



Department
for Education

Evaluation of Teachers' Pay Reform

Technical Appendix

October 2017

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Acknowledgements

This report is part of a longitudinal study conducted by the NFER in partnership with the Institute for Fiscal Studies, University of Texas at Austin and University of Bristol. This study, the Evaluation of Teachers' Pay Reform, has been commissioned by the Department for Education.

Our thanks to the Department for Education for access to the longitudinal School Workforce Census dataset that makes this work possible.

Executive summary

1. Background

- This research is part of a wider evaluation commissioned by the Department for Education (DfE) to assess the impact and perception of the recent reforms to teachers' and leaders' pay in England. The wider evaluation is led by the National Foundation for Educational Research (NFER), see Sharp *et al.*, (2017), which surveyed teachers and headteachers with the purpose of gaining a clearer understanding of schools' responses to the 2013 and 2014 pay reforms.
- This part of the evaluation used the Schools Workforce Census (SWC), a national administrative dataset on the pay of the school workforce, which covers the majority of primary and secondary schools in England. The report analyses the impact of the reforms on the level, variation and annual growth in pay, progression from the main to the upper teacher pay range, and teacher retention and mobility (DfE, 2016).

2. The reforms to teachers' and leaders' pay

- The reforms of relevance here are the introduction of Performance-Related Pay (PRP) for teachers and leaders in state-funded schools in England (DfE, 2013a). A new system was introduced for determining teachers' pay in England in September 2013, which affected pay decisions from September 2014. Leaders' pay was first affected by the reforms from September 2015. In general, these reforms mean that annual pay awards are now linked to performance rather than length of service, and school leaders have more flexibility in setting the salary of new teachers at the school. School leaders also have flexibility in designing the appraisal system used to measure 'performance'. 'Spine points' that determined the annual growth in salary within teacher pay ranges were removed from 2014, but 'reference' spine point levels have been produced by teaching unions.
- PRP was introduced in England, citing research that shows that teacher effectiveness is a key determinant of pupil progress, particularly for disadvantaged pupils, and that teacher quality can be improved where appraisal systems provide effective incentives to teachers (DfE, 2012). The first necessary step for teacher effectiveness to increase as a result of these reforms is for schools to use their new powers to introduce meaningful PRP. Assuming that there is variation in teacher quality within and across schools,

this would be reflected in increased variation in teachers' pay, and/or more effective teachers remaining in the sector following the reform.

3. Methodology and caveats

- The longitudinal SWC provided the opportunity to study teachers' and leaders' pay and annual pay awards between 2010 and 2015, using a sample of most primary and secondary schools in England.¹ The analysis presented in this report therefore provides representative and comprehensive information to policy makers about the potential impact of the reforms to date, and areas to explore further in future.
- The analysis presented here is descriptive, simply showing the main patterns of interest spanning the period immediately before and after the reforms (November 2010 to November 2015). There are three limitations of the SWC and the wider national context, which mean that the patterns and changes over time presented here should not be causally attributed to the reforms. These are:
 1. The national roll-out of the reforms means that any changes over time may be due to other factors, such as:
 - a. Changes in the statutory conditions for teachers and leaders, from public sector pay restraint in 2011 and 2012 to statutory increases in the maxima and/or minima of the teacher pay ranges from 2013 onwards.
 2. Changes in the composition of schools and the school workforce over the period. For example, between 2010 and 2015, the percentage of males in the school workforce declined slightly, from 25.4% to 24.6%; and the average age declined slightly, from 40.1 years to 38.9 years.
 3. Significant changes to the way that the SWC recorded pay coincided with these reforms. Whilst these changes were accounted for in the analysis in a comprehensive way, it is not possible to determine the full extent that these changes have had on the figures presented.
 4. The SWC may not record all relevant school pay decisions. This is because (under the most pessimistic assumption) around 32% of classroom teachers in post for at least one year had not yet received their pay award decision by the census date in 2015. This is likely to create a lag in pay

¹ Employees of independent schools in England are not included in the SWC. Of schools included in the SWC, 99% (18,491 out of 18,637) of the primary and secondary schools are included in the analysis. The sample selection excludes schools where information on staff pay is missing for more than half of teachers and leaders. Full details on the sample selection are provided in Appendix Section 2.

awards, so that changes are observed every two years rather than every year, depressing the figures for annual pay awards presented here.

- While the following findings are nationally representative and comprehensive, for the stated reasons above, one should exercise caution when interpreting the figures in relation to the reforms. Finally, any impacts of the reforms that occurred after the latest available data (November 2015) are not reflected in this report.

4. Findings

4.1. Level and variation of teachers' and leaders' pay

- The **level of pay for teachers and leaders declined slightly in real terms** (accounting for inflation) between 2010 and 2015 (Section 3.1):
 - The average nominal base pay of teachers increased very slightly between 2010 and 2015. Once adjusted for inflation, this equates to a real terms decrease in base pay for teachers of around 2%. Over the same period the average base pay for leaders rose slightly, which equates to a real terms decrease of around 1%.
 - The very small increase in nominal base pay for teachers across the period has been partly offset by a small decline in the prevalence of additional payments for teachers, from around 38% receiving an additional payment in 2013, to around 36% in 2015.² The average value for those that receive an additional payment has remained similar (although slightly lower than the value before the reforms).
 - The decline in the use of additional payments means that teachers that no longer receive an additional payment will have a larger decrease in total pay than the decrease in base pay reported above.
- There is **limited evidence that the variation of teachers' and leaders' pay has changed** as a result of the reforms up to 2015 (Section 3.2):
 - The variation of teachers' and leaders' pay changed over time, but these changes were small (in the case of teachers) and not clearly related to the timing of the reforms (for leaders).

² Total additional pay is defined as the sum of four components of additional pay: Special Educational Needs (SEN) allowances, recruitment and retention allowances, teaching and learning responsibilities, and other. Note that General Teaching Council for England (GTC) additional payments are not included for any years, as these payments are not relevant after 2012. Further details can be found in the Appendix 3.3.

4.2. Variation in annual pay awards

- **Variation in the annual pay awards for teachers has increased** following the reforms up to 2015, although not universally (Section 4):
 - Annual pay awards for teachers changed over time. This is partly due to recommendations from the School Teachers' Review Body (STRB) to increase the maxima and/or minima of the teacher pay ranges and consequent changes in the School Teachers' Pay and Conditions Document (STPCD), in addition to any effect of the reforms to teachers' pay (DfE, 2012).
 - Many schools, when they did increase teacher pay, were still awarding annual increases in line with (now purely reference) spine points, suggesting that the existing pay ranges and points in operation before the reforms were still used. However, the increase in variation around these reference spine points suggests that at least some schools had moved away from using these reference points.
 - Increases between reference spine points for the upper pay range were between 3% and 4%. The proportion of teachers on the upper pay range being awarded a pay increase in line with these spine point increases, declined from 27% for pay awards between 2010 and 2011 to 12% for pay awards between 2014 and 2015.
 - Increases between reference spine points for the main pay range were largely between 7% and 8%. The proportion of teachers on the main pay range being awarded a pay increase in line with these spine point increases, declined from 50% for pay awards between 2010 and 2011 to 22% for pay awards between 2014 and 2015. This decrease was due to some teachers receiving less than the typical 7% and 8% and some receiving more.
 - There is large variation in the use of reference spine points across the country. In some local authorities, around 60% of teachers had changes in pay consistent with movement up the reference spine points, compared to other local authorities with less than 10%.
 - The combination of increased variation in teachers' annual pay awards and a largely flat average level of teachers' pay, implies that some teachers are experiencing lower pay awards than before the reform, while others are experiencing higher pay awards.

4.3. Teacher mobility and ‘pay portability’

- Teachers’ **salaries upon starting at a new school have been affected by the removal of ‘pay portability’³** as a statutory requirement up to 2015 (Section 5):
 - Some schools seemed to be using the flexibility in starting salaries to offer lower salaries to new teachers in equivalent positions. The proportion of teachers that moved schools to an equivalent position and received a lower nominal salary increased after the reforms, from 5.5% of moving teachers to equivalent positions between 2012 and 2013, to around 9% between 2013 and 2014, and 7.4% between 2014 and 2015, although this still affected only a small proportion of teachers.
 - There was a larger increase in the proportion of teachers that moved schools to an equivalent position and received a nominal base pay equivalent to a lower reference spine point. This is because reference spine points increased between years, while nominal base pay could remain constant.
 - There were increases in the percentage of teachers that left their school each year between 2010 and 2015. This was reflected in increases in the percentage of teachers that moved between state-funded schools in England each year from 2010 to 2015. However, these patterns are more consistent with a general time trend than any effect of the reforms on the size and composition of the teacher workforce.

4.4. Progression from main to upper pay range

- There is some evidence of **increased flexibility in progression across pay ranges** up to 2015 (Section 6):
 - Progression from the main to upper pay range for teachers has stayed roughly constant over time, between roughly 12% and 13% each year. Those at the top of the main pay range were more likely to receive progression to the upper pay range than those below the top. For example, between 2010 and 2011, 35.5% of those at the top of the main pay range progressed to the upper pay range, compared to 2.7% of those below the top of the main pay range.
 - Those below the top of the main pay range had the largest growth in progression to the upper pay range across the period (2.7% between 2010 and 2011 to 7.8% between 2014 and 2015). This possibly reflects more flexibility in teachers’ pay and progression as a result of the reforms, as

³ The term ‘pay portability’ refers to the requirement for schools to match the spine point teachers received at their previous school.

teachers are less rigidly paid according to typical (now reference) spine point progression.

4.5. Equity concerns

- The research findings **do not support the equity concerns** about the effect of PRP for teachers, although further research is required to explore this more carefully:
 - The introduction of PRP for teachers was accompanied by concerns from teachers' unions that the progression of female teachers relative to male teachers, and ethnic minority teachers relative to White British teachers would be unfairly disadvantaged (ATL, 2015; NASUWT, 2015).
 - This report explores the patterns in the level and variation of teachers' pay and the level and variation in annual pay awards for female and minority ethnic teachers. In general, there is little evidence that particular groups have been disadvantaged as a result of the reforms to teachers' pay. However, it is beyond the scope of this technical appendix to conclusively state if this was the case.

1. Introduction

1.1. Background

These analyses have been commissioned by the Department for Education (DfE) as part of a wider evaluation to assess the impact and perception of the reforms to teachers' and leaders' pay in England. This evaluation is led by the National Foundation for Educational Research (NFER) – see Sharp *et al.*, (2017). The main purpose of this research is to gain a clear understanding of schools' responses to the 2013 and 2014 pay reforms, in particular:

- Track schools' progress with implementing pay reforms and identify areas of best practice
- Understand resulting changes in schools' behaviour in relation to pay award and progression between the main and upper pay range
- Explore perceptions of the reforms amongst teachers and school leaders
- Explore whether the reforms are influencing behaviour in relation to pay award and progression amongst academies and free schools
- Understand the reasons underlying schools' decisions to implement pay freedoms or choosing not to do so, and
- Identify examples of innovative practice and establish their perceived benefits and challenges.

This technical appendix is an addendum to the main report. The School Workforce Census (SWC), (DfE, 2016) national administrative data on the pay of the school workforce in England, was analysed to consider the impact of the reforms on teachers' pay and annual growth in pay, progression from the main to the upper pay range, and teacher mobility, across the majority of primary and secondary schools in England.⁴ The analysis presented here is descriptive, simply showing the main patterns of interest spanning the period immediately before and after the reforms (November 2010 to November 2015). There are three limitations of the SWC and the wider national context, which mean that the patterns and changes over time presented here should not be causally attributed to the reforms. These are:

1. The national roll-out of the reforms means that any changes over time may be due to other factors, such as:

⁴ Employees of independent schools in England are not included in the SWC. Of schools included in the SWC, 99% (18,491 out of 18,637) of the primary and secondary schools that submitted data to the SWC in England are included in the analysis. The sample selection excludes schools where information on staff pay is missing for more than half of teachers and leaders. Full details on the sample selection are provided in Appendix Section 2.

- a. Changes in the statutory conditions for teachers and leaders, from public sector pay restraint in 2011 and 2012 to statutory increases in the maxima and/or minima of the teacher pay ranges from 2013 onwards.
 - b. Changes in the composition of schools and the school workforce over the period. For example, between 2010 and 2015, the percentage of males in the school workforce declined slightly, from 25.4% to 24.6%; and the average age declined slightly, from 40.1 years to 38.9 years.
2. Significant changes to the way that the SWC recorded pay coincided with these reforms. Whilst these changes were accounted for in the analysis in a comprehensive way, it is not possible to determine the full extent that these changes have had on the figures presented.
 3. The SWC may not record all relevant school pay decisions. This is because (under the most pessimistic assumption) around 32% of classroom teachers in post for at least one year had not yet received their pay award decision by the census date in 2015. This is likely to create a lag in pay awards, so that changes are observed every two years rather than every year, depressing the figures for annual pay awards presented here.

While the following findings are nationally representative and comprehensive, for the stated reasons above, one should exercise caution when interpreting the figures in relation to the reforms. Finally, any impacts of the reforms that occurred after the latest available data (November 2015) are not reflected in this analysis.

The research questions are described in more detail below.

1.2. Prior research

PRP for teachers was introduced in England in 2013. The main reason given for its introduction (DfE, 2012) was research evidence showing that teacher effectiveness is a key determinant of pupil progress, particularly for disadvantaged pupils, and that teacher quality can be improved where appraisal systems provide effective incentives for improving pupil performance.

Research evidence supports the claim that teacher effectiveness (or quality) has a large influence on pupil progress. The typical result found in studies by economists is remarkably consistent: a one standard deviation change in teacher effectiveness yields a 10% - 20% standard deviation change in pupil attainment (Burgess, 2015). This appears to be true across different stages of school, different subjects (though it is typically greater in maths) and (to the extent there is evidence) across different countries (Burgess, 2015). An alternative way of expressing the difference is in terms

of years of achievement gain; using this method the difference produced by effective teachers is equivalent to “some teachers producing 1.5 years of gain in achievement in an academic year while others with equivalent students produce only 1/2 year of gain” (Hanushek, 2011).

The evidence for whether PRP linked to an appraisal system improves teacher effectiveness is less consistent. In theory, PRP can improve teacher quality through two mechanisms: first, raising individual productivity as incentives are more aligned with teachers’ ‘effort’; second, selecting and retaining more productive workers as they choose to work in occupations with PRP. There are a number of issues that complicate the effect of PRP in the public sector, however - see Dixit (2002) and Burgess and Ratto (2003). Relevant to teachers, these include multi-tasking and output measurement problems: there are multiple dimensions of teachers’ ‘effort’, for example, preparing for classes, providing feedback through marking, and non-academic support, but only limited scope to measure the effect of effort on multiple pupil outcomes. These problems can lead to unintended consequences, for example substituting teachers’ effort away from non-measurable activities (Neal, 2011). Jacob (2005) studied the introduction of ‘No Child Left Behind’ (NCLB) accountability in Chicago Public Schools and found that teachers reacted strategically to the incentives, including substituting teaching time towards the tested subjects and away from others, and also by increasing special education placements. Teachers might focus narrowly on the rewarded measure, rather than a ‘true’ aim of education. This is often described as ‘teaching to the test’. Another issue is ‘multiple principals’, where PRP reduces collaboration between colleagues at the detriment to pupil outcomes. Finally, it is argued that providing monetary incentives for teachers can undermine their intrinsic motivation to do their best for their pupils.

It is, then, an empirical question whether the introduction of performance-related schemes raise or reduce pupil attainment; see recent surveys in Neal (2011) and Jackson *et al.*, (2014).⁵ The brief answer is that there are robust well-designed studies yielding both answers. It is very hard to be able to introduce a PRP scheme that admits an experimental evaluation, including the recent reforms in England. There are therefore relatively few studies credibly estimating a causal effect.

In an attempt to side step the issue of experimental evaluation of PRP systems, Rothstein (2015) applied a range of parameters found in the existing literature to simulate teacher labour markets. In these simplified models, which replicated a range of PRP systems, he found that they can improve selection into and out of the

⁵ These reviews find a range of impacts for PRP in the US. Positive impacts were found by Winters *et al.*, (2008) in Arkansas. Negligible impacts were found by: Springer *et al.* (2010) in Tennessee; Goodman and Turner (2010) in New York; Springer, Pane *et al.* (2012) in Round Rock, Texas; Goldhaber and Walch (2012) in Denver, Colorado; and Glazerman and Seifullah (2010) in Chicago). Negative impacts were found by Fryer (2013) in New York.

profession, but annual bonuses only have small effects, in comparison to reductions in initial tenure rates for new teachers.

This report is concerned with the first necessary step for PRP reforms to affect pupil attainment: did the pay reforms actually affect the level and distribution of teachers' pay, and/or change the composition of the teacher workforce? These are relevant and non-trivial questions to ask because the change in regulations was very general and deliberately non-prescriptive, with each school designing its own policies. This means it is possible that only minimal changes were implemented. The reforms in England are described in more detail in the following sections, and the specific research questions are outlined below.

1.3. The reforms and pay review body context

In 2012, the Secretary of State for Education asked the School Teachers' Review Body (STRB) to review current provisions for teachers' pay, aiming to raise the status of the profession and improve the quality of teaching in schools. The case for change was presented in the context of research evidence showing that teacher effectiveness is a key determinant of pupil progress, particularly for disadvantaged pupils (DfE, 2012).

The STRB (DfE, 2012) recommended a broad national pay framework, establishing minima and maxima for teacher and leadership pay ranges and the main additional responsibility allowances. This framework defines the areas within which schools are free to make their own decisions, such as setting recruitment and retention allowances, and making individual pay decisions. Key recommendations focused on replacing increments based on length of service with progression linked to annual appraisal. A new system was introduced for determining teachers' pay in England in September 2013, which affected pay decisions from September 2014. The main changes as described by Government are (DfE, 2013a):

- all pay awards are now linked to performance and not length of service
- schools can increase individual teachers' pay at different rates based on their performance
- there are new criteria for progression from the main to the upper pay range instead of the threshold test
- introducing a pay range for leading practitioners who will improve teaching skills across the profession
- more freedom for schools to set the starting salaries of teachers new to the school

- schools no longer have to match a teacher's existing salary when recruiting staff (relaxing 'pay portability')

The first three points clearly signal a major shift in emphasis, away from simple regular moves up a fixed pay scale known as spine points within the teacher and leader pay ranges, to a world where pay depends explicitly on performance. Another important provision is the ending of 'pay portability' described in the last two points – schools no longer need to match a moving teacher's current pay. Further reforms came into force in September 2014, which extended the same principle of greater autonomy at school level to the pay of school leaders (head teachers, deputy heads and assistant heads).

One of the key features of these reforms is the deliberately non-prescriptive way in which it was introduced. DfE issued advice to schools (DfE, 2013b) which, while providing a framework, was largely non-prescriptive and encouraged schools to make appropriate choices on how best to implement the reforms. Note also that 'performance' itself is left for schools to define in their appraisal policies.

The effect of the reforms to teachers' and leaders' pay must be considered carefully alongside the public sector pay freeze, which affected pay in 2011 and 2012, and recommendations made by the STRB for the adjustments made to pay ranges for classroom teachers and leaders that coincided with the reform. A summary of these recommendations is shown in Table 1. In contrast to 2011 and 2012, all teachers in post on or after 1 September 2013 were awarded a 1% pay uplift, and the statutory minima and maxima of the main and upper pay ranges for classroom teachers were increased by 1% from September 2014. Teachers within the minima and maxima of the pay ranges in September 2014 and 2015 were not obliged to receive a 1% uplift in pay. From 2014, the discretionary national reference points (known as spine points) were removed from departmental advice, with the aim of moving pay awards away from the typical level of pay progression before the reforms to teachers' pay.

Table 1 Summary of changes recommended by the School Teachers' Review Body (2009 to 2015)

Year	Pay	Pay ranges	Other
2009 ^a	2.3%	An adjustment to the main and upper pay scale for Inner London (as proposed in 17th report)	
2010 ^b	2.3%		
2011 ^c	0% (public sector pay freeze)	Non-consolidated payment of £250 for those earning below £21,000 (unqualified teachers)	Overall limit on discretions that can be applied to head teachers' pay.
2012	0% (public sector pay freeze)		
2013 ^d	Classroom teachers' pay and allowances uprated by 1%.		
2014	Statutory minima and maxima for classroom teachers' pay uprated by 1%.		Discretionary national reference points removed from Departmental advice.

Year	Pay	Pay ranges	Other
2015 ^e	<p>Uplift of 1% to the minima of the main pay range, leadership pay range and the eight head teacher group pay ranges.</p> <p>Uplift of 2% to the maxima of the main pay range.</p> <p>Uplift of 1% to the minima and maxima of all other classroom teacher pay ranges, the allowances in the national pay framework (Teaching and Learning Responsibilities (TLRs) and Special Educational Need (SEN))</p> <p>No uplift to the maxima of the leadership pay range nor to any of the eight head teacher group pay ranges.</p>		

Source: ^a [School Teachers' Review Body Eighteenth Report Part One - 2009](#) and [School Teachers' Review Body Eighteenth Report Part Two - 2009](#)

^b [School Teachers' Review Body Nineteenth Report - 2010](#)

^c [School Teachers' Review Body Twentieth Report – 2011](#)

^d [School Teachers' Pay and Conditions Document 2013 and Guidance on School Teachers' Pay and Conditions September 2013](#)

^e [School Teachers' Review Body Twenty-Fifth Report – 2015](#)

1.4. Teachers' and leaders' reaction to the reforms

The decentralising nature of the pay reforms means that the opinions of teachers and school management regarding the nature of PRP will play an important role in how the reforms were, and continue to be, implemented. The last survey of teacher opinions on this subject before the reforms came into effect was in August 2013 (Policy Exchange, 2013). This found teachers were open to PRP, with 89% of teachers agreeing that the '*quality of their teaching should be important in driving teacher's pay and progression*'. This reduced to 66% when linking pay directly to student progress.

Within a few months of the reforms coming into effect, but before any school had made their first pay decisions under the new pay framework, the majority of teachers had their performance assessed against the Teachers' Standards and objectives set by the school. Teachers were equally divided in their opinions of the usefulness of these standards to provide a fair basis for recommendations for their pay (O'Beirne and Pyle, 2014). However, this masks a large difference between senior leaders and classroom teachers, with 66% of senior leaders thinking that the standards were an appropriate basis for making decisions about pay, compared to 36% of classroom teachers (O'Beirne and Pyle, 2014). A divergence of opinions was also present in teachers' views on performance pay in general. Whilst the majority of teachers felt that they understood the new arrangements, and more teachers agreed than not that the pay of individual teachers should be on the basis of their performance rather than length of service (48% to 38%), nearly half of teachers thought that the new pay arrangements would not reward them appropriately for the quality of their teaching (O'Beirne and Pyle, 2014).

Similar concerns about the new pay arrangements are reported by Marsden (2015), who surveyed over 4,000 teachers and 200 school leaders between January and April 2014. In this survey only 24% of teachers agreed that linking pay progression to performance is good in principle. Teachers' reasons for why the new PRP programme will not work were due to: 1) the difficulty of linking work done to individual teacher performance (87%); 2) schools not having sufficient funds to reward good performance (73%); and 3) the perception that leaders will reward their favourite teachers (70%).

Teacher unions also voiced their opinions on the reforms through surveying their members. Note: these responses may not be representative of all teachers, or indeed all members of these unions. At the end of 2014, the National Union of Teachers (NUT) surveyed its members and received responses from 5,000, of whom half thought the reforms were 'unfair' (Education Journal, 2015). A year on, the most

recent survey of 10,000 teachers carried out by the Association of Teachers and Lecturers (ATL) and the NUT, found that this had decreased slightly to 43% (NUT and ATL, 2017). A related question asked by the National Association of Schoolmasters Union of Women Teachers (NASUWT) in February 2015 of 16,000 teachers and leaders, found that only 38% believed that they had received the pay progression which they were entitled to within the last twelve months (NASUWT, 2015). Note the results from NASUWT survey would also reflect pay progression generally, rather than the specifics of the reforms.

In the summer of 2016, the DfE commissioned the NFER to survey a representative sample of teachers as part of the Teacher Voice Omnibus Survey (Smith *et al.*, 2017). Respondents were asked what had been the outcome of their last annual performance review in terms of pay progression. Overall, over a third of teachers surveyed (37%) were ineligible for pay progression as they were at the top of the scale, whilst just under half (46%) reported their pay progression had been recommended and awarded. Only 8% of respondents said that their pay progression had been recommended but not awarded, and 5% stated they had not been recommended for pay progression.

The teacher union surveys also reflect concerns among teachers about the reforms' potential for bias and discrimination (NASUWT, 2015). Both the NASUWT and ATL surveys highlighted a concern that Black teachers were more likely to be denied progression than white British teachers. Moreover, a previous survey of ATL members in 2015 (ATL, 2015), highlighted concerns of gender discrimination, finding male teachers progressed at a higher rate than female teachers (53.7% versus 37.7%) and that 40% of male teachers reported receiving a higher salary at their new school for a similar role, compared to only 12.1% of female teachers.

Statements from teacher and leadership unions suggest that the majority of schools have implemented the minimum required pay reforms. For example, in their submission to the 26th STRB, the National Association of Head Teachers (NAHT, 2015) emphasised that its 'members have largely chosen to continue to use the existing pay scales and points that existed in STPCD 2013'. Therefore, despite the flexibility, they, along with other teaching unions, have continued to publish and use reference pay points that include points within the minimum and maximum of the pay ranges, and that increase in line with the STRB recommendations for increases to the minimum and maximum of the pay ranges. This opinion was shared by the General Secretary of the NUT who stated "*Results depend upon the work of the whole school, not just individuals. Paying one teacher more than another can be very divisive and lead to unnecessary disputes. Equally, schools do not want or need the additional cost and bureaucracy of working out individual pay for teachers, and for this reason many have kept to the national pay scales.*" (NUT, 2016).

1.5. Research questions

This report considers the impact of the reforms on teachers' pay and annual change in pay, progression from the main to the upper pay range, and teacher mobility, across the majority of primary and secondary schools in England. Full-time equivalent nominal base pay is used throughout the report, which separates changes in pay from changes in working hours for teachers and leaders. The research questions for this part of the study are outlined below.

1.5.1. Teachers' Pay

After the reforms, teachers' pay is no longer required to follow defined spine points within pay ranges, and pay increases are at the discretion of the head teacher, dependent on performance. The hypothesis investigated here, therefore, is that the reforms increased the variance in teacher pay, and potentially reduced the level of teacher pay, on average. In order to examine this, the following statistics for November 2010 to November 2015 are presented:

- Teachers' and leaders' average full-time equivalent nominal base pay across school type and individual characteristics
- The variance in teachers' and leaders' full-time equivalent nominal base pay by age and across school type and individual characteristics
- The within- and between-school variance in teachers' and leaders' full-time equivalent nominal base pay.

1.5.2. Teachers' Annual Change in Full-time Equivalent Nominal Pay

The reforms included the removal of defined spine points and 'automatic progression' between these spine points within pay ranges. The report therefore explores the hypothesis that the reforms reduced the likelihood of teachers receiving an annual increase in full-time equivalent nominal base pay similar to that expected under the old system. In order to examine this, the following statistics on the annual growth of teacher pay for between 2010 and 2011 through to between 2014 and 2015 are presented:

- The likelihood of an annual increase in full-time equivalent nominal pay for individual teachers
- The likelihood of an annual increase in full-time equivalent nominal pay for teachers mirroring the increase that would have been expected under the old system of spine point progression within a teacher pay range.

- The likelihood of this “expected” annual increase in full-time equivalent nominal pay across school types and individual characteristics
- The within- and between-school variance in teachers’ annual change in full-time equivalent nominal pay.

1.5.3. Teachers’ Mobility

After the reforms, schools could choose to relax the previous requirement of ‘pay portability’. This means that a teacher’s salary in a new school could be lower (as well as equal or higher) than their previous salary. This could affect mobility across schools, as schools are now more willing to hire new teachers, or teachers are now more reluctant to move schools. The reforms could also affect mobility and retention of teachers if PRP is used in conjunction with recruitment and retention allowances. The hypothesis investigated is that the reforms changed the mobility of teachers across schools, and that a higher proportion of teachers who move school have lower pay after moving schools. In order to examine this, the following statistics on teacher mobility between 2010 and 2011 through to between 2014 and 2015 are presented:

- Teacher mobility across school type and individual characteristics
- The percentage of teachers that move schools moving to a lower reference spine point, which refers to a spine point within the main and upper pay ranges before the reforms, and the reference spine points (uprated by 1%) provided by teachers’ unions after the reforms
- The percentage of teachers that move schools moving to a lower reference spine point and lower nominal base pay.

1.5.4. Progression to Upper Pay Range

After the reforms, schools could introduce new criteria for progression from the main to the upper pay range instead of the existing threshold test. The hypothesis investigated, therefore, is that the reforms changed the likelihood of teachers progressing to the upper pay range. In order to examine this, the following statistic between 2010 and 2011 through to between 2014 and 2015 is presented:

- The percentage of teachers with annual progression to the upper pay range from the main pay range across school type and individual characteristics

2. Data: School Workforce Census (SWC)

The School Workforce Census (SWC) consists of individual-role level data on all staff from all local authorities (LAs) and state-funded schools in England (including academy and LA maintained schools). The census is co-ordinated by DfE. The first full sweep took place on 4th November 2010, and takes place on the first Thursday of November thereafter. It is a statutory requirement on schools and LAs to submit the SWC return, with data being supplied from either schools or LAs, or a combination of the two. The latest available data are from November 2015. This means that relevant information on pay and mobility is available for two years after the reforms would be expected to influence these factors for teachers, and one year for leaders. It would be possible to update the analysis presented below using future waves of the SWC to explore the emerging trends over time.

This research uses the longitudinal version of the SWC, which has been created by DfE for individuals with a post defined as a teacher or leader. The longitudinal SWC links teachers and leaders observed in multiple annual school censuses. The SWC assigns each teacher an anonymous unique reference number, which allows researchers to follow individuals (without revealing their names) over multiple years. This means that that changes in all aspects of their contract and presence in state-funded schools in England over time can be analysed.

There are two important limitations to the SWC data, which should be kept in mind throughout the report. First, significant changes to the way that the SWC recorded pay coincided with these reforms. Whilst these changes were accounted for in a comprehensive way in the analysis, it is not possible to determine the full extent that these changes have had on the figures presented.

Second, the SWC may not record all relevant school pay decisions. This is because (under the most pessimistic assumption) around 32% of classroom teachers in post for at least one year had not yet received their pay award decision by the census date in 2015. This is likely to create a lag in pay awards, so that changes are observed every two years rather than every year, depressing the figures for annual pay awards presented here.

The longitudinal SWC dataset has 2,923,109 observations from 20,115 schools, including information on 650,501 teachers and 70,697 leaders. The census includes contract information such as the start date, hours worked, annual pay and all roles an individual has within a school (teacher, head of department, lunch time supervisor etc.), as well as an indicator for whether the member of staff is employed by the LA or the school they are working at. It also includes personal characteristics such as date of birth, gender and ethnicity, an indicator of whether a teacher has attained qualified teacher status (QTS), information on subject studied and the level of

qualification (degree, PGCE etc.), as well as on the amount of time spent in the classroom teaching each subject (it does not include names). In order to protect teacher confidentiality, these data was stored on encrypted secure servers and access was limited to two researchers who had been specifically trained and vetted. The final sample used for analysis contained 2,557,496 observations from 18,491 primary and secondary schools including information on 574,270 teachers and 59,144 leaders. This final dataset is described fully in Appendix 2 and in brief below.

Teachers and leaders are defined in line with DfE guidance.⁶ Some ‘cleaning’ of the longitudinal data was required, and is described in full in Appendix 3. Complete Stata syntax is also available from the authors on request. The main steps to achieve the dataset used for analysis were:

1. **Create consistent school identifiers over time:** this ensures that changes in school governance associated with changes in school identifiers are not confused with teachers’ moves across school in the analysis. Although school identifiers are consistent over time, school status as academy or non-academy school can vary over time.
2. **Clean nominal base pay:** this removes erroneous values of nominal base pay in the longitudinal SWC data, therefore presenting a more representative picture of teachers’ and leaders’ pay over the period. This was particularly necessary in 2010 (the first year of data collection) and 2013 (where the method of data collection changed). All cleaning of nominal base pay is subject to the reasonable assumptions described in detail in Appendix 3.1. Full-time equivalent nominal base pay is used throughout the report.
3. **Clean additional pay:** this removes erroneous values of additional pay in the longitudinal SWC data, therefore presenting a more representative picture of teachers’ and leaders’ additional pay over the period. All cleaning of additional pay is subject to the reasonable assumptions described in detail in Appendix 3.2.

The final sample used in the analysis excludes those with erroneous values of nominal base pay that couldn’t be reasonably adjusted. The final sample also includes: only schools classified as primary and secondary schools; excludes special schools, LA nursery schools, pupil referral units, studio schools and university technical colleges; includes only schools with more than 50% of (recoded) base pay

⁶ Teacher: Advanced Skills Teachers, classroom teacher (upper pay range and main pay range), Excellent Teacher and Leading Practitioner. Leader: Advisory Teacher, Assistant Head, Deputy Head, Executive Head, Head

observed; includes individuals aged 22 and above and 62 and below⁷; includes individuals who work at least five hours per week and at least five weeks per year. The numbers of observations dropped in each stage of this sample selection are given in Appendix 2.

⁷ These ages are chosen as age 22 corresponds to the 1st percentile and age 62 corresponds to the 99th percentile. This means that 1% of the sample with the lowest recorded age in the longitudinal SWC and 1% of the sample with the highest recorded age in the longitudinal SWC are excluded from the analysis. This decision was taken to remove observations with recorded ages at the extremes of the age distribution.

3. Level and variation of teachers' pay in England

3.1. The level of teachers' and leaders' pay

This section considers the level of teachers' and leaders' pay in England, as recorded in the longitudinal SWC. First, a general picture of pay is presented, shown according to teachers' and leaders' ages and across years spanning the pay reform. This informs whether there have been general trends in pay across the age distribution, which is used as a proxy for the distribution of teaching experience. Second, a more detailed description of average pay across school types, teacher and leader types, and years is presented. This informs whether there have been particularly noticeable increases in particular circumstances. In both cases, however, it is not possible to distinguish the effect of the PRP reforms from the effect of recommendations on base pay from the STRB.

3.1.1. Average teacher and leader pay across teaching tenure/age

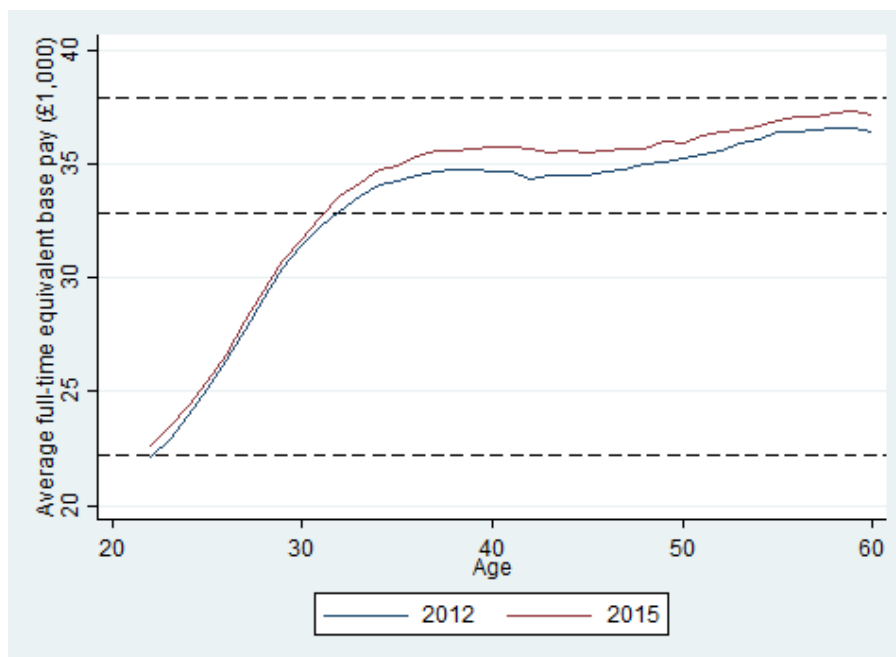
Figure 1 shows the base pay for teachers for one time period before the reforms (November 2012) and one time period after the reforms (November 2015). The distribution is shown according to teachers' age, which is used as a proxy for years of teaching as this information is not consistently reported in the SWC.

Figure 1 (and all figures and tables throughout the report) use full-time equivalent (FTE) base pay in nominal terms. This means that changes over time do not conflate changes in hourly pay and changes in working hours. The general pattern across both years is a steep earnings gradient for younger teachers, rising on average around £1,000 per year of age to age 30, to a base pay which roughly corresponds to the maximum of the main pay range outside London, followed by a shallower earnings gradient.

There is a clear increase in base pay across the middle and upper part of the age distribution over time. For example, average base pay for teachers aged 40 in 2015 was around £35,700, compared to around £34,600 for teachers aged 40 in 2012. In real terms this equates to a small decrease of around 0.1% over the period for this age group.⁸

⁸ Real terms change calculated using the Consumer Price Index available from the [Office for National Statistics](#). The change in teachers' base pay at age 40 is equivalent to a 3.1% increase and inflation increased by 3.2% over the same period.

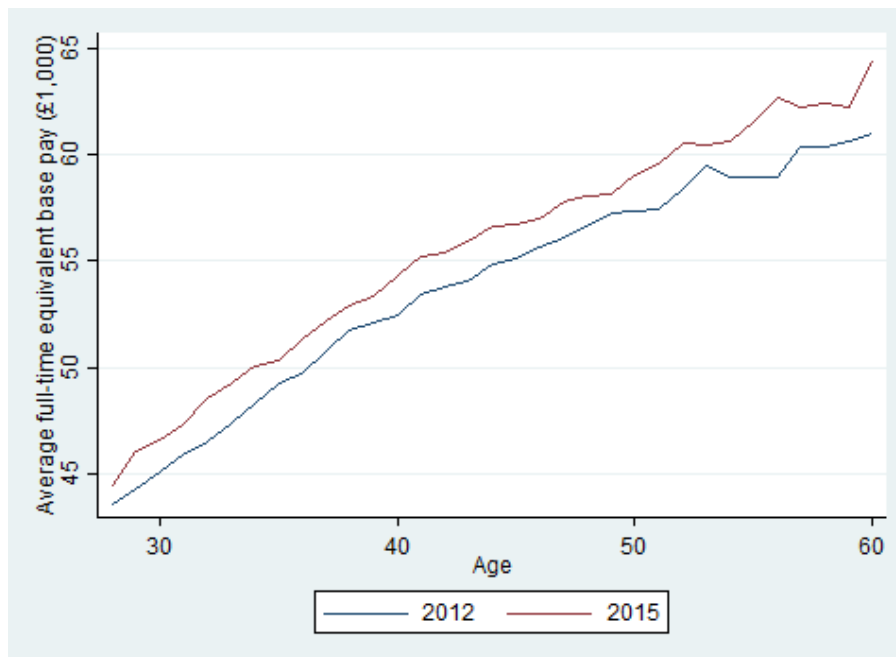
Figure 1: Average base pay (full-time equivalent base pay) for teachers in England in 2012 and 2015 (£1,000s)



Note: Figures based on final analysis sample described in Appendix 2, for teachers only. The dashed horizontal lines show the bottom of the main pay range, top of the main pay range, and top of the upper pay range in 2015 for reference.
Source: Longitudinal SWC.

Figure 2 presents the equivalent picture for leaders. In contrast to the picture for teachers, the increase in base pay across ages is roughly constant, increasing from around £45,000 for leaders aged 30 to around £60,000 for leaders aged 60. Focusing on the change over time, there is an increase of around £1,500 on average across the entire period, across the age distribution. For example, for leaders age 40, pay increased from an average of £52,500 in 2012 to £54,300 in 2015. Despite the nominal increase, this is equivalent to a decrease of around 0.3% in real terms. This suggests that the reform has led to increases in base pay for leaders, but it is impossible to distinguish the effect of the pay reforms from the effect of guidance from the STRB through this figure. Section 3.2 considers the effect of the pay reforms on the variation in pay, which is more likely to be directly attributed to the reform.

Figure 2: Average base pay (full-time equivalent base pay) for leaders in England in 2012 and 2015 (£1,000s)



Note: Figures based on final analysis sample described in Appendix 2, for leaders only, additionally excluding leaders with age 27 or below as there are less than 500 observations per age group. Source: Longitudinal SWC.

3.1.2. Average teachers’ pay across school type and individual characteristics

3.1.2.1. Teachers’ pay

Table 2 shows the average level of teachers’ base pay across all available years of the SWC, for all teachers, and then for teachers in particular school types and particular characteristics. For all teachers as a whole, average nominal pay is almost constant across years: around £32,600 in 2010 and £33,000 in 2015. The majority of this slight increase in nominal pay for teachers, on average, is due to the increase between 2012 and 2015. This is consistent with the STRB recommendations that at least teachers at the minima or maxima of a teacher pay range received a 1% increase from 2013.

3.1.2.2. Teachers’ pay across school types

Considering the differences across school types, there is a slight increase across years for secondary school teachers, from £33,000 in 2010 to £33,800 in 2015, which begins from 2013. It’s not possible to say whether this is due to the PRP reform, or recommendations from the STRB. The increase in secondary rather than primary schools is consistent with secondary schools having more flexibility in

awarding PRP for teachers, as primary and secondary schools have a similar proportion of classroom teachers affected by the STRB recommendations (at the top and bottom of a pay range).

Teachers in academy schools have slightly higher average pay than teachers in non-academy schools across the period. The difference is largely unchanged between 2010 and 2015, despite the increasing number of academy schools (particularly academy converters) over the period.

Across schools in different pay regions, the growth between 2010 and 2015 is almost unchanged, although again since the STRB recommendations (and teacher pay reform) in 2013 there has been small annual growth. Teacher pay in Inner London remains higher, on average, than Outer London, which in turn is higher than Fringe London, then the rest of England. This is expected given the structure of pay across pay regions.

3.1.2.3. Teachers' pay across teacher types

Considering the differences across teacher types, male teachers have higher pay than female teachers, on average. This could reflect a number of factors such as average tenure (including career breaks) or the relative presence in primary and secondary schools, and across subjects. For example, male teachers in primary schools in 2015 had lower base pay, on average, than female teachers in primary schools in 2015. A full exploration of the gender pay gap for teachers is beyond the scope of this report, however. There is little change in the growth in average pay across years for both male and female teachers.

Black teachers have higher pay than Asian teachers, on average, who in turn have (slightly) higher pay than White British teachers, on average. This is likely to reflect the different composition of teachers across teacher pay regions, as there is a higher proportion of Black teachers in London pay regions (shown in Appendix 2). For example, the average difference in pay for teachers across these ethnic groups in Inner London in 2015 was around £1,000, as compared to around £2,000 across England as a whole. As for male and female teachers, there is very little difference in the growth of average teacher pay across ethnic groups, particularly since 2013. This is suggestive that the reforms have not been discriminatory across these ethnic groups (although further information on the effect at individual level is presented in Table 8 and Table 9.

Table 2 Level of teachers' pay (full-time equivalent base pay) in England across years (mean, £1,000s)

	2010	2011	2012	2013	2014	2015
All	32.6	32.6	32.5	32.7	32.7	33.0
Primary	32.2	32.2	32.0	32.1	32.0	32.2
Secondary	33.0	32.9	32.9	33.2	33.4	33.8
Academy	32.8	32.7	32.6	32.7	32.7	33.0
Non-academy	32.6	32.5	32.5	32.6	32.7	32.9
Inner London	36.9	36.7	36.5	36.3	36.5	36.8
Outer London	34.6	34.5	34.4	34.4	34.5	34.7
Fringe London	32.2	32.2	32.2	32.3	32.3	32.7
Rest of England	32.1	32.0	31.9	32.1	32.1	32.4
Main pay range	27.9	27.9	27.8	27.9	28.3	28.5
Upper pay range	37.0	36.8	36.8	37.2	37.3	37.8
At top of pay range	36.3	36.1	36.0	36.5	37.2	38.4
Below top of pay range	30.3	30.5	30.3	30.8	31.7	31.9
Male	33.0	32.8	32.7	32.8	32.8	33.1
Female	32.5	32.5	32.4	32.6	32.7	32.9
White	32.6	32.6	32.5	32.7	32.7	33.0
Black	34.5	34.8	34.7	34.9	34.9	35.0
Asian	32.2	32.4	32.4	32.7	32.6	32.9
Maths	33.0	32.9	32.7	32.9	33.0	33.3
English	32.6	32.7	32.6	32.9	32.9	33.2
Physics	34.7	34.5	34.2	34.2	34.5	34.9
Science	32.8	32.8	32.8	33.0	33.1	33.6
PE	32.5	32.8	33.1	33.5	33.7	34.2
MFL	33.7	33.7	33.5	33.6	33.7	34.1

Note: Figures based on final analysis sample described in Appendix 2, for teachers only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years as more schools converted to academy status. Subject refers to secondary school teachers only. Not all ethnic groups or secondary subjects have been included in the table.

Source: Longitudinal SWC.

Table 2 shows that there are differences in average pay across teachers of different subjects. For example, in 2010, average pay for Physical Education (PE) teachers was £32,500, compared to £34,700 for physics teachers. Differences in average pay

across teachers of different secondary school subjects would be expected if there are different rates of retention and promotion of staff across subjects, leading to changes in the average pay range (and position within pay range). It is hypothesised that the pay reforms would affect these differences if teachers receive systematically different pay awards across subjects, either due to differences in objective measures of performance or school leaders conflating pay for performance and pay for recruitment and retention. Increasing pay for retention would be especially likely in shortage subjects, such as physics and maths, although specific recruitment and retention allowances could be used instead. In 2015, the range in average pay across subjects is slightly larger than in 2010, suggesting that the reforms could have increased variation in pay awards across subjects, although the composition of teachers across subjects is also likely to have changed. The largest increase between 2013 and 2015 is for physics and PE teachers: one shortage and one non-shortage subject. This suggests that increases in pay across years are not driven by attempts to retain teachers.

3.1.3. Average leaders' pay across school type and individual characteristics

3.1.3.1. Leaders' pay

Table 3 presents the equivalent figures for leaders. In contrast to teachers, there is a noticeable increase in average pay between 2010 and 2015, of around £1,200 on average. This increase largely starts in 2013, consistent with the end of the public sector pay freeze. Some of the increase for leaders between 2010 and 2015 is due to increasing numbers of executive head teachers and/or school amalgamations, as these leaders tend to be paid more and are an increasing proportion of the leadership pool over time.

3.1.3.2. Leaders' pay across school types

Considering differences across school types, the pay of leaders in secondary schools is higher than the pay of leaders in primary schools, which perhaps reflects greater managerial responsibilities in larger schools. Note the STPCD states that head teachers pay is directly dependent on the size of school (DfE, 2013a). Base pay for leaders has increased across the period in primary and secondary schools. The absolute growth (changes in percentage point terms) and relative growth (changes in percentage terms) over time are slightly lower in secondary schools.⁹

⁹ To illustrate the difference between percentage point change and percentage change, there is a 10 *percentage point* increase between 10% and 20%. The *percentage* increase between 10% and 20% is 100%.

Table 3 Level of leaders' pay (full-time equivalent base pay) in England across years (mean, £1,000s)

	2010	2011	2012	2013	2014	2015
All	54.6	54.7	54.8	55.2	55.4	55.8
Primary	51.4	51.4	51.4	51.8	52.2	52.8
Secondary	60.6	61.0	60.9	61.4	61.3	61.7
Academy	61.2	60.6	59.7	59.2	58.5	58.3
Non-academy	54.4	53.9	53.4	53.7	54.0	54.5
Inner London	64.2	63.8	63.7	63.4	63.9	63.9
Outer London	60.9	60.8	60.1	60.7	60.6	60.9
Fringe London	55.4	55.7	55.7	55.8	56.1	56.6
Rest of England	53.1	53.3	53.4	53.8	54.0	54.4
Male	58.1	58.3	58.5	58.9	59.2	59.6
Female	52.8	52.9	52.9	53.3	53.6	54.1
White	54.4	54.5	54.5	54.9	55.2	55.6
Black	59.9	59.1	59.1	59.5	59.7	60.5
Asian	55.4	55.6	55.5	55.9	56.5	57.0

Note: Figures based on final analysis sample described in Appendix 2, for leaders only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years as more schools convert to academy status. Not all ethnic groups have been included in the table.

Source: Longitudinal SWC.

Average pay for leaders in academy schools has declined between 2010 and 2015, from an average of around £61,200 to around £58,300. This decline is also present from 2013, after the pay reforms and STRB recommendations, suggesting that either academy schools have reduced pay for their leaders in response to the reform, or changed the composition of leaders to be more junior. This is consistent with increasing numbers of academy schools and particularly more primary academy schools, which have lower pay, on average.

Across pay regions, the largest growth between 2010 and 2015 for leaders has been in Fringe London and the Rest of England, which is also true comparing the change between the pre- and post-reforms periods (2012 to 2015). This may reflect attempts to retain staff in regions outside the highest teacher pay regions, but could also reflect differences in the proportion of academies across pay regions, or changes in the ratio of teachers of shorter and longer tenure.

3.1.3.3. Leaders' pay across leader types

Considering the pay for leaders with particular characteristics, male leaders have higher average pay than female leaders by around £5,500, across the period. This may be driven by the unequal split of male and female teachers in primary and secondary schools, as Table 3 also shows that secondary school leaders, on average, are paid more than primary school leaders. For example, the average base pay for male head teachers in primary schools in 2015 is higher than female head teachers in primary schools by around £1,800, compared to an average difference of around £7,000 across primary and secondary schools. The disparity between male and female leaders could be due to differences in the years of experience, however this is not explored here because it is not possible to corroborate in the longitudinal SWC, and a full exploration of the gender pay gap for leaders is beyond the scope of this report.

Similarly, the higher levels of pay for Black and Asian leaders compared to White British leaders, on average, could be due to the prevalence of these teachers in London (where average pay is higher).

3.1.3. Additional pay across school type and individual characteristics

Small nominal increases in base pay (on average) have been offset to some extent by lower receipt of additional pay for teachers.

Table 4 shows that 38% of teachers received some additional payment in 2013, compared to 36% in 2015. The mean level of additional payment (for teachers that receive one) is roughly similar between 2013 and 2015 (around £3,500 per annum), but lower than in 2010 and 2011. This perhaps suggests that schools have responded to the reforms by shifting remuneration from additional pay to base pay, but this could be driven by the greater flexibility in base pay or the need to meet the requirement for a 1% uplift in pay for some/all classroom teachers within their existing budget.

Table 4 The percentages of teachers in England in receipt of additional payments and average full-time equivalent value (in £1,000s) of these additional payments across years (in brackets)

		2010	2011	2012	2013	2014
All	37.1 (4.5)	37.3 (4.6)	36.9 (3.8)	37.7 (3.6)	35.8 (3.6)	36.0 (3.5)
Primary	23.5 (3.0)	24.0 (3.0)	23.6 (2.5)	24.3 (2.3)	22.8 (2.4)	23.3 (2.4)
Secondary	50.0 (5.2)	50.1 (5.3)	49.9 (4.4)	51.2 (4.2)	49.4 (4.2)	49.9 (4.1)
Academy	41.8 (5.0)	46.4 (5.1)	45.6 (4.0)	45.5 (3.9)	43.5 (3.9)	43.3 (3.8)
Non-academy	36.9 (4.5)	35.2 (4.4)	33.5 (3.7)	33.7 (3.4)	31.2 (3.3)	31.2 (3.2)
Inner London	44.6 (4.5)	44.6 (4.7)	43.6 (3.9)	43.6 (3.6)	42.9 (3.7)	43.8 (3.5)
Outer London	43.8 (4.3)	43.3 (4.5)	43.6 (3.6)	43.7 (3.5)	42.4 (3.4)	43.4 (3.3)
Fringe London	39.3 (4.7)	37.8 (4.9)	38.1 (3.7)	38.0 (3.5)	38.1 (3.4)	37.4 (3.3)
Rest of England	35.5 (4.5)	36.0 (4.5)	35.5 (3.8)	36.5 (3.6)	34.2 (3.6)	34.3 (3.5)
Main pay range	22.1 (3.5)	22.4 (3.4)	21.8 (2.6)	22.9 (2.4)	22.9 (2.4)	23.1 (2.3)
Upper pay range	51.9 (4.9)	51.1 (5.0)	51.0 (4.3)	52.2 (4.1)	49.6 (4.1)	50.3 (4.0)
At top of pay range	49.5 (5.0)	48.5 (5.1)	48.1 (4.4)	50.1 (4.2)	47.3 (4.2)	51.5 (4.2)
Below top of pay range	29.7 (4.0)	30.7 (4.0)	30.3 (3.2)	31.7 (3.0)	34.1 (3.3)	33.9 (3.1)
Male	48.0 (5.2)	47.7 (5.3)	47.1 (4.5)	47.8 (4.2)	45.5 (4.1)	45.4 (4.0)
Female	33.8 (4.2)	34.1 (4.3)	33.8 (3.5)	34.7 (3.4)	32.9 (3.4)	33.2 (3.3)
White	37.2 (4.5)	37.4 (4.6)	37.1 (3.8)	37.8 (3.6)	35.7 (3.6)	36.0 (3.5)
Black	39.6 (4.5)	40.8 (4.7)	41.7 (3.9)	42.6 (3.6)	41.3 (3.7)	40.8 (3.6)

		2010	2011	2012	2013	2014
Asian	35.5 (4.1)	36.7 (4.3)	36.2 (3.6)	37.9 (3.3)	37.3 (3.2)	37.4 (3.1)
Maths	45.6 (5.2)	46.5 (5.6)	45.4 (4.5)	46.9 (4.2)	44.8 (4.1)	44.7 (3.9)
English	47.5 (5.1)	49.0 (5.4)	48.7 (4.3)	49.3 (4.0)	47.3 (4.0)	47.2 (3.9)
Physics	56.2 (5.3)	54.4 (5.7)	56.6 (4.5)	58.1 (4.1)	56.8 (4.2)	56.8 (4.2)
Science	58.2 (5.0)	59.8 (5.2)	60.3 (4.5)	62.6 (4.3)	60.5 (4.3)	62.1 (4.3)
PE	46.5 (5.0)	47.6 (5.3)	47.2 (4.4)	48.5 (4.0)	46.6 (4.0)	47.2 (3.9)
MFL	47.9 (5.0)	48.5 (5.4)	47.7 (4.4)	48.4 (4.2)	46.7 (4.2)	47.9 (4.0)

Note: Figures based on final analysis sample described in Appendix 2, for teachers only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years as more schools convert to academy status. Subject refers to secondary school teachers only. Not all ethnic groups or secondary subjects have been included in the table.

Source: Longitudinal SWC.

3.1.4. Summary

This section has shown that on average, the pay of teachers increased very slightly between 2010 and 2015, and when comparing pre- and post- reforms periods. The pay for teachers, on average, stayed almost identical, which equates to a real terms drop in base pay of around 2%. Average pay for leaders rose slightly, by around £1,200, which equates to a real terms decrease of around 1%. This means that teachers experienced a greater reduction in pay than leaders in real terms between 2010 and 2015. There is variation across school and teacher types, with noticeable differences in the level of base pay over the period between academy and non-academy schools, male and female teachers, and teachers of White British, Black and Asian ethnicity. As noted previously, these differences may be due to other factors, such as prevalence in particular regions with different teacher pay ranges, or other features of the teacher labour market, but provide a first indication that the reforms may have affected teachers' and leaders' pay in England.

Small nominal increases in base pay across the period have been partly offset by a decline in the prevalence of additional payments for teachers, although the average value for those that receive an additional payment remained similar between the

immediate pre-reforms year and post-reforms years. The decrease in prevalence of additional payments implies that teachers that no longer receive an additional payment will have a larger decrease in *total pay* than the decrease for base pay reported above.

3.2. Variation of teachers' base pay in England by teacher's age across years

This section considers the variation in teachers' and leaders' base pay in England. Variation is defined by the sample standard deviation,¹⁰ although the figures below also present an alternative measure, which focuses on the ratio of pay near the top and bottom of the pay distribution. The variation in pay is a useful summary indicator for whether the reforms have meaningfully affected teachers' and leaders' pay in state funded schools in England. This is because changes in the variation in teacher pay suggest that schools are using flexibility in teacher pay awards, with the caveat that changes in the composition of the workforce, such as proportionally more newly qualified teachers (NQTs), would also affect the variation. First, a general picture of the variation in pay is presented, shown according to teachers' and leaders' ages and across years spanning the pay reform. This informs whether there have been general trends in the variation of pay across the age distribution, which is used as a proxy for the distribution of teaching experience. Second, a more detailed description of the average variation in pay across school types, teacher and leader types, and years is presented. This informs whether there have been particularly noticeable increases in particular circumstances. In both cases, however, it is not possible to distinguish the effect of the PRP reforms to the effect of recommendations from the STRB on the variation of teachers' pay.

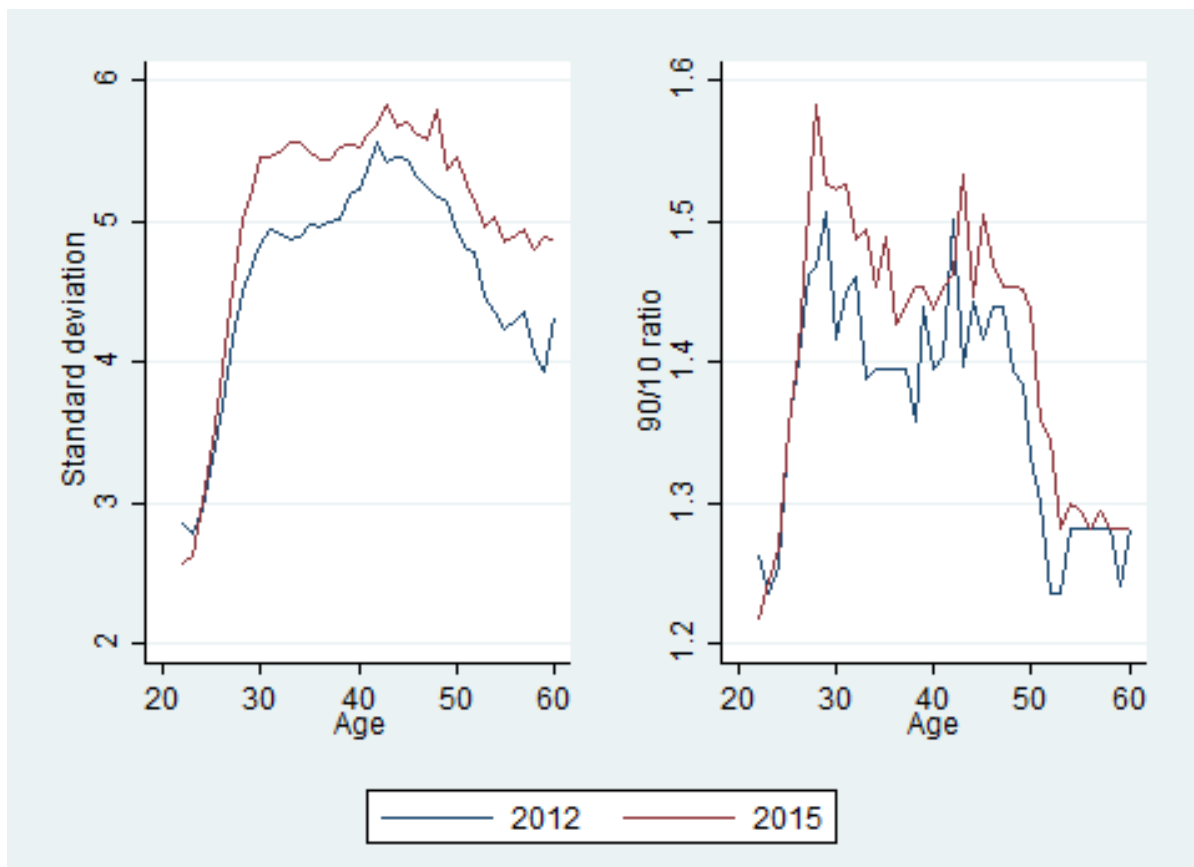
3.2.1. Variation in teacher and leader pay across teaching tenure/age

Figure 3 shows the variation in base pay for teachers for a time period before the reforms (November 2012) and a time period after the reforms (November 2015). The first panel uses the standard deviation. A higher standard deviation implies more variation in teacher pay. The distribution is shown according to teachers' age, which is used as a proxy for years of teaching as this information is not consistently reported in the SWC. The second panel of Figure 3 shows an alternative measure of the variation in teachers' pay, which is the ratio between pay at the 90th percentile (high in the distribution) and 10th percentile (low in the distribution). This "90-10" measure has the benefit of being robust to outlying observations (not affected by

¹⁰ The standard deviation is a measure of the variance across observations in a sample (in this case teachers and leaders in the SWC). More values, which are further from the mean (or average), imply higher variation, and therefore a higher standard deviation.

particularly low and high values which may be spurious), but the disadvantage that changes in variation in the middle of the distribution are not included. A higher “90-10” measure implies a larger difference between pay at the 10th percentile and pay at the 90th percentile, so more variation between these points. Both measures of variation in Figure 3 show a slight increase in variation in teachers’ base pay across ages over time, across all ages, which suggest that teachers’ pay awards have diversified in response to the reform.

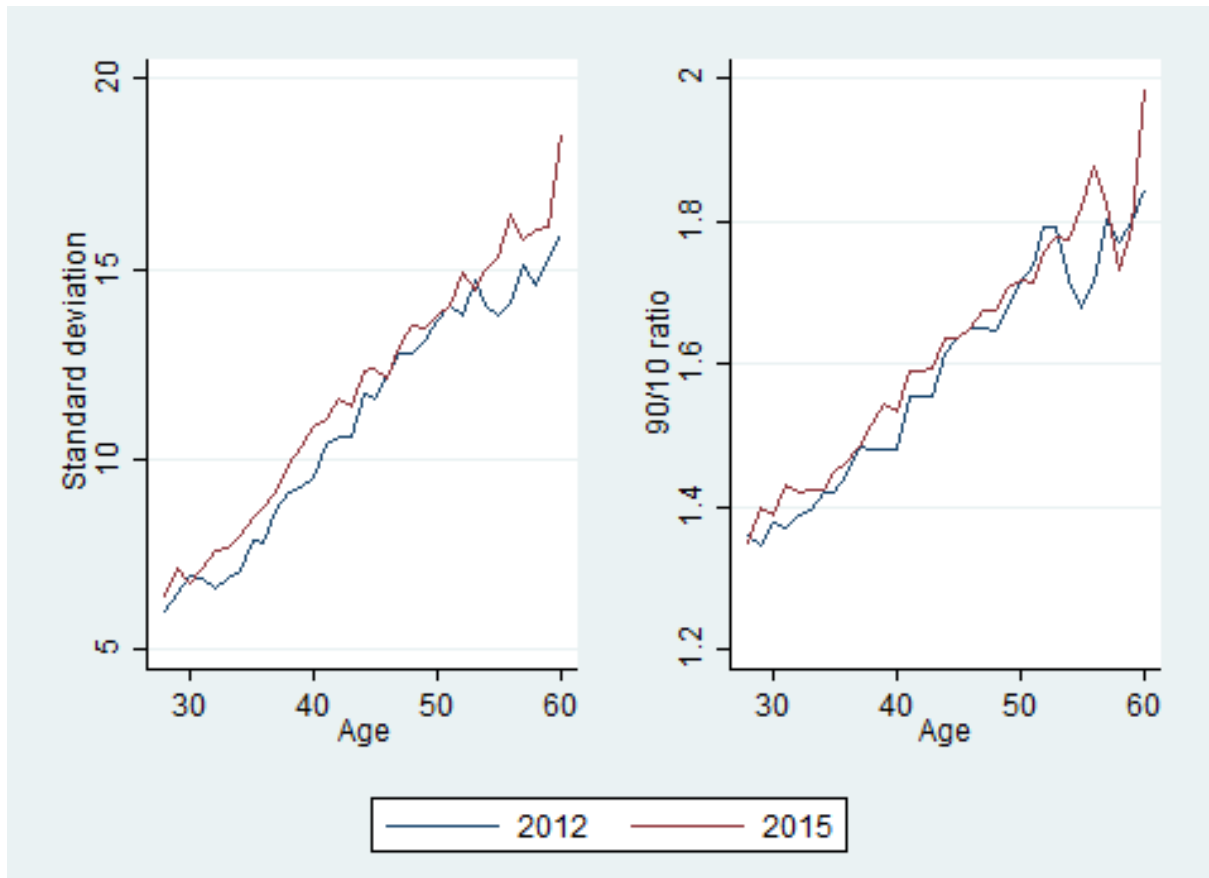
Figure 3: Standard deviation and 90-10 ratio in teachers' pay (full-time equivalent base pay) in England in 2012 and 2015



Note: Figures based on final analysis sample described in Appendix 2, for teachers only.
Source: Longitudinal SWC.

Figure 4 shows the equivalent picture for the variation in leaders’ pay. There is a slight increase in the variation in leaders’ base pay across the period and across ages, but this is mostly evident for older leaders, who would typically have more experience. Note that the variation in leaders’ pay increases as leaders’ age, in contrast to the variation in teachers’ pay which is non-linear (increasing until around 30, before flattening, and then increasing around age 50). For leaders as for teachers, the 90-10 ratio and standard deviation measures of variation are consistent, both showing a small increase for leaders of most ages.

Figure 4: Standard deviation and 90-10 ratio in leaders' pay (full-time equivalent base pay) in England in 2012 and 2015



Note: Figures based on final analysis sample described in Appendix 2, for leaders only, additionally excluding leaders with age 27 or below as there were less than 500 observations which is too low for meaningful comparisons over time.

Source: Longitudinal SWC.

3.2.2. Variation in teacher and leader pay across school type and individual characteristics

Table 5 shows the variation in teachers' base pay across all available years of the SWC, for all teachers, and then for teachers in particular school types and particular characteristics. For all teachers as a whole, there is evidence of a small increase in the variation of teachers' base pay across years. This small increase in variance is evident across school and teacher types. Some caution in this interpretation is required, however, as the STRB reforms could affect the variation of teachers' pay if a large proportion of teachers are awarded a 1% increase in the post-reforms period. This is explored further in later sections.

The increase in variation over time is slightly larger for teachers on the main pay range than the upper pay range. This suggests that increasing flexibility is being used for teachers on the main pay range.

Table 5 Variation of teachers' pay (full-time equivalent base pay) in England across years (standard deviation)

	2010	2011	2012	2013	2014	2015
All	6.2	6.0	6.1	6.2	6.5	6.6
Primary	5.7	5.7	5.8	5.9	6.2	6.3
Secondary	6.6	6.3	6.3	6.5	6.7	6.8
Academy	7.6	6.6	6.4	6.6	6.7	6.7
Non-academy	6.1	5.9	5.9	6.0	6.3	6.4
Inner London	7.5	7.3	7.4	7.7	8.0	8.0
Outer London	6.2	6.1	6.3	6.4	6.6	6.6
Fringe London	6.0	5.8	5.9	6.0	6.1	6.4
Rest of England	5.8	5.7	5.7	5.9	6.1	6.2
Main pay range	4.1	4.1	4.1	4.3	4.9	4.8
Upper pay range	3.1	2.9	2.9	3.0	3.3	3.3
At top of pay range	4.0	3.7	3.7	3.9	4.2	3.9
Below top of pay range	5.5	5.5	5.6	5.6	5.7	5.6
Male	6.6	6.5	6.5	6.6	6.8	6.9
Female	6.0	5.9	5.9	6.1	6.4	6.4
White	6.1	5.9	5.9	6.1	6.3	6.4
Black	7.0	6.8	6.9	7.1	7.3	7.5
Asian	6.7	6.5	6.5	6.7	7.0	7.1
Maths	6.6	6.5	6.6	6.8	7.0	7.1
English	6.5	6.3	6.4	6.7	6.9	7.1
Physics	5.6	5.9	5.6	6.0	6.0	6.0
Science	6.3	6.1	6.2	6.4	6.6	6.6
PE	6.1	5.8	5.7	5.9	6.1	6.2
MFL	5.9	5.9	6.0	6.2	6.4	6.5

Note: Figures based on final analysis sample described in Appendix 2, for teachers only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years as more schools convert to academy status. Subject refers to secondary school teachers only. Not all ethnic groups or secondary subjects have been included in the table.

Source: Longitudinal SWC.

Table 6 presents the equivalent figures for leaders. There is a noticeable increase in the variation of base pay between 2010 and 2015, which is larger than is evident for teachers. This is consistent with the aim of the reforms to increase variation by performance, although the increase is evident across the period, which suggests it is

not entirely due to the reform. This is true across most categories of school and leader characteristics. One exception is academy schools, where the variation decreased between 2010 and 2015. There is also less change in variation over time for non-academy schools, but there is an increase in variation between 2013 and 2015 (pre- and post- reform).

Considering differences across school and leader characteristics, there is a larger increase in variation for male than female leaders, which may reflect their higher initial level of base pay. There is also a larger increase in variation for Black and White British leaders in comparison with Asian leaders. The variation in base pay increases across all regions where teacher pay ranges vary, but less so outside the London area.

Table 6 Variation of leaders' pay (full-time equivalent base pay) in England across years (standard deviation)

	2010	2011	2012	2013	2014	2015
All	12.1	12.4	12.7	12.8	13.0	13.1
Primary	9.5	9.8	10.0	10.1	10.4	10.6
Secondary	13.9	14.3	14.6	14.9	15.2	15.2
Academy	16.1	15.3	15.4	15.2	15.3	15.1
Non-academy	11.9	11.7	11.5	11.5	11.6	11.7
Inner London	13.5	14.0	14.2	14.5	15.0	15.1
Outer London	13.4	14.0	15.1	14.2	14.3	14.0
Fringe London	12.1	12.5	12.9	13.0	13.4	13.7
Rest of England	11.2	11.6	11.7	12.0	12.2	12.2
Male	13.3	13.7	14.0	14.3	14.7	14.7
Female	11.0	11.3	11.5	11.6	11.8	11.8
White	11.9	12.3	12.5	12.7	12.9	13.0
Black	12.9	13.6	13.2	13.3	13.4	13.8
Asian	12.9	13.2	12.7	12.5	12.8	12.6

Note: Figures based on final analysis sample described in Appendix 2, for leaders only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years as more schools convert to academy status. Not all ethnic groups have been included in the table.

Source: Longitudinal SWC.

3.2.3. Within- and between-school variation in pay

Table 7 breaks down the overall variation in teachers' base pay into that due to variation within schools, and variation across schools. Within-school variation is the average variation in base pay between teachers measured within schools. The reforms would increase within-school variation if schools differentiate the pay of their teachers according to performance. Between-school variation is the average variation in base pay between teachers measured across schools. The reforms would increase between-school variation if schools adopt different policies, and have different financial capacity to increase the pay of some teachers.

The between-school variation is larger than the within-school variation across years, and most school and teacher types. This means that there is more variation across schools than within schools, which might be partly driven by the teacher pay regions. Exceptions where the within-school variation is larger than the between-school variation are for Black and Asian teachers, which is most likely driven by low numbers of these teachers in some schools, as this would inflate the within-school variation in pay. Another exception where the within-school variation is higher than the between-school variation is physics teachers. The within-school variation is also highest for teachers of this subject. These factors might reflect larger differences in the seniority of teachers within schools for this shortage subject.

Considering now changes in the within-school variation over time, there is little evidence of large systematic changes up to 2015, although the within-school variation typically rises over time for most groups. This suggests that pay is increasingly differentiated over time. There is also little evidence of large changes in the between-school variation over time for all teachers, although again the trend is generally an increase in variation over time. This is consistent with schools implementing different PRP policies, and differences in the scope to differentiate pay.

Table 7 Within and between school variation in teachers' pay (full-time equivalent base pay) across years

	Within-school variation						Between-school variation					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
All	2.6	2.6	2.6	2.6	2.8	2.8	5.7	5.6	5.6	5.7	6.0	6.0
Primary	2.6	2.6	2.6	2.6	2.8	2.8	5.1	5.1	5.2	5.3	5.6	5.7
Secondary	2.3	2.2	2.1	2.4	2.4	2.4	6.2	6.0	6.0	6.1	6.3	6.4
Academy	3.0	2.3	2.4	2.8	2.8	2.8	7.2	6.2	6.0	6.1	6.2	6.3
Non-academy	2.6	2.6	2.6	2.6	2.8	2.8	5.4	5.4	5.4	5.5	5.8	5.8
Inner London	2.7	2.8	2.8	2.9	3.2	3.1	7.1	6.9	7.0	7.2	7.5	7.4
Outer London	2.1	2.1	2.2	2.2	2.3	2.3	5.9	5.8	6.0	6.0	6.2	6.3
Fringe London	2.2	2.1	2.1	2.2	2.2	2.3	5.7	5.5	5.6	5.7	5.8	6.0
Rest of England	2.3	2.3	2.3	2.4	2.6	2.6	5.5	5.4	5.4	5.5	5.7	5.8
Main pay range	2.5	2.5	2.5	2.5	2.8	2.8	3.5	3.4	3.5	3.7	4.1	4.1
Upper pay range	2.2	2.1	2.2	2.2	2.5	2.4	2.1	1.9	1.9	2.1	2.3	2.3
At top of pay range	2.7	2.5	2.6	2.9	3.8	3.5	3.1	2.9	2.9	3.0	3.1	2.7
Below top of pay range	3.0	3.0	3.0	3.0	3.1	3.0	4.9	4.9	5.0	5.0	5.0	4.9
Male	4.8	4.9	4.9	4.9	5.0	5.1	5.8	5.7	5.6	5.7	5.9	5.9
Female	2.7	2.6	2.6	2.7	2.9	2.9	5.5	5.4	5.4	5.5	5.8	5.9
White	2.7	2.7	2.7	2.8	2.9	3.0	5.6	5.4	5.4	5.5	5.8	5.8
Black	5.7	5.5	5.5	5.7	5.8	5.9	5.1	5.0	5.1	5.3	5.5	5.6

	Within-school variation						Between-school variation					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
Asian	5.3	5.3	5.2	5.4	5.7	5.7	5.1	4.9	5.0	5.1	5.4	5.5
Maths	3.1	3.1	3.1	3.3	3.5	3.5	5.9	5.7	5.9	6.0	6.2	6.4
English	3.2	3.0	3.0	3.2	3.4	3.4	5.8	5.6	5.7	5.9	6.2	6.3
Physics	4.5	4.8	4.7	5.0	4.9	5.3	4.0	4.1	3.7	3.9	4.1	3.8
Science	3.0	2.9	2.9	3.1	3.2	3.2	5.7	5.5	5.6	5.7	5.9	6.0
PE	3.2	3.1	3.0	3.3	3.4	3.6	5.4	5.1	5.0	5.0	5.3	5.3
MFL	3.7	3.6	3.6	3.8	4.1	4.0	5.0	5.0	5.1	5.3	5.4	5.5

Note: Figures based on final analysis sample described in Appendix 2, for teachers only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years are more schools convert to academy status.

Subject refers to secondary school teachers only. Not all ethnic groups or secondary subjects have been included in the table.

Source: Longitudinal SWC.

3.2.4. Summary

This section has shown that there have been some changes in the variation of teachers' and leaders' pay across time, but these are minimal (in the case of teachers) and not clearly related to the timing of the reforms (for leaders). In addition, there are no large systematic changes in the within- and between-school variances, which would indicate changes in schools' individual pay decisions within-school or differences in pay policies adopted across schools. However, the data currently available are informative for only two years' of pay awards after the reforms for teachers and one year after the reforms for leaders. These findings are also limited by the impact of changes in the composition of teachers and leaders across the workforce. For example, moving to a less experienced teacher workforce changes both the observed level and variation of pay. The following section therefore considers whether there have been changes in the level and variation of individual teachers' annual change in nominal pay as a result of the reform.

4. Level and variation of teachers' annual change in nominal pay in England

This section considers the size and variation in the year-to-year change in gross annual base pay of teachers and leaders in England from 2010-to-2011 to 2014-to-2015. "2010-to-2011" refers to the year-to-year change in gross annual base pay between the academic year 2010/2011 (measured in the SWC November 2010 census) and the academic year 2011/2012 (measured in the SWC November 2011). Prior to the reforms, pay was a function of spine points and the STRB pay recommendations. Post the reforms, there were no official spine points and pay awards should depend on performance. Therefore, one would expect more diversion in annual changes in wages after the reform. It is important to note that the first two years in the tables (2010-to-2011 and 2011-to-2012) were affected by the public sector pay freeze, which changes the interpretation of schools' pay awards significantly. The first year where year-to-year changes in gross annual base pay would be affected by the reforms is "2013-to-2014", as the first pay determination under the new PRP would be observed in the November 2014 SWC.

4.1. Teachers' change in nominal pay

4.1.1. Main pay range

Table 8 presents the proportion of teachers on the main pay range receiving growth in base pay by percentile band across each academic year from 2010-to-2011 to 2014-to-2015. Each column will sum to 100%, although note that the percent in each band has been rounded to one decimal place. The first two columns show that around 20% of teachers on the main pay range had no growth in base pay, all else being equal. This is in contrast to 2014-to-2015, when only 10% of teachers on the main pay range have no annual growth in base pay. Again it should be noted that the SWC may not record all relevant school pay decisions. This is because under the most pessimistic assumption around 32% of classroom teachers in post for at least one year had not yet received their pay award decision by the census date in 2015.

Despite the pay freeze, not all teachers experience zero growth in wages, as teachers who moved up a spine point would still receive a pay increase. This is reflected in the high proportion of teachers experiencing specific jumps in pay. These can be seen at 7-8% growth, accounting for about 50% of teachers on the main pay range and 16-17% growth, representing 5% of teachers on the main pay range. These specific jumps in pay are highlighted in Table 8 in light blue, with the most common being growth of around 7-8%, consistent with the typical growth between reference spine points over the pay regions.

The same pattern in the spikes in the growth of teacher pay can also be seen in 2012-to-2013, but at a 1 percentage point higher growth in accordance with the STRB recommendation of a 1% pay increase. For example in 2011-to-2012, 50% of teachers on the main pay range experienced a pay rise of 7-8%, and in 2012-to-2013, 47% of teachers on the main pay range experienced an 8-9% increase. In this year, there was an increase in the percentage of teachers with a 1-2% pay increase, which coincides with the change in STRB recommendations for annual increases in nominal pay.

In all the subsequent years, the same pattern in the growth of teacher pay growth remains, but to a lesser extent. For example, the proportion experiencing the 8-9% increase reduces from 47% in 2011-to-2012, to 22% in 2014-to-2015. There is also more spread around this reference level of growth, with 25% of teachers in the adjacent four categories, compared to 18% in 2011-to-2012. This is indicative evidence that in November 2015, schools' annual pay awards were in line with these (now reference) spine points, supporting the statement by the NAHT to the STRB that its members have 'largely chosen to continue to use the existing pay scales and points that existed in STPCD 2013' (NAHT 2015). However, the increase in variation around these reference spine points suggests that at least some schools have moved away from these reference points.

The proportion of teachers receiving 1-2% growth declines slightly from 2012-to-2013 to 2014-to-2015, from 16% to 14%. This is in line with changes in the STRB recommendations that the 1% inflation increase was applicable only those at the minimum and maximum of the pay range from 2014 onwards.

Table 8 Teachers' annual change in nominal pay (full-time equivalent base pay) in England between years, for teachers on the main pay range below the top of the pay range

	2010-2011	2011- 2012	2012- 2013	2013- 2014	2014- 2015
Less than 0%	1.0	0.5	3.3	5.3	1.7
0%	19.3	20.4	0.4	11.0	10.8
0-1%	0.2	0.2	1.6	4.8	2.4
1-2%	0.1	0.0	15.8	22.0	14.4
2-3%	0.1	0.0	0.2	0.9	4.0
3-4%	0.1	0.1	0.1	0.3	1.8
4-5%	0.1	0.0	0.1	0.9	0.8
5-6%	3.2	3.2	0.8	0.7	0.8
6-7%	3.4	3.4	3.6	3.5	2.8
7-8%	50.1	50.3	4.0	6.9	7.3
8-9%	11.4	11.6	47.2	24.3	21.8
9-10%	0.1	0.1	10.6	6.1	8.7
10-11%	0.3	0.3	0.2	0.6	5.9
11-12%	0.1	0.0	0.4	0.5	1.5
12-13%	0.4	0.3	0.1	0.4	0.6
13-14%	0.2	0.1	0.6	0.6	0.7
14-15%	0.0	0.0	0.2	0.3	0.4
15-16%	1.0	0.9	0.1	0.6	0.5
16-17%	5.7	5.4	1.1	1.6	2.2
17-18%	0.0	0.0	4.6	3.0	3.6
18-19%	0.0	0.0	0.7	0.7	2.3
19-20%	0.1	0.1	0.1	0.2	0.8
More than 20%	3.2	2.8	4.1	4.9	4.2

Note: Figures based on final analysis sample described in Appendix 2, for teachers below the top of (but on) the main pay range only, with “all else equal” across adjacent years. The dashed line shows the first year of the reform. The dotted line shows the first year annual change in nominal pay would be affected by the reform.

Source: Longitudinal SWC.

4.1.2. Upper pay range

Table 9 presents the equivalent figures for teachers on the upper pay range. Here, the relevant reference level of growth in nominal pay is around 3-4%. As for teachers on the main pay range, there is a reduction in the proportion of teachers receiving a pay award in line with this reference growth and increasing variation around this point. Teachers on the upper pay range appear to have been particularly affected by the change in STRB recommendations, with 60% of teachers on this pay range receiving an annual increase in base pay of between 1-2% in the year following the change.

Overall, Table 8 and Table 9 suggest that the pay reforms have affected the annual change in nominal base pay for teachers, all else being equal. When base pay is increased, the increase is still largely in line with the pre-defined reference level (spine point), but there is evidence that at least some schools are diverging from these reference levels and differentiating pay awards.

Table 9 Teachers' annual change in nominal pay (full-time equivalent base pay) in England between years, for teachers on the upper pay range below the top of the pay range

	2010-2011	2011- 2012	2012- 2013	2013- 2014	2014- 2015
Less than 0%	3.7	2.0	5.6	6.8	2.6
0%	65.9	70.5	0.4	14.4	15.9
0-1%	1.1	1.1	6.5	12.0	5.1
1-2%	0.1	0.1	60.3	38.3	39.9
2-3%	0.2	0.1	0.3	3.1	14.4
3-4%	27.1	24.1	0.6	4.0	5.2
4-5%	0.9	0.9	22.4	17.6	12.2
5-6%	0.0	0.0	1.0	1.1	2.5
6-7%	0.0	0.0	0.1	0.3	0.6
7-8%	0.5	0.6	0.2	0.2	0.2
8-9%	0.0	0.0	1.4	0.7	0.4
9-10%	0.0	0.0	0.1	0.1	0.1
10-15%	0.0	0.1	0.3	0.3	0.2
15-20%	0.0	0.1	0.2	0.2	0.1
More than 20%	0.2	0.2	0.7	0.8	0.5

Note: Figures based on final analysis sample described in Appendix 2, for teachers below the top of (but on) the upper pay range only, with “all else equal” across adjacent years. The dashed line shows the first year of the reform. The dotted line shows the first year annual change in nominal pay would be affected by the reform.

4.2. Teachers' change in nominal base pay (where increasing)

Expanding on these findings, Table 10 presents summary statistics for the size of the increases in base pay over the five year period for those that experienced some growth. The top row of Table 10 reports the proportion of teachers receiving a nominal pay increase, which are first reported in Table 8 and Table 9. The remaining rows report summary statistics for those who have experienced at least some growth. For example, the mean increase in nominal pay between 2010 and 2011 for those (56.8% of the full sample) that received at least a positive increase in nominal base pay was 8.1%. For these individuals, the mean increase in growth during the pay restraint (and pre-reform) years (2010-to-2011, 2011-to-2012) was around 8%. This is similar to the median level of growth for both periods. The 5th percentile is 2.5%, suggesting that teachers either received zero or a relatively large annual increases in base pay in the pre-reform, public pay restraint, period.

Table 10 Teachers' annual change in nominal pay (below the top of the pay range) in England between years: % with some increase in nominal pay and summary statistics for those with increase in nominal pay

	2010-2011	2011-2012	2012-2013	2013-2014	2014- 2015
% increase in nominal pay	56.8	54.5	95.2	81.4	84.7
For those with some increase in nominal pay:					
Mean (%)	8.1	8.0	6.0	5.8	6.0
Standard deviation (%)	6.4	5.9	7.3	8.0	7.5
5th percentile (%)	3.7	3.7	1.0	1.0	1.0
25th percentile (%)	5.2	6	1.0	1.0	1.0
50th percentile (%)	7.9	7.9	4.7	3.7	3.9
75th percentile (%)	7.9	7.9	9.0	8.8	9.0
95th percentile (%)	16.6	16.6	17.5	17.6	17.7

Note: Figures based on final analysis sample described in Appendix 2, for teachers below the top of their pay range only, with "all else equal" across adjacent years. The dashed line shows the first year of the reform. The dotted line shows the first year annual change in nominal pay would be affected by the reform.

Source: Longitudinal SWC.

The distribution of annual increases in base pay changes significantly after the change in STRB recommendations for 2013. For the 2012-to-2013, period the majority of teachers that receive some growth receive an annual increase of 1% - the

recommended level by the STRB. This has the effect of decreasing the mean level from 2012-to-2013 onwards, as the majority of teachers received this smaller increase in base pay (rather than zero and so are included in this sample). This is also reflected in the smaller standard deviation in the increase in wages (for those with a positive increase in pay), and that the lower median pay growth, which in 2012-to-2013 and 2013-to-2014 was 1%, compared to 7.9% in previous years.

4.3. “Expected” increases in nominal base pay

Table 10 highlights the need for caution when interpreting changes in the mean and standard deviation of the growth in base pay across years for the whole sample, which is affected significantly by the proportion of teachers with zero growth, and those directly affected by STRB recommendations with annual growth of 1%. To address this, Table 11 compares the proportion of teachers that receive a level of increase in nominal pay that is approximately consistent with growth between the spine points previously used before the pay reform, and equivalent reference spine points now used by some schools. The “expected” or greater increase in base pay in Table 11, therefore, shows the proportion of teachers currently below the top of their pay range, that receive an annual increase in pay at least equal to the increase between their current reference spine point and next reference spine point.¹¹ This definition is used rather than one based on a fixed percentage increase, as the growth between different reference spine points and across the pay regions varies.

The overall proportion is also affected by the proportion of teachers on the upper pay range, where progression between reference spine points was more typical every two years than annually before the reform. To illustrate these points, in 2011-to-2012, 69% of those on the main pay range received the “expected” level of growth, compared to 25% of those on the upper pay range.

4.3.1. Changes over time

The reforms have coincided with a decline in the percentage receiving the expected increase in nominal base pay across years, across the sample of teachers as a whole, falling from 54% between 2011 and 2012 to 47% between 2014 and 2015. This decline is most notable for those on the main pay range - 74% between 2011 and 2012, compared to 46% between 2013 and 2014, and 58% between 2014 and 2015. This suggests that some schools have adopted flexible annual pay awards, at least in the proportion of schools awarding annual nominal pay increases in line with

¹¹ This, and the following tables in this section, use those below the top of the pay range only, as the teachers at the top of their pay range would not expect to receive “automatic” progression to the next pay range, even before the pay reform. Promotion between the main and upper pay range is considered separately in Table 17.

the reference spine points. The effect has been to generally decrease the proportion of teachers receiving the nominal pay increases associated with the spine points previously used. However, this is not universally true. For example, teachers in Inner London are more likely to receive a pay award in line with previously expected growth in nominal pay according to spine points. This could reflect changes in the composition of the teacher workforce in Inner London, for example if there are proportionally more teachers on the main pay range in Inner London over time, or the type of pay policies adopted in Inner London.

4.3.2. Changes over time by teacher type

Comparing differences across teacher types, there is a decline over time for male and female teachers. Although the level is consistently lower for female teachers over time, the reforms appears to have closed the gap in the proportion achieving at least the expected level between male and female teachers. This is also true across teachers of different subjects, where although differences remain, they have equalised over time. The absolute difference between the maximum and minimum, was 10 percentage points in 2010-to-2011, and declines 7 percentage points in 2014-to-2015. Priority subjects do not have the highest level of teachers receiving at least the expected level, which would be expected if schools were more likely to award this level of pay increase to increase retention. This may reflect differences in the composition of teachers across subjects.

Table 11 Percentage with expected or greater increase in base pay for teachers below the top of the pay range, according to spine point equivalent progression

	2010- 2011	2011- 2012	2012- 2013	2013- 2014	2014- 2015
All	53.5	48.6	48.7	38.9	46.9
Primary	49.5	45.1	45.3	39.1	46.3
Secondary	58.1	52.5	52.7	38.5	47.8
Academy	54.8	52.4	52.6	40.5	47.6
Non-academy	53.4	47.8	47.4	38.2	46.6
Inner London	48.6	45.7	45.5	42.8	53.6
Outer London	52.3	49.9	48.4	41.4	45.8
Fringe London	51.8	47.7	47.5	39.3	51.6
Rest of England	54.3	48.8	49.2	38.1	46.0
Main pay range	74.2	68.8	66.7	46.0	57.6
Upper pay range	28.6	24.7	26.1	28.1	28.2
Male	56.4	51.3	51.8	39.9	48.8
Female	52.7	47.8	47.8	38.6	46.4
White	53.2	48.3	48.4	39.3	47.0
Black	48.5	42.1	42.6	33.5	40.1
Asian	58.5	52.2	50.6	38.3	48.5
Maths	57.0	52.6	54.4	39.4	48.2
English	58.5	53.0	53.7	38.9	49.5
Physics	52.5	50.5	50.9	42.2	48.1
Science	58.8	52.6	52.4	38.5	47.6
PE	62.7	56.6	56.7	44.1	54.3
MFL	55.0	50.0	51.4	38.6	48.1

Note: Figures based on final analysis sample described in Appendix 2, for teachers below the top of their pay range only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years are more schools convert to academy status. Subject refers to secondary school teachers only. Not all ethnic groups or secondary subjects have been included in the table.

Source: Longitudinal SWC.

Differences across teachers of White British, Black and Asian ethnic groups have decreased slightly since the reform. Between 2014 and 2015, Black teachers had the lowest level of expected increase in base pay (40%), compared to 47% for White British teachers and 49% for Asian teachers. This goes against the general pattern for Inner London (where Black teachers are proportionally more likely to teach), where there has been an increase in the proportion of teachers achieving the expected level of increase in nominal pay. This disparity should therefore be explored in more detail, but unfortunately it is outside the scope of this report.

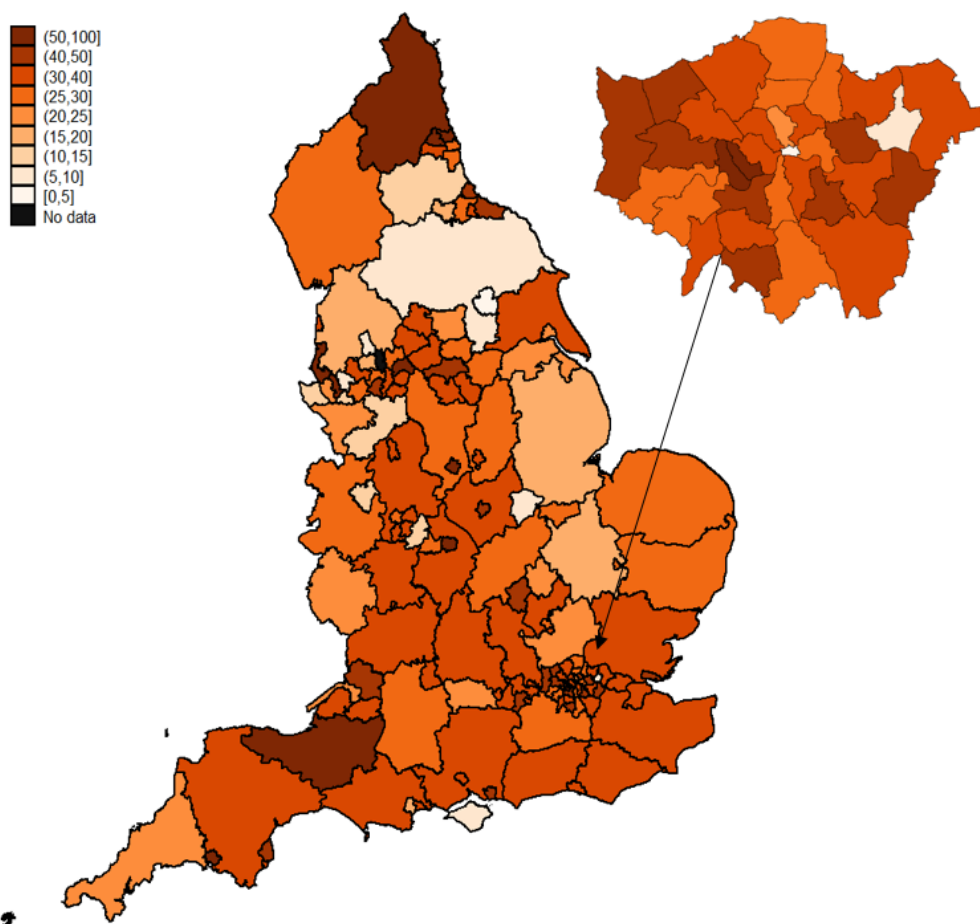
There is a general pattern across Table 11 that the proportion of teachers with an annual increase in nominal pay in line with reference spine points is lower between 2013 and 2014, than between 2014 and 2015. This could reflect schools moving towards more typical pay awards, as their pay reforms become established, or a change in the composition of teachers across these years, potentially in response to the reform. For example, poorly performing teachers who received a low level of increase in nominal pay between 2013 and 2014 may be more likely to have left the profession between 2014 and 2015.¹²

4.3.3. Variation across local authorities

The variation in the proportion with “expected” or greater increase in base pay across LAs is shown in Figure 5. As already shown in Table 11, there are typically higher proportions of teachers receiving the expected increase in base pay in London LAs (shown most clearly in the expanded inset). There are generally relatively high levels around London, and most of the South West, and generally lower levels in the East of England. There are some LAs where the proportion is especially low, and future research could usefully explore the school-level policies and LA guidance in these areas.

¹² Table 13 explores the proportion of teachers that leave or move schools between each year, finding that the proportion has increased over time. This could be due to the pay reforms or a general trend in the movement of teachers, however.

Figure 5: Percentage "expected or greater annual change in nominal pay" for those below the top of their pay range according to spine point approximation across Local Authorities in England (2013 to 2014)



Note: The legend to the graph refers to the percentage of teachers in the LA that receive “expected or greater annual change in nominal pay” between 2013 and 2014. For example, (5,10] means that more than 5% and less than (or equal to) 10% of teachers receive “expected or greater annual change in nominal pay”.

Source: Longitudinal SWC.

4.4. Within- and between-school variation in annual pay awards

A final way to consider the variance in the change of teacher pay is to again consider the variance both within and across schools. It is hypothesised that the reforms will increase the within-school variation in annual changes in pay as school leaders have the freedom to pay teachers more or less (dependant on performance) and at non-standard (away from reference spine point) amounts. It is also hypothesised that the between-school variation will increase if schools adopt different policies to recruit and retain staff, and according to their financial circumstances. Table 12 presents

summary statistics for the within- and between-school variance in the change of teacher base pay to explore these hypotheses.

In general, there is more variation in the change of pay across schools than within schools, which may in part be driven by the presence and structure of teacher pay regions, which have different growth between regional reference spine points. Within-school variation is also likely to be lower due to school-specific practices in the timing of pay decisions. For example, some schools may make all pay decisions before the November census date and other schools may make all pay decisions afterwards, which would reduce the within-school variation in pay and increase the between-school variation in pay. Unlike Table 7, which presented the within- and across-school variation in the level of base pay, and showed a minor impact of the reform, Table 12 shows the variance in the change of teacher pay appears to have been affected more markedly. Across all schools, the within-school variation and between-school variation increases across the period.

4.4.1. Within-school variation in annual pay awards

Focussing first on the within-school variation in changes in pay, primary schools typically have higher within-school variance compared to secondary schools, both before and after the reform, which is likely to be driven by the smaller school workforce in primary schools. The within-school variance in pay growth is similar for academy and non-academy schools for all years, and there is evidence of growth in within-school variation in both school groups. Schools across all teacher pay regions show a growth in the within-school variation over time. Schools in Inner London have the largest level of within-school variation, and growth since the reform.

Male teachers consistently have higher within-school variance than female teachers, and both experience an increase post-reforms. Asian and Black teachers have higher within-school variance in pay growth than White British teachers, which may be due to smaller sample sizes within schools, which artificially increases the within-school variance.

4.4.2. Between-school variation in annual pay awards

Turning to the between-school variation in pay growth across schools, there is typically an increase between the pre-reforms years and 2014-to-2015

The between-school variance for Inner London increases less than in other pay regions. This is in contrast to the change in the within-school variance over time, and suggests that schools in Inner London have responded more to the reforms - which has affected teachers' pay awards - but in a largely consistent way across schools. In other pay regions, the variation across schools has increased.

Table 12 Within- and between- school variation in teachers' annual change in nominal pay for those below the top of their pay range across years

	Within-school variation					Between-school variation				
	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
All	4.4	4.0	5.4	5.5	4.9	5.4	5.0	6.5	6.7	6.7
Primary	4.6	4.1	5.3	5.8	5.0	5.0	4.7	6.0	6.6	5.9
Secondary	3.4	3.5	5.8	4.0	4.0	5.8	5.4	7.1	6.8	7.4
Academy	4.9	3.5	6.4	5.7	5.0	7.4	5.7	7.1	6.7	7.7
Non-academy	4.4	4.0	5.3	5.5	4.9	5.3	4.9	6.3	6.7	6.0
Inner London	4.1	4.0	5.4	6.5	5.8	5.8	5.3	7.4	10.7	6.5
Outer London	3.3	3.0	4.0	4.8	4.3	4.5	4.7	6.2	6.4	6.1
Fringe London	4.3	3.5	4.6	6.0	5.0	4.9	4.5	5.8	6.6	6.5
Rest of England	4.5	4.1	5.5	5.5	4.9	5.5	5.1	6.5	6.1	6.8
Main pay range	5.5	5.1	6.3	6.8	6.3	4.9	4.6	6.0	6.8	6.3
Upper pay range	2.5	2.0	4.2	4.4	3.5	2.3	2.4	4.2	4.2	4.8
Male	5.4	5.1	6.5	6.0	5.9	5.1	4.7	6.0	5.5	5.6
Female	4.5	4.1	5.5	5.7	5.1	5.3	5.0	6.5	6.8	6.7
White	4.5	4.1	5.5	5.7	5.0	5.4	4.9	6.4	6.6	6.7
Black	6.2	6.1	8.1	7.5	6.6	4.7	4.1	5.5	5.4	4.1
Asian	5.8	5.2	7.2	7.0	6.5	4.2	4.1	5.5	5.4	4.9
Maths	4.8	4.9	7.4	5.8	5.4	5.0	4.8	6.2	5.7	5.9

	Within-school variation					Between-school variation				
English	5.1	4.6	6.8	5.7	5.6	5.4	4.6	6.3	6.0	5.8
Physics	5.4	4.9	9.7	6.0	5.9	2.8	2.8	3.9	3.2	2.8
Science	4.3	4.3	6.8	5.6	5.4	5.0	4.4	6.1	5.5	5.5
PE	5.3	5.2	7.1	6.2	5.6	4.9	4.3	5.9	5.5	5.5
MFL	5.6	5.0	7.4	6.5	5.9	3.9	4.1	5.0	5.3	4.6

Note: Figures based on final analysis sample described in Appendix 2, for teachers below the top of their pay range only, with “all else equal” across adjacent years. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years as more schools convert to academy status. Subject refers to secondary school teachers only. Not all ethnic groups or secondary subjects have been included in the table.

Source: Longitudinal SWC.

4.5. Summary

This section has shown that there have been changes in the annual pay award of teachers' over time, all else being equal (which is defined in Appendix 3.4.). This section has demonstrated that the level and variation of annual change in nominal pay between 2010-to-2011 and 2014-to-2015 have been affected by the STRB recommendations for uplifting pay and consequent changes in the STPCD, in addition to any effect of the reforms to teachers' pay. For example, the proportion of teachers receiving 1-2% growth increases from the period of pay restraint to 2012-to-2013. This then declines in subsequent years, in line with changes in the STRB recommendations that the 1% inflation increase is mandatory to only those at the minimum and maximum of the pay range, rather than all classroom teachers.

More broadly across the (now reference) spine points, there is indicative evidence that schools are still awarding annual increases in line with these, verifying the statement by the NAHT to the STRB that its members have 'largely chosen to continue to use the existing pay scales and points that existed in STPCD 2013' (NAHT 2015). However, the increase in variation around these reference spine points suggests that at least some schools have moved away from using these reference points.

The increase in variation in annual changes in nominal pay is also evident through the decline in the use of reference spine points for annual pay growth. The largest decline is for teachers on the bottom of the main pay range, where there is a drop of around 16 percentage points in the percentage of teachers who received an increase in nominal base pay in line with the previously used (now reference) spine points over the period, from 74% in 2010-to-2011 to 58% in 2014-to-2015.

Consistent with this, there is evidence that the within- and between-school variance of teachers' pay awards increased after the reform.

5. Annual mobility of teachers across schools

One prominent feature of the pay reforms was the relaxation of pay portability, meaning that schools could choose to pay teachers less than their pay at their previous school. A change in the movement of teachers across schools would be expected as a result of the reforms, if teachers choose to work in schools depending on their pay policies. The retention of teachers in state-funded schools may decrease if the pay reforms encouraged some (lower performing) teachers to leave. This section therefore presents the annual level of movement across schools and from the state sector, with a special focus on the proportion of teachers that move between state-funded schools to an equivalent post to a lower level of base pay (measured by a decrease in their reference spine point). To give context to these results, this section also shows the proportion of teachers that move between state-funded schools to an equivalent post to a lower reference spine point *and* decrease in nominal pay.

5.1. Percentage of teachers that leave their school

Table 13 shows the percentage of teachers that leave their school between the current and next academic year, either moving schools within the state-funded sector in England, or leaving the state sector in England. Note that this definition would define teachers that leave the workforce temporarily (for example for a career break due to family circumstances) as leaving the state sector between years.¹³ There is an increase over the period, for all school types and subjects. The proportion of teachers that leave their school is similar for primary and secondary schools, around 12% between 2010 and 2011 and around 18% between 2014 and 2015. Female teachers are slightly less likely to leave their school than male teachers, across all years, but the proportion increases by a similar amount for male and female teachers. It is difficult to conclude whether the increase in the proportion of teachers leaving their school is due to the pay reform, or the general trend to lower teacher retention. This is because the proportion of teachers leaving increases year on year, which suggests a general trend in mobility/retention. Other potential sub-groups of movers, for example by ethnicity or subject, are not reported, as sample sizes are too low to allow secure inference.

¹³ Note that this will be higher than the Rate of Leavers to Other Schools used by the DFE in 'Schools workforce in England 2010 to 2015' (2016) as it includes leavers from the sector. The Rate of Leavers to Other Schools is calculated by dividing the headcount of all teachers who either leave to go to a different school or become centrally employed by the total headcount of all qualified teachers. This excludes teachers who leave a school by; leaving the sector, retiring, or dying. In addition, nursery schools are excluded from the sample used in this report.

Table 13 Percentage of teachers that leave their school between the current and next academic year

	2010- 2011	2011- 2012	2012- 2013	2013- 2014	2014- 2015
All	12.0	13.5	15.3	17.5	20.0
Primary	11.6	13.6	15.3	17.5	19.7
Secondary	12.2	13.3	15.2	17.5	20.3
Main pay range	13.2	15.2	17.5	20.3	23.0
Upper pay range	9.5	10.7	12.3	14.3	16.1
Male	13.2	14.9	16.7	19.3	21.7
Female	11.6	13.0	14.8	17.0	19.5

Note: Figures based on final analysis sample described in Appendix 2, for teachers only. The dashed line shows the first year of the reform. The dotted line shows the first year pay and mobility would be affected by the reform.

Source: Longitudinal SWC.

5.2. Percentage of teachers that move schools

Table 14 shows the percentage of teachers that move school between years, to explore whether the increase shown in Table 13 is entirely due to teachers leaving the state-funded sector (between years). There is an increase in the proportion of teachers that move schools within the state-funded sector in England over the period, for all school types, almost doubling from 4.8% to 8.5% for the whole sample. This suggests that at least some of the increase in the percentage leaving their current school across years is due to an increase in the percentage of teachers moving across schools. Again, this trend is difficult to attribute to the pay reforms, as there is no specific jump coinciding with the first year of the reform.

Table 14 Percentage of teachers that move schools between the current and next academic year

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
All	4.8	6.3	7.4	8.5	8.5
Primary	5.5	7.0	8.0	9.0	8.8
Secondary	4.2	5.6	6.8	8.0	8.1
Main pay range	6.6	8.6	10.0	11.1	10.8
Upper pay range	2.9	3.9	5.0	6.2	6.3
Male	5.1	6.8	8.2	9.4	9.4
Female	4.7	6.1	7.2	8.2	8.2

Note: Figures based on final analysis sample described in Appendix 2, for teachers only. The dashed line shows the first year of the reform. The dotted line shows the first year pay and mobility would be affected by the reform.

Source: Longitudinal SWC.

5.3. Percentage of teachers that move schools to a lower reference spine point

Table 15 shows the proportion of teachers that move schools to a lower reference spine point, of those that move schools, and have all other characteristics equal across years.¹⁴ Of those that move schools and have “all else equal”, there is a large jump in the percentage that have a lower reference spine point after the reform, from 7.8% in 2012-to-2013, to 13.8% in 2013-to-2014. Although it is not possible to conclude that this increase was definitely due to the reform, it is consistent with this hypothesis. This provides some suggestion that at least some schools relaxed pay-portability, and that the pay reforms may have led to an increase in movement to a lower reference spine point. This report cannot definitively say why this is occurring, but the change could be due to a range of reasons: from teachers using this increased flexibility to move to schools that are more desirable despite having lower pay, to teachers with lower effectiveness moving to less attractive schools. The change is most notable for teachers on the upper pay range, where 18.6% of teachers that moved in 2014-to-2015 moved to an equivalent role at a lower reference spine point. Again it should be noted that this could be an artefact of the changes to how the data is collected. This might suggest that teachers on this pay range are more likely to accept a lower salary for a better school match. It is important to note that this change affects a small proportion of teachers overall, equivalent to less than 1% of all teachers.

¹⁴ This restriction on the sample is made to isolate movements across state-funded schools to a lower salary while all other characteristics of the role remain the same. “All else equal” is defined as moving to a job with the same definition of “post” and QTS status.

Table 15 Percentage of teachers that move schools to an equivalent post between the current and next academic year to a lower (now reference) spine point

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
All	4.9	3.7	7.8	17.6	13.8
Primary	3.9	3.5	7.7	18.5	15.4
Secondary	6.0	4.0	7.9	16.6	12.0
Main pay range	2.2	2.0	4.8	12.9	11.6
Upper pay range	10.8	7.4	13.7	26.7	18.6
Male	5.2	3.6	7.5	16.3	11.9
Female	4.7	3.7	7.9	18.0	14.4

Note: Figures based on final analysis sample described in Appendix 2, for teachers that move schools to an equivalent role between the current and adjacent period only. The dashed line shows the first year of the reform. The dotted line shows the first year pay and mobility would be affected by the reform.

Source: Longitudinal SWC.

Teachers that change schools and move to a lower reference spine point do not always experience a fall in nominal base pay, as reference spine points rise by 1% each academic year. Table 16 replicates Table 15 but now reports only the percentage of teachers that move schools to an equivalent post to a lower reference spine point *and* have lower nominal base pay (full-time equivalent base pay). In the pre-reforms period the proportions are very similar, meaning that moving to a lower spine point resulted in a lower base salary. Table 16 shows that after the reform, there was an increase in the proportion of teachers moving to lower nominal pay, but that this was less marked than the increase in the proportion of moves to lower (now reference) spine points (shown in Table 15). This means that with the increase in pay flexibility, a large proportion of those moving schools to a lower reference spine point will have the same or higher nominal base pay. For example, in 2013-to-2014, 16.6% of secondary teachers who moved schools moved to a lower reference spine point (all else equal), but only 8.3% of the same movers experienced a drop in nominal base pay. Similarly, for teachers in the upper pay range, 26.7% of movers in that year were classified as on a lower reference spine point in their new school, but only 14.8% experienced a fall in nominal base pay. Approximately half of movers to a lower spine point in 2013-to-2014 and 2014-to-2015 did not experience a fall in base pay, which is true regardless of gender. Table 15 and Table 16 are consistent in showing that the timing of the pay reforms, coincides with an increase in the proportion of teachers that move between state-funded schools (all else equal) receiving lower pay. The difference over time is amplified when considering movements to a lower reference spine point (Table 15), as moves to an equivalent nominal base pay (or nominal base pay less than 1% higher) would be classified as movement to a lower reference spine point.

Table 16 Percentage of teachers that move schools to an equivalent post between the current and next academic year to a lower (now reference) spine point and lower nominal base pay (full-time equivalent base pay)

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
All	4.7	3.6	5.5	8.9	7.4
Primary	3.8	3.3	5.6	9.5	8.4
Secondary	5.9	3.9	5.5	8.3	6.2
Main pay range	2.1	1.9	3.4	5.9	4.7
Upper pay range	10.6	7.1	9.7	14.8	12.5
Male	5.1	3.4	5.3	8.2	6.1
Female	4.6	3.6	5.6	9.2	7.8

Note: Figures based on final analysis sample described in Appendix 2, for teachers that move schools to an equivalent role between the current and adjacent period only. The dashed line shows the first year of the reform. The dotted line shows the first year pay and mobility would be affected by the reform.

Source: Longitudinal SWC.

5.4. Summary

This section has indicated that the pay reforms may have increased the percentage of teachers that move schools to an equivalent role but at a lower reference spine point, presumably as a result of some schools relaxing pay portability. This is partly driven by the abolishment of spine points (although reference spine points are produced by teachers' unions), as around half of the teachers that move to a lower reference spine point have the same nominal base pay as in their previous post. This suggests that schools' behaviour has changed due to the reform; there is an increase in the proportion of teachers moving to a lower nominal base pay, and an even larger increase in the proportion of teachers moving to a lower reference spine point (suggesting a movement away from the use of reference spine points). There are increases in the percentage of teachers leaving their school each year, and increases in the percentage of teachers moving between state-funded schools in England each year, but these patterns are more consistent with a general time trend than effect of the reform.

6. Annual progression from main to upper pay range

This final section explores the change in rate of progression from main to upper pay range since the reform, which it is hypothesised would change as a result of the change in requirements for the threshold test.

Table 17 shows that across the sample as a whole, there is a roughly constant percentage of teachers from the main pay range progressing to upper pay range, although there is some variation across years, with a higher proportion in 2013-to-2014.

This pattern is also true for primary and secondary schools, where the proportion is higher in 2013-to-2014, but the level remains higher in secondary than primary schools throughout the period. The difference in rates of progression across primary and secondary teachers could reflect more flexibility in secondary schools' budgets, allowing a higher proportion of teachers to be on the upper pay range, or alternatively a higher churn of teachers on the upper pay range in secondary schools, as proportionally more become school leaders each year.

Teachers in academy schools are less likely than teachers in non-academy schools to progress from the main to upper pay range at the start of the period, but more likely at the end of the period, particularly in 2013-to-2014. The rest of England has a slightly higher rate of progression compared to London pay regions, and this difference has been constant over time (the exception being Fringe London becoming more similar to the rest of England).

As expected, those at the top of the main pay range are more likely to receive progression to the upper pay range than those below the top, although those below the top have the largest growth in progression across the period (2.7% to 7.8%). This possibly reflects more flexibility in teachers' pay in progression as a result of the reform, as teachers are less rigidly paid according to typical reference spine point and pay range progression.

There are few differences across teachers with different characteristics. For example, male, female, White British, Black and Asian teachers have similar rates of progression from the main to upper pay range across all years. The reforms do not therefore seem to have disproportionately affected one demographic group of teachers more than another. There are some differences between teachers of different subjects, where the rate of progression from main to upper pay range is typically lowest for maths and science teachers. These differences across subjects could be due to differences in the proportion of teachers at the top of the pay range, but the precise mechanism through which the reforms would affect progression for different subjects is unclear.

Table 17 Annual progression from main to upper pay range

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
All	12.9	11.9	12.0	13.4	12.6
Primary	11.5	10.4	10.1	11.7	10.6
Secondary	14.5	13.7	14.3	15.8	15.4
Academy	12.1	12.7	13.6	14.2	13.6
Non-academy	12.9	11.7	11.4	13.1	12.0
Inner London	10.5	11.0	10.9	12.6	11.2
Outer London	10.9	11.2	11.0	12.0	11.1
Fringe London	11.6	10.5	9.4	11.6	13.2
Rest of England	13.5	12.2	12.5	13.9	12.9
At top of pay range	35.5	33.1	31.8	32.5	33.2
Below top of pay range	2.7	2.5	3.3	6.1	7.8
Male	13.6	12.7	13.0	13.0	13.1
Female	12.7	11.6	11.7	13.6	12.4
White	13.0	12.0	12.1	13.7	12.7
Black	12.6	12.7	13.4	13.6	12.8
Asian	11.8	11.7	11.6	12.2	12.3
Maths	13.6	11.8	12.4	13.6	13.7
English	14.3	12.9	13.6	15.9	14.5
Physics	15.7	13.8	16.5	19.4	15.3
Science	13.2	12.8	12.8	14.2	13.6
PE	14.4	14.9	17.4	19.4	17.9
MFL	15.8	13.6	13.2	15.3	12.2

Note: Figures based on final analysis sample described in Appendix 2, for teachers below the top of their pay range only. The dashed line shows the first year of the reform. The dotted line shows the first year pay would be affected by the reform. The sample of academy schools changes over years as more schools convert to academy status. Subject refers to secondary school teachers only. Not all ethnic groups or secondary subjects have been included in the table.

Source: Longitudinal SWC.

7. Conclusion

PRP was introduced in England, citing research showing that teacher effectiveness is a key determinant of pupil progress, particularly for disadvantaged pupils, and that teacher quality can be improved where appraisal systems provide effective incentives to teachers (DfE, 2012). The first necessary step for teacher effectiveness to increase as a result of these reforms, is for schools to use their new powers to introduce meaningful PRP. Assuming that there is variation in teacher quality within and across schools, this would be reflected in increased variation in teachers' pay, and/or more effective teachers remaining in the sector following the reform.

This report demonstrates that the variation in teachers' annual pay awards since the reforms (up to November 2015) has increased, although not universally. Across all schools, it is clear that the majority still award annual pay increases (where given) in line with the reference spine points that defined teachers' pay before the reform. However, there is evidence of increasing dispersion around these reference levels of pay growth, which suggests increasing pay flexibility in at least some schools. There is variation in the use of reference spine points across the country. Some LAs have around 60% of teachers with annual pay awards consistent with movement up the reference spine points, compared to other LAs with less than 10%. This is consistent with schools in some areas still largely referring to the reference spine points produced by teachers' unions to determine teachers' pay awards, with schools in other areas moving away from this (as recommended by the STRB). The reason for these differences, such as existence of template pay policy documents in these LAs, could be explored in future research. Flexibility in pay and annual pay awards is also evident through an increasing percentage of teachers progressing to the upper pay range from below the top of the main pay range. There is an emerging pattern of increasing variation in annual pay awards within and across schools.

These increases in the variation of teachers' pay awards occur despite the average level of teachers' pay increasing only marginally across the period of interest (and indeed declining slightly in real terms). As the variation in pay growth has increased, this suggests that some teachers are experiencing lower levels of nominal pay increases than before the reform, while others are experiencing higher levels of nominal pay increases.

Another aspect of the reforms meant that schools were no longer required to match a teacher's previous salary as a teacher when employing them. There is evidence consistent with 'pay portability' being removed by at least some schools from observing the movement of teachers across schools. The proportion of teachers that move schools to a lower salary increases after the reform, from under 6% of teachers moving to an equivalent role in 2012-to-2013 to around 15% in 2013-to-2014, but this still affects only a small proportion of teachers. Around half of this increase is due to movements to the same (or slightly higher) nominal base pay, but where the reference spine point has

increased by more. For movement across schools in general, and leaving the state-funded sector in England, there are increases over time that are indistinguishable from general time trends. This makes it difficult to conclude whether or not the reforms have affected the size and composition of the teacher workforce.

The introduction of PRP for teachers was accompanied by concerns that the pay awards and progression between the main and upper pay range for female teachers relative to male teachers, and ethnic minority teachers relative to White British teachers would be unfairly disadvantaged. Are these equity concerns justified? This report has documented the patterns in the level and variation of teachers' pay and the level and variation in annual pay awards for these subgroups of teachers throughout. From these statistics, there is little evidence that particular groups have been disadvantaged as a result of the reforms to teachers' pay in aggregate. However, more in-depth research, which would take account of the distribution of teachers across teacher pay regions and school types, would be required to state this conclusively.

The longitudinal SWC has provided the opportunity to study teachers' and leaders' pay and annual changes in nominal pay between 2010 and 2015, using a sample of most primary and secondary schools in England. The analysis presented in this report therefore provides representative and comprehensive information to policy makers about the impact of the reforms to date, and potential areas to explore in future.

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Appendix

1. Introduction to Appendix

The longitudinal SWC is created internally by the DfE by linking teachers and leaders across waves of the annual SWC. Unlike the annual SWC, each record is a de-identified individual rather than role, so that each record contains information about all roles held. This appendix contains information about the steps taken to derive a final analysis dataset from the dataset received from the DfE.

2. Sample selection and summary statistics

The coding of base pay and growth variables to require 'all else equal' already implies some implicit selection to the final analysis sample. For example, those with exceptionally large or small values of base pay are excluded. Additional sample restrictions are:

- Include only schools classified as primary and secondary schools
- Exclude special schools, LA nursery schools, pupil referral units, studio schools and university technical colleges.
- Include only schools with more than 50% of (recoded) base pay observed.
- Include individuals aged 22 and above and 62 and below. These values correspond to the 1st and 99th percentile of the age distribution for teachers and leaders.
- Include individuals who work at least five hours per week and at least five weeks per year.

The impact of these sample restrictions on the final sample used for analysis is given in Table 18 below. Summary statistics for the final sample are presented in Table 19 and Table 20 below.

3. Data cleaning

This section describes in detail the steps taken to create the final SWC dataset used for analysis. The main steps required are described in turn below. These are:

1. Creating consistent school identifiers over time
2. Cleaning base pay
3. Cleaning additional pay
4. Defining teachers and leaders with "all else equal" between one year and the next

Full syntax in Stata 'do' file format is available from the authors on request.

Table 18 The impact of sample restrictions on the number of individuals and schools used in analysis

Sample restriction	N schools	N teachers*years	N leaders*years
None	20,115	2,529,811	393,298
Non-missing base pay	20,114	2,500,771	391,296
Non-missing adjusted base pay	20,114	2,486,700	388,616
Primary and secondary schools only	18,637	2,283,148	343,630
Exclude special schools, LA nursery schools, pupil referral units, studio schools and university technical colleges	18,637	2,281,193	343,153
Include only schools with more than 50% of (adjusted) base pay observed	18,491	2,263,782	340,735
Include individuals aged 22 and above and 62 and below	18,491	2,235,920	337,780
Include individuals who work at least 5 hours per week and at least 5 weeks per year	18,491	2,220,461	337,035

Table 19 Number of teachers across school and teacher types

	2010	2011	2012	2013	2014	2015
Total	364,182	363,188	371,640	372,096	376,030	373,325
Primary	175,130	177,310	183,319	186,670	192,107	193,982
Secondary	189,052	185,878	188,321	185,426	183,923	179,343
Academy	15,288	68,060	105,655	125,585	140,326	149,347
Non-Academy	348,894	295,128	265,985	246,511	235,704	223,978
Inner London	27,918	27,752	28,409	29,176	30,283	30,215
Outer London	27,758	27,729	28,590	28,672	28,770	28,488
Fringe London	25,552	25,914	26,548	26,601	26,710	26,805
Rest of England	282,954	281,793	288,093	287,647	290,267	287,817
Main pay range (MPR)	157,930	155,595	161,037	165,463	171,554	170,499
Upper pay range (UPR)	189,521	191,382	194,768	191,689	186,558	182,857
Top of MPR	49,065	48,040	49,421	44,826	29,356	15,099
Middle of MPR	84,843	84,077	84,164	88,172	91,463	106,596
Bottom of MPR	23,008	22,490	26,294	27,137	31,102	29,901
Top of UPR	100,755	99,787	101,401	92,956	63,093	67,249
Middle of UPR	39,939	40,175	40,948	41,973	52,842	51,958
Bottom of UPR	47,466	50,641	51,657	50,386	48,898	44,586
Male	86,961	85,954	87,364	86,705	86,911	86,209
Female	277,049	276,882	283,908	285,196	288,917	286,961
White British	310,573	308,521	314,149	311,832	312,233	305,190
Black	7,009	6,776	6,879	6,914	7,051	7,230
Asian	12,123	12,305	13,010	13,520	14,278	14,769

	2010	2011	2012	2013	2014	2015
Maths majority subject	15,747	17,134	18,148	18,461	18,708	18,837
English majority subject	17,164	18,602	19,638	20,028	20,288	20,069
Physics majority subject	965	1,127	1,220	1,336	1,386	1,338
Science majority subject	11,704	12,456	12,810	12,649	12,621	12,040
PE majority subject	19,342	20,920	21,806	21,921	21,850	21,409
MFL majority subject	9,429	10,264	10,708	10,701	10,499	10,189
Primary: Academy	313	3,946	11,126	20,197	28,662	35,303
Primary: Non-Academy	174,817	173,364	172,193	166,473	163,445	158,679
Primary: Top of MPR	27,795	27,882	29,037	27,133	17,992	9,524
Primary: Middle of MPR	43,169	43,395	43,913	47,545	52,236	64,149
Primary: Bottom of MPR	12,363	12,313	15,289	16,791	19,096	18,688
Primary: Top of UPR	38,573	38,781	39,102	35,437	24,466	25,291
Primary: Middle of UPR	21,403	21,443	21,618	21,064	22,601	22,849
Primary: Bottom of UPR	25,906	27,574	28,363	28,280	26,747	24,860
Inner London: White British	15,567	15,633	15,998	16,492	16,955	16,236
Inner London: Black	2,931	2,853	2,845	2,841	2,913	2,983
Inner London: Asian	2,774	2,808	2,886	3,112	3,221	3,301
Outer London: White British	19,205	19,059	19,537	19,200	18,675	18,076
Outer London: Black	1,438	1,416	1,453	1,501	1,566	1,643
Outer London: Asian	2,201	2,216	2,352	2,492	2,717	2,817

Table 20 Number of leaders across school and teacher types

	2010	2011	2012	2013	2014	2015
Total	53,645	53,532	55,008	56,311	58,768	59,771
Primary	34,592	34,914	35,718	36,711	38,237	39,381
Secondary	19,053	18,618	19,290	19,600	20,531	20,390
Academy	1,766	6,902	11,570	14,907	18,094	20,370
Non-Academy	51,879	46,630	43,438	41,404	40,674	39,401
Inner London	4,043	4,096	4,247	4,493	4,804	5,059
Outer London	3,520	3,527	3,655	3,874	4,184	4,286
Fringe London	3,478	3,482	3,585	3,701	3,872	4,040
Rest of England	42,604	42,427	43,521	44,243	45,908	46,386
Male	18,415	18,055	18,421	18,547	18,991	18,969
Female	35,219	35,445	36,559	37,749	39,742	40,793
White British	48,876	48,733	49,812	50,515	52,342	52,583
Black	582	617	639	692	740	762
Asian	811	882	951	1,044	1,170	1,274
Primary: Academy	59	726	2,084	3,889	5,689	7,353
Primary: Non-Academy	34,533	34,188	33,634	32,822	32,548	32,028
Inner London: White British	2,767	2,849	2,876	3,060	3,272	3,352
Inner London: Black	331	328	350	363	380	402
Inner London: Asian	208	226	243	268	283	322
Outer London: White British	2,885	2,843	2,951	3,085	3,238	3,268
Outer London: Black	93	104	100	120	148	157
Outer London: Asian	137	146	159	163	202	228

3.1. Creating consistent school identifiers over time

School identifiers can change over time, most commonly if a school changes status from LA-maintained to not LA-maintained (academy). This causes problems for the analysis, where one question of interest is whether the reforms led to changes in the mobility of teachers and leaders across schools. A “stable” identifier is therefore created, which in practice is the most recently recorded unique reference number (URN) in the linked data available through Edubase (accessed on 11/01/2016). This linked data records all known cases of “parent” and “child” schools, where the parent is typically the LA maintained school and child is typically the not LA-maintained school. Wherever a “child” is identified in the longitudinal SWC data the school identifier is replaced with the “parent”, which leads to a stable identifier across the period.

3.2. Cleaning full-time equivalent nominal base pay

Full-time equivalent nominal base pay (referred to as base pay in this section) is observed for the majority of teachers and leaders in the longitudinal SWC. At the school level, 90% of schools have complete records of base pay for all teachers and leaders, rising to 96% once teachers and leaders paid a daily rate rather than base pay are excluded. There are problems observed with base pay where it is recorded, however. A number of steps have been taken to correct for clear cases of miscoding or mis-entry of base pay information. In turn, these steps are:

- Replace base pay with base pay/10 if the original value is large (above £70,000 for teachers and £120,000 for leaders) and the recoded variable is in line with adjacent values of base pay (within 18%)¹⁵.
- Replace base pay with missing if base pay is large (defined as above) and the original and recoded value (when divided by 10) is out of line with adjacent values (more than 18% difference).
- Replace base pay with missing if there are exceptionally large values, even if consistent with adjacent values. Exceptionally large values are defined as £250,000 for leaders and £115,000 for teachers.
- Replace base pay with missing where the hourly pay is equivalent to less than £7 per hour, which is less than the hourly rate for unqualified teachers in England.
- Replace base pay with missing where the hours worked per week are less than 0.33 hours per week.

¹⁵ These cut-offs are based on the maximum growth across two spine points (around 18%) and the maximum pay range for teachers and leaders in maintained schools, which were £65,978 in 2015/16 for leading practitioners (teachers) and £114,437 in 2015/16 for head teachers.

3.3. Cleaning additional pay

Total additional pay is created from summing four components of additional pay: SEN allowances, recruitment and retention allowances, teaching and learning responsibilities, and other. All components are adjusted to be full-time equivalent. For example the additional payment for a teacher working 0.5 full-time equivalent and in receipt of an additional payment of £1,000 would be £2,000. Note that General Teaching Council for England (GTC) additional payments are not included for any years, as these payments are not relevant after 2012. As for full-time equivalent nominal base pay, decisions are taken to remove observations that are likely to be miscoded in the original longitudinal SWC. Each component of total additional pay is recoded to missing if the value recorded in the SWC is larger than the maximum defined in the School Teachers' Pay and Conditions Document (2015), and the individual has no other "high" value of additional pay in any other year. The annual limits for a classroom teacher are between £7,546 and £12,770 for TLR1 allowances, £2,613 and £6,386 for TLR2 allowances, £517 and £2,577 for TLR3 allowances and £2,064 and £4,075 for SEN allowances. TLR payments are therefore recoded to missing if the value is greater than £16,000 and there is no other recorded value above £10,000. SEN payments are therefore recorded to missing if the value is greater than £5,000 and there is no other recorded value above £3,500. There are no such limits for the other components of total additional pay.

3.4. Defining teachers and leaders with "all else equal" between years

To consider the changes in teacher and leader pay across years, and classify observations as an outlier or otherwise, it is necessary to create an indicator of whether everything else is equal for the teacher/leader over the adjacent period. An individual is defined as "all else equal" across two periods if:

- The staff matching reference numbers are identical
- There is a difference in one between SWC census years. This means that individuals that have left and re-entered the state education sector are excluded from the analysis.
- The school of employment is identical
- Qualified Teacher Status (QTS) is unchanged
- Post recorded is unchanged

3.5. Definitions for key variables

Definition of reference spine point and following definitions:

- Spine point is not recorded in the longitudinal SWC, despite being in operation up to 2012, and provided for reference in the 2013 STRB report. Reference spine points are still produced by teaching unions, however, which extrapolate from STRB guidelines for the minimum and maximum of the pay ranges to provide annual reference points within pay ranges.
- Estimated spine point is created in the SWC by coding the minimum and maximum of each spine point (or reference spine point) and placing the observation in the spine point where base pay falls.
- Note that this is done according to a FTE equivalent version of base pay, as throughout the report.
- Those classified as at the “top” of the pay range have base pay that falls within the penultimate and ultimate values of the spine point for that pay range. Similarly, those classified as at the “bottom” of the pay range have base pay that falls within the lowest and second lowest spine point values.
- Whether the individual receives the “expected level of increase in nominal base pay” across adjacent periods is therefore defined according to the starting spine point and spine point in the adjacent period. This accounts for differences in growth between spine points in different parts of the pay ranges, across years, and across teacher pay regions.

Definition of changes in school across years:

- Coded as changing school if the consistent school identifier across adjacent time periods is different and staff matching reference number is the same.
- Coded as changing schools or leaving the state education system if the consistent school identifier across adjacent time periods is different and staff matching reference number is the same (as above) OR the staff member is not observed in any other school in the adjacent year.
- Coded as changing schools to a lower reference spine point if the staff member is observed to change schools (defined as above) AND has a lower recorded reference spine point in the adjacent period in the new school.
- Coded as changing schools to a lower reference spine point and lower nominal base pay if the staff member is observed to change schools (defined as above) AND has a lower recorded reference spine point in the adjacent period in the new school (as defined above) AND has a lower recorded nominal base pay in the new school.

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Reference: DFE-RR676

ISBN: 978-1-78105-739-1

This research was commissioned under the 2010 to 2015 Conservative and Liberal Democrat coalition government. As a result the content may not reflect current Government policy. The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education.

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