879	0.940*
	(0.396)	(0.512)	(0.554)	(0.585)	(0.524)
Number of beds (reference: 600 or more)					
Less than 400	-0.065	-0.273***	-0.363***	-0.363***	-0.288***
	(0.054)	(0.056)	(0.071)	(0.069)	(0.064)
400-599	-0.053	-0.050	-0.160***	-0.160***	-0.118***
	(0.033)	(0.039)	(0.047)	(0.046)	(0.035)
% female	0.546	0.835	-1.165*	-0.388	-0.175
	(0.486)	(0.581)	(0.689)	(0.707)	(0.534)
% aged 75 plus	1.294***	1.172***	0.688	1.232**	1.059***
	(0.329)	(0.411)	(0.472)	(0.482)	(0.349)
% emergency admissions	-0.293	0.039	-0.315	-0.449	-0.221
	(0.189)	(0.248)	(0.304)	(0.291)	(0.210)
Mean length of stay	-0.076***	-0.056**	-0.142***	-0.147***	-0.110***
	(0.021)	(0.025)	(0.027)	(0.029)	(0.025)
Unemployment rate of local area	-0.004	-0.013**	-0.002	0.010	-0.002
	(0.005)	(0.006)	(0.007)	(0.007)	(0.005)
% population with degree or above	-0.006***	-0.006***	-0.003	0.000	-0.003**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Teaching hospital	-0.053	0.020	0.039	0.077	0.030
	(0.038)	(0.046)	(0.056)	(0.055)	(0.033)
Foundation Trust	0.026	0.024	-0.004	-0.025	-0.001
	(0.022)	(0.027)	(0.031)	(0.031)	(0.024)
Capital investment	-0.016*	0.004	0.002	-0.003	-0.004
	(0.009)	(0.011)	(0.017)	(0.021)	(0.008)
2011					0.018
					(0.012)
2012					-0.039**
					(0.016)
2013					-0.045**
					(0.018)
Constant	11.117***	10.930***	13.759***	13.037***	12.421***
	(0.648)	(0.815)	(0.965)	(0.968)	(0.682)
N	139	139	139	139	556
r2	0.941	0.913	0.885	0.877	0.891

Notes: Standard errors in parentheses. ***indicates statistically significant at the 1 per cent level, ** indicates statistically significant at the 5 per cent level, * indicates statistically significant at the 10 per cent level.

6.2 Summary Hospital-level Mortality Indicators

Table 7 presents the results when Trust performance is considered in terms of mortality, using the Summary Hospital-level Mortality Indicators (SHMI). Here a negative sign is desirable; as lower values of the SHMI indicate that the observed deaths were fewer than the number of expected deaths. Again we first consider the relationship with investment in organisational capital without controlling for other factors. From the upper panel of Table 7, we see a statistically significant correlation between total investment in organisational capital and the SHMI; that is, greater investment in organisational capital is associated with a lower value of the SHMI. When we distinguish between general and clinical managers, the picture is mixed. In the first two years of the analysis period, it appears to be mainly clinical managers who are driving this result (a negative relationship remains in the latter two years but is not statistically significant), but in the final year it is only organisational capital in terms of general managers that is statistically significant.

Table 7: SHMI and investment in organisational capital, regression results, excluding controls

	2010-11	2011-12	2012-13	2013-14
Investment in OC: all managers	-0.040**	-0.051***	-0.043**	-0.041**
	(0.017)	(0.017)	(0.017)	(0.016)
N	139	139	139	139
r2	0.037	0.066	0.046	0.044
Investment in OC: general managers	-0.004	0.006	-0.008	-0.039*
	(0.022)	(0.021)	(0.022)	(0.023)
Investment in OC: clinical managers	-0.036*	-0.059***	-0.034	-0.002
	(0.022)	(0.022)	(0.023)	(0.023)
N	139	139	139	139
r2	0.042	0.084	0.048	0.048

Notes: Standard errors in parentheses. ***indicates statistically significant at the 1 per cent level, ** indicates statistically significant at the 5 per cent level, * indicates statistically significant at the 10 per cent level.

Once we control for the same set of characteristics as used in our models with the CWOI as a dependent variable, we see a statistically significant negative association between investment in organisational capital in terms of clinical managers in the pooled analysis (Table 8). This relationship is present, but not always statistically significant, in the separate cross-sectional models for each year. There is also a negative association between investment in organisational capital in terms of general managers, but this is never statistically significant in either the cross-sectional models by year or in the pooled analysis.

Other notable relationships are a positive association between average length of stay and the SHMI indicator. There is also some suggestion that smaller hospitals (measured in terms of the number of beds) were associated with lower values of the SHMI. Teaching hospitals were associated with lower SHMI values. Area characteristics also play a role, although both the rate of unemployment, and the proportion of the population educated to degree level or above, were associated with lower SHMI values.

Table 8: SHMI and investment in organisational capital, regression results, including controls

	2010-11	2011-12	2012-13	2013-14	Pooled
Investment in OC: general managers	-0.010	-0.002	-0.013	-0.027	-0.013
	(0.019)	(0.017)	(0.018)	(0.019)	(0.012)
Investment in OC: clinical managers	-0.050	-0.072**	-0.041	-0.018	-0.046**
	(0.035)	(0.031)	(0.031)	(0.033)	(0.020)
Total staff	0.050	0.055	0.020	0.000	0.031
	(0.049)	(0.038)	(0.038)	(0.036)	(0.025)
% nurses	0.180	0.516*	0.204	0.346	0.287*
	(0.279)	(0.268)	(0.244)	(0.252)	(0.172)
Number of beds (reference: 600 or more)					
Less than 400	-0.034	-0.039	-0.065**	-0.058*	-0.051*
	(0.038)	(0.029)	(0.031)	(0.030)	(0.028)
400-599	-0.036	-0.018	-0.027	-0.037*	-0.030**
	(0.024)	(0.020)	(0.021)	(0.020)	(0.014)
% female	0.035	0.031	-0.237	-0.377	-0.138
	(0.343)	(0.303)	(0.303)	(0.305)	(0.220)
% aged 75 plus	-0.151	-0.301	-0.117	0.082	-0.117
	(0.231)	(0.215)	(0.208)	(0.208)	(0.157)
% emergency admissions	0.116	0.257**	0.152	0.049	0.144
	(0.133)	(0.130)	(0.134)	(0.126)	(0.092)
Mean length of stay	0.020	0.042***	0.024**	0.031**	0.029***
	(0.015)	(0.013)	(0.012)	(0.013)	(0.010)
Unemployment rate of local area	-0.007*	-0.009***	-0.004	-0.002	-0.005**
	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)
% population with degree or above	-0.007***	-0.006***	-0.005***	-0.005***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Teaching hospital	-0.052*	-0.044*	-0.042*	-0.036	-0.043**
	(0.027)	(0.024)	(0.024)	(0.024)	(0.019)
Foundation Trust	-0.008	0.006	0.014	0.011	0.005
	(0.015)	(0.014)	(0.014)	(0.013)	(0.011)
Capital investment	-0.006	-0.004	-0.007	-0.006	-0.006
	(0.007)	(0.006)	(0.008)	(0.009)	(0.004)
2011					0.014**
					(0.006)
2012					0.017**
					(0.007)
2013					0.023***
					(0.008)
Constant	1.623***	1.525***	1.850***	1.857***	1.707***
	(0.457)	(0.426)	(0.424)	(0.418)	(0.268)
N	139	139	139	139	556
r2	0.430	0.520	0.517	0.508	0.475

Notes: Standard errors in parentheses. ***indicates statistically significant at the 1 per cent level, ** indicates statistically significant at the 5 per cent level, * indicates statistically significant at the 10 per cent level.

6.3 Models for selected conditions

In the analysis for Germany, Schulz and Beckmann (2016) additionally explore the relationship between organisational capital and hospital quality indicators based on mortality rates for seven specific conditions (the relevant ICD-10 classification code is given in parentheses):

- Hypertensive heart disease (I11)
- Ischaemic heart disease without Angina pectoris (I21-I25)
- Cardiac failure (I50)
- Ischaemic stroke (I63)
- Stroke (I64)
- Other cerebrovascular diseases (I67)
- Pneumonia (J12-J18)

The idea is that these seven conditions are ones which are in particular need of urgent or efficient treatment in order to avoid in-hospital mortality, and better-performing hospitals are therefore likely to have lower in-hospital mortality for these conditions.

The SHMI for Trusts in England is based on 140 diagnosis groups. We can therefore use this information to explore mortality based on a selected set of conditions, similar to those used in the analysis for Germany. SHMI data by diagnosis group are however only publicly available at Trust level for 2013-14 and therefore this analysis focuses solely on this one year.

Our starting point is the seven conditions identified in Schulz and Beckmann. These are identified on the basis of the ICD- 10 classification; we use this to identify the most comparable SHMI diagnosis groups, using the lookup table provided by HSCIC which maps ICD-10 codes to the SHMI diagnosis groups (HSCIC, 2014c). This results in a total of eight SHMI diagnosis groups which we use in our analysis:

56	Essential hypertension, Hypertension with complications and secondary hypertension
57	Acute myocardial infarction
58	Coronary atherosclerosis and other heart disease
61	Other and ill-defined heart disease
65	Congestive heart failure; nonhypertensive
66	Acute cerebrovascular disease
67	Occlusion or stenosis of precerebral arteries, Other and ill-defined cerebrovascular disease, Transient cerebral ischemia
73	Pneumonia (except that caused by tuberculosis or sexually transmitted disease)

For many Trusts information on the number of deaths in some of these diagnosis groups is suppressed due to small numbers, in order to ensure data confidentiality. In addition to exploring models based on all eight SHMI groups, we therefore also run alternative models based on the four SHMI groups for which data is only suppressed for a very small number of Trusts (and excluding those Trusts where this information has been suppressed). These four diagnosis groups are: Acute myocardial infarction; Congestive heart failure; Acute cereborvascular disease and pneumonia. The results of our regression models are presented in the first two columns of Table 9. While these

indicate a negative association between investment in organisational capital and the SHMI based on these selected conditions, these relationships are never statistically significant.

We also explored using the survival rate for these selected conditions as an alternative outcome/performance measure (results are shown in the final two columns of Table 9). Here investment in organisational capital, at least in terms of clinical managers, was positively associated with survival rates; this was not statistically significant at conventional levels when using the eight selected conditions, but was statistically significant at the 10 per cent level when focusing on the four selected conditions where survival information was available for the majority of Trusts.

Table 9: SHMI and survival rates for selected conditions, regression results

	SHMI (8 conditions)	SHMI (4 conditions)	Survival (8 conditions)	Survival (4 conditions)
Investment in OC: general managers	-0.014	-0.010	-0.000	-0.004
	(0.023)	(0.023)	(0.005)	(0.005)
Investment in OC: clinical managers	-0.049	-0.050	0.003	0.015*
	(0.041)	(0.041)	(0.008)	(0.008)
Total staff	0.048	0.038	0.006	-0.004
	(0.045)	(0.045)	(0.009)	(0.009)
% nurses	0.429	0.344	-0.003	-0.028
	(0.314)	(0.318)	(0.064)	(0.063)
Number of beds (reference: 600 or more)				
Less than 400	-0.018	-0.013	0.002	0.004
	(0.038)	(0.038)	(0.008)	(0.008)
400-599	-0.014	-0.015	0.001	0.002
	(0.025)	(0.025)	(0.005)	(0.005)
% female	-0.364	-0.315	-0.209***	-0.120
	(0.377)	(0.381)	(0.076)	(0.076)
% aged 75 plus	0.146	0.090	-0.176***	-0.196***
	(0.256)	(0.259)	(0.052)	(0.052)
% emergency admissions	0.233	0.248	-0.057*	-0.051
	(0.155)	(0.156)	(0.031)	(0.031)
Mean length of stay	0.009	0.010	-0.004	-0.002
	(0.016)	(0.016)	(0.003)	(0.003)
Unemployment rate of local area	0.001	0.000	0.000	0.000
	(0.004)	(0.004)	(0.001)	(0.001)
% population with degree or above	-0.005***	-0.005***	0.000*	0.001***
	(0.001)	(0.001)	(0.000)	(0.000)
Teaching hospital	-0.012	-0.019	0.008	0.004
	(0.030)	(0.030)	(0.006)	(0.006)
Foundation Trust	-0.003	-0.002	0.001	0.002
	(0.017)	(0.017)	(0.003)	(0.003)
Capital investment	0.002	0.001	0.000	-0.000
	(0.011)	(0.012)	(0.002)	(0.002)
Constant	1.491***	1.602***	0.960***	0.830***
	(0.522)	(0.528)	(0.106)	(0.105)
N	136	136	136	136
r2	0.342	0.362	0.472	0.501

Notes: Standard errors in parentheses. ***indicates statistically significant at the 1 per cent level, ** indicates statistically significant at the 5 per cent level, * indicates statistically significant at the 10 per cent level.

7. Discussion and conclusions

This paper has explored the role of organisational capital in explaining variation in the performance of NHS Acute Trusts in England.

We find that, in aggregate, investment in organisational capital in NHS Trusts has been increasing over the period of our analysis. This has been driven primarily by increases in organisational capital in terms of clinical managers; while the number of clinical managers has been increasing, on average, the number of general managers has remained relatively stable over this period. There is however considerable variation across NHS Trusts in the proportion of total staff in management roles.

When Trust performance is considered in terms of cost-weighted output, we find little evidence of a relationship with investment in organisational capital, once controlling for other factors. There is however some evidence of a positive relationship between investment in organisational capital and cost-weighted output based on inpatient activity (at least in more recent years). This association is driven by investment in organisational capital in terms of clinical managers, rather than for general managers.

The analysis also provides some evidence of a statistically significant relationship between investment in organisational capital and Trust performance in terms of mortality (as measured by the SHMI). In the pooled cross-sectional analysis, we find higher levels of investment in organisational capital in terms of clinical managers are associated with lower values of the SHMI. No statistically significant relationship was apparent for investment in organisational capital in terms of general managers.

There are a number of limitations of our analysis. Firstly, we are limited in our ability to accurately measure investment in organisational capital. While our approach is in line with that adopted in the existing literature, we have only been able to make assumptions about the amount of time individuals spend on the creation of organisational capital, and we do not know how this may vary across different NHS Trusts. Furthermore, we are unable to identify how the wages of the individuals in these occupations vary across Trusts.

Our measures of Trust performance are also limited. Our cost-weighted output measures do not take account of the quality of output. While the use of mortality indicators goes some way towards addressing this issue, it is still limited in that it does not enable any assessment of how the health of individuals who survive hospital treatment may have changed.

Thirdly, our dataset only covers a four year period, and so we are only able to undertake cross-sectional analysis. While this is still valuable for identifying associations between investments in organisational capital and hospital performance, if data were available for a greater number of years, it would be possible to undertake panel estimation which would allow us to control for fixed unobserved differences across Trusts.

Nevertheless, our analysis has provided some tentative evidence that investments in organisational capital may matter for NHS Trust performance in England. Furthermore, given that statistically significant results typically focus on organisational capital in terms of clinical managers, the study

provides further support for the argument that it is important to consider not only general managers in any analysis of organisational capital, but to also consider the broader contribution made by other professionals, at least within hospital settings.

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Appendix A: Data sources

Table A.1 Data sources

	Source	**Time period**
Trust performance:		
Cost weighted output index	NHS Reference Costs	April-March (financial year)
SHMI	HSCIC Indicator Portal	April-March
Investment in organisational capital:		
Number employed in relevant occupations	NHS Workforce Census	September of each year
Average wages	NHS Staff Earnings (mean annual basic pay per FTE)	April-March
Labour input:		
Total number of staff	NHS Workforce Census	September of each year
Earnings	NHS Staff Earnings (mean annual basic pay per FTE)	April-March
Capital:		
Expenditure on capital investment	NHS Estates and Facilities Statistics	April-March
Control variables:		
Inpatient demographics (e.g. age and gender of patients)	Hospital Episode Statistics	April-March
Trust characteristics (number of beds)	NHS Estates and Facilities Statistics	April-March
Unemployment rates	Annual Population Survey	April-March
Qualification levels	Annual Population Survey	January-December
Foundation Trust status	Register of Foundation Trusts	Not applicable

Appendix B: Descriptive statistics

Hospital size (number of beds)

Table B.1 shows the average number of beds in NHS Acute Trusts (excluding specialist Trusts). There has been some fall in the average number of beds over this period.

While there are far fewer NHS Acute Trusts in England than there are hospitals in Germany, the average size of an Acute Trust is much larger than that of a German hospital. Around 10 per cent of German hospitals in the analysis sample had 600 or more beds. In comparison, in our analysis sample of NHS Acute Trusts, more than 60 per cent of Trusts had 600 or more beds. There is also considerable variation in Trust size – excluding specialist Trusts, which are typically smaller in size, the number of beds ranged from just over 200 to almost 2000.

Table B.1 Average number of available beds in NHS Acute Trusts

	Available beds (mean)
2010	805
2011	783
2012	760
2013	757

Labour input

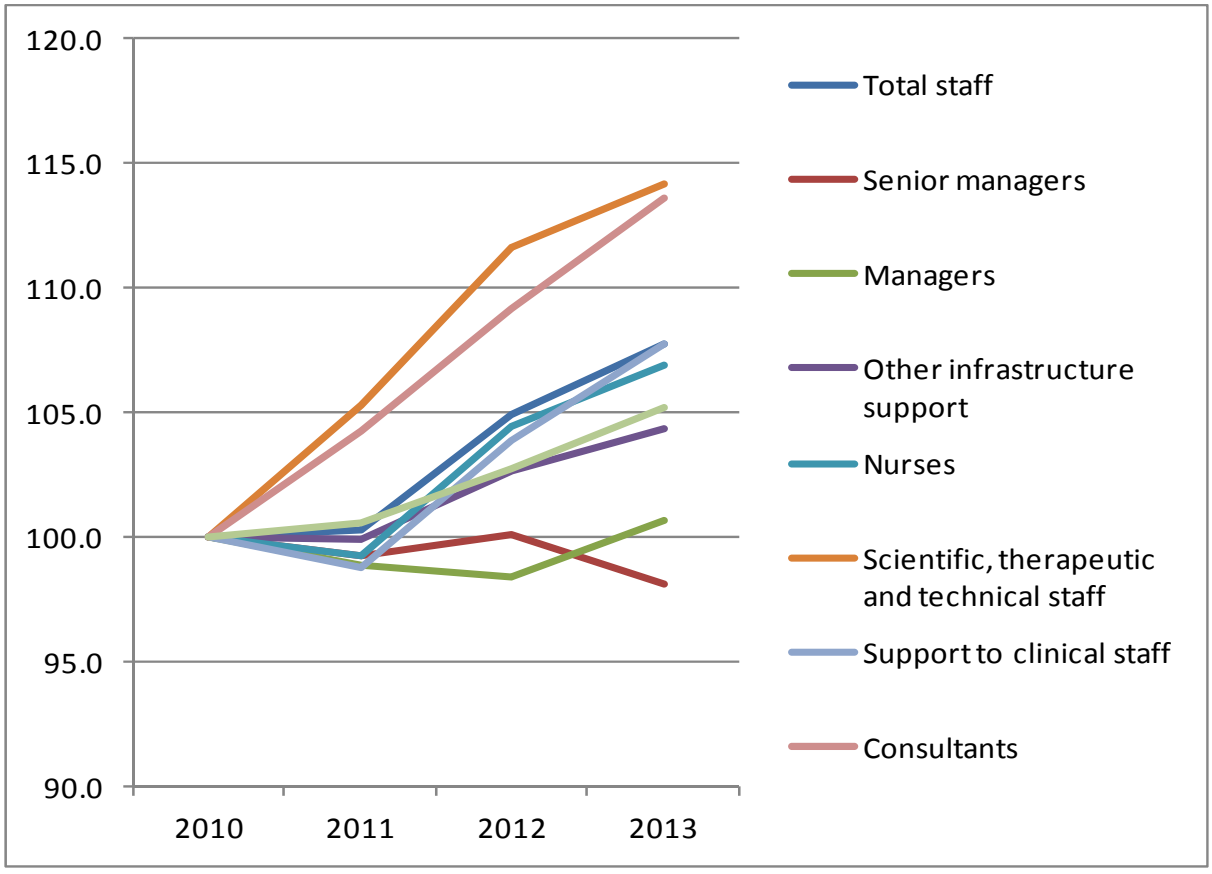
In part reflecting differences in hospital size, the number of staff employed varies considerably across NHS Trusts. On average, the full-time equivalent number of staff has increased over our analysis period (at least in our analysis sample) (Figure B.1). This increase is reflected in most occupational groups, although relatively little change, on average, has been seen in the number of managers over this time period, and the greatest proportionate increases have been seen for qualified scientific, therapeutic and technical staff and consultants.

On average, nurses account for the greatest proportion of staff; just under one third (31.3 per cent, on average) were nurses (Table B.2). The next largest group is support to clinical staff, who accounted on average for 27.8 per cent of all staff. Managers, in contrast, accounted on average for two per cent of staff. These figures refer to 2013 but are very similar in all years of our analysis period.

Table B.2 Per cent workforce (full-time equivalent) by broad occupational group, 2013

Occupational group	Per cent workforce
Senior managers	0.5
Managers	1.5
Other infrastructure support	12.9
Nurses	31.3
Scientific, therapeutic and technical staff	13.2
Support to clinical staff	27.8
Consultants	4.8
Medical staff excluding consultants	7.9

Figure B.1 Change in average number of staff by broad occupational group, 2010=100



Appendix C: Regression results

Table C.1 CWOI and investment in organisational capital, wage-weighted labour input

		2010-11	2011-12	2012-13	2013-14	Pooled
Investment in OC: general managers		-0.016	-0.020	-0.031	-0.019	-0.021
		(0.022)	(0.038)	(0.036)	(0.029)	(0.025)
Investment in OC: clinical managers		-0.062	0.005	-0.010	0.030	-0.010
		(0.040)	(0.069)	(0.063)	(0.052)	(0.047)
Total staff		1.028***	0.854***	0.945***	0.859***	0.913***
		(0.057)	(0.089)	(0.082)	(0.059)	(0.050)
% nurses		1.403***	1.455**	1.727***	2.057***	1.572***
		(0.307)	(0.573)	(0.480)	(0.386)	(0.256)
Number of beds (reference: 600 or more)						
Less than 400		-0.048	-0.085	-0.002	-0.132***	-0.078
		(0.043)	(0.064)	(0.062)	(0.046)	(0.048)
400-599		-0.025	-0.011	-0.007	-0.047	-0.031
		(0.026)	(0.044)	(0.041)	(0.030)	(0.023)
% female		0.599	1.358**	0.196	1.007**	0.789**
		(0.388)	(0.658)	(0.596)	(0.468)	(0.363)
% aged 75 plus		0.822***	0.993**	0.935**	0.751**	0.896***
		(0.261)	(0.464)	(0.409)	(0.318)	(0.201)
% emergency admissions		-0.271*	-0.062	-0.116	-0.130	-0.167
		(0.150)	(0.281)	(0.264)	(0.192)	(0.166)
Mean length of stay		-0.044***	0.025	-0.043*	-0.025	-0.022
		(0.017)	(0.028)	(0.023)	(0.019)	(0.018)
Unemployment rate of local area		0.002	0.002	0.006	0.010**	0.006*
		(0.004)	(0.007)	(0.006)	(0.005)	(0.003)
% population with degree or above		-0.002	-0.002	0.001	0.001	-0.000
		(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Teaching hospital		-0.102***	-0.053	-0.058	-0.041	-0.062**
		(0.031)	(0.053)	(0.048)	(0.036)	(0.028)
Foundation Trust		0.005	0.010	0.003	-0.001	0.003
		(0.017)	(0.030)	(0.027)	(0.021)	(0.017)
Capital investment		-0.006	0.009	0.005	0.001	0.002
		(0.007)	(0.012)	(0.015)	(0.014)	(0.005)
	2011					0.049***
						(0.014)
	2012					0.015
						(0.012)
	2013					0.012
						(0.013)
Constant		11.335***	10.850***	11.261***	10.718***	11.120***
		(0.514)	(0.919)	(0.836)	(0.639)	(0.537)
N		139	139	139	139	556
r2		0.964	0.879	0.909	0.947	0.921

Table C.2 CWOI and investment in organisational capital, labour input by type, regression results

	2010-11	2011-12	2012-13	2013-14	Pooled
Investment in OC: general managers	0.017	0.005	-0.005	0.005	0.006
	(0.022)	(0.038)	(0.038)	(0.030)	(0.025)
Investment in OC: clinical managers	-0.059	-0.023	-0.031	0.031	-0.026
	(0.040)	(0.075)	(0.072)	(0.060)	(0.049)
Total clinical support staff	-0.201	-0.562*	0.025	0.067	-0.185
	(0.199)	(0.324)	(0.311)	(0.241)	(0.174)
Total administrative staff	-0.184	-0.243	-0.002	0.027	-0.114
	(0.114)	(0.184)	(0.176)	(0.135)	(0.102)
Total medical staff	0.072	0.073	0.211	0.138	0.116
	(0.121)	(0.211)	(0.184)	(0.136)	(0.103)
Total qualified nursing staff	1.424***	1.826**	0.760	0.526	1.176***
	(0.509)	(0.837)	(0.798)	(0.616)	(0.449)
Total STT and ambulance staff	-0.117	-0.209	-0.033	0.073	-0.077
	(0.109)	(0.194)	(0.181)	(0.137)	(0.091)
% nurses	-4.245*	-6.104	-0.431	0.872	-2.750
	(2.427)	(4.024)	(3.892)	(2.972)	(2.153)
Number of beds (reference: 600 or more)					
Less than 400	-0.053	-0.053	0.009	-0.135***	-0.068
	(0.042)	(0.065)	(0.064)	(0.048)	(0.049)
400-599	-0.021	-0.010	-0.002	-0.047	-0.027
	(0.027)	(0.044)	(0.042)	(0.031)	(0.024)
% female	0.399	1.500**	0.269	0.949*	0.829**
	(0.391)	(0.688)	(0.648)	(0.502)	(0.361)
% aged 75 plus	0.762***	1.088**	0.981**	0.827**	0.925***
	(0.261)	(0.467)	(0.420)	(0.330)	(0.204)
% emergency admissions	-0.326**	-0.144	-0.133	-0.146	-0.187
	(0.156)	(0.290)	(0.274)	(0.205)	(0.167)
Mean length of stay	-0.043**	0.025	-0.031	-0.026	-0.016
	(0.017)	(0.029)	(0.026)	(0.022)	(0.017)
Unemployment rate of local area	0.003	0.001	0.006	0.011**	0.006*
	(0.004)	(0.007)	(0.006)	(0.005)	(0.003)
% population with degree or above	-0.001	-0.004	0.001	0.001	-0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Teaching hospital	-0.100***	-0.074	-0.059	-0.033	-0.065**
	(0.030)	(0.054)	(0.051)	(0.039)	(0.027)
Foundation Trust	0.008	0.026	0.013	0.002	0.012
	(0.018)	(0.032)	(0.029)	(0.022)	(0.018)
Capital investment	-0.006	0.010	0.002	0.001	0.001
	(0.007)	(0.012)	(0.015)	(0.015)	(0.005)
2011					0.053***
					(0.014)
2012					0.024*
					(0.012)
2013					0.021*
					(0.012)
Constant	13.954***	13.634***	12.944***	12.159***	13.275***
	(0.677)	(1.203)	(1.153)	(0.896)	(0.648)
N	139	139	139	139	556
r2	0.966	0.885	0.910	0.946	0.922

Table C.3 CWOI and investment in organisational capital, labour input measured by total other staff

		2010-11	2011-12	2012-13	2013-14	Pooled
Investment in OC: general managers		0.022	0.008	-0.001	0.009	0.010
		(0.022)	(0.038)	(0.036)	(0.028)	(0.024)
Investment in OC: clinical managers		0.002	0.080	0.072	0.104**	0.065
		(0.038)	(0.065)	(0.060)	(0.049)	(0.045)
Total other staff^		0.928***	0.734***	0.813***	0.751***	0.794***
		(0.052)	(0.079)	(0.072)	(0.052)	(0.044)
% nurses		1.821***	1.658***	1.901***	2.217***	1.793***
		(0.316)	(0.586)	(0.487)	(0.389)	(0.258)
Number of beds (reference: 600 or more)						
Less than 400		-0.043	-0.101	-0.019	-0.139***	-0.088*
		(0.043)	(0.064)	(0.062)	(0.046)	(0.048)
400-599		-0.021	-0.020	-0.016	-0.047	-0.035
		(0.027)	(0.045)	(0.041)	(0.030)	(0.023)
% female		0.358	1.143*	-0.068	0.775	0.546
		(0.389)	(0.664)	(0.605)	(0.469)	(0.367)
% aged 75 plus		0.801***	0.973**	0.917**	0.795**	0.888***
		(0.263)	(0.470)	(0.415)	(0.320)	(0.208)
% emergency admissions		-0.321**	-0.113	-0.187	-0.209	-0.227
		(0.151)	(0.284)	(0.267)	(0.193)	(0.168)
Mean length of stay		-0.051***	0.019	-0.054**	-0.036*	-0.031*
		(0.017)	(0.028)	(0.024)	(0.019)	(0.018)
Unemployment rate of local area		0.003	0.003	0.007	0.012**	0.007**
		(0.004)	(0.007)	(0.006)	(0.005)	(0.003)
% population with degree or above		-0.001	-0.001	0.002	0.002*	0.001
		(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Teaching hospital		-0.088***	-0.036	-0.039	-0.023	-0.044
		(0.031)	(0.053)	(0.049)	(0.037)	(0.030)
Foundation Trust		-0.003	0.000	-0.007	-0.010	-0.007
		(0.017)	(0.031)	(0.027)	(0.021)	(0.018)
Capital investment		-0.006	0.009	0.005	0.001	0.002
		(0.008)	(0.012)	(0.015)	(0.014)	(0.006)
	2011					0.053***
						(0.014)
	2012					0.020*
						(0.012)
	2013					0.017
						(0.013)
Constant		10.809***	10.541***	10.963***	10.330***	10.755***
		(0.520)	(0.933)	(0.847)	(0.643)	(0.532)
N		139	139	139	139	556
r2		0.963	0.876	0.907	0.947	0.919

^Calculated as total staff minus staff employed in those occupations considered to be contributing to organisational capital.