Sponsor-led Academies and the Teacher Labour Market[*]

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Executive summary

Context

Since the early 2000s, 25 percent of English State-funded secondary schools have been converted to so-called Sponsor-led academies. This institutional model has been specifically designed to improve students' outcomes in low-performing schools. When the Department for Education (DfE) identifies a low-performing school, it matches it with a *Sponsor*, usually an educational charity or business group, interested in taking over the management of the school. Upon the DfE's approval of the conversion application, while funding remains public, the Sponsor takes the lead of the school and nominates a new governing board that becomes responsible for managing the school budget, hiring and paying the headteacher and teachers, and setting the school direction and ethos.

Aims and Method

There is solid evidence that Sponsor-led academies have improved student performance and educational attainment (Eyles et al. 2016, Andrews et al. 2017, Eyles and Machin 2019). Our study aims to analyse one of the potential mechanisms behind these positive effects, that is, the impact of Sponsor-led academy conversions on the governance and personnel policy adopted by Sponsors. In particular, this study investigates the effect of Sponsors-led academies conversions on teacher turnover, composition, and pay, using individual-level teacher data drawn from the Database of Teacher Records (DTR) and the School Workforce Census (SWC), from 2001/02 to 2018/19. To identify causal effects, the study exploits the staggered expansion of academies over time and compares the evolution of the outcomes of interest in schools that convert earlier and schools that convert later.

Findings

Our analysis shows that Sponsors strongly innovate the school personnel policy, and that Sponsor-led schools experience substantial changes in their teaching body. The probability that the Sponsor-

led governing body appoints a new headteacher doubles upon the conversion, with the new headteacher being, on average, better paid, and more likely to come from outstanding schools. The academy conversion also induces both older teachers and potentially lower-achieving teachers to leave the school, while new teachers joining the Sponsor-led school are more likely to come from outstanding schools. Lastly, Sponsors substantially restructure teachers' rewarding scheme and abandon a pay scale entirely based on seniority, leading to a 10 percent increase in pay dispersion across equally experienced/educated teachers.

Policy implications

In terms of potential policy implications, our results add to the consolidated set of studies showing that management flexibility is generally effective at improving students' outcomes in disadvantage, low-performing schools (Hoxby and Rockoff 2004, Bohlmark and Lindahl 2007, Hoxby and Murarka 2008, Clark 2009, Dobbie and Fryer Jr 2011, Dobbie and Fryer Jr 2015, Abdulkadiroğlu et al. 2016, Eyles et al. 2016, Eyles and Machin 2019, Dobbie and Fryer 2020, Cohodes et al. 2021). Specifically, our study complements this literature by showing that management flexibility helps low-performing schools attract and retain teachers from outstanding schools, which may have played an important role in improving students' outcomes. This result also suggests that the policy of Sponsor-led academies has helped leveling the playing field, by allowing disadvantaged schools to access a pool of teachers that they may have struggled to attract without the Sponsors. On the other hand, teachers who leave Sponsor-led academies and remain employed at State-funded secondary schools are less likely to move to a different Local Authority, but are not necessarily more likely to move to low-performing schools, which points to limited negative spillover effects of sponsored academy conversions on neighbouring schools.

These conclusions come with three caveats. First, our identification strategy only allows us to study the impact of Sponsor-led academy conversions on teachers until four years after the conversion takes place, that is, the medium-term effects of this policy, but we cannot necessarily extrapolate from these results the long-term implications on teacher recruitment and retention, and

on spillover effects on neighbouring schools. In addition, while this study identifies substantial changes to the teacher body that are likely to explain at least in part how Sponsor-led academies improved student performance, we cannot quantify their exact contribution to such improvements. Second, our results concern Sponsor-led academies and should not be generalised to the case of converter academies, which are typically conversions of better-performing schools and do not involve external Sponsors into the management of the school. Finally, the policy of Sponsor-led academy and its scale are unique in the international scene, while to draw sound policy implications, it would be important to analyse the impact of such a policy across different contexts and time periods.

1 Policy context

In the early 2000s, a mounting consensus emerged in the educational community that many State-funded secondary schools, and especially those located in poor urban neighbourhoods, were failing to provide an adequate educational level to their pupils. With the precise aim of reforming these low-performing schools, the UK Government opted for restructuring the school management, by introducing the institutional model of Sponsor-led academies (Eyles et al. 2018). Inspired by the experience of the 15 "City Technology Colleges" (CTCs) created at the end of the 1980s as new independent state-funded schools managed by businesses and geared towards science, mathematics, technology, the then Labour government decided to apply this model to low-performing schools and envisaged a large-scale system whereby a broader set of Sponsor-managers, including private businesses, educational charities, but also universities or successful schools, would take over the management of the struggling school from the Local Authority (LA), while continuing to receive public funding directly from the State (Adonis 2012).

Although some details of the *academisation* process have changed over time, the conversion of a State-funded school to a Sponsor-led academy basically works as follows. An organisation or individual interested in taking over the management of a school submits an expression of interest to the DfE, where it has to demonstrate it has the skills and expertise to help schools improve. If approved, the DfE matches this so-called Sponsor with a low-performing school, usually located in the same area where the Sponsor operates. The conversion is completed once the Sponsor obtains the DfE's approval to convert the school into a charitable trust, a process that takes on average one year and a half. Upon conversion, the Sponsor nominates a board of trustees, usually composed of educational experts, that becomes the decision-making body of the trust.

The conversion grants the Sponsor full autonomy from the LA in terms of the organisation of the school curriculum, the structure of the school day and year, spending allocation, headteacher and teachers' hiring, pay and working conditions. In exchange for these freedoms, the Sponsor needs to offer a long-term commitment to run the school and improve pupils' outcomes. Also, the Sponsor cannot set selective admission criteria, nor charge fees. Importantly, the converted school

remains publicly funded, and the DfE also provides a one-off grant of around £400K on average to cover the costs of the conversion process.

Students already enrolled in the school are granted a place at the converted school. Similarly, teachers already employed at the school are guaranteed their job at the academy, and retain the pay and working conditions negotiated with the original school. However, the Sponsor-managed school can negotiate different pay and conditions for newly hired teachers. Finally, Sponsor-managed schools are subjected to the same accountability mechanisms of LA-managed schools, including regular inspections by the independent inspection authority, the Office for Standards in Education, or OFSTED hereafter.

The first three Sponsor-led academy conversions took place in the school year 2002/03. Over the following years, the programme scaled up and, by September 2010, 203 academies were running.

To boost school autonomy at every level of the educational system, the Academies Act, issued in May 2010 by the newly elected Conservative government, introduced a new and simplified conversion route in both the primary and secondary phases. In particular, schools willing to convert under this route did not have to find a Sponsor anymore, and for this reason, the new autonomous schools were simply named *converter academies*. Importantly, however, at both primary and secondary level, low-performing schools, and specifically, schools deemed "inadequate" by OFSTED had to follow the sponsor route. As shown in Figure 1, by the school year 2022/23, 53 (29) percent of secondary (primary) schools have acquired the status of converter academy and 25 (10) percent have been converted into Sponsor-led academies.

Figure 1: Expansion of academies among English schools
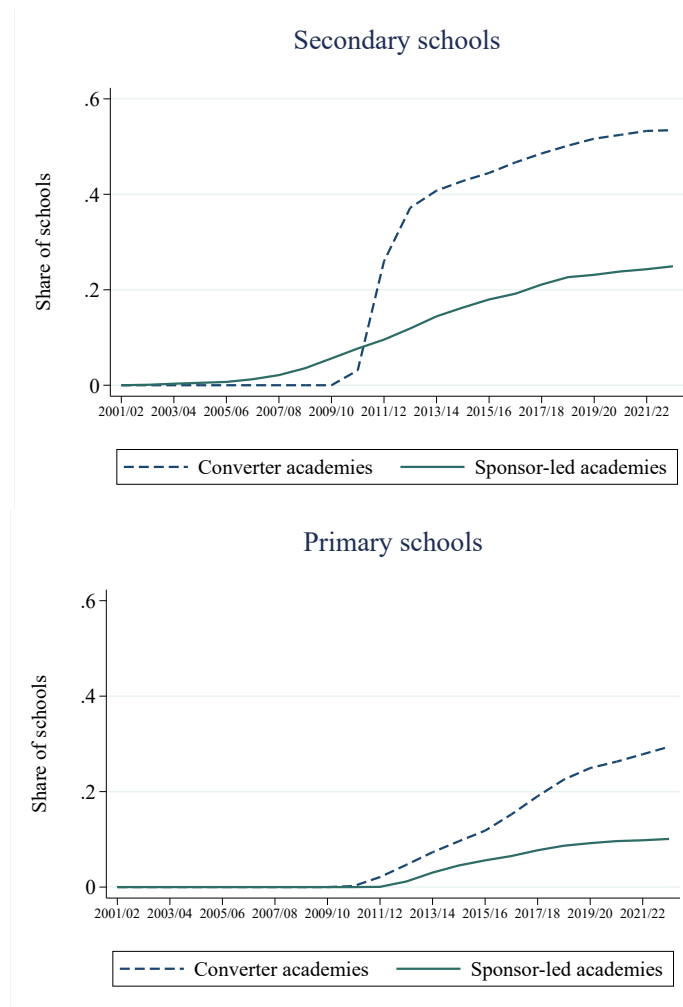
Secondary schools

Primary schools

Notes: These graphs present the expansion of academies over time in English secondary and primary schools.

Our study analyses the impact of Sponsor-led academy conversions on teacher turnover, composition, and pay. We focus on Sponsor-led academies for two reasons. First, the fact that Sponsors take over the management of low-performing, high-poverty schools makes this institutional model especially important to study from a policy point of view. Second, by now the economics literature has provided solid evidence that Sponsor-led academies have improved students' performance and educational attainment, and we want to investigate to what extent these could in part be explained by the impact of the academy conversion on the governance and personnel policy adopted by the Sponsor (Eyles et al. 2016, Andrews et al. 2017, Eyles et al. 2018, Eyles

and Machin 2019).

2 Data

To study how Sponsor-led academy conversions affect teacher turnover, composition, and pay, we built an individual-level teacher panel data set spanning the entire period of academy conversions, by combining the Database of Teacher Records (DTR) with the School Workforce Census (SWC). The DfE has used the DTR for the management of the teachers' pension system since the early 1990s, and provides teachers' characteristics as of May of each school year. We have access to it from the school year 2001/02 to 2009/10. From the school year 2010/11 onward, the DfE has discontinued access to the DTR, but has made available to researchers the SWC, a teachers' census conducted every year in November that focuses on state-funded schools and is supplemented with information on teachers' qualifications, subject taught, and absences. The DfE has created a unique anonymized teacher identifier for this project that allows us to follow the same teacher across the two data sets. Both data sets provide consistent information on teachers' roles in the school (classroom teacher vs. headteacher), gender, age, full-time status, qualified teacher status, teachers' annual gross and base pay and additional payments.

Both data sets also provide a consistent school identifier that we use to match them with school-level data. In particular, we merge the teacher data with publicly-available data extracted from "Get information about schools" (GIAS), a website managed by the DfE and covering all schools in England since the school year 2001/02. Among other things, GIAS provides key information on school phase and type of school. We further supplement the resulting data set with DfE data on schools' conversions, amalgamation and splits, which are crucial to follow a school overtime given that the school identifier changes when one of these events takes place. And we also merge annual data on OFTSED inspections, available from the school year 2005/06, and data on school resources and expenditure, also available from the school year 2005/06 for LA-managed schools, and from 2010/11 for academies.[1]

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[1]A comprehensive list of data sources that we have merged together for this project is provided in Duchini et al.

Table 1 compares the characteristics of schools that never experience a conversion to a Sponsor-led academy over the period considered in our analysis (Column 1), with the characteristics of the 600 schools that eventually convert to sponsored academies between 2005/06 and 2018/19.[2] We focus on these conversions of pre-existing secondary schools as we observe outcomes of teachers employed at these schools from at least 3 years before the conversion.[3]

Table 1 shows that schools that never experience a conversion over the period considered (Column 1) appear different from schools that eventually become Sponsor-led academies (Columns 2) along many dimensions. Specifically, ever Sponsor-managed schools have a (70 percent) larger proportion of pupils eligible for free school meals, a (35 percent) smaller proportion of pupils achieving a sufficient standard in grade-11 standardized exams (corresponding to 5 Cs), are (2.5 times) more likely to be classified as "requires improvements" or "inadequate" by OFSTED, are (20 percent) less likely to be located in high-earning LAs and (7 percent) more likely to be urban schools, and have a (6 percent) lower proportion of teachers with a master degree. In other words, as explained in Section 1, Sponsors disproportionally take over the management of disadvantaged, low-performing, urban schools. Importantly, schools that eventually experience a conversion to a Sponsor-led academies also tend to have fewer pupils and a larger share of teachers leaving the schools before their conversion. We will return to this in Section 4 to discuss to what extent these two factors could influence the timing of conversion or being themselves driven by the conversion announcement.

(2023).

[2]The figures in Column 1 are averages (and standard deviations) computed from 2002/03 to 2014/15. The figures in Column 2 are instead averages (and standard deviations) calculated over the three years before the conversion of each of the cohorts of academies considered.

[3]Thus, we exclude the 17 conversions that happen between the school years 2002/03 and 2004/05 for which we only observe two or fewer pre-conversion years. Also, we do not consider newly created Sponsor-led academies, for which we would not have pre-treatment data (37 schools); we also exclude conversions from the CTCs which were already enjoying high autonomy (12 schools); finally we disregard conversions from private or special schools (10 schools), to focus on public mainstream secondary schools only.

Table 1: Summary statistics

	Never converted 2002/03 to 2014/15	Conversions btw 2005/06 to 2018/19 3 to 1 year before conversion
	(1)	(2)
School characteristics		
N pupils	1,016	992
	(394)	(372)
% FSM students	0.13	0.22
	(0.12)	(0.12)
% Students with 5 A*C	0.58	0.38
	(0.18)	(0.13)
% OFSTED low score	0.29	0.73
	(0.45)	(0.44)
% in high-earnings LA	0.51	0.44
	(0.50)	(0.50)
% in urban LA	0.84	0.90
	(0.37)	(0.29)
Teachers' characteristics		
N teachers	59	60
	(27)	(24)
Pupil-teacher ratio	17	17
	(4)	(4)
% New hires	0.15	0.15
	(0.09)	(0.09)
% Leaving in t+1	0.15	0.17
	(0.10)	(0.11)
% Female	0.62	0.61
	(0.09)	(0.07)
Age	40	40
	(3)	(2)
Experience	14	14
	(3)	(2)
% Master or above	0.67	0.63
	(0.10)	(0.10)
% Top GPA in education	0.06	0.05
	(0.08)	(0.07)
% Part-time	0.15	0.12
	(0.09)	(0.07)
Annual basic pay	37,242	36,982
	(3,654)	(3,111)
Additional payments/Gross pay	0.04	0.05
	(0.03)	(0.03)
N schools	2,700	600

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: This table presents mean and standard deviation (in parenthesis) of school, pupils, and teachers' outcomes for schools that never become sponsored academies throughout the period considered, and schools that become sponsored academies between 2005/06 and 2018/19. The figures in Column 1 are calculated over the period 2002/03-2014/15, while the figures in Column 2 are calculated over the three years prior to the conversion year.

3   Identification strategy

To identify the causal impact of Sponsor-led academy conversions on teacher turnover and composition, we focus on schools that eventually become Sponsor-led academies over the period considered, and adopt a difference-in-differences (DiD) strategy that compares the evolution of the outcomes of interest in schools that acquire academy status in a certain year and in schools that convert 4 years after. The main benefit of using the 4-year time window between treated and control cohorts is that it allows us to study dynamic effects of the conversion up to at least 2 years after the event (when control cohorts are still two years apart from converting). Moreover, while we cannot argue that the timing of conversions is random, in Duchini et al. (2023) we show that these two groups of schools are comparable in many dimensions. Duchini et al. (2023) further describe in detail the regression models that we estimate, as well as the different robustness checks that we perform to test for the validity of our identification strategy.

4   Results

4.1   Headteacher selection

One of the key responsibilities that the academy's board of trustees acquires is that of appointing the school headteacher. Figure 2 shows that the probability of nominating a new principal increases by 8 p.p. the year when the conversion has started and by 35 p.p. the year that the conversion has been completed, or more than two times compared to the pre-conversion mean.
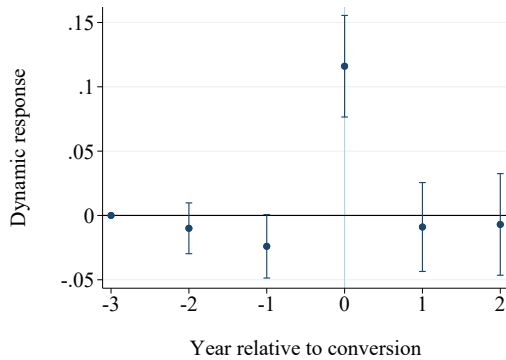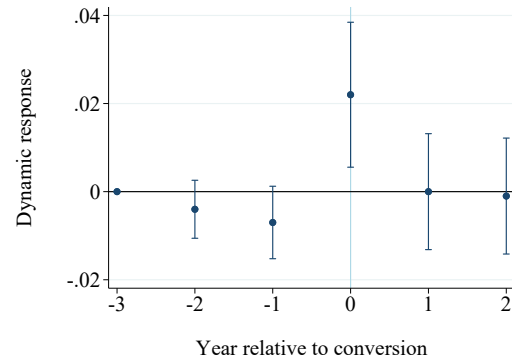
Figure 2: Probability of appointing a new headteacher
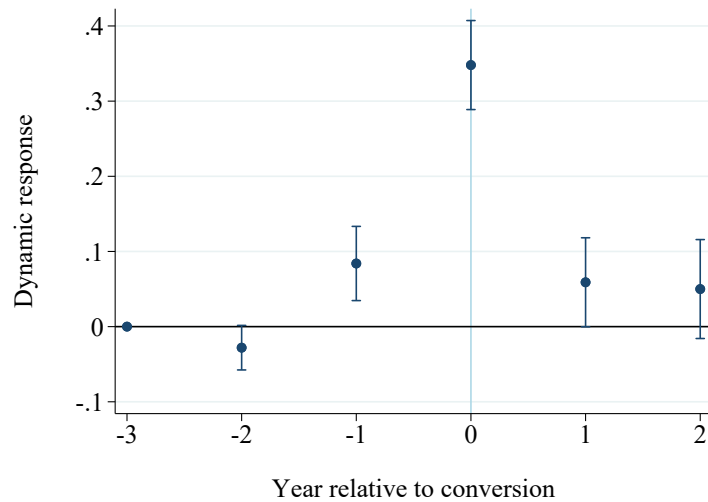
Notes: This graph presents the dynamic impact of Sponsor-led academy conversions on the probability that the school appoints a new headteacher. The estimation sample includes schools that convert between 2002/03 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

Figure 3 further shows that this effect is above all driven by an increase in the probability of hiring (promoting) a new head from a different school, and the likelihood of appointing a new head who previously worked in a different sector, with all these probabilities doubling compared to the pre-conversion mean.
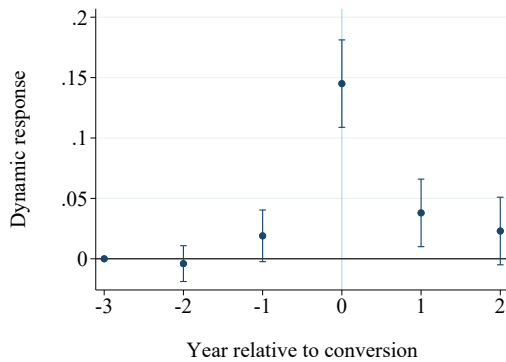
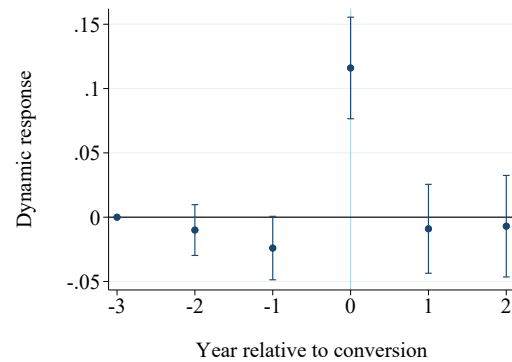Figure 3: Probability of appointing a new headteacher - where from

(A) New head promoted internally

(B) New head hired from other sector

(C) New head hired from other school

(D) New head promoted from other school

Notes: These graphs present the dynamic impact of Sponsor-led academy conversions on the probability that the school appoints a new headteacher internally, from another school, or another sector. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence interval are also reported.

Importantly, Table 2 shows that the new headteacher tends to be slightly younger (1 year or a 2 percent decrease compared to the pre-conversion mean), but, more importantly, better paid (7 percent increase), and, respectively, 2 to 3 times more likely to come from a different LA and an outstanding school (as certified by OFSTED).

Table 2: Changes in headteacher characteristics

| | Fem | Age | Years of experience | Master or above | Top GPA in education | Part-time | Log annual pay | Coming from | |
| | | | | | | | | other LA | outstanding school |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sponsored academy	-0.038	-0.994***	-0.755	0.012	-0.018	-0.009	0.070**	0.136***	0.030***
	(0.030)	(0.416)	(0.474)	(0.029)	(0.030)	(0.007)	(0.013)	(0.017)	(0.010)
Observations	5388	5388	5388	5388	1422	5388	5388	5388	4040
N Schools	599	599	599	599	261	599	599	599	570
Pre-SA Mean T	0.44	50	27	0.61	0.08	0.02	86560	0.06	0.01
Pre-SA Mean C	0.40	50	28	0.62	0.05	0.01	89337	0.09	0.01
School FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: DTR, 2001/02-2008/09, SWC, 2010/11-2018/19.

Notes: This table presents the impact of school Sponsor-led academy conversions on the headteacher characteristics. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. The variable "Top gpa in education" is only available for half of the teachers in the sample. Schools' OFSTED performance is available from the school year 2005/06.

*** p<0.01, ** p<0.05, * p<0.1.

4.2 Teacher turnover

Figure 4 presents the dynamic impact of Sponsor-led academy conversions on the (log of the) number of pupils enrolled in the school (Panel A), the (log of the) number of teachers (Panel B), the share of teachers leaving the school between one year and the next (Panel C), and the share of new hired teachers (Panel D). Both students' and teachers' numbers start decreasing in treated schools compared to control schools already 2 years before the conversion takes place, relative to the reference event year -3. While we cannot exclude that these dynamics may have influenced the timing of conversion, and been in turn explained by a generalised declined in the school quality, it is also possible that they are caused by the conversion announcement. First of all, Panel C shows that the decline in teachers' number is primarily due to an increase in the share of teachers leaving the school, which spikes between the pre-conversion year and the year the conversion is completed. Second, both declines in pupils' and teachers' numbers are completely reversed as treated schools experience the conversion. In particular, the conversion leads to a stable and significant increase in the share of new hired teachers (an average increase of 4 p.p., or 27 percent compared to the pre-conversion mean). And importantly, these effects on teacher turnover change teacher compo-

sition in a way that is consistent with the hypothesis that the conversion announcement influences the dynamics of pupils' and teachers' numbers.
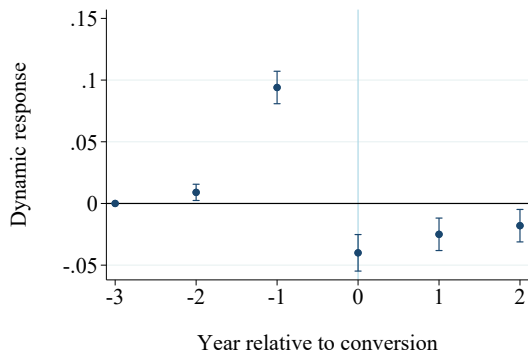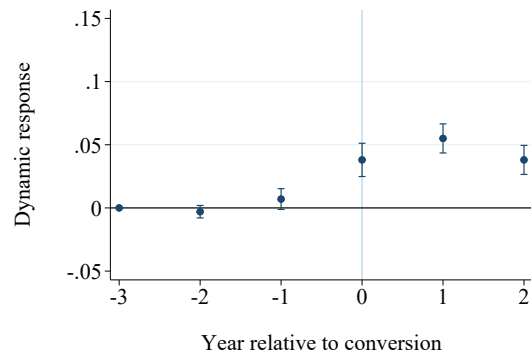
Figure 4: Teacher turnover
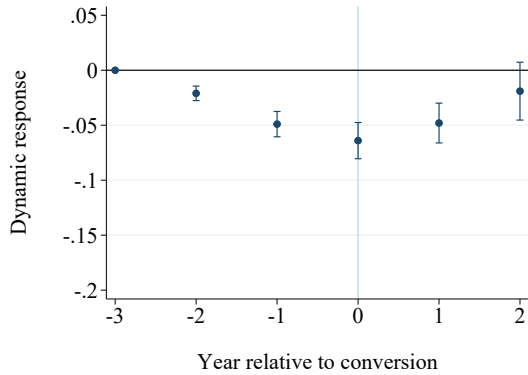
(A) Number of pupils
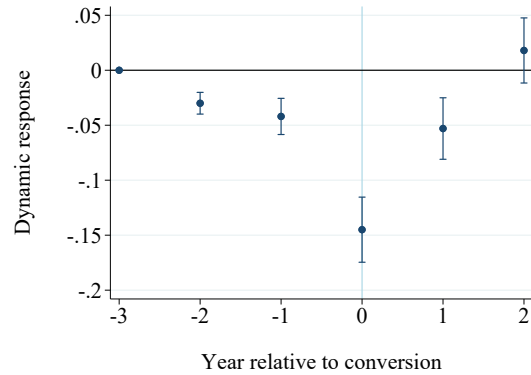
(B) N of teachers

(C) Share of teachers leaving in t+1

(D) Share of new hires

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.
Notes: These graphs present the dynamic impact of Sponsor-led academy conversions on teacher turnover. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

First, Table 3 shows that among teachers leaving the schools, teachers moving to another secondary school tend to be older and less likely to be high-achievers in education.

Table 3: Changes in characteristics of teachers who leave

	Fem	Age	Years of experience	Master or above	Top GPA in education	Teach First	Part-time	Log annual pay	Going to	
									other LA	outstanding school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
To other school										
Sponsored academy	-0.023	0.480*	0.313	-0.019	-0.036**	0.003	-0.005	0.027***	-0.024*	-0.013
	(0.015)	(0.269)	(0.271)	(0.014)	(0.016)	(0.004)	(0.010)	(0.010)	(0.013)	(0.011)
Observations	5149	5149	5149	5149	3834	5149	5149	5149	5149	4400
N Schools	600	600	600	600	600	600	600	600	600	580
Pre-SA Mean T	0.59	36	10	0.68	0.07	0.01	0.10	10.48	0.64	0.16
Pre-SA Mean C	0.58	35	9	0.68	0.07	0.01	0.10	10.46	0.65	0.15
School FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
To other sector										
Sponsored academy	0.011	-0.443	-0.224	-0.018	0.018	0.002	-0.022	0.022		
	(0.018)	(0.460)	(0.571)	(0.019)	(0.017)	(0.004)	(0.017)	(0.015)		
Observations	4045	4045	4045	4045	2780	4045	4045	4045		
N Schools	593	593	593	593	593	593	593	593		
Pre-SA Mean T	0.59	45	19	0.47	0.06	0.01	0.25	10.42		
Pre-SA Mean C	0.61	43	18	0.49	0.07	0.01	0.26	10.43		
School FE	✓	✓	✓	✓	✓	✓	✓	✓		
Year FE	✓	✓	✓	✓	✓	✓	✓	✓		

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: This table presents the impact of Sponsor-led academy conversions on the characteristics of teachers who leave the school from the year prior to the conversion onward. Panel A refers to teachers leaving for other schools, Panel B to teachers leaving the educational sector or leaving for a school in a different phase of education. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. The variable "Top gpa in education" is only available for half of the teachers in the sample. Schools' OFSTED performance is available from the school year 2005/06.
*** p<0.01, ** p<0.05, * p<0.1.

Second, Table 4 suggests that the new school management tends to hire teachers based on available signals of quality, as new hires from other schools tend to come from outstanding schools themselves or even the same school as the new head, while novice teachers coming from outside the educational sectors tend to be high-achievers in education, and all new hires are two times more likely to be *Teach First* teachers.

Table 4: Changes in characteristics of new hires

	Fem	Age	Years of experience	Master or above	Top GPA in education	Teach First	Part-time	Log annual pay	Same school as new head	Coming from other LA	Coming from outstanding school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
From other school											
Sponsored academy	-0.005	0.128	0.194	-0.012	-0.007	0.007**	-0.001	0.053***	0.014***	0.021	0.040***
	(0.016)	(0.319)	(0.304)	(0.016)	(0.014)	(0.003)	(0.011)	(0.012)	(0.003)	(0.016)	(0.012)
Observations	5018	5018	5018	5018	3311	5018	5018	5018	5018	5018	4786
N Schools	600	600	600	600	600	600	600	600	600	600	580
Pre-SA Mean T	0.57	37	10	0.68	0.07	0.00	0.10	10.51	0.00	0.64	0.10
Pre-SA Mean C	0.57	37	10	0.66	0.04	0.01	0.10	10.52	0.00	0.65	0.09
School FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
From other sector											
Sponsored academy	0.002	0.141		0.002	0.016	0.019**	-0.035***	0.054***			
	(0.016)	(0.336)		(0.018)	(0.017)	(0.007)	(0.011)	(0.011)			
Observations	4672	4672		4672	3367	4672	4672	4672			
N Schools	599	599		599	574	599	599	599			
Pre-SA Mean T	0.65	31		0.61	0.07	0.03	0.11	10.10			
Pre-SA Mean C	0.65	31		0.65	0.08	0.01	0.11	10.12			
School FE	✓	✓		✓	✓	✓	✓	✓			
Year FE	✓	✓		✓	✓	✓	✓	✓			

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: This table presents the impact of Sponsor-led academy conversions on the characteristics of new hired teachers. Panel A refers to teachers hired from other secondary schools, Panel B to teachers hired from outside the educational sector or schools in other phases of education. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. The variable "Top gpa in education" is only available for half of the teachers in the sample. Schools' OFSTED performance is available from the school year 2005/06.
*** p<0.01, ** p<0.05, * p<0.1.

In turn, Table 5 shows that these dynamics change the composition of teachers towards slightly younger (2.5 percent increase) and less experienced teachers (5 percent increase), but also teachers who obtained top grades in education (20 percent increase), and are 70 percent more likely to come from an outstanding school and 0.3 p.p. more likely to come from the same school as the new head (from a pre-conversion 0 probability). In sum, these sorting patterns suggest that the change in the school management is accompanied by the injection of business-like ethos and practices that pushes away teachers who are reluctant to experience these changes, and attracts teachers who are willing to embrace these changes (Lazear 2000, Gielen et al. 2010, Leaver et al. 2021). The next Section further explores this hypothesis by studying the impact of the school takeover on teacher pay.

Table 5: Changes in teachers' characteristics

	Fem	Age	Years of experience	Master or above	Top GPA in education	Teach First	Part-time	Log annual pay	Same school as new head	Coming from	
										other LA	outstanding school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sponsored academy	-0.005*	-0.790***	-0.652***	0.003	0.009**	0.006***	-0.013***	-0.002	0.003***	0.016***	0.007***
	(0.003)	(0.100)	(0.096)	(0.003)	(0.004)	(0.001)	(0.004)	(0.004)	(0.001)	(0.003)	(0.001)
Observations	5501	5501	5501	5501	5497	5501	5501	5501	5501	5501	4722
N Schools	600	600	600	600	600	600	600	600	600	600	580
Pre-SA Mean T	0.61	40	14	0.61	0.05	0.01	0.12	10.57	0.00	0.05	0.01
Pre-SA Mean C	0.60	40	14	0.62	0.05	0.00	0.11	10.58	0.00	0.04	0.01
School FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: DTR, 2001/02-2008/09, SWC, 2010/11-2018/19.

Notes: This table presents the impact of the Sponsor-led academy conversion on teachers' characteristics. The estimation sample includes schools that convert between 2002/03 to 2015/16 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. The variable "Top gpa in education" is only available for half of the teachers in the sample. Schools' OFSTED performance is available from the school year 2005/06.

*** p<0.01, ** p<0.05, * p<0.1.

4.3 Teacher pay

While Sponsor-led academies are financed through public funding, as their predecessors, one of the key dimensions over which the Sponsor acquires autonomy concerns the allocation of resources. In particular, Sponsors may re-design teachers' reward policies and also set teachers' pay based on criteria other than seniority. To investigate these decisions, we analyse the impact of the conversion on teachers' annual pay, pay dispersion, and school expenditure.

We first look at incumbent teachers, that is teachers who were already employed at the school the year before the academy conversion and are still in the school when the conversion takes place. We compare the evolution of their annual pay with that of teachers who, over those years, were employed at schools that only convert 4 years after the control group. When considering newly hired teachers, we compare the pay dynamics of teachers hired both the year of the academy conversion and the year after in treated vs. control schools, from 3 years before the conversion to 2 years afterwards.

To measure pay dispersion, we follow Biasi (2021) and construct the ratio between a measure of variability in teachers' pay (unexplained by teachers' observable characteristics such as education or experience) and teachers' average annual pay. More details on the construction of this variables and the regressions run for this part of the analysis are available in Duchini et al.

(2023).

Figure 5 shows that the new school governing body increases, on average, teachers' base pay, but reduces the use of additional payments, such as teaching and learning responsibility payments (TLR). As a result, incumbent teachers' gross pay does not change after the takeover, but its composition shifts away from additional payments towards the contractual pay.

Figure 5: Incumbent teachers' pay
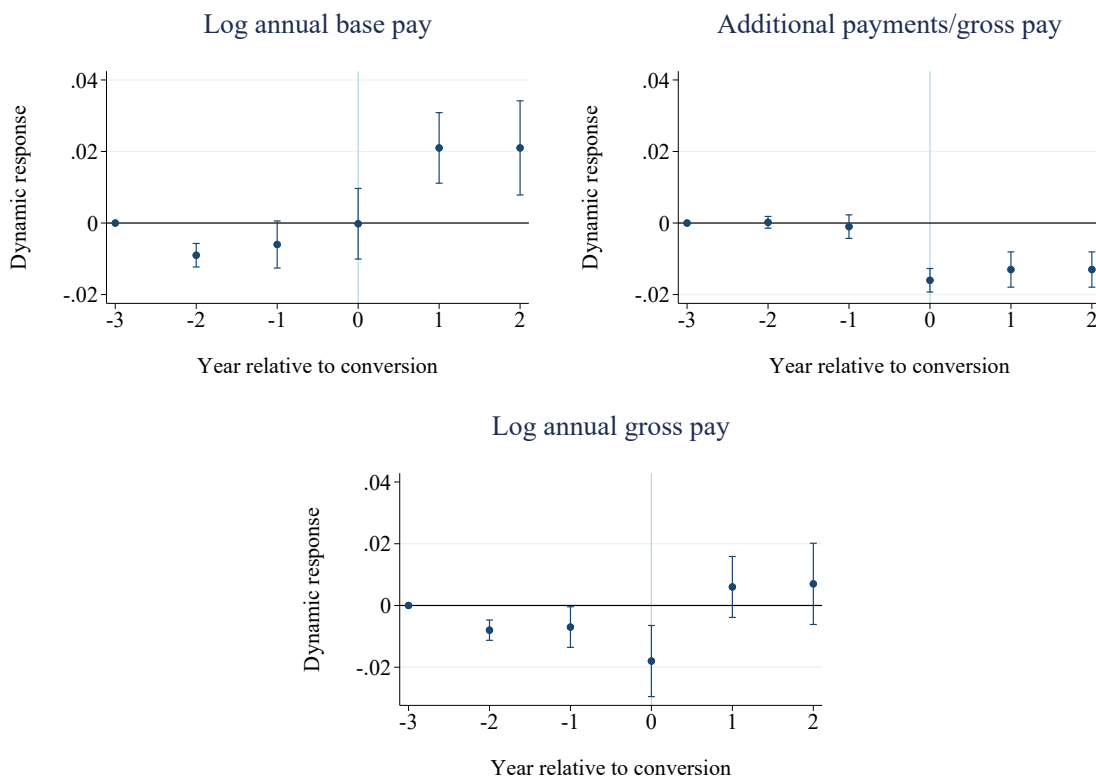
Log annual base pay

Additional payments/gross pay

Log annual gross pay

Notes: These graphs present the dynamic impact of Sponsor-led academy conversions on incumbent teachers' pay. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

Figure 6 shows that Sponsors adopt this new rewarding scheme for novice teachers as well. Interestingly, they also seem to offer new hires an overall higher gross annual pay, a result that is however not very robust across alternative specifications (See Duchini et al. 2023).

Figure 6: New teachers' pay
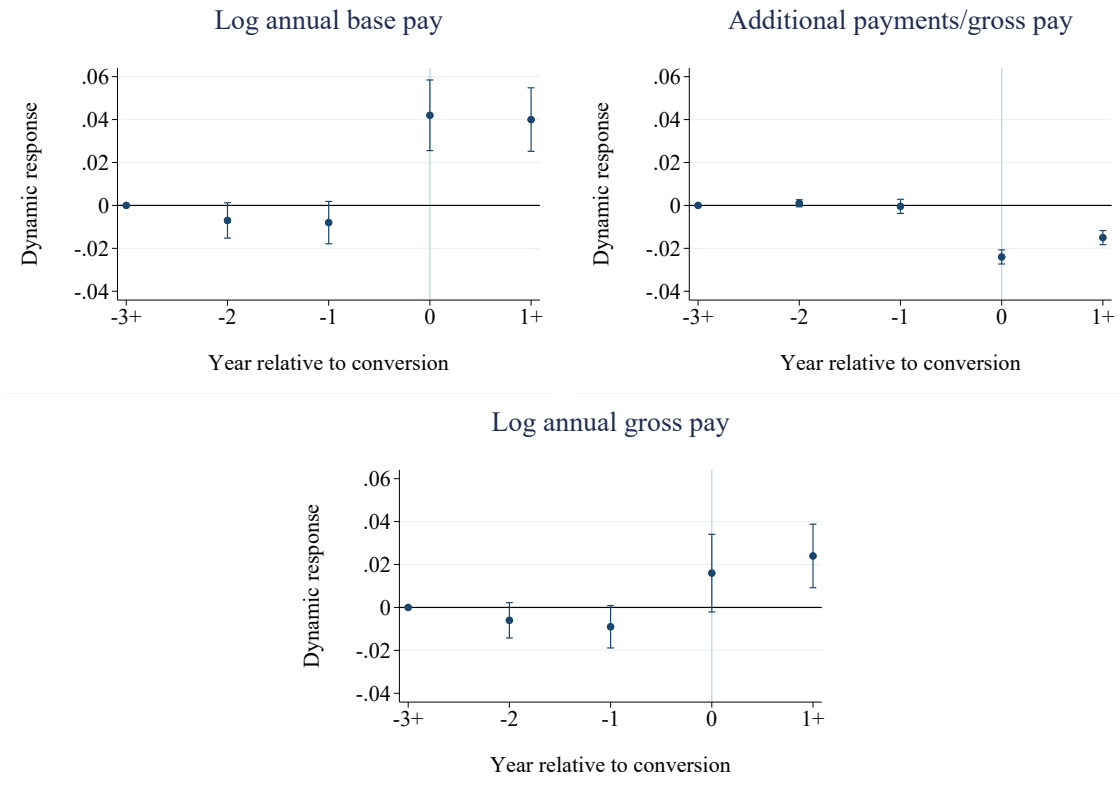
Log annual base pay

Additional payments/gross pay

Log annual gross pay

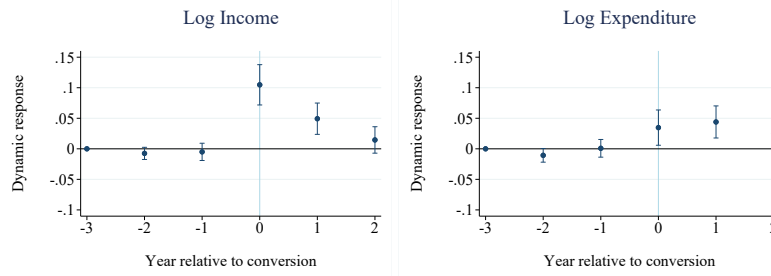*Notes:* These graphs present the dynamic impact of Sponsor-led academy conversions on new teachers' pay. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

In turn, Figure 7 shows that pay dispersion among equally experienced teachers increases after conversion, which suggests that Sponsors use criteria other than experience to reward teachers. Notably, a survey conducted by the DfE in 2014 shows that 70 percent of schools that had been converted to Sponsor-led academies by then had changed their performance management system for teachers (Eyles and Machin 2019). Thus, although we cannot construct teachers' value-added measures, it seems plausible that the new management starts rewarding teachers based on their performance, which would also be consistent with the results of Biasi (2021) in the context of Wisconsin.

Figure 7: Teacher pay dispersion
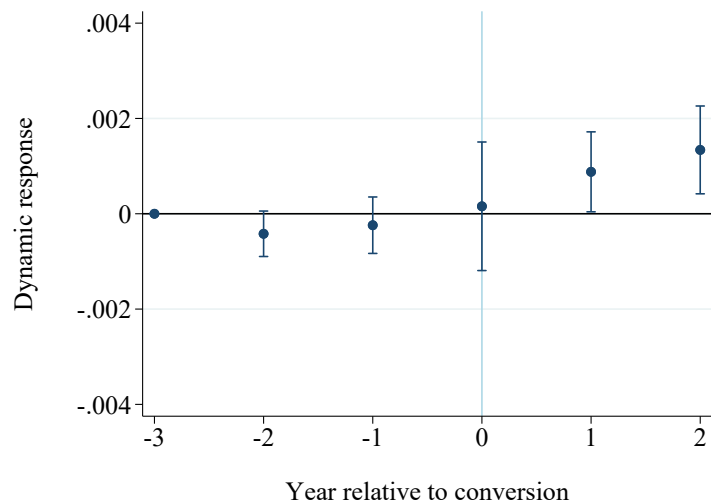
Notes: These graphs present the dynamic impact of Sponsor-led academy conversions on teachers' pay dispersion. The estimation sample includes schools that convert between 2005/06 to 2014/15 (treated schools) and schools that convert 4 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 2 years following this event. 90-percent confidence intervals are also reported.

To further understand how Sponsors manage the school resources and provide additional support to our interpretation on the effects on teachers' pay, we exploit school expenditure data, available for academy conversions taking place from 2010/11 onward. As explained in Section 1,

Sponsors receive a one-off grant to cover the costs of the conversion. Panel A of Figure 8 shows indeed that, while the evolution of school funding is comparable in treated and control schools before the academy conversion, it increases by 10 percent the year of the conversion in treated schools, but rapidly reverses to the level of control schools over the following two years. In turn, school expenditure also increases but more gradually across the years following the academy conversion.[4] Importantly, Sponsors use their resources as follows: they strongly decrease expenditure on temporary staff, such as supply teachers or support staff, while using most of this money on non-teaching personnel, including the headteacher. In the conversion year, they also allocate some funding to other running costs, such as improving the school building. Importantly, and consistently with the fact that Sponsors merely restructure teachers' rewarding policies, expenditure on regular teachers does not change in treated schools compared to control schools after the academy conversion.

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[4]An important caveat of these data is that they do not include capital spending, so that expenditure on a new building would not show up in these data, for instance, and anecdotally many Sponsor-led academies chose to move the school to a brand-new building (Adonis 2012).
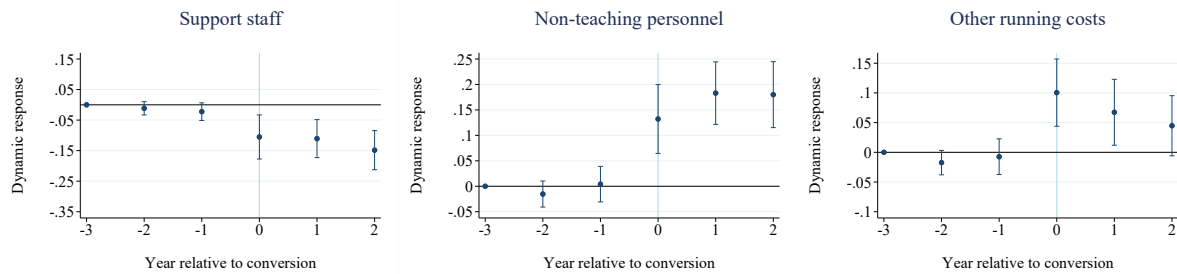
Figure 8: School resources and expenditure per pupil

(A) Resources and expenditure
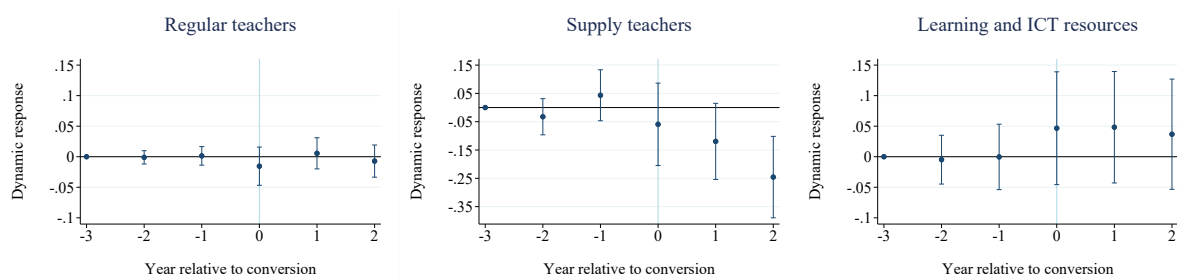
(B) Expenditure on teaching staff and educational resources


(C) Other expenditure

4.4 Medium-term effects

Our main results show the impact of Sponsor-led academy conversions over the first two years following the conversion. In this section, we exploit the long panel of conversions to extend the horizon of analysis to 4 years after the academy conversion. For this, we use as control group cohorts that experience a conversion 6 years after the treated group, and exclude cohorts converting between 2013/14 and 2014/15 from the treatment group, for which we would not have such a control group, unless we were to include academy conversions taking place during the pandemic. Interestingly, Figure 9 shows that the dynamic effects estimated over the first two years on pupils and teachers persist over a longer horizon. In particular, the positive trends in pupils' and teachers' numbers induced by the conversion continue over the following fours years, with the dynamics in teachers' numbers driven both by a decrease in teachers' separations and persistent increase in new hires.
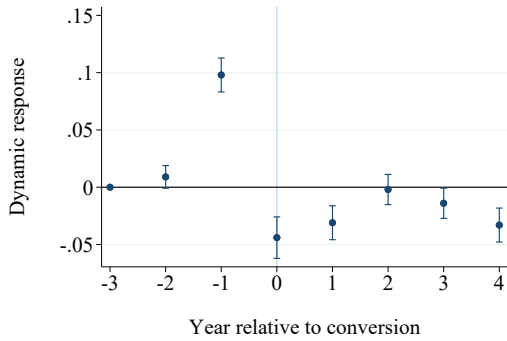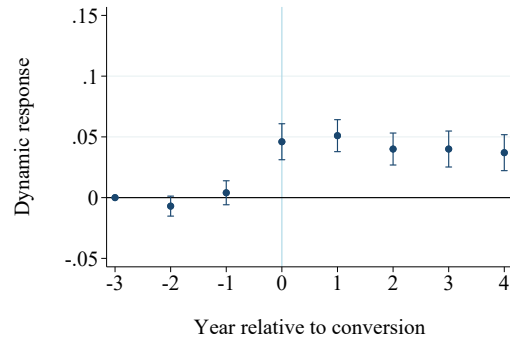
Figure 9: Teacher turnover - medium-term effects
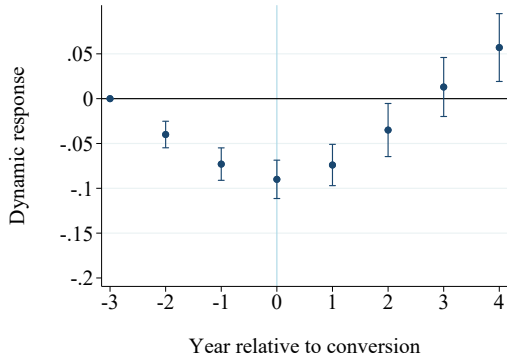
(A) Number of pupils
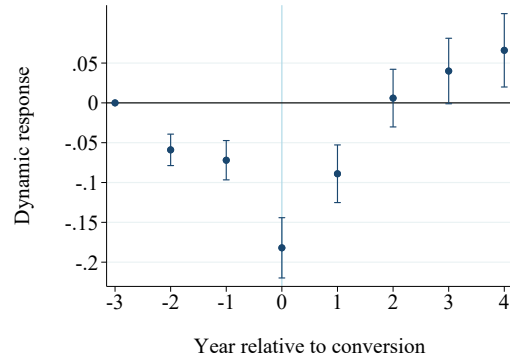
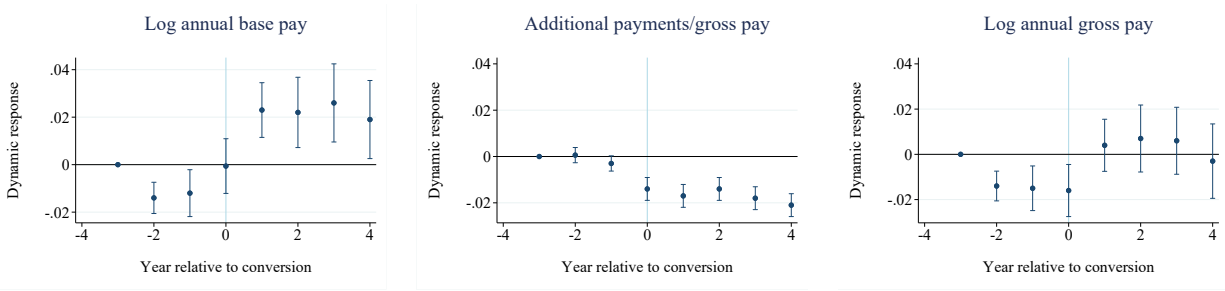(B) N of teachers

(C) Share of teachers leaving in t+1

(D) Share of new hires

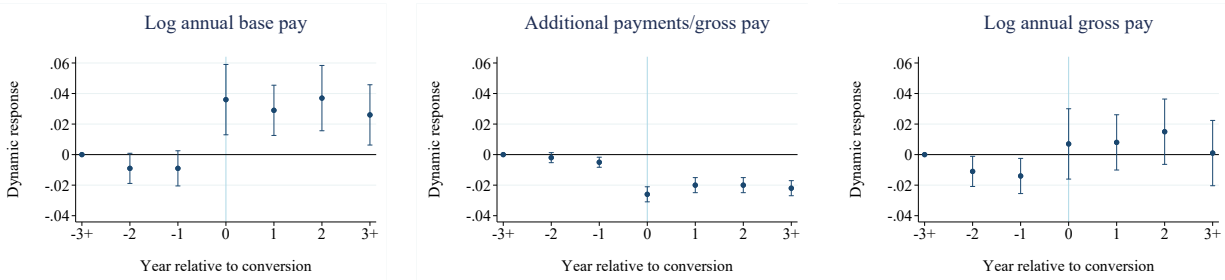*Source:* DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.
Notes: These graphs present the medium-term dynamic effects of Sponsor-led academy conversions on teacher turnover. The estimation sample includes schools that convert between 2005/06 to 2012/13 (treated schools) and schools that convert 6 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 4 years following this event. 90-percent confidence intervals are also reported.

Second, Figure 10 shows that the restructuring of teachers' pay rewarding scheme promoted by the Sponsor appears to be a long-term decision, as both teachers' pay and pay dispersion among equally educated/experienced teachers remain higher in treated schools compared to control schools up to 4 years following the academy conversion.
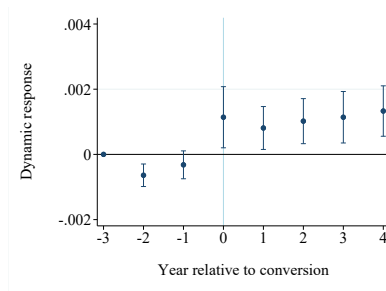
Figure 10: Teacher pay - medium-term effects

(A) Incumbent teachers

(B) New teachers

(C) Pay dispersion

Source: DTR, 2001/02-2009/10, SWC, 2010/11-2018/19.

Notes: These graphs present the medium-term dynamic effects of Sponsor-led academy conversions on teachers' pay. The estimation sample includes schools that convert between 2005/06 to 2012/13 (treated schools) and schools that convert 6 years after each treated conversion cohort (control schools). The estimation period includes the 3 years before the conversion of each treated schools up to 4 years following this event. 90-percent confidence intervals are also reported.

5   Conclusion

Disadvantaged, low-performing schools notoriously struggle to attract and retain high-quality teachers (Clotfelter et al. 2008, Glazerman et al. 2013, Springer et al. 2016, Swain et al. 2019, Benhenda 2020, Bobba et al. 2021, Morgan et al. 2023). Our study analyses the experience of English Sponsor-led academies to understand whether a substantial change in management and personnel practices can help low-performing schools improve teacher recruitment and retention.

Our results show that, upon the academy conversion, Sponsors tend to appoint a new head-teacher that is, on average, better paid and more likely to come from outstanding schools. The composition of the teaching body also changes towards slightly younger and less experienced teachers, but also teachers who achieved top grades in education and are more likely to come from an outstanding school and the same school as the new head. Finally, Sponsors substantially re-structure teachers' rewarding scheme and abandon a pay scale entirely based on seniority, leading to an increase in pay dispersion across equally experienced/educated teachers.

In terms of potential policy implications, our results add to the consolidated set of studies showing that management flexibility is generally effective at improving students' outcomes in disadvantage, low-performing schools (Hoxby and Rockoff 2004, Bohlmark and Lindahl 2007, Hoxby and Murarka 2008, Clark 2009, Dobbie and Fryer Jr 2011, Dobbie and Fryer Jr 2015, Abdulkadiroğlu et al. 2016, Eyles et al. 2016, Eyles and Machin 2019, Dobbie and Fryer 2020, Cohodes et al. 2021). Specifically, our study complements this literature by showing that management flexibility also helps low-performing schools attract and retain teachers from outstanding schools, which is likely to be an important factor for improving students' outcomes.

In this respect, the institutional model of Sponsor-led academies has to be compared to other policy tools such as providing financial and non-financial incentives for teachers to work in disadvantaged schools. The economic literature shows that both monetary bonuses and career-oriented incentives are effective at decreasing teacher turnover, but are often poorly targeted, have mixed effects on pupils' achievement, and are costly to scale up (Clotfelter et al. 2008, Lavy 2008, Glazerman et al. 2013, Springer et al. 2016, Swain et al. 2019, Ajzenman et al. 2020, Benhenda 2020,

Bobba et al. 2021). Relative to these tools, the policy of delegating the management of struggling secondary schools to charities or businesses has been scaled up at national level in England in the last 20 years, and, as such, may represent a viable alternative for governments aiming to improve the performance of struggling State-funded schools.

Consistent with the increasing number of papers that study the impact of collective bargaining reforms on teacher turnover and pay, and students' performance (Hoxby 1996, Lovenheim and Willén 2019, Biasi 2021, Biasi et al. 2021, Biasi and Sarsons 2022, Burgess et al. 2022, Willén 2021), our results also suggest that granting school managers flexibility over teachers' pay could be important to attract and retain high-quality teachers.

Finally, our analysis suggests that the policy of Sponsor-led academies has helped leveling the playing field, as both the headteacher and teachers appointed by the new management are more likely to come from outstanding schools. On the other hand, teachers who leave Sponsor-led academies and remain employed at State-funded secondary schools are less likely to move to a different Local Authority, but are not necessarily more likely to move to low-performing schools, which points to limited negative spillover effects of sponsored academy conversions on neighbouring schools.

To conclude, three important points have to be considered when reflecting on the policy implications of our results. First, our identification strategy only allows us to study the impact of Sponsor-led academy conversions on teachers until four years after the conversion takes place, that is, the medium-term effects of this policy, but we cannot necessarily extrapolate from these results the long-term implications on teacher recruitment and retention, and on spillover effects on neighbouring schools. In addition, while this study identifies substantial changes to the teacher body that are likely to explain at least in part how Sponsor-led academies improved student performance, we cannot quantify their exact contribution to such improvements. Second, our results concern Sponsor-led academies and, as also stressed by Eyles et al. (2018), should not be generalised to the case of converter academies, which are typically conversions of better-performing schools and do not involve external Sponsors into the management of the school. Finally, the pol-

icy of Sponsor-led academy and its scale are unique in the international scene, while to draw sound policy implications, it would be important to analyse the impact of such a policy across different contexts and time periods.

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