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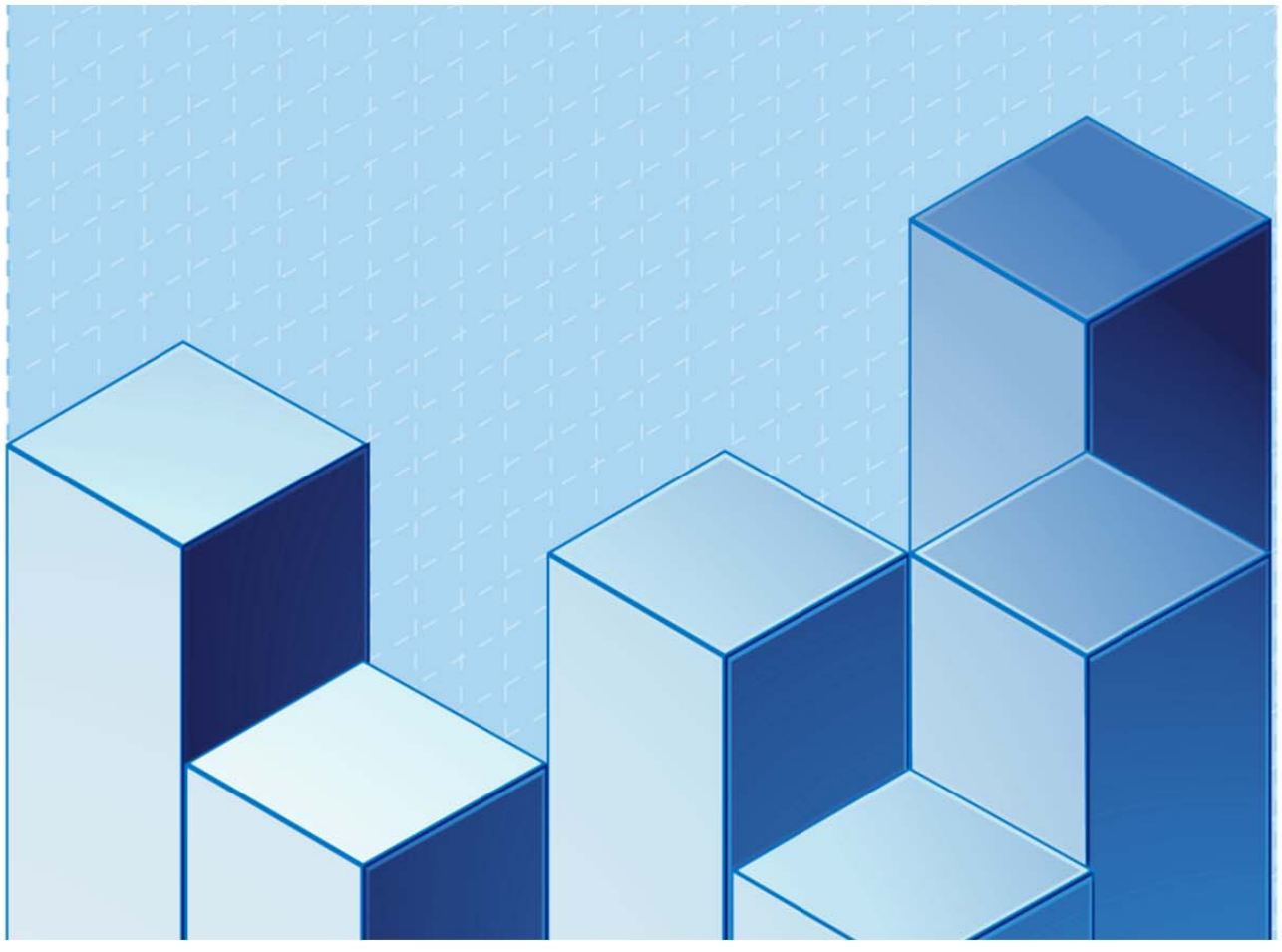

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Abstract

This paper explores the role of intangibles in schools, through a case study for England. The education sector forms a significant part of the public sector; in the UK, expenditure on education accounted for around 11 per cent of total public spending in 2014-15 (HM Treasury, 2015). A better understanding of the role and extent of intangible investment in schools therefore has the potential to make an important contribution to measurement of intangibles in the public sector overall. In this paper we focus specifically on the role of organisational capital. We make use of administrative data on the school workforce in England, which allows us to identify not only staff within the leadership group but also staff outside of the leadership group, such as classroom teachers, who hold leadership roles in addition to their teaching post. We find evidence of considerable variation in organisational capital across secondary schools in England. Our results indicate a positive and statistically significant association between organisational capital and school performance, measured in terms of attainment. We also find evidence to support the notion that organisational capital is not just embodied in senior leaders, but also in others within the workforce who contribute to leadership and management.

We also explore changes in leadership in response to school inspection, with the aim of exploring whether schools make changes to organisational capital following inspection, particularly if they obtain a poor inspection result. We find some evidence in support of this; as schools rated satisfactory show an increase in the relative size of their broader leadership group following inspection. Overall, our analysis provides tentative evidence that organisational capital matters for school performance. Furthermore, the results provide further support for the importance of considering contributions to organisational capital beyond those made by individuals in the main leadership group.

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1. Introduction

The importance of intangibles has been increasingly recognised both at a macro-economic level, in terms of the contribution of intangibles to overall economic performance, but also at a micro-economic level, for example, in explaining differences in firm performance. Challenges in defining and measuring intangibles remain apparent in the private sector, but additional challenges are evident in the public sector (Corrado, Haskel and Jona-Lasinio, 2015).

This paper explores the role of intangibles in schools, through a case study for England. The education sector forms a significant part of the public sector; in the UK, expenditure on education accounted for around 11 per cent of total public spending in 2014-15 (HM Treasury, 2015). Expenditure on schools (measured by expenditure on primary and secondary education) accounted for around 75 per cent of all public sector education spending. A better understanding of the role and extent of intangible investment in schools therefore has the potential to make an important contribution to measurement of intangibles in the public sector overall.

In this paper, we begin by discussing what forms of intangibles are evident within the school sector, and the information available to identify such investment within our country of study, England. We focus on intangibles in the form of organisational capital, and thus this paper is complementary to analysis of the role of organisational capital in hospital performance also undertaken as part of the SPINTAN project (Schulz et al., 2016). In Section 3 we describe the data used in our analysis. Section 4 presents descriptive statistics on the composition of the workforce, with particular emphasis on leadership given our focus on organisational capital. We also explore variation in leadership according to various school characteristics. In Section 5 we explore the relationship between investment in organisational capital and school performance. Finally, Section 6 considers changes in organisational capital following school inspection. Section 7 concludes.

2. Defining and identifying intangible investment in schools

In the seminal work of Corrado, Hulten and Sichel (2005, 2009), the authors identify and classify intangibles in the business sector into three broad groups:

- computerised information: including software and databases
- innovative property: including scientific and non-scientific research and development (R&D)
- economic competencies: including branding, firm-specific human capital (such as training) and organisational capital or structure

Corrado, Haskel and Jona-Lasinio (2015) note that while there are similarities across the market and non-market sectors for many intangible assets, such as software, other forms of intangible asset are quite different across sectors. In particular, a significant intangible in the public sector is "open data" - the collection and provision of information available for public use (for example, the work of national statistical agencies – see Blaug and Lekhi, 2009, for further discussion). Cultural assets are also of significance.

Building on the framework for the business sector set out by Corrado, Hulten and Sichel (2005, 2009), Corrado, Haskel and Jona-Lasinio (2015) set out an approach for classifying intangible investments in the public sector. They propose two broad groupings for intangibles in the public sector:

- information, scientific and cultural assets: comprising software, open data, R&D, cultural and heritage, and mineral exploitation
- organisational competencies: including brands, organisational capital and function-specific human capital (training)

Corrado, Haskel and Jona-Lasinio also note the different nature of own-account organisational capital in the public sector. It is often assumed that own-account organisational capital can be measured based on a proportion of manager's time, following the approach adopted by Corrado, Hulten and Sichel (2005). Squicciarini and Le Mouel (2012), however, suggest that focusing only on managers may result in the exclusion of some organisational capital. Their analysis shows that this is particularly the case for public service industries, where other occupational groups also make a substantial contribution to organisational capital.

In a school setting, there are potentially investments in a range of intangibles, namely expenditure on software/ICT, on training and on organisational capital.[1] It is organisational capital that forms the focus of this paper. This is in part because of its likely significance as an intangible asset. Bacchini et al. (2016), using estimates of public sector intangible investment for 2010 from the SPINTAN database show that in the UK, economic competencies (which includes organisational capital) account for the majority (more than 60 per cent) of investment in intangibles in the public sector. The importance of organisational capital has also been demonstrated for the UK market economy; Riley and Robinson (2011) show that organisational capital was significant in explaining differences in productivity among firms, and more important in doing so than other intangible investments such as expenditure on research and development and IT capital.

[1] Some data on expenditure on other forms of intangible investment do exist for schools; the financial returns completed by schools, for example, require schools to report expenditure on staff development. However, there have been substantial changes to the reporting of financial data following the introduction of academy schools (the introduction of academy schools is discussed further in Section 5). Financial data is reported separately for Academy schools and schools converting to Academies were not always required to report returns while in transition, which results in a substantial proportion of missing data during our analysis period. For this reason, we do not make use of this data in this paper.

However our second reason for focusing on organisational capital is that we are able to make use of detailed administrative data on the school workforce in England. These data, which have only become available in recent years, allow us to identify individuals in occupations that are likely to contribute to the production of intangible assets. This includes those specifically employed in leadership posts, but also staff in other occupations, such as teachers, who hold leadership roles. This distinction allows us to contribute to the debate within the intangibles literature on measuring organisational capital within public sector services and the contribution of occupations other than managers.

3. Data sources

In this paper we make use of data from three main sources: the School Census, the School Workforce Census and school-level attainment at Key Stage 4.[2] Our analysis covers the three year period from 2010/11 to 2012/13. Throughout our focus is on secondary schools, which cater primarily for children from age 11 to age 16.

Our starting point is the School Census. The School Census is a statutory return, covering all local authority maintained schools in England, as well as some specific types of non-maintained schools such as academies.[3] We use the School Census to identify secondary schools in England; we include all schools classified as either a secondary school or middle-deemed secondary school in any year of our analysis period; there are around 3,300 schools in each year on this basis (Table 1). The School Census collects information on a range of school and pupil characteristics, which enables us to take various school characteristics into account in our analysis.

Table 1: Analysis sample, number of secondary schools

	2010/11	2011/12	2012/13
School Census	3,312	3,267	3,285
School Workforce Census	3,307 (99.8%)	3,251 (99.5%)	3,265 (99.4%)
KS4 attainment	3,043 (91.9%)	3,028 (92.7%)	3,057 (93.1%)

Notes: Figures shown in parentheses are number of schools as a percentage of all secondary schools in the School Census.

[2] We thank the Department for Education for granting access to data from the National Pupil Database and School Workforce Census for the purposes of conducting this analysis. All errors and omissions remain the sole responsibility of the authors.

[3] Until fairly recently most state-funded secondary schools in England were local authority maintained schools, who receive funding and are overseen by local authorities. Academy schools are also state-funded but are independent of local authority control, and instead receive funding directly from the government. We discuss the introduction of academy schools further in Section 5.

The School Workforce Census (SWF) is a census of all publicly funded schools in England. The SWF has been conducted annually since 2010, and collects detailed information on the workforce within schools, including contractual details, pay, subjects taught, qualifications and absence. For our purposes, it is particularly important to note that the SWF provides information on both staff post and roles, which allow us to identify teachers with leadership posts (i.e. head teachers and their deputies), but also staff who are primarily classroom teachers (or in other posts) but who also have leadership roles, for example, as head of a year group or department. As such, it is this data that forms the basis for our measures of organisational capital.

We are able to match in information from the SWF for the vast majority (more than 99 per cent) of secondary schools in the School Census (Table 1).[4] We make use of both published school-level data on the School Workforce Census, which provides some information on the composition of the workforce in schools, as well as the underlying micro-data which allows us to explore the prevalence of staff with leadership roles outside of the main leadership group. The SWF takes place in November each year; we match this to the relevant school year (such that the November 2010 SWF is matched to the School Census data for the school year running from September 2010 to July 2011, for example).

We also link in information on school performance at the end of Key Stage 4 (KS4), from the National Pupil Database. This provides information on pupils' attainment at age 16, which during this period was the end of compulsory schooling.[5] We are able to match in data on school-level KS4 attainment for more than 90 per cent of secondary schools in our analysis sample. The majority of schools for which data on KS4 attainment were not available are middle deemed secondary schools (which would typically not have pupils aged 16), or schools catering for the 16 plus age range only. We conduct all of our analysis on the sample of schools for which we have data from all three sources.

Finally, we also make use of data on school inspection ratings. The Office for Standards in Education, Children's Services and Skills (Ofsted) is responsible for the inspection of all maintained schools and academies in England. We discuss this data further in Section 6.

4. The composition of the school workforce

In this section we begin by presenting descriptive statistics on the composition of the workforce within secondary schools. As our interest in this paper is on the role of organisational capital, we focus particularly on staff employed in the leadership group. We also explore the prevalence of staff engaged in leadership roles outside of those employed

[4] A small number of schools in the SWF could not be found in the School Census, this applied for 11 schools in 2010/11, 20 schools in 2011/12 and 16 schools in 2012/13.

[5] The school leaving age rose to 17 in September 2013, and to 18 in 2015. Young people can leave school at 16, but until they are 18 must either remain in full-time education (for example at college), undertake a traineeship or apprenticeship, or work or volunteer while in part-time education or training.

in the leadership group. Finally, we explore which school characteristics are associated with variation in the size of both the leadership group itself, as well as variation in the percentage of other staff with leadership responsibilities.

Table 2 shows the average percentage of the workforce in each of the main occupational groups identified in the School Workforce Census. The figures are presented on both a headcount and full-time equivalent basis.[6]

Table 2: Average percent of workforce in each occupational group

	2010/11	2011/12	2012/13
Headcount			
Leadership group	4.9	5.1	5.2
Classroom teachers	47.0	47.8	47.5
Teaching assistants	15.6	15.5	15.6
Support staff	20.7	20.4	20.3
Auxiliary staff	-	12.0	12.1
Full-time equivalent			
Leadership group	-	6.0	6.1
Classroom teachers	-	52.8	52.4
Teaching assistants	-	14.5	14.6
Support staff	-	20.2	20.2
Auxiliary staff	-	7.1	7.3

Measured on a headcount basis, the leadership group, which comprises head teachers, deputy heads and assistant heads, accounts for around 5 per cent of staff on average. Classroom teachers make up the largest occupational group, accounting for just under half of staff. Teaching assistants account for around a further 15 per cent of the workforce. Support staff, which refers to non-classroom based support staff such as school secretaries and other clerical staff, account for around one-fifth of the workforce. On average a further 12 per cent are auxiliary staff, which includes catering and school maintenance staff. These proportions are relatively stable throughout the three years of our analysis period.

When considered on a full-time equivalent basis, classroom teachers and the leadership group account for a greater proportion of the total workforce, and auxiliary staff for a smaller share (reflecting the greater prevalence of part-time work among auxiliary staff).

These averages conceal some considerable variation across schools, as shown in Figure 1, which presents the proportion in each occupational group based on the 2012 SWF (the same patterns are also apparent for the other years of our analysis sample). This is true even when considering numbers on a full-time equivalent basis (Figure 2).

[6] Full-time equivalent figures are not available for 2010; data on auxiliary staff is also not available in this year.

Figure 1: Variation in workforce composition, headcount, 2012/13

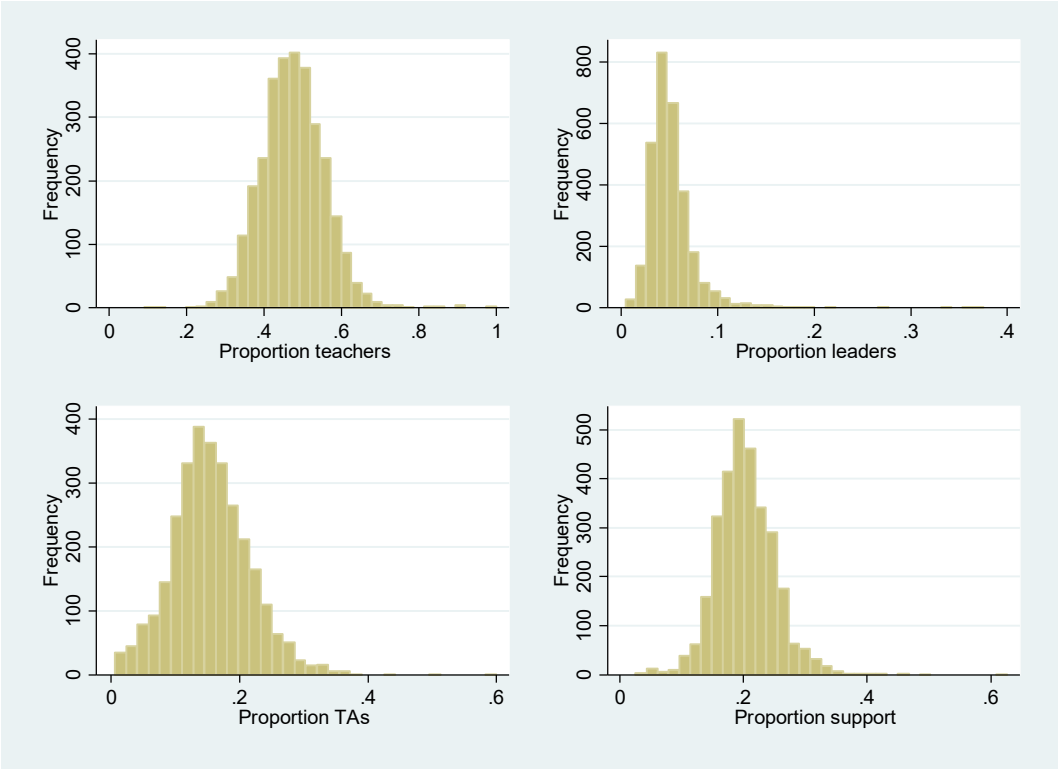
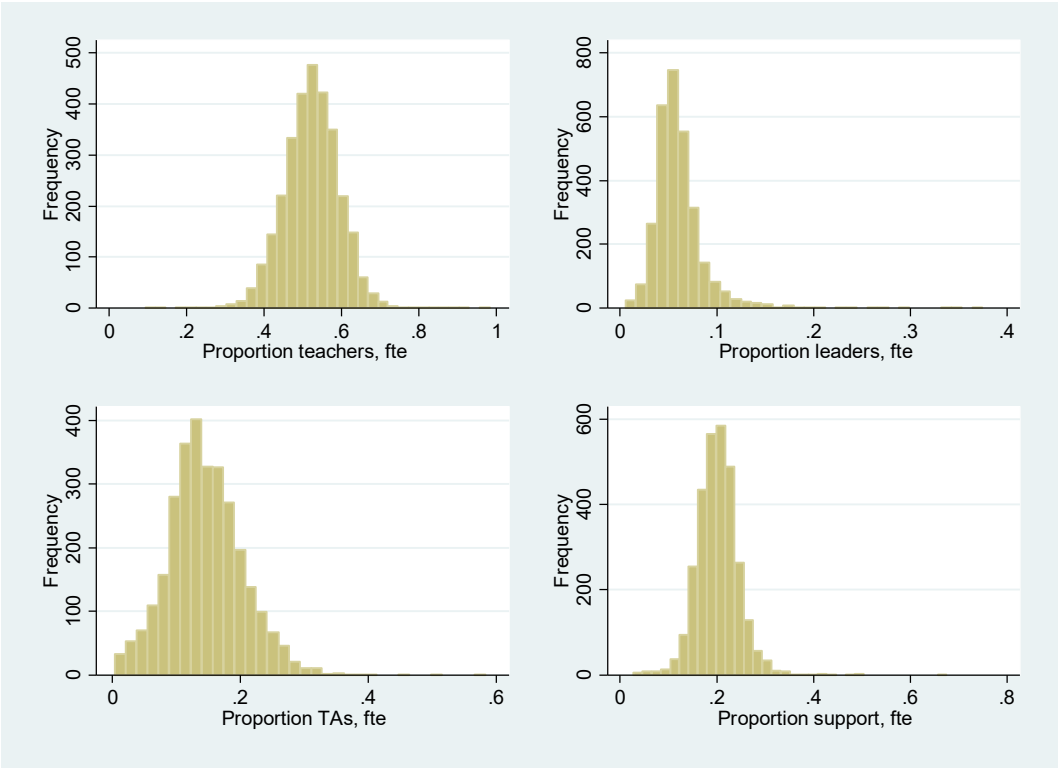


Figure 2: Variation in workforce composition, fte, 2012/13



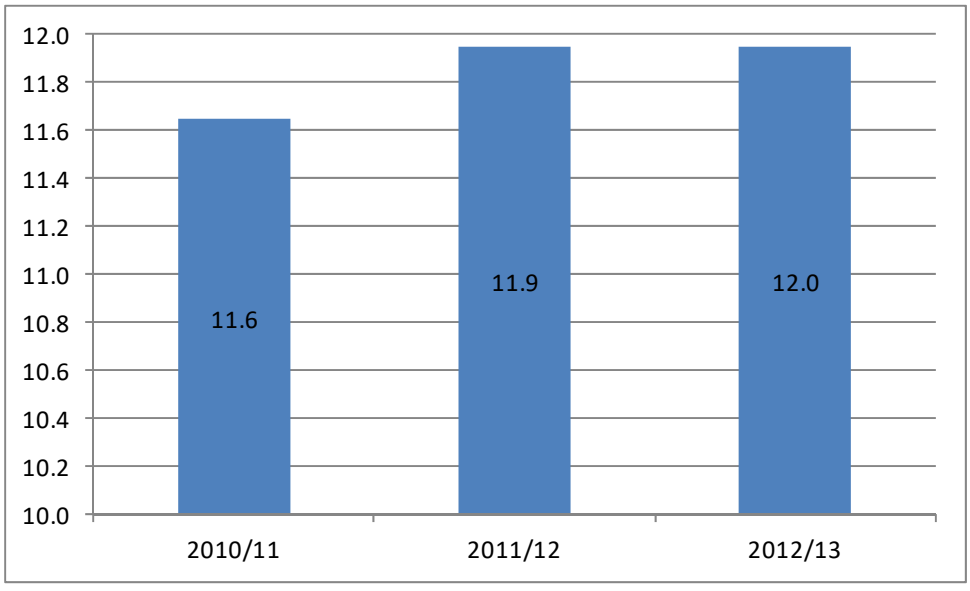
We noted earlier that we are also able to use the SWF to identify staff employed outside of the leadership group who hold leadership roles. Here we can only obtain measures of headcount, and we are not able to identify the time which individuals spend on these leadership roles. Nevertheless, these data can be used to give an indication of the proportion of staff with leadership responsibilities, and who may therefore be contributing to the organisational capital of the school.

We define the following categories as leadership roles:

- Assistant Heads
- Deputy Heads
- Headteacher
- Executive Headteacher
- Bursar
- Business Manager
- Head of Department
- Head of House
- Head of Year
- Learning Manager
- SEN Co-ordinator

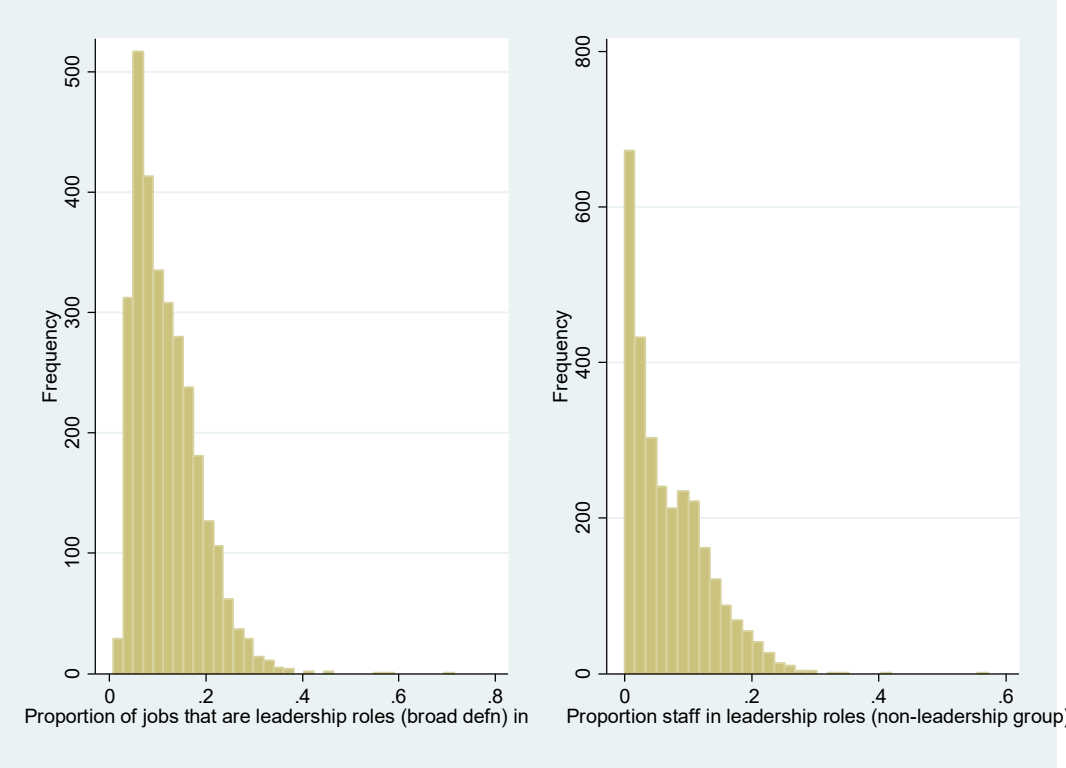
For each individual in the SWF, up to three roles can be reported. We count an individual as holding a leadership role if they hold at least one of the roles on the list given above. On this basis, on average, around 12 per cent of staff in secondary schools held leadership roles (Figure 3). We refer to these staff as the "broader leadership group".

Figure 3: Average percent of workforce in broader leadership group



Again, there is considerable variation across schools in the proportion of staff in the broader leadership group (Figure 4, left-hand chart). This is in part driven by the variation in the proportion of staff employed in the main leadership group, as we observed earlier. However, there is also variation across schools in the proportion of staff employed outside of the leadership group who hold leadership roles, as shown in the right-hand chart of Figure 4.

Figure 4: Variation in broader leadership group across schools, 2012/13



Notes: the left hand panel shows the proportion of staff in the broader leadership group (the main leadership group plus staff employed outside of the leadership group holding leadership roles). The right hand panel shows just the proportion of staff employed outside of the leadership group who hold leadership roles, that is, it excludes staff in the main leadership group.

Among those staff outside of the leadership group who hold leadership roles, around two-thirds were teachers (66 per cent in 2012/13), while around one third (34 per cent) were support staff. A very small proportion (less than one per cent) were teaching assistants.

As to be expected, the leadership roles undertaken by these individuals varied according to their occupation. Among teachers, the most common leadership role was Head of Department (more than 70 per cent of teachers with leadership roles were a Head of Department), followed by Head of Year (around 10 per cent). The majority of support staff with such roles were Business Managers or Bursars; this was the case for more than 80 per cent of support staff with leadership roles.

4.1 School characteristics and variation in organisational capital

There appears to be considerable variation across schools in both the proportion of the workforce that are employed in the leadership group, and the proportion that hold leadership roles. This suggests that there may be considerable variation in schools' organisational capital. It is therefore of interest to consider whether this is related to observable school characteristics.

As we have focused on the *proportion* of the workforce who are leaders, this will inevitably in part be driven by school size. In smaller schools, the leadership group typically accounts for a higher proportion of the workforce.[7] This is true of both the leadership group itself, and when considering the percentage of staff involved in leadership roles outside of the leadership group (Table 3).

Table 3: Percent leaders by school size, 2013, headcount

	Leadership group (% workforce)	Leadership roles outside of leadership group (% workforce)
School size (number of pupils)		
Lowest quartile	6.2	8.0
2nd quartile	5.2	7.7
3rd quartile	4.8	6.7
Top quartile	4.3	5.6

Table 4 reports the results of regression models exploring the relationship between the percentage of the workforce who are leaders and various school characteristics. The left-hand panel of Table 4 reports results for the percentage of the workforce in the leadership group, while the right-hand panel reports results for the percentage of the workforce outside of the leadership group who hold leadership roles.

As observed from the descriptive statistics presented in Table 3 above, the percentage of the workforce that is employed in the leadership group is smaller in larger schools. School size accounted for around ten per cent of the variation in the percentage of the workforce who were in the leadership group. However other characteristics were also associated with the size of the leadership group, even once controlling for school size (Table 4). The leadership group accounted for a larger proportion of the workforce in schools with a higher proportion of pupils eligible for free school meals (FSM), which is typically used as a proxy for disadvantage. In contrast, the leadership group accounted for a smaller percentage of the workforce in schools where a greater proportion of pupils were of White British origin,

[7] A school will, for example, usually only have one Headteacher (although in some schools there may be two), regardless of school size. Thus headteachers inevitably account for a larger percentage of the total workforce in smaller schools.

and also in schools where a higher proportion of pupils had a statement of special educational needs (SEN).[8] Little difference in the proportion of the workforce in the leadership group was apparent by school type.

In terms of the proportion of the workforce outside of the leadership group who held leadership roles, again, this proportion tended to be smaller in larger schools. We observe similar patterns as for the leadership group in terms of the proportion of pupils who are White British and who have a statement of SEN; both were associated with a smaller percentage of staff engaged in broader leadership roles. However, in contrast to the results for the leadership group, we no longer see a positive relationship with the proportion of pupils eligible for FSM (and in fact this is negative and significant in the first year of our analysis period). We also observe some differences by school type: academy schools were likely to have a greater percentage of staff in broader leadership roles than community schools. This was also true of Foundation and voluntary aided schools in 2011 and 2012, although not in 2013. This may well reflect the considerable number of schools that have become academies over the period of our analysis; we return to this issue in Section 5.

Nevertheless, a considerable amount of variation in the size of the leadership group remains unexplained, suggesting other factors are likely to be important that we do not observe here. This is particularly the case in terms of explaining variation in the size of the broader leadership group.

[8] Some children will have SEN but will not have a statement of SEN. Changes to the data available in the School Census over this period mean we focus only on the percentage of children with a statement of SEN (for which we have a consistent measure over time), rather than all children with SEN.

Table 4: Per cent staff in leadership group/other leadership roles and school characteristics, regression results

	% staff in leadership group						% staff in leadership roles outside leadership group					
	2011		**2012**		**2013**		**2011**		**2012**		**2013**	
Number of pupils	-0.001	***	-0.001	***	-0.001	***	-0.003	***	-0.003	***	-0.003	***
	(-15.63)		(-14.88)		(-15.69)		(-9.26)		(-8.84)		(-9.28)	
% male pupils	0.005	***	0.004	**	0.003		0.003		-0.004		-0.001	
	(3.05)		(2.38)		(1.63)		(0.42)		(-0.62)		(-0.13)	
% FSM pupils	0.023	***	0.028	***	0.027	***	-0.027	**	-0.011		-0.019	*
	(7.36)		(8.82)		(8.30)		(-2.45)		(-0.97)		(-1.80)	
% White British pupils	-0.004	***	-0.003	**	-0.006	***	-0.023	***	-0.018	***	-0.02	***
	(-2.59)		(-2.28)		(-3.96)		(-4.71)		(-3.69)		(-4.56)	
% SEN pupils	-0.063	***	-0.087	***	-0.1	***	-0.333	***	-0.229	***	-0.225	***
	(-2.83)		(-3.95)		(-4.21)		(-4.33)		(-2.97)		(-2.99)	
School type (ref: community school)												
...Academy	0.144		-0.045		0.071		1.598	***	1.732	***	1.359	***
	(1.34)		(-0.60)		(0.88)		(4.29)		(6.58)		(5.31)	
...Foundation	0.08		-0.055		-0.099		1.103	***	0.628	*	0.175	
	(1.05)		(-0.58)		(-0.84)		(4.13)		(1.89)		(0.46)	
...Voluntary aided	0.168	*	0.166		0.229	*	0.676	**	0.918	**	0.604	
	(1.83)		(1.64)		(1.91)		(2.10)		(2.58)		(1.58)	
...Voluntary controlled	-0.153		-0.09		-0.197		0.739		1.201		2.074	**
	(-0.78)		(-0.40)		(-0.69)		(1.08)		(1.51)		(2.24)	
Constant	6.016	***	6.155	***	6.547	***	11.794	***	11.052	***	11.154	***
	(28.59)		(29.24)		(30.18)		(16.08)		(15.11)		(16.02)	
R-squared	0.144		0.147		0.151		0.049		0.048		0.047	
N	2884		2843		2901		2874		2786		2836	

Note: t-statistics in parentheses.*indicates statistically significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level. We exclude those schools in the bottom and top percentiles on the leadership variables to minimise any effect of outliers. We also excluded the small number of schools that were not a mainstream type, as these schools are typically much smaller in size compared with other school types.

5. Organisational capital and school performance

5.1 Approach

In this section we explore the relationship between investment in organisational capital and school performance.

We set out to estimate the following:

$$Y_i = \alpha + \Sigma\beta_j L_{ji} + \Sigma\gamma_k K_{ki} + \pi INT_i + \Sigma\delta_n Z_{ni} + e_i$$

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

Throughout we estimate separate cross-sectional models for each year of our analysis. As our dataset comprises only three years, we are unable to reliably undertake panel estimation, therefore we focus solely on cross-sectional analysis.[9] We describe the measures used in our analysis below, before reporting the results of our models.

5.2 Measures

School performance

We measure school performance based on attainment at the end of KS4, when pupils are aged 16. We explore two measures of performance:

- The percentage of pupils achieving at least five GCSEs at grades A*-C, including English and maths. This is one of the key targets against which schools in England have been judged; it is also commonly reported in school league tables.
- "Best 8 value added": this compares pupil performance at KS4, based on their eight best GCSE examination results, with their expected outcome given their attainment at Key Stage 2 (KS2), at the end of primary school at age 11. These scores are then averaged across all pupils in a school to obtain a school-level value added measure. This measure is calculated and published by the Department for Education.[10]

Intangible investment

We measure investment in intangibles, or more precisely, organisational capital, in terms of payments to managers, in line with the approach developed by Corrado, Hulten and Sichel (2005, 2009). In order to do so, it is necessary to make a number of assumptions.

Firstly, we need to make assumptions about the amount of time spent on management, and within this, time spent on the creation of organisational capital. For those in the leadership

[9] We also ran pooled cross-sectional models but the results were substantively the same – full results are available on request from the authors.

[10] These measures were available for the period of our analysis. As part of the new secondary school accountability system, from 2016, new headline measures of school performance are in place, namely Progress 8 and Attainment 8. For further details of these measures see Department for Education (2016).

group, we assume that all of their time relates to management responsibilities. We make the same assumption for support staff who are either Bursars or Business Managers. For classroom teachers who hold leadership responsibilities, we assume that ten per cent of their time relates to management responsibilities. While there are difficulties in identifying the amount of time teachers spend on management, we opt for a figure of 10 per cent, partly informed by a report by the National Union of Teachers (NUT) on the introduction of planning, preparation and assessment time, which states, "Many secondary teachers with leadership and management responsibilities will, prior to the PPA entitlement coming into force, already receive at least 10 per cent non-contact time in order to undertake these responsibilities. Heads of department and heads of year are likely to fall into this category." (NUT, 2005). This figure is also roughly in line with evidence from the 2013 Teacher Workload Diary Survey (TNS BMRB, 2014), which finds classroom teachers spend on average around 8 per cent of their time on management (in non-academy schools).

For all leadership occupations/leadership roles, we then assume, in line with the assumption made in Corrado, Hulten and Sichel, that 20 per cent of management time is spent on the creation of organisational capital. While Corrado, Hulten and Sichel themselves note that this is an "arbitrary choice", in the absence of better information this assumption has been used both in their own analysis and by others (e.g. Schulz et al., 2016).

In order to calculate investment we also require information on pay of those staff with leadership responsibilities. We use the same average wage across all schools, in line with the approach taken by O'Mahony et al. (2016) for the analysis of organisational capital in hospitals in England. This has the implication that variation in our measures of organisational capital across schools is driven purely by differences in the number of people employed in roles that are contributing to organisational capital, rather than reflecting differences in their pay. To obtain average wages, we use information from published reports on the SWF for the average salary of a classroom teacher in a secondary school (£36,200 in 2011) and for the leadership group (£60,900 in 2011) (Department for Education, 2012). For school support staff employed as Bursars or Business Managers, we calculate the mean wage across all individuals in these roles from the micro-data (£24,531 in 2011).[11]

In our analysis we explore total investment in organisational capital, consisting of both that of the main leadership group as well as that of staff employed outside of the leadership group with leadership roles. We also consider these two elements separately to explore whether both show an association with school performance. All our intangibles measures are logged when entered in the regression models.

[11] This information is missing or zero for many individuals in these occupations (and indeed for other occupations too), and so this estimate should be treated with some caution.

Labour and other inputs

Our models also include a measure of labour input, measured as the total number of staff (logged). We use a headcount measure as this is available in all three years of our analysis, although for the two years where a full-time equivalent measure is available we checked the robustness of our results to using this instead (this makes no substantive difference). We also experiment with including separate measures of labour input for teaching and non-teaching staff.

Ideally we would also like to include measures of capital and intermediate inputs. However, it did not prove possible to incorporate such measures due to data availability. While data on school expenditure is available from the financial returns completed by schools, this does not cover capital spending. Furthermore, there have been substantial changes to the collection of expenditure data following the introduction of academy schools, for which expenditure information is collected separately. During our analysis period many schools have converted to academy status and expenditure data is often not reported for schools in the year of their transition, resulting in a substantial amount of missing expenditure data. For this reason we do not incorporate this data in our analysis.

School type

The introduction of academy schools has been perhaps the major change to the school system in England in recent years. Free from local authority control, academies have greater autonomy over staffing, pay and conditions, and have freedom over non-core parts of the curriculum and many aspects of school organisation (Eyles and Machin, 2015; Eyles et al., 2015). Arguably, the role of leadership, and organisational capital, is therefore even more important in academy schools given the greater decision-making freedoms of such schools and their leaders. We saw in Section 4 that academy schools had a slightly higher proportion of staff in broader leadership roles compared with community schools.

Our analysis period has seen a significant increase in the number of academy schools. In the first year of our analysis, around 11 per cent of schools in our sample were academies, while by the final year, almost half had academy status.

We include in our models a set of dummy variables capturing school type (academy, foundation, voluntary aided and voluntary controlled), with reference to community schools. Foundation, voluntary aided and voluntary controlled schools also have greater autonomy than community schools, although not to the same extent as for academies.

Other measures

We also include a number of other control variables capturing the composition of the school:

- Proportion of pupils that are male
- Proportion of pupils eligible for free school meals (as a proxy for disadvantage)
- Proportion of pupils with special educational needs

- Proportion of pupils of White British origin

In our models where school performance is measured in terms of the percentage of pupils attaining 5 or more GCSEs, we also include a measure of the prior attainment of these pupils at age 11 (as measured at the end of Key Stage 2). In our value added models the inclusion of the prior attainment variable is unnecessary as the dependent variable is effectively already accounting for progress.

We do not include a variable for number of pupils in these specifications as this is highly correlated with the total number of staff in the school (as both reflect school size). We also considered including the proportion of pupils for whom English is an additional language, but this measure was highly correlated with ethnicity and so we omit this from our final specification. We also experimented with including a measure of local deprivation in terms of the Income Deprivation Affecting Children Index (IDACI), but this did not substantively affect the results.

5.3 Results

Per cent pupils attaining 5 or more GCSEs at grades A*-C including English and maths

We begin by examining performance in terms of the percentage of pupils in the school attaining 5 or more GCSEs at grades A*-C including English and maths. Table 5 presents the results of regressing this measure of school performance on our measures of investment in organisational capital; the first panel presents total investment in organisational capital while the second panel separates this into organisational capital within the leadership group and organisational capital in terms of all other occupations with leadership roles. We control for prior attainment of pupils, but no other control variables are included in this specification.

Here we see a positive and statistically significant association between our measure of total investment in organisational capital and school performance in all three years of our analysis. When we separate our organisational capital measure into that which is contained within the leadership group and that created by other leadership roles, we find the effect is driven predominantly by the leadership group. Nevertheless, in two of the three years, organisational capital from broader leadership roles is also positively and significantly associated with performance.

Table 5: Per cent pupil achieving 5 or more GCSEs at grades A*-C and investment in organisational capital, regression results, excluding controls

	2011	2012	2013	2011	2012	2013
Investment in OC (total)	1.424***	3.663***	4.436***			
	(3.30)	(7.50)	(9.80)			
Investment in OC: leadership group				1.158***	2.648***	3.831***
				(3.03)	(6.08)	(9.28)
Investment in OC: outside leadership group				0.066	0.851***	0.46*
				(0.31)	(3.48)	(1.94)
Prior attainment	8.392***	7.774***	8.184***	8.388***	7.751***	8.174***
	(87.81)	(71.19)	(73.24)	(87.77)	(70.95)	(73.09)
R-squared	0.736	0.649	0.657	0.735	0.649	0.656
N	2792	2744	2811	2792	2744	2811

Note: t-statistics in parentheses. .*significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level. These results are restricted to the sample for which we were able to observe both total organisational capital and organisational capital split by type so we can be sure any differences are not driven by differences in the analysis sample as a result of missing observations. However, the substantive results are unchanged if we do not apply this restriction and allow the sample sizes to vary.

Once we introduce a measure of labour input and our other control variables we still find a positive and statistically significant association between our organisational capital measures and school performance, in two out of the three years of our analysis period (Table 6).

Table 6: Per cent pupil achieving 5 or more GCSEs at grades A*-C and investment in organisational capital, regression results, including controls

	2011	2012	2013	2011	2012	2013
Investment in OC (total)	0.687	2.599***	3.39***			
	(1.48)	(4.75)	(6.58)			
Investment in OC: leadership group				0.546	1.759***	2.833***
				(1.37)	(3.73)	(6.21)
Investment in OC: outside leadership group				-0.111	0.587**	0.334
				(-0.55)	(2.50)	(1.48)
Total staff	-0.685	-0.648	-0.68	-0.594	-0.454	-0.574
	(-1.40)	(-1.13)	(-1.23)	(-1.22)	(-0.80)	(-1.04)
% male pupils	-0.03***	-0.047***	-0.046***	-0.03***	-0.047***	-0.045***
	(-3.66)	(-5.03)	(-5.11)	(-3.64)	(-4.98)	(-5.08)
% FSM pupils	-0.125***	-0.071***	-0.151***	-0.124***	-0.07***	-0.148***
	(-6.56)	(-3.28)	(-7.45)	(-6.48)	(-3.22)	(-7.30)
% White British pupils	-0.134***	-0.113***	-0.123***	-0.135***	-0.113***	-0.122***
	(-20.09)	(-15.12)	(-17.63)	(-20.10)	(-15.10)	(-17.57)
% SEN pupils	0.143	0.085	0.101	0.139	0.073	0.095
	(1.30)	(0.68)	(0.85)	(1.27)	(0.59)	(0.80)
School type (ref: community school)						
…Academy	2.019***	2.992***	2.625***	2.089***	2.973***	2.652***
	(3.93)	(7.22)	(6.70)	(4.05)	(7.15)	(6.75)
…Foundation	-0.051	-0.162	-0.608	-0.023	-0.212	-0.583
	(-0.14)	(-0.32)	(-1.08)	(-0.06)	(-0.41)	(-1.03)
…Voluntary aided	1.256***	1.27**	1.726***	1.254***	1.279**	1.724***
	(2.83)	(2.28)	(2.98)	(2.83)	(2.30)	(2.97)
…Voluntary controlled	0.407	0.644	1.233	0.443	0.558	1.239
	(0.43)	(0.52)	(0.89)	(0.47)	(0.45)	(0.90)
Prior attainment	8.194***	7.58***	7.568***	8.199***	7.561***	7.569***
	(64.44)	(50.85)	(50.77)	(64.37)	(50.59)	(50.61)
Constant	-159.22***	-166.478***	-171.975***	-157.087***	-162.471***	-168.861***
	(-25.61)	(-22.67)	(-24.80)	(-26.37)	(-23.05)	(-25.06)
R-squared	0.776	0.691	0.702	0.776	0.691	0.702
N	2792	2744	2811	2792	2744	2811

Note: t-statistics in parentheses. .*significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level.

The relationships between our other controls and school performance are consistent with expectations and existing evidence (see, for example, the review by Cook, 2013). School performance (in terms of the percentage of pupils attaining the specified GCSE benchmark) is higher where pupils had higher attainment on entry to secondary school. School performance is on average lower where schools have a higher proportion of male pupils, a higher proportion of disadvantaged pupils (as proxied by the percentage of pupils who are eligible for free school meals) and where a higher proportion of pupils are of White British origin.

The results also suggest some interesting variation by school type. While these results should be interpreted with caution, and cannot be taken to imply a causal relationship, they do suggest a positive association between this measure of school performance and being an academy school in this period (relative to community schools). Voluntary aided schools also showed higher performance relative to community schools, although the magnitude of the effect was smaller than for academy schools.

We also experimented with alternative measures of labour input (Table 7). This is only feasible for 2012 and 2013 due to changes in the variables available over time. This results in little change to the relationship between organisational capital and school performance. While total labour input was not significantly associated with school performance in earlier specifications, when separating this into teachers and non-teachers, we see that a greater number of teachers is positively associated with school performance, while a higher number of non-teaching staff (this includes the leadership group as well as support staff, teaching assistants and all other non-teaching staff), is associated with lower performance. This could, at least in part, reflect the fact that schools which have students with greater support needs (and are thus likely to demonstrate lower levels of performance) may well employ more support staff.

Table 7: Per cent pupil achieving 5 or more GCSEs at grades A*-C and investment in organisational capital, regression results, including controls, labour input by broad occupational group

	2012		2013		2012		2013	
Investment in OC (total)	2.168	***	2.872	***				
	(4.01)		(5.70)					
Investment in OC: leadership group					1.4	***	2.41	***
					(3.02)		(5.40)	
Investment in OC: outside leadership group					0.573	**	0.277	
					(2.40)		(1.22)	
Number teachers	4.139	***	3.715	***	4.271	***	3.787	***
	(6.20)		(5.74)		(6.43)		(5.87)	
Number non-teachers	-4.16	***	-3.741	***	-4.129	***	-3.728	***
	(-6.82)		(-6.48)		(-6.77)		(-6.46)	
% male pupils	-0.043	***	-0.044	***	-0.043	***	-0.044	***
	(-4.60)		(-4.88)		(-4.54)		(-4.85)	
% FSM pupils	-0.07	***	-0.14	***	-0.07	***	-0.137	***
	(-3.17)		(-6.79)		(-3.14)		(-6.65)	
% White British pupils	-0.104	***	-0.112	***	-0.104	***	-0.112	***
	(-13.54)		(-15.70)		(-13.52)		(-15.63)	
% SEN pupils	0.208		0.246	**	0.2		0.241	**
	(1.62)		(2.00)		(1.56)		(1.96)	
School type (ref: community school)								
…Academy	2.928	***	2.843	***	2.908	***	2.871	***
	(6.98)		(7.19)		(6.91)		(7.24)	
…Foundation	-0.185		-0.329		-0.23		-0.303	
	(-0.36)		(-0.58)		(-0.44)		(-0.53)	
…Voluntary aided	1.035	*	1.865	***	1.054	*	1.864	***
	(1.83)		(3.21)		(1.87)		(3.20)	
…Voluntary controlled	0.201		0.896		0.116		0.909	
	(0.16)		(0.65)		(0.09)		(0.66)	
Prior attainment	7.287	***	7.365	***	7.265	***	7.364	***
	(46.62)		(47.57)		(46.40)		(47.45)	
Constant	-157.522	***	-165.118	***	-153.952	***	-162.437	***
	(-20.94)		(-23.40)		(-21.38)		(-23.69)	
R-squared	0.695		0.708		0.695		0.708	
N	2646		2723		2646		2723	

Note: t-statistics in parentheses. .*significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level.

Best 8 value added

We then turn to consider school performance in terms of Best 8 value added. This measure allows us to look at pupil progress during secondary school. Table 8 presents the results of regressions of this measure of school performance on our measures of organisational capital, before the inclusion of any controls. Again we see a positive and statistically significant relationship between organisational capital and school performance. The notable difference here compared with the results for performance measured in terms of the percentage of pupils attaining the specified level of GCSEs, is that for value added, investment in organisational capital outside of the leadership group is positively associated with school performance and statistically significant in all three years of our analysis period.

Table 8: Best 8 value added and investment in organisational capital, regression results, excluding controls

	2011	2012	2013	2011	2012	2013
Investment in OC (total)	5.978***	7.455***	8.503***			
	(5.78)	(6.97)	(8.34)			
Investment in OC: leadership group				4.459***	5.122***	6.712***
				(4.86)	(5.37)	(7.22)
Investment in OC: outside leadership group				1.625***	2.127***	1.897***
				(3.16)	(3.95)	(3.54)
R-squared	0.012	0.017	0.024	0.013	0.017	0.024
N	2792	2744	2811	2792	2744	2811

Note: t-statistics in parentheses. .*significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level

Table 9 presents results once including the same set of controls as in our model for attaining 5 or more GCSEs (excluding prior attainment). Again we find that our measures of organisational capital are positively associated with Best 8 value added in all years, both for the leadership group itself but also for our broader measure of organisational capital.

The relationships between other school characteristics and performance show similar patterns to those observed for our GCSE performance measure. Again, relative to community schools, academy schools appeared to be faring better in terms of value added.

Table 9: Best 8 value added and investment in organisational capital, regression results, including controls

	2011	2012	2013	2011	2012	2013
Investment in OC (total)	5.999***	6.918***	7.535***			
	(5.32)	(5.82)	(6.52)			
Investment in OC: leadership group				4.639***	4.709***	5.766***
				(4.79)	(4.60)	(5.63)
Investment in OC: outside leadership group				1.245**	1.642***	1.497***
				(2.55)	(3.21)	(2.95)
Total staff	-4.644***	-4.607***	-3.724***	-4.5***	-4.119***	-3.416***
	(-3.89)	(-3.68)	(-2.99)	(-3.81)	(-3.32)	(-2.76)
% male pupils	-0.106***	-0.129***	-0.136***	-0.105***	-0.127***	-0.136***
	(-5.23)	(-6.31)	(-6.79)	(-5.21)	(-6.25)	(-6.76)
% FSM pupils	-0.352***	-0.221***	-0.311***	-0.349***	-0.214***	-0.305***
	(-9.71)	(-6.10)	(-8.83)	(-9.65)	(-5.92)	(-8.69)
% White British pupils	-0.264***	-0.228***	-0.241***	-0.264***	-0.227***	-0.241***
	(-16.44)	(-14.20)	(-15.62)	(-16.41)	(-14.16)	(-15.58)
% SEN pupils	-1.035***	-0.896***	-0.624**	-1.039***	-0.914***	-0.628**
	(-4.04)	(-3.46)	(-2.42)	(-4.06)	(-3.53)	(-2.44)
School type (ref: community school)						
…Academy	8.908***	8.239***	7.467***	8.931***	8.157***	7.435***
	(7.13)	(9.20)	(8.52)	(7.13)	(9.07)	(8.46)
…Foundation	1.017	-1.872*	-1.938	0.988	-2.015*	-1.976
	(1.15)	(-1.67)	(-1.53)	(1.12)	(-1.80)	(-1.55)
…Voluntary aided	3.384***	2.041*	2.06	3.355***	2.045*	2.081
	(3.17)	(1.69)	(1.59)	(3.14)	(1.70)	(1.60)
…Voluntary controlled	0.659	-1.855	0.87	0.52	-2.104	0.719
	(0.29)	(-0.69)	(0.28)	(0.23)	(-0.78)	(0.23)
Constant	985.804***	969.878***	959.828***	989.769***	978.109***	965.452***
	(85.04)	(81.35)	(84.22)	(90.94)	(87.38)	(88.65)
R-squared	0.152	0.159	0.168	0.152	0.158	0.168
N	2792	2744	2811	2792	2744	2811

Note: t-statistics in parentheses. .*significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level.

If we separate labour input into teaching and non-teaching staff we again find that a greater number of classroom teachers is associated with greater school performance, whereas the same does not apply for greater numbers of non-teaching staff (Table 10).

Table 10: Best 8 value added and investment in organisational capital, regression results, including controls, labour input by broad occupational group

	2012		2013		2012		2013	
Investment in OC (total)	6.287	***	6.705	***				
	(5.35)		(5.92)					
Investment in OC: leadership group					4.275	***	5.247	***
					(4.23)		(5.23)	
Investment in OC: outside leadership group					1.682	***	1.336	***
					(3.23)		(2.62)	
Number teachers	3.208	**	4.364	***	3.462	**	4.481	***
	(2.25)		(3.06)		(2.44)		(3.15)	
Number non-teachers	-6.837	***	-7.109	***	-6.725	***	-7.044	***
	(-5.29)		(-5.61)		(-5.20)		(-5.56)	
% male pupils	-0.123	***	-0.133	***	-0.122	***	-0.133	***
	(-5.96)		(-6.61)		(-5.90)		(-6.56)	
% FSM pupils	-0.17	***	-0.25	***	-0.164	***	-0.245	***
	(-4.48)		(-6.77)		(-4.33)		(-6.65)	
% White British pupils	-0.209	***	-0.219	***	-0.208	***	-0.219	***
	(-12.55)		(-13.72)		(-12.50)		(-13.67)	
% SEN pupils	-0.665	**	-0.273		-0.674	**	-0.277	
	(-2.43)		(-1.01)		(-2.47)		(-1.03)	
School type (ref: community school)								
…Academy	8.016	***	7.738	***	7.933	***	7.71	***
	(8.82)		(8.73)		(8.69)		(8.68)	
…Foundation	-2.001	*	-1.626		-2.142	*	-1.653	
	(-1.76)		(-1.27)		(-1.88)		(-1.29)	
…Voluntary aided	1.967		2.297	*	2.003		2.313	*
	(1.60)		(1.76)		(1.63)		(1.77)	
…Voluntary controlled	-2.523		0.186		-2.771		0.051	
	(-0.93)		(0.06)		(-1.02)		(0.02)	
Constant	966.774	***	958.889	***	973.128	***	963.087	***
	(79.92)		(83.47)		(85.93)		(87.70)	
R-squared	0.163		0.174		0.163		0.173	
N	2646		2723		2646		2723	

Note: t-statistics in parentheses. .*significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level.

6. Organisational capital and school inspections

Our earlier analysis has identified the relationship between investment in organisational capital and school performance, measured in terms of attainment. We next consider the relationship between organisational capital and school inspection.

6.1 Inspection

The Office for Standards in Education, Children's Services and Skills (Ofsted) inspection of a school provides an independent external evaluation of its effectiveness and a diagnosis of what it should do to improve, based upon a range of evidence including that from first-hand observation. School inspection reports present a written commentary on the outcomes achieved and the quality of a school's provision (especially the quality of teaching and its impact on learning), the effectiveness of leadership and management and the school's capacity to improve.

All school inspections carried out by Ofsted use the same grading scale:

- Grade 1: outstanding
- Grade 2: good
- Grade 3: satisfactory[12]
- Grade 4: inadequate

The general principles and processes which underpin all Ofsted's inspection and regulatory work are set out in an over-arching framework. The framework is refreshed on a regular basis, for the framework relating to the period under consideration in this report, see Ofsted (2009).

Under section 5 of the Education Act 2005, schools are required to be inspected at prescribed intervals and inspectors must report on:

- the quality of the education provided in the school
- how far the education meets the needs of the range of pupils at the school
- the educational standards achieved in the school
- the quality of the leadership in and management of the school, including whether the financial resources made available to the school are managed effectively
- the spiritual, moral, social and cultural development of the pupils at the school
- the contribution made by the school to the well-being of those pupils
- the contribution made by the school to community cohesion.

At the time that the analysis presented here relates to, all maintained schools and academies were required to be inspected within five school years of the end of the school

[12] This was the grading scale in place for the inspection data used in this analysis. In September 2012, the satisfactory grade was replaced by a new grade "requires improvement": https://www.gov.uk/government/news/good-now-minimum-standard-ofsted-expects-from-schools

year in which they were last inspected. However, from September 2009, Ofsted varied the frequency of schools' inspections depending upon the results of their previous inspections and an annual assessment of their subsequent performance. This means that schools doing less well in inspections are inspected more frequently, so analysis of schools that were inspected in a particular time period are not a representative sample of schools. This inherent bias is not corrected for in the following analysis.

In general, schools judged good or outstanding at their previous inspection are inspected at approximately five-year intervals. Schools which were judged satisfactory at their previous inspection are inspected within three school years from the end of the school year in which that inspection took place. A significant proportion of these schools will receive monitoring inspections to check on their progress following their last full inspection.

If inspectors judge that a school's overall effectiveness is inadequate, they must then decide whether it requires special measures or requires significant improvement (commonly known as a notice to improve). These two categories of schools causing concern are defined below:

Special measures: the school is failing to give its pupils an acceptable standard of education, and the persons responsible for leading, managing or governing the school are not demonstrating the capacity to secure the necessary improvement in the school.

Notice to improve: the school requires significant improvement, because either:

- it is failing to provide an acceptable standard of education, but is demonstrating the capacity to improve, or
- it is not failing to provide an acceptable standard of education but is performing significantly less well than it might in all the circumstances reasonably be expected to perform.

A school made subject to special measures is not permitted to appoint newly qualified teachers without prior permission from Ofsted.

6.2 Leadership and inspection ratings

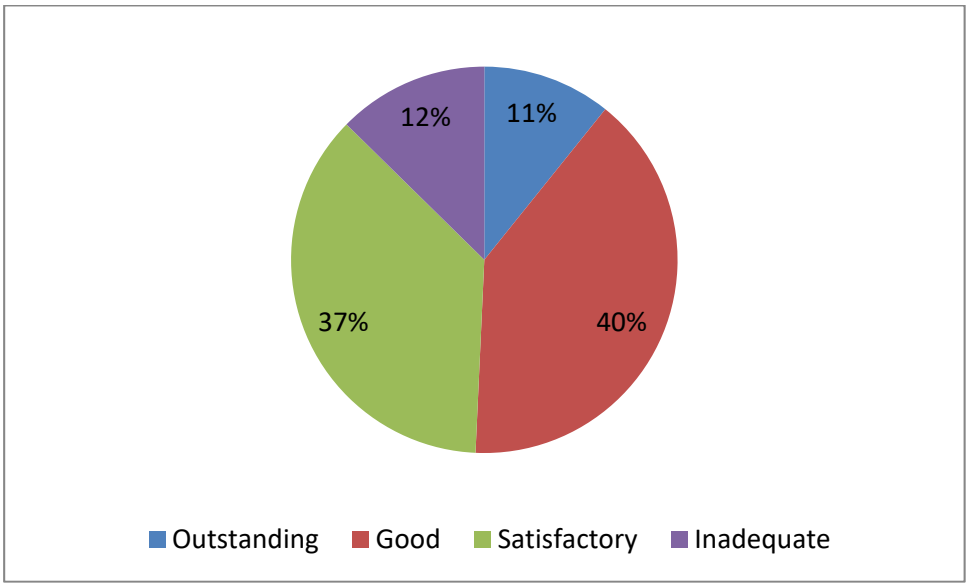
Our analysis seeks to investigate how schools respond to inspections in terms of changes in organisational capital, as measured by a change in the percentage of the workforce in leadership roles. Here we focus solely on the percentage of the workforce, and not our measures of investment in organisational capital used in the analysis of performance in Section 5. As our investment measures assume constant average wages across all schools, variation in these is driven by differences in the quantity of leadership, rather than its price. This is made clearer if we focus solely on the percentage of the workforce in leadership roles.

As noted earlier, the SWF identifies roles of the school workforce in November of each year. In this analysis we consider a change in the percentage of the workforce in leadership roles

between November 2011 and November 2012, and see whether this is influenced by the results of school inspections between December 2011 and July 2012.

There were 2,501 schools that reported data on leadership roles in 2011 and 2012 allowing us to examine changes in organisational capital. Between December 2011 and July 2012, 483 of these schools had an inspection. More than three-quarters of these schools were rated 'Good' (40 per cent) or Satisfactory (37 per cent), whilst 11 per cent were rated 'Outstanding', and 12 per cent 'Inadequate' (Figure 5). This latter group of schools rated as 'inadequate' comprised 34 schools deemed as requiring improvement and 27 schools requiring special measures.

Figure 5: The Distribution of Inspection results, December 2011 to July 2012



For all schools, the percentage of the workforce in the narrow leadership group was broadly unchanged, standing at 5.1 per cent in November 2011 and 5.0 per cent in November 2012 (Table 11). Similarly, for schools that were not inspected between December 2011 and July 2012 there was a small fall in the percentage of the workforce in the narrow leadership group (5.1 per cent to 5.0 per cent). However, for schools that were inspected there was no change (5.0 per cent in both years).

This, however, varied a little by the outcome of the inspection, as did the actual percentage of the workforce in the narrow leadership group. In November 2012, schools that were rated 'Outstanding' or 'Good' had a lower percentage of the workforce in the narrow leadership group (4.8 and 4.9 per cent, respectively) than schools that were rated 'Satisfactory' or 'Inadequate' (5.3 and 5.2 per cent, respectively).

Following inspection, the percentage of the workforce in the narrow leadership group fell for schools rated 'Outstanding' (by 0.2 percentage points) and Schools rated 'Inadequate'

(0.1 percentage points), but increased for schools rated 'Satisfactory' (0.1 percentage points) with little change for schools rated 'Good'. This may reflect policy responses within schools to different inspection outcomes.

For the broader leadership group, patterns were somewhat similar (Table 12). Note that here this includes both the narrow leadership group plus other staff in leadership roles. Here, however, the percentage of the workforce in the broad leadership group in November 2012 was highest for schools that were rated 'Outstanding' (12.9 per cent) compared with schools rated 'Good', 'Satisfactory', or 'Inadequate' (11.0, 11.6, and 11.1 respectively). This is quite a large difference and may be indicative of Ofsted inspectors viewing the existence of a larger broad leadership group as being beneficial to the school.

Changes following inspection also varied by rating, with schools rated 'Good' reducing the percentage of the workforce in the broad leadership group by 0.4 percentage points, whilst schools rated 'Satisfactory' increased the percentage of the workforce in the broad leadership group by 0.3 percentage points.

Table 11: Average percentage of workforce in narrow leadership group

	November 2011	November 2012	Change
All Schools (N=2,501)	5.1	5.0	0.0
School inspected between December 2011 and July 2012?			
No (N=2,018)	5.1	5.0	0.0
Yes (N=483)	5.0	5.0	0.0
If inspected, Rating:			
Outstanding (N=52)	5.0	4.8	-0.2
Good (N=193)	4.8	4.9	0.0
Satisfactory (N=177)	5.2	5.3	0.1
Inadequate (N=61)	5.2	5.2	-0.1

We further explore these changes following inspection through regression analysis, with the dependent variable being the change in organisational capital. Results are shown in Table 13. For the narrow leadership group indicator (columns 1 and 2), the result of the inspection is not related to any changes in organisational capital. Here, the changes in organisational capital were small, so it is not a surprise to find no significant changes.

Table 12: Average percentage of workforce in broad leadership group

	November 2011	November 2012	Change
All Schools (N=2,501)	12.0	11.8	-0.2
School inspected between December 2011 and July 2012?			
No (N=2,018)	12.1	11.9	-0.2
Yes (N=483)	11.5	11.4	-0.0
If inspected, Rating:			
Outstanding (N=52)	12.9	12.9	-0.1
Good (N=193)	11.4	11.0	-0.4
Satisfactory (N=177)	11.3	11.6	0.3
Inadequate (N=61)	11.1	11.1	0.0

However, for the broad leadership group indicator, we find that following a 'Satisfactory' rating there does appear to be some increase in investment in organisational capital, both in the raw comparisons and when controlling for some other school level characteristics (columns 3 and 4).

On the face of it, this is difficult to interpret. However, schools that were rated 'Outstanding' or 'Good' are performing well and head teachers may perceive that the inspection supports their existing strategies and no change of investment is required. Schools rated 'Inadequate', often have a plan of action imposed on them and it's not always clear how much scope there may be to change organisational capital. For example, as noted above, a school subject to special measures is not permitted to appoint newly qualified teachers without prior permission from Ofsted.

Schools rated 'Satisfactory' are increasingly thought of as underperforming[13], and have more scope to implement their own changes than schools rated 'Inadequate'. Hence, it is reasonable to expect that changes in organisational capital are more likely to be evident for these schools. This is supported by our analysis with 'Satisfactory' schools having increased the percentage of workforce in the broad leadership group by around 0.5 percentage points in the four to 11 months following inspection.

Further analysis, not reported, uses the Ofsted rating on leadership and management as opposed to the overall rating. The results are essentially the same. However, the relationship between a 'Satisfactory' rating on leadership and management and organisational capital is slightly stronger indicating an increase in the percentage of workforce in the broad leadership group of around 0.8 percentage points.

[13] As noted earlier, since September 2012, the satisfactory grade has been replaced by the grade "requires improvement".

Table 13: Changes in percentage of workforce in leadership group following inspection

	Change in percentage of workforce in narrow leadership group			Change in percentage of workforce in broad leadership group		
	(1)	(2)		(3)		(4)	
Ofsted Inspection rating:							
Outstanding	-0.141	-0.124		0.160		0.205	
	(0.66)	(0.57)		(0.38)		(0.48)	
Good	0.047	0.029		-0.138		-0.157	
	(0.41)	(0.25)		(0.60)		(0.69)	
Satisfactory	0.121	0.126		0.562	**	0.536	**
	(1.01)	(1.04)		(2.37)		(2.24)	
Inadequate	-0.048	-0.052		0.229		0.217	
	(0.24)	(0.26)		(0.58)		(0.54)	
Number of pupils		0.001	*			0.001	
		(1.93)				(0.94)	
% male pupils		-0.003	*			-0.002	
		(1.71)				(0.53)	
% FSM pupils		0.001				0.003	
		(0.24)				(0.55)	
% White British pupils		-0.000				0.002	
		(0.10)				(0.72)	
% SEN pupils		0.020				0.026	
		(0.92)				(0.60)	
School type (ref: community school)							
...Academy		-0.059				-0.168	
		(0.79)				(1.13)	
...Foundation		0.034				-0.279	
		(0.34)				(1.38)	
...Voluntary aided		0.124				0.016	
		(1.18)				(0.08)	
...Voluntary controlled		-0.049				-0.076	
		(0.19)				(0.15)	
Constant	-0.032	-0.089		-0.228	***	-0.437	
	(-0.94)	(0.46)		(3.38)		(1.15)	
R-squared	0.001	0.005		0.003		0.004	
N	2501	2501		2501		2501	

Note: t-statistics in parentheses.*significant at 10 per cent level, ** significant at 5 per cent level, ***significant at 1 per cent level

7. Discussion and conclusions

This paper has explored the role of organisational capital in English secondary schools, for the period 2010/11 to 2012/13.

On average, the leadership group accounts for around 5 per cent of the school workforce. This percentage has remained stable throughout our analysis period. A considerable number of staff employed outside of the leadership group hold leadership roles, in total therefore, around 12 per cent of the school workforce were involved in school leadership, on average. However, this varied considerably across schools. This variation is partly explained by differences in school size, school type and pupil intake, however, a substantial amount of variation remains unaccounted for.

The period of our analysis has seen considerable change in the school sector, with many schools converting to academies during this period. This is also of significance for organisational capital as academy schools have greater autonomy with which to make decisions. We find that academy schools appear to have a slightly greater proportion of their workforce engaged in broader leadership roles than community schools.

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 schools. Furthermore, we are unable to accurately identify how the wages of the individuals in these occupations vary across schools and over the time period for which our analysis is conducted. It is also quite possible that this approach does not capture all organisational capital; it is feasible that other employees who do not have official leadership roles are nevertheless contributing to organisational capital. A further limitation of our analysis is that we are only able to conduct our analysis for a three year period. This restricts us to cross-sectional analysis. While this is useful for exploring associations between organisational capital and school performance, with data for a greater number of years it would be possible to conduct panel analysis and take account of fixed unobserved differences across schools. It should also be noted that our measures of school performance both relate to academic attainment. It is common for studies of school performance to focus on educational attainment but arguably other goals are also important (Schwartz et al., 2011).

Nevertheless, our analysis points to some interesting findings. Our measures of investment in organisational capital are positively associated with school performance, measured both in terms of GCSE attainment and value added. The results also provide support for the notion that organisational capital is not just embodied in senior leaders, but also in others within the workforce who contribute to leadership and management. This was particularly evident when considering school performance in terms of progress during secondary school.

Schools judged as outstanding by Ofsted appeared to have a slightly higher proportion of staff engaged in broader leadership roles. We also find some evidence to suggest that schools rated satisfactory at inspection go on to expand the size of their broader leadership group. The same did not apply for schools rated good or outstanding (who may see no need for change) or for schools rated inadequate (who may be constrained in their ability to implement changes due to restrictions placed on schools receiving this rating).

This research points to a number of areas in which further analysis may be valuable. As future years of data become available, it will be possible to undertake panel estimation to explore whether the relationship between organisational capital and school performance persists once accounting for fixed unobservable differences across schools. It would also be of interest to consider non-linearities in the relationship between organisational capital and school performance, to explore, for example, potential trade-offs between allocating resources to leadership and to teaching.

Overall, our analysis provides tentative evidence that organisational capital matters for school performance and indicates that this relationship is worthy of further exploration. Furthermore, the results point to the importance of considering not just senior leaders when measuring organisational capital, but also contributions to leadership and management made by staff outside of the main leadership group.

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