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Report

What teachers do next after leaving and the implications for pay-setting

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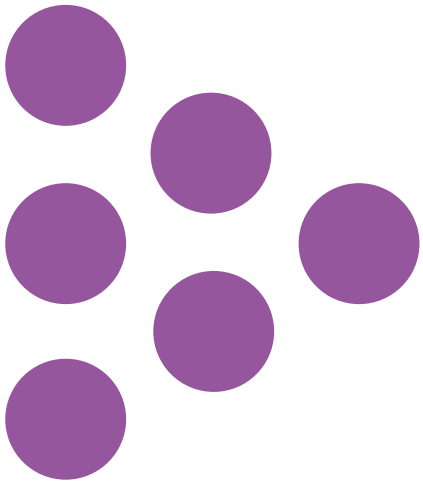

What teachers do next after leaving and the implications for pay-setting

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Executive Summary

Key research findings

- Only two per cent of teachers who left teaching switched to a different professional or managerial career
- More than two-thirds (72 per cent) of teachers who left for another job remained working in the wider education and childcare sector after leaving
- Teachers who left teaching for another job tended to earn more than when they were a teacher, but less than otherwise similar teachers who stayed in teaching
- Earnings after leaving teaching tended to differ across gender, phase and experience. Relative to similar teachers who stayed in teaching, female, primary and experienced teachers who left teaching tended to earn less than male, secondary and inexperienced teachers who left.
- Teacher pay appears to have become relatively less competitive compared to outside options over the last decade, particularly for early-career teachers

Policy implications

- Teacher supply challenges have been considerably eased in the short term due to the economic recession induced by the Covid-19 pandemic. However, there is a strong argument for at least maintaining the competitiveness of teacher pay, if not increasing it, in order to stave off future teacher supply challenges.
- The particular deterioration in the relative competitiveness of early-career teacher pay provides some evidence in support of targeting a greater share of finite fiscal resources towards improving early-career teacher pay

Introduction and motivation

Before the Covid-19 pandemic, England's school system was facing a severe challenge of training enough teachers to meet the demand caused by growing secondary pupil numbers and higher teacher attrition rates than earlier in the 2010s. As part of its plans to address this long-term retention and recruitment challenge, the Department for Education (DfE) proposed a series of increases to teacher pay between 2020/21 and 2022/23, which were particularly aimed at improving the retention of early-career teachers (STRB, 2020).

However, the outlook for the long-term teacher supply challenge was dramatically upended due to the effects of the Covid-19 pandemic in the UK. Lockdowns, school closures and the ensuing recession led to a substantial fall in teacher mobility and attrition, and a boost in recruitment to teacher training. This led the Chancellor, in the autumn 2020 Spending Review to announce that, alongside most other public sector workers, teachers' pay in 2021/22 would not be increasing but frozen at current levels.

This reversal of proposed pay increases likely means that attracting and retaining a healthy supply of high-quality teachers will remain a key long-term challenge for policymakers as the wider labour market recovers and the short-term supply boost begins to wane.

This report aims to support the STRB's remit by helping to inform the setting of teacher pay over the next few years, when pay decisions are occurring against the backdrop of a rapidly changing

macroeconomic context. To do so, we analysed data from the Office for National Statistics' (ONS) Annual Survey of Hours and Earnings (ASHE) panel dataset to examine the occupational choices and earnings for teachers who left teaching over the last 30 years, and what implications can be drawn from this to inform teacher pay policy.

Key research questions and findings

What occupations and industries do teachers leave the teaching profession for?

Our results suggest that the largest fraction of teachers who leave teaching either retire or leave employment altogether, although methodological issues prevent us from estimating this proportion with a high degree of certainty.

Most teachers who leave the profession for another job do not tend to leave for radically different occupations, as 72 per cent are still in the wider education and childcare sector after leaving. However, when teachers do leave for jobs outside of the education and childcare sector, nearly all of them tended to be working in occupations which were below professional level.

Only about two per cent of teachers who leave state-sector teaching in England enter professional or managerial occupations outside of teaching one year after leaving. This proportion grew to only three per cent ten years after leaving teaching, meaning there was limited evidence of teachers 'investing' in a move out of teaching and into a different professional or managerial career.

Early-career teachers who left, who we might expect to be more likely to invest in an alternative professional career if it appears more relatively financially attractive than teaching, were a little more likely than experienced teachers who left to switch into professional or managerial occupations outside of teaching. However, it remained rare, as only around four per cent of early-career teachers who left, compared to two per cent of experienced teachers who left, were in professional or managerial occupations ten years after leaving.

How does ex-teachers' pay after leaving differ to what it would have been as a teacher?

Within the full, unmatched sample of teachers who left the state-sector in England and moved into new jobs, we found that, on average, teachers who left teaching tended to earn more in their new job than in teaching. This is because a large number of teachers who left teaching were early-career teachers, who tend to be near the bottom of the teacher pay scale and therefore have higher scope for earning more outside the profession. Specifically, earnings for leavers were about seven per cent higher in real-terms in their new job than in their last year of teaching, which is roughly in line with the 7.3 per cent higher earnings that teachers outside London would experience moving from the first to the second spine points of the main teacher pay scale in the 2021/2022 academic year (DfE, 2021).

In order to meaningfully compare earnings growth between teachers who left and those who stayed in teaching, it is important to account for differences in observed characteristics between leavers and non-leavers. Accordingly, we compared a subset of leavers and non-leavers who had the same characteristics to estimate that earnings growth for leavers was about three per cent. This is lower than the unmatched sample because the matching puts relatively lower weight on early-career teachers, who are over-represented in the leavers group relative to the non-leavers

group and who tend to have higher earnings growth than experienced teachers after they leave teaching.

Teachers with similar characteristics who did not leave teaching experienced about six per cent higher earnings, about three percentage points higher than teachers who left. While there are some issues of comparability between teachers who left and those who stayed, comparing teachers who left to teachers with similar observed characteristics who stayed suggests that a move out of teaching was unlikely to have resulted in higher pay than what could have been expected within the profession, particularly in the long term.

This does not suggest that pay is not a reason why teachers leave the profession, given that, as we found, the average teacher who leaves does tend to initially earning more outside of teaching than in their last year teaching. However, the fact that teachers who leave teaching accept relatively poor longer-term earnings prospects suggests that other factors such as workload and opportunities for part-time or flexible working could be significant factors that are weighed up against pay by teachers considering leaving. Indeed, teachers who left were more likely to move into part-time work than to move from part-time to full-time work, which supports this notion.

Relatively poor earnings growth relative to staying in teaching was the case for many different types of teachers who left. However, there were some notable differences. Female, primary and experienced teachers faced a greater fall in their earnings trajectory after having left, compared to similar non-leavers. These differences were likely to be explained, at least in part, by their tendency to move into lower-skilled and lower-paying occupations. It may suggest that these types of teachers have less lucrative outside options compared to male teachers, secondary teachers and early-career teachers.

What influence do teachers' relative outside pay and the economic cycle have on retention?

The above findings raise questions about the extent to which teacher pay relative to other occupations is associated with retention, and what benchmark of pay in other occupations is the most appropriate to use in this comparison.

Benchmarking to average pay in professional occupations is often used in the teacher pay-setting process. However, as we found, the majority of teachers who leave the profession transition into below-professional occupations. We set out to define a measure of outside pay that better reflects the type of occupations that teachers tended to move into after they left, and the earnings that they tended to receive in those occupations.

However, there was limited evidence that our measure of outside pay was superior to using professional pay as a pay benchmark. Our measure of outside pay had a similar profile over time to professional pay, suggesting that they were both driven over time by very similar economic trends. In particular, both pay measures suggest that teacher pay has become relatively less competitive compared to outside options over the last decade.

Relative competitiveness over the last decade was similar across different teachers but, notably, the competitiveness of early-career teacher pay was lower in the 2010s than it had been in previous periods, and further lost competitiveness during the decade. In contrast, the relative competitiveness of experienced teachers' pay over the last decade was higher in the 2010s than

previous time periods and had not deteriorated as a result of the public sector pay restraint, as much as for other groups.

As a predictor of the retention rate, our regression modelling indicated that teacher pay relative to both professional and outside pay were not significantly associated with attrition, and there was no evidence that one measure was any better than the other. Importantly, this does not necessarily suggest that pay is unrelated to retention decisions, as the report highlights several methodological issues that are likely related to this lack of a significant association.

These results also do not provide a strong reason to abandon making comparisons between teacher pay and professional pay in order to understand the likely impacts of relative competitiveness on attrition. Not only is benchmarking teacher pay to professional occupations likely more useful for analysing recruitment (versus retention), the larger sample sizes available for professionals makes it a useful benchmark to derive from a number of different datasets.

Implications for policy

The teacher supply challenges that developed through the latter part of the 2010s raised key questions about whether the level and structure of teacher pay was appropriate for attracting and retaining sufficient numbers of high-quality teachers into/in teaching.

Our finding that teachers' pay became less competitive compared to benchmarks of outside pay during this post-recession period suggests that teacher pay is likely to have contributed in part to the increase in leaving rates and persistent under-recruitment to initial teacher training (ITT). This suggests that overall, higher pay increases for teachers during this period may have helped to ease supply challenges, though of course increases in secondary pupil numbers and scarce funding for schools may have also exacerbated the situation.

Teacher supply challenges have been considerably eased due to a new economic recession induced by the Covid-19 pandemic. However, these gains are likely to be only temporary, and once the labour market recovers, policymakers will need to once again address the question of whether the existing level and structure of teacher pay will be sufficient for attracting and retaining sufficient numbers of high-quality teachers for the future. Over the longer-term, our findings suggest there is a strong argument for at least maintaining the competitiveness of teacher pay, if not increasing it, in order to stave off future supply challenges.

Another key part of the Government's 2019 proposals for a set of three-year teacher pay increases was to direct higher pay increases to early-career teachers and lower pay increases at experienced teachers. This was aimed particularly at increasing the competitiveness of early-career teacher pay to boost retention rates and increase recruitment.

Our findings that the relative competitiveness of early-career teacher pay has deteriorated at the same time that retention and recruitment issues have become problematic may provide some evidence in support of targeting a greater share of finite fiscal resources towards improving early-career teacher pay. Flattening the teacher pay structure may come at the expense of lower pay increases for more experienced teachers. However, the relative competitiveness of experienced teacher pay is significantly higher than early-career teachers, so a flatter pay structure could improve overall retention rates while minimising additional pressure on schools' financial

resources. Nonetheless, flattening the teacher pay structure could also have other effects, such as reducing the incentive to progress and take on extra responsibility, which would need careful consideration and study alongside the effects on teacher supply.

The Office of Manpower Economics (OME) is an independent organisation that provides impartial secretariat support to the independent public sector Pay Review Bodies. The work described in this report was carried out under contract as part of OME's research programme. The views and judgements expressed in this report are therefore those of the contractor and do not necessarily reflect those of the OME.

1 Introduction

1.1 Policy background

Before the Covid-19 pandemic, England's school system was facing a severe challenge of training enough teachers to meet the demand caused by growing secondary pupil numbers and higher teacher attrition rates than earlier in the 2010s. The number of entries to postgraduate secondary teacher training increased in 2019/20 compared to the year before, but recruitment remained substantially below the numbers required to meet demand. The recruitment situation significantly worsened for perennial shortage subjects such as physics, maths, chemistry and modern foreign languages. Despite small improvements in the retention rate of teachers in 2018/19 and 2019/20, the overall rate of teachers leaving the profession remained higher than at the beginning of the decade.

The Department for Education (DfE) published a Teacher Recruitment and Retention Strategy in January 2019, which set out its plans for tackling the long-term challenge (DfE, 2019). A major policy initiative has been a proposed series of increases to teacher pay between 2020/21 and 2022/23. The DfE proposed, and the STRB confirmed, the first stage in 2020, involving larger pay increases for early-career teachers compared to more experienced teachers, aimed at improving their retention rates, which tend to be much lower compared to other teachers (STRB, 2020).

However, this long-term teacher supply challenge has dramatically shifted in 2020 and 2021 due to the effects of the pandemic in the UK. Lockdown restrictions led to school closures from March to May, with partial reopening during June and July. This led to a substantial fall in teacher mobility and attrition. Reduced teacher mobility led to fewer vacancies in 2020 than in 2019, which had a knock-on impact on job-searching newly-qualified teachers, making it more difficult to secure their first post.

The pandemic has also led to a recession in the wider economy, which has boosted recruitment to teacher training. Data from UCAS shows that the number of applicants to initial teacher training for 2020 in England and Wales increased throughout May, June and July to higher overall levels than in previous years. There was an average of more than 200 new applicants per day from mid-June to mid-July. This is unprecedented compared to recent years, especially given the time of year, which tends to be slower for recruitment than in the early spring. The increased interest in entering teaching has continued to boost the initial teacher training (ITT) application numbers in 2021 (Worth and Faulkner-Ellis, 2021).

In the autumn 2020 Spending Review, the Chancellor announced that teachers' pay in 2021/22 would be frozen, alongside all public sector workers apart from those in the NHS, marking a deviation from the previously announced teacher pay increases from before the pandemic hit.

A key challenge for policymakers over the coming years is to ensure an on-going healthy supply of high-quality teachers, even as the wider labour market recovers and the short-term boost to supply that labour market uncertainty brought begins to wane.

Teachers' pay remains an important policy tool for ensuring teacher supply is sufficient, by setting teacher pay so that it is competitive enough to attract and retain the required numbers of high-

quality teachers. Understanding the role that the competitiveness of teacher pay plays in teachers' decisions about whether to stay in teaching or leave therefore remains important for policymakers in setting an optimal pay structure within tight overall fiscal limits.

An additional challenge of determining the optimal policy on teacher pay is appreciating the economic context within which decisions are made. Low job security in the wider labour market, which the Office for Budget Responsibility expects to continue into 2022 and beyond, is likely to – everything else equal – contribute to an easier environment for recruiting and retaining teachers.

1.2 Previous research

Previous research has not highlighted pay as one of the key reasons cited by most ex-teachers for why they left teaching (Smithers and Robinson, 2004; DfE, 2017). Indeed, previous NFER research found that teachers who left the profession saw their pay fall in the first year after leaving and not recover over the next four years to the level it was in the last year before they left teaching (Worth *et al*., 2018).

This suggests that most working-age teachers' decisions to leave the profession are not primarily motivated by the prospect of higher pay in the short- or medium-term. A review of the literature on economic influences on teacher labour market decisions by Hutchings (2011) found that "salary is rarely the key attraction of moves into other employment".

However, research has found a relationship between higher pay outside of teaching relative to teachers' pay and higher rates of teachers leaving the profession (Sims and Jerrim, 2020; Chevalier *et al.*, 2007; Dolton and Chung, 2004; Dolton and van der Klaauw, 1999). Hutchings' review of the evidence concludes that "there is evidence that relative wage levels are a factor in some decisions to leave, but this is clearly not the case for the majority". This effect tends to be larger among teachers in their first few years of teaching and especially for teachers of shortage subjects such as maths and science (Allen *et al.*, 2016).

Recent research has argued that targeting pay increases or salary supplements at teachers of shortage subjects, such as science and mathematics, could have an impact on their relative undersupply (Sims, 2018). That research drew on evidence from randomised controlled trials in the United States to highlight the positive impact that bonuses for shortage teachers could have on teacher retention. It estimated that retention payments targeted at this group could be less costly than the alternative of training new replacement teachers.

A review of the evidence on the elasticity of teacher attrition (referred to by DfE as 'wastage') to pay by the DfE concluded that "estimates of the 'elasticity' of wastage in response to pay vary in the literature depending on the study designs, location of the study and types of teachers included" (DfE, 2020), but were generally in the range of 1.0 to 1.5 for all teachers (i.e. a ten per cent increase in pay would lead to a 10-15 per cent reduction in the wastage rate). However, it acknowledged that some evidence indicates higher responsiveness to pay among early-career teachers and teachers of shortage subjects.

The findings are consistent with the relative competitiveness of teacher pay being one factor among many that affect teachers' decision about whether to stay in teaching or leave. The reason

for leaving that is most cited by ex-teachers is workload (DfE, 2017). However, an increase in teacher pay relative to the alternative may encourage some teachers who are considering leaving because of their workload (or because of another factor) to instead stay in teaching.

1.3 Motivation for this research

The main aim of this new research is to analyse longitudinal employment data to gain new insights into teachers' labour market behaviour, particularly their decisions about whether to leave teaching in state-funded schools in England, or to stay. We aim to support the STRB's remit by helping to inform the setting of teacher pay, particularly over the next few years when substantial changes to the teacher pay structure are proposed and pay decisions are occurring against the backdrop of a rapidly changing macroeconomic context.

Our research questions are:

- What occupations and industries do teachers go to when they leave the teaching profession? Do their destinations vary by years of experience, region and the economic context?
- How does ex-teachers' pay after leaving differ in the short- and long-term to what it would have been as a teacher? Does it vary by their years of experience, region and the economic context?
- What influence do teachers' relative outside pay and the economic cycle have on teacher retention, particularly during and after an economic downturn?

We answer these questions by first analysing the destinations of teachers who leave the profession, including which occupations and industries they tend to enter after leaving and how much they are paid in their new job compared to when they were a teacher, both immediately and in the medium- and longer-term after leaving teaching.

Teacher pay is often benchmarked against the pay of other professional occupations, but it is not necessarily a useful benchmark if teachers do not typically leave teaching to go into those occupations. Moreover, comparing average teacher pay to the average pay in other professions may not be appropriate for considering retention responses if there are barriers to immediately entering at a similar level of seniority. We therefore aim to characterise teachers' 'outside' option in a more nuanced way that is more tailored to the sort of destinations that teachers who leave tend to enter.

We also explore the heterogeneity of the destinations according to teachers' characteristics (such as gender, experience, and region) and the macroeconomic conditions at the time (such as during economic downturns compared to periods of economic expansion). For example, the relative attractiveness of the outside option available to early-career teachers may be quite different from the options available to more experienced teachers, due to the pay differentials from starting afresh in a new career.

To answer the third research question, we estimate the relationship between teacher retention and a number of explanatory factors, including teachers' personal characteristics, macroeconomic conditions (e.g. the regional unemployment rate) and a variable describing teacher pay relative to the 'outside option'.

1.4 Data and methodology

This research uses data from the Office for National Statistics' (ONS) Annual Survey of Hours and Earnings (ASHE) panel dataset as its main source. The survey measures hours and earnings for a sample of employees in employment in the UK, excluding those in self-employment and those working outside of the country. The ASHE is a random sample of one per cent of the UK labour force,[1] and captures a snapshot of employees in employment in April of the survey year.

The survey has been conducted annually since 1997, and is longitudinal, meaning that once an individual has been selected into the sample, they continue to be sampled in future survey years. Prior to 1997, a similar survey called the New Earnings Survey (NES) was conducted, the data from which has been integrated with the ASHE to yield a panel dataset observing occupations, hours and earnings for the same sets of individuals over time, with annual data from 1975 to 2020.

ASHE is completed by employers, rather than by the selected employees themselves. This implies some limitations for our research, for example that the survey does not collect any subjective employee data. As a result, we are unable to account for factors such as job satisfaction in our analysis of teacher retention. The ASHE survey also only measures contracted hours worked, rather than actual hours worked, meaning that we are not able to measure weekly hours worked for teachers, who typically work more than their contracted number of hours.

Businesses are obliged to respond to the ASHE, yielding a response rate of around 90 per cent (NISRA, 2020). Despite this, the relatively few businesses that did not respond to the survey may affect our results if they were more likely than responding businesses to have certain characteristics (i.e. if non-responding businesses were more likely to have very high-earning employees, or be in a certain industry).

Notwithstanding these limitations, the ASHE provides a reliable source of comparable observations of earnings and hours over a long time period, and is thus valuable for analysing teacher pay and labour market mobility over time.

For this research, we rely on several sets of key variables in the survey. These are:

- demographic variables such as age, gender and region
- the occupation and industry the employee worked in
- weekly earnings, working pattern (e.g. full-time or part-time) and the number of contracted working hours.

We define our sample of main analytical interest as teachers working in state-sector schools in England. To identify teachers, we use Standard Occupational Classification (SOC) and Standard Industrial Classification (SIC) codes (see Appendix B for SOC/ SIC code combinations used for teacher identifications). To further narrow in on teachers in state-sector schools in England, we use the ASHE variable on work region to filter out teachers working in Scotland, Wales and Northern

[1] Selection into the survey is determined by the last two digits of one's National Insurance Number, which are randomly allocated.

Ireland, and the Inter-Departmental Business Register Legal Status (an ASHE variable observing the public/private legal status of the employer) to filter out teachers working in private schools.

Once we have identified our sample of teachers in the survey, we then exploit the longitudinal nature of the data which allows us to observe the entire trajectory of teachers' careers, and in particular their transitions out of teaching.

Teachers leave teaching either by switching to another job or leaving the workforce altogether.[2] See Appendix B for details outlining how we identified teachers who left teaching and how we imputed missing observations to decrease the likelihood of falsely classifying teachers as leavers.

After having identified teachers who leave teaching, we then use the earnings and demographics variables to tabulate the types of occupation into which they tend to transition, and how this changes up to ten years after leaving. We also determine how leaving teaching impacts the working patterns of teachers who leave, in particular whether full-time teachers tend to transition into part-time jobs outside of teaching, or vice versa. We do all of this separately for teachers of different gender, levels of experience and in different regions, to explore the occupations and working pattern changes for different types of teachers who leave.

We then analyse how earnings for teachers who leave teaching tend to evolve after leaving. We first analyse earnings for the full sample of leavers to determine whether earnings for teachers who leave teaching tend to increase or decrease over the ten years after they left, compared to what they earned in their last year as teachers.

We then compare the earnings of teachers who left teaching to the earnings of a group of otherwise similar teachers who stayed in teaching, to establish the extent to which leaving teaching may impact the earning trajectories of leavers, compared to what they may have expected to have earned had they not left. To do so, we match teachers who leave teaching with those who do not leave teaching on the basis of their characteristics and compare earnings growth for each group. In order to make meaningful comparisons in real earnings across time, we convert earnings to be in 2019 prices and adjusted to represent full-time equivalent (FTE) earnings. Appendix B details the procedures for these adjustments.

We combine these results together to derive a measure of earnings outside of teaching, tailored specifically to the occupations that teachers actually tend to transition into. Comparing the earnings of teachers who left to average teacher earnings, we then explore the extent to which the relative competitiveness of teacher pay has changed over time. We also compare average teacher pay to average professional pay, to see whether the insights on the trends in competitiveness are similar.

As a final step, we explore how we might expect teacher pay, relative to pay in comparator occupations, to influence attrition, over and above the effect of teacher characteristics and the macroeconomic context. We use a logistic regression model to predict individual teachers'

[2] ASHE is unable to distinguish those who leave the workforce but stay in the UK from those who leave the UK or leave for self-employment. Any teachers who move into self-employment or jobs outside of the country will be considered as having left the workforce.

decisions of whether to leave teaching as a function of their demographic characteristics and relative teacher pay. There are more details about how we estimate this model in Appendix D.

1.5 Report structure

Section 2 of this report describes the types of destinations that teachers who left moved into, both in the first few years after leaving and in the longer-term. The section explores the heterogeneity in destinations according to different teacher characteristics and also explores changes in working pattern (i.e. movements between full-time and part-time working).

Section 3 analyses how much teachers who left for another job were earning in their new job, and how that compared to what they were earning in their last year as a teacher. The section also extends the analysis to compare the pay trajectories of teachers who left with a group of similar teachers who subsequently stayed, to account for the opportunity cost of leaving.

Section 4 explains how we derive a measure of 'outside' pay (i.e. the typical earnings of teachers who left teaching) that is tailored to the type of occupations that teachers who leave tend to move into. We compare the trends in outside pay over time with trends in teacher pay to explore the relative competitiveness of teacher pay relative to the alternative. We also make comparisons with the average pay of people in professional occupations, which is often used as a benchmark for the competitiveness of teachers' pay.

Section 5 describes the outcome of the regression modelling and section 6 summarises the research findings in this report and provides some conclusions.

2 What jobs do teachers go into when they leave?

2.1 Key findings

In this section, we present the findings from longitudinal analysis of employment data on what destinations, and in particular what occupations teachers who left teaching in the state sector in England moved into.

We find that the most common destination is to leave employment, whether to retire (around 10 per cent in the first year after leaving) or leave employment at working age (around 55 per cent in the first year). The latter could reflect a career break, self-employment (which is not covered by the survey) or moving out of the UK. However, it could also include teachers who moved to an employer that consistently fails to respond to the ASHE survey, which may have implications for how representative the sample is.

Of the 35 per cent of leavers who moved into a new job, the most common type of destination for teachers who left the state sector in England was to work in the wider education and childcare sector. This included working as a teacher outside of schools (for example, as a tutor or for the local authority), outside England or in the private sector and also working in further or higher education, and childcare related occupation or as a teaching assistant.

Among those who moved to work outside of the education and childcare sector, most were working in jobs that were below professional or managerial level. Only around two per cent of teachers moved into a different professional occupation straightaway, and only three per cent were working in a different professional occupation ten years after leaving.

Teachers who left also tended to change their working patterns, with greater movement from full-time into part-time work than movements the other way. This was particularly the case compared to a group of teachers with otherwise similar characteristics, but who stayed in teaching for the next ten years. The latter group was more likely to stay working fulltime or to move from part-time into full-time work.

Differences in destination and working pattern changes were observed across different types of teacher. Notably, female teachers were more likely than men to leave teaching while of working age, which is likely reflective of parental or childcare responsibilities. Women were also more likely than men to move into part-time work outside teaching or transition from teaching into lower-skilled jobs such as teaching assistants.

The working pattern change findings seem to align with previous research that one of the reasons why teachers may have left state-sector teaching was to change to a part-time working pattern, perhaps because they were unable to arrange part-time or flexible working as a teacher in a state school (Worth, *et al.*, 2018). However the ASHE data suggests that the association between leaving teaching and switching to part-time work has lessened considerably in the last decade, relative to the 1990s and 2000s.

2.2 Motivation

The main aim of this new research is to analyse longitudinal employment data to gain new insights into teachers' labour market behaviour, particularly their decisions about whether to leave teaching in state-funded schools in England, or to stay.

Teaching is a graduate-level professional occupation. A typical benchmark used to assess the competitiveness of the salary in teaching is against the pay of other professional occupations. This makes sense for understanding teacher recruitment, as graduates are likely to weigh up the pros and cons of entering different occupations. The competitiveness of pay is one of the factors determining that choice, but other factors will also have influence, for example, the nature of the work in each profession. Indeed, teachers tend to be highly 'mission-oriented' citing the impact on improving life chances and working with young people as big motivators, and less so pay and conditions (Jerrim and Sims, 2019; Gorard, *et al*., 2020).

But the pay offer in other professions may be even less relevant for teachers' decisions about whether to stay or leave, having already entered teaching. Teachers have already committed to teaching, so are already invested in the profession. Balanced against this are other factors such as workload (Perryman and Calvert, 2020; DfE, 2017). Therefore, to what extent is the competitiveness of teacher pay relative to other professionals an important factor for policymakers?

One potential way to answer this is to look at what occupations teachers go into after they leave state-sector teaching, and assess what this reveals about their preferences and their labour market behaviour. This section presents the findings from our analysis of longitudinal ASHE data on what teachers do next after they leave.

2.3 Destinations of teachers who leave

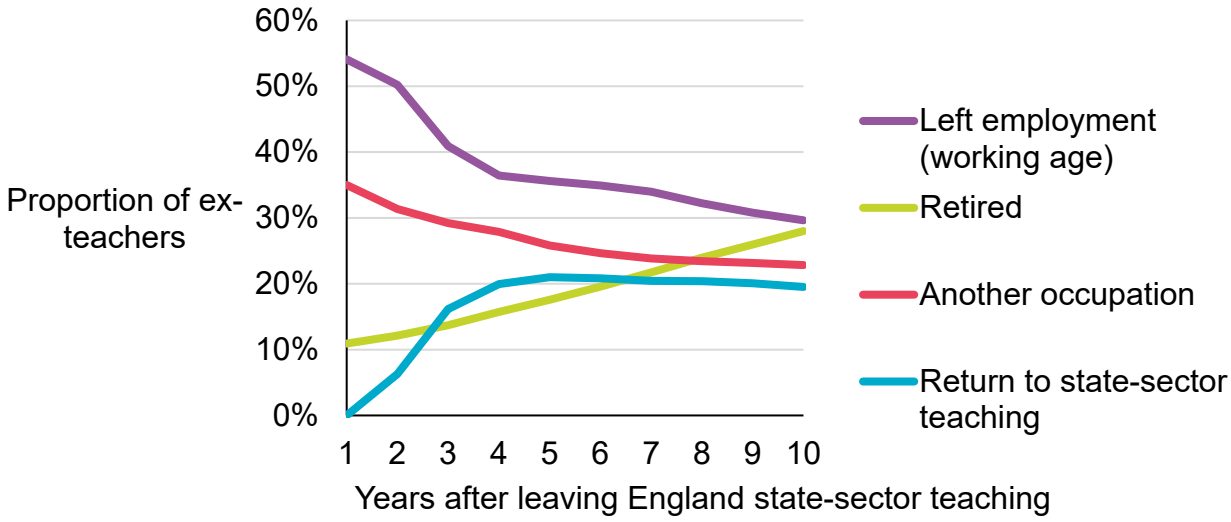
2.3.1 Types of destination

Figure 1 shows the proportion of teachers who left teaching, divided by the type of destination in the years after they left.

The most common destination of teachers who left state-sector teaching was to leave employment. This destination is defined by individuals who were teachers in one period and then not observed at all in the ASHE for either of the next two years. As a result they could have left the workforce entirely, been self-employed (who are not surveyed as part of ASHE) or have left the UK. This group may also include individuals where their employer failed to respond to at least two ASHE surveys in a row, and where we were unable to impute records of employment from subsequent ASHE responses. We cannot determine which of these destinations individuals left for (or indeed may not have actually left, but the survey stopped measuring them).

As we observe individuals' age, we are able to estimate a distinction between those who retired and those of working age who left employment. We define retirees as those aged 55 or over and working-age leavers as those aged under 55. While the official retirement age is 60, this definition includes those who retire early.

Figure 1 The most common destination for teachers who left teaching between 1991 and 2017 was to leave employment during working age



Source: NFER analysis of ASHE data.

In the first year after leaving, around 55 per cent of ex-teachers were of working age and had left employment. This is higher than previous estimates of the proportion of teachers who left to be economically inactive. Our previous analysis of Labour Force Survey data suggested that 29 per cent of non-retiring teachers became economically inactive, and our previous analysis of *Understanding Society* data suggested that 27 per cent of non-retiring teachers became self-employed or economically inactive (Worth *et al.*, 2015; Worth *et al.*, 2018). This may indicate that a substantial proportion of teachers in the data appear to have left (as measured by having no subsequent survey records) but were actually in employment.

Since our analysis mainly focuses on the outcomes of those who leave teaching to move into other occupations, overestimating those who leave employment is not necessarily a concern for our interpretation (other than reducing the numbers of ex-teachers we are able to analyse). While the rate of non-response to the ASHE is generally low, it may bias our findings if there are certain types of employer that are particularly likely to fail to respond to ASHE surveys. As these are non-responses, there is no further analysis we can undertake to assess the extent of this issue. Therefore, interpretation of our findings about the type of occupations teachers tend to move into after they leave teaching relies on the untestable (at least with currently available data) assumption that individuals whose data is erroneously missing from the longitudinal ASHE dataset due to prolonged employer non-response are missing at random[3].

A further ten per cent of teachers who left were assumed to have retired on the basis of being of age 55 and over, and having left employment. The proportion of ex-teachers who had retired rises

[3] In other words, their characteristics are, on average, identical to those who we do observe in the data.

with the number of years that they have been out of teaching, which is a combination of individuals that left employment getting older (e.g. turning 55 in subsequent years after they left teaching) and individuals who left teaching for another job entering retirement.

By definition, no teachers were in state-sector teaching in the first year after they left. In subsequent years, some teachers re-entered teaching: six per cent in the second year after leaving and 16 per cent by the third year. We find a stable proportion of around 20 per cent of ex-teachers had returned to teaching three to ten years after leaving. An implication is that most returners are teachers who have left recently and relatively few teachers take long career breaks and then return to the profession. Previous research using data from the School Workforce Census found that a large proportion of returners were those who had left the profession in recent years (Worth, *et al.*, 2018).

Around 35 per cent of ex-teachers moved to another job in their first year after leaving state-sector teaching in England. The proportion of ex-teachers in other occupations is lower among those who were out of teaching for longer, due to changing destination again: either leaving employment, retiring or returning to teaching.

2.3.2 Occupations of teachers who leave for another job

The group of state-sector teachers in England who left for another job is the main focus of the analysis in this research. This section explores further the different occupations and industries teachers who left moved into, while the next section explores the pay trajectories of teachers who left for another job.

Table 1 shows a breakdown of the different types of occupation that teachers who left for another job went into. The data is categorised according to a combination of occupation codes and, where relevant, industry and sector codes. The columns show the proportion of teachers in these occupations after different numbers of years after leaving.

A large proportion of teachers who left for another job moved into employment in the wider education sector outside of state-sector teaching in England. In the first year after leaving, these destinations represented nearly three-quarters of those who left for employment (72 per cent). This includes around 12 per cent who moved into private-sector teaching (which may include supply teaching as well as teaching in independent schools) and 33 per cent who moved into a teaching occupation outside of schools or outside of England (for example as a tutor, working for the local authority, or in the state-sector elsewhere in the UK). Smaller, but notable, proportions of teachers moved into working as teaching assistants (7 per cent), other teaching-related occupations (6 per cent) and childcare and related occupations (3 per cent).

The proportion of teachers that were teaching but not working in schools in England fell away over time from 33 per cent in the first year after leaving to 16 per cent five years after they left. This group was particularly likely to return: they were around twice as likely as those in other destinations to return to state-sector teaching in England in later years.

Table 1 Occupations relating to education and childcare are the most common destinations of teachers who leave for another job

Occupational destination	Years after leaving state-sector teaching in England			
	1	**3**	**5**	**10**
Private-sector teaching	12%	13%	14%	13%
Teaching outside of schools in England	33%	22%	16%	11%
Further and Higher education	11%	12%	13%	12%
Educational and teaching assistants	7%	8%	7%	7%
Other teaching and education occupations	6%	7%	7%	7%
Childcare and related occupations	3%	2%	2%	2%
Total education and childcare occupations	**72%**	**65%**	**60%**	**52%**
Outside education - professional or managerial occupation	6%	9%	10%	14%
Outside education - below professional occupations	22%	26%	30%	34%
Total outside education	**28%**	**35%**	**40%**	**48%**
Number of ex-teachers in employment in ASHE sample	3,107	2,473	1,981	1,371
Number of ex-teachers in ASHE sample (any destination)	8,877	8,461	7,676	6,002

Source: NFER analysis of ASHE data.

Among teachers that had been out of teaching for more years, destinations outside of the education and childcare sector were more prevalent. The proportion of teachers who left for another job who moved out of the education and childcare sector rose from 28 per cent in the first year to 35 per cent in the third, 40 per cent after five years and 48 per cent ten years after leaving.

Among teachers who left for jobs outside of the education and childcare sector, a majority were in occupations below professional level[4]. Very few teachers who left for another job moved into professional occupations, particularly immediately after leaving where the proportion was only six per cent. Even ten years after leaving teaching, only 14 per cent of those who left for another job were in professional or managerial occupations outside of teaching.

As a proportion of all the teachers who left the state-sector in England, just two per cent entered a professional occupation outside of teaching straight after leaving and three per cent ten years after leaving. Professional occupations outside of the education sector therefore made up only a very

[4] According to the three-class version of the National Statistics Socio-Economic Classification, these occupations are collectively classed as 'intermediate occupations' and 'routine and manual occupations'.

small proportion of the destinations of teachers after they left. This finding raises a question about whether the pay level in other professions represents a valid benchmark for understanding the outside option for teachers who are considering whether to leave or stay. This is a question we explore further in section 3.

2.3.3 Differences in destinations for different types of teacher

The above findings describe the destinations of all the teachers who we identified as having left state-sector teaching in England during the 1990-2017 period for which we have ASHE data. However, the pattern of destinations differs according to the characteristics of teachers and the time period during which they left.

We explore differences in the destinations of teachers who leave by gender, experience level, geographical region and whether or not they left during an economic downturn[5].

1.1.1.1 Differences by gender

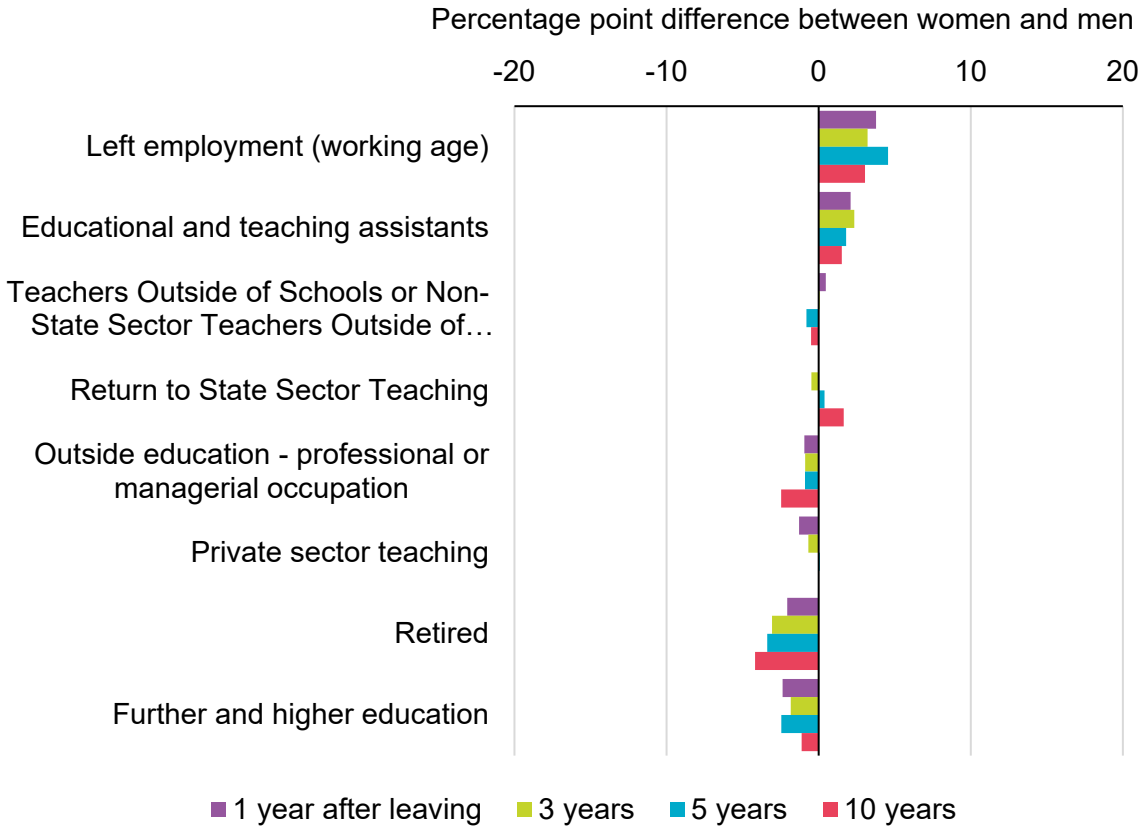
Figure 2 shows data from a selection of occupational groups, describing the extent to which teachers were more or less likely to move into a destination after leaving state-sector teaching in England, depending on their gender. A positive value means that female leavers were more likely than male leavers to move into that destination, whereas a negative value means that male leavers were more likely than female leavers to move into that destination.

The data shows that female teachers were more likely to leave employment when they were working age, which is likely to be driven largely by being more likely to leave to take up full-time childcare or caring responsibilities. Male teachers who left were slightly more likely to return to teaching after three years, but female teachers who left were slightly more likely to return to teaching after ten years. This is also likely to reflect patterns of full-time childcare responsibility that influence different lengths of career breaks from teaching for men and women. Male teachers who left were also slightly more likely than female teachers who left to retire, which may reflect male teachers having fewer breaks in their careers than female teachers.

Female teachers who left were more likely than male teachers who left to become teaching assistants and enter lower-than-professional-level occupations outside of education. In contrast, male teachers who left were more likely than female teachers who left to move into further and higher education, professional and managerial occupations outside education and private-sector teaching (in the first few years, although there was no difference after five or ten years). As shown in section 3, the types of occupation that female teachers who left tended to move into were lower-paying occupations than the ones male teachers who left entered.

[5] We define a downturn as a year in which the UK unemployment rate rises at least 0.25 percentage points above the five-year rolling average. This identifies 1992 – 1994 and 2009 – 2013 as downturn years. See Appendix A.

Figure 2 Female teachers who left were slightly more likely to leave employment and become teaching assistants, whereas male teachers were slightly more likely to enter further or higher education



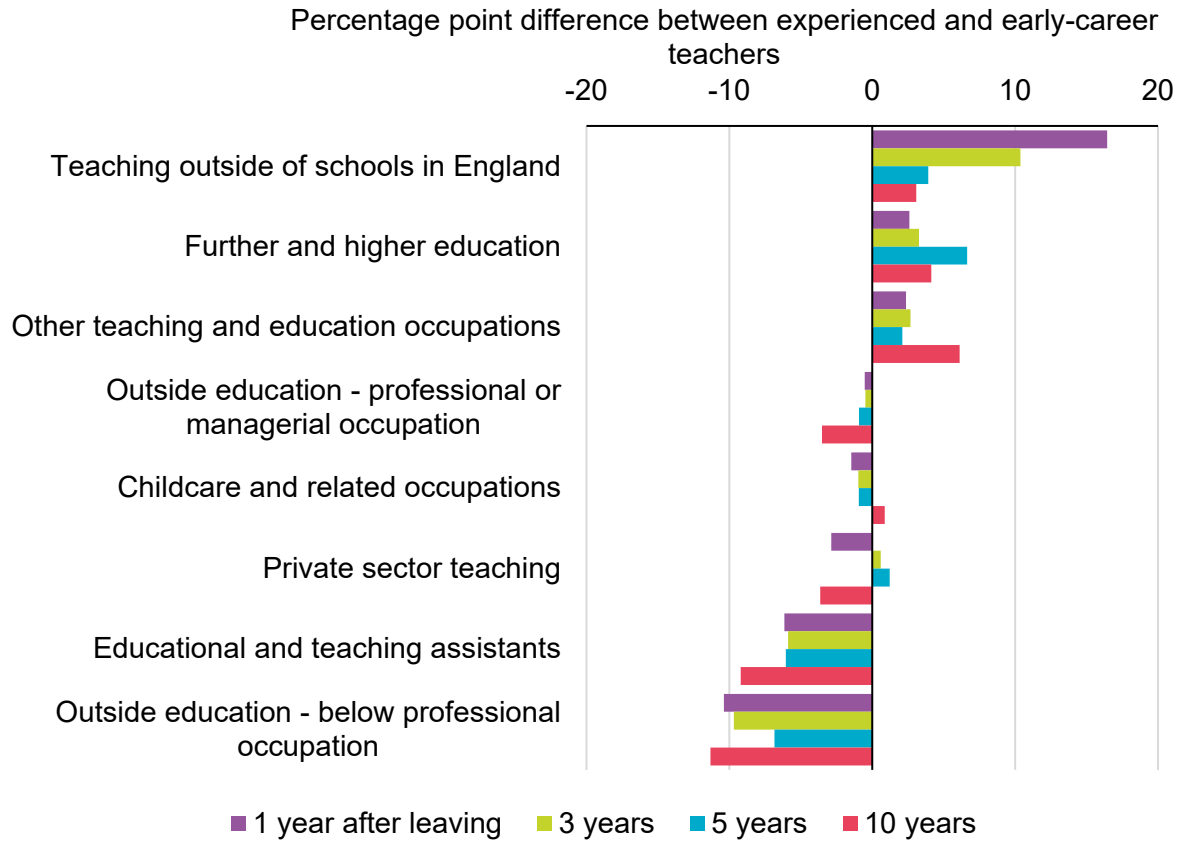
Source: NFER analysis of ASHE data.

1.1.1.2 Differences by experience level

Figure 3 describes the extent to which teachers were more or less likely to move into particular occupations after leaving state-sector teaching in England, depending on their level of experience. This data excludes non-employment destinations, as there were substantial differences between early-career teachers[6] and experienced teachers[7] that were entirely expected, such as experienced teachers being much more likely to retire and early-career teachers being more likely to leave employment at working age. A positive value means that experienced leavers were more likely than early-career leavers to move into that destination, whereas a negative value means that early-career leavers were more likely than experienced leavers to move into that destination.

[6] Defined as teachers within their first five years of teaching.
[7] Defined as teachers with at least five years of experience in teaching.

Figure 3 Early-career teachers who left for another job were more likely than experienced teachers to be in a lower-than-professional occupation or be a teacing assistant



Source: NFER analysis of ASHE data.

The data shows that experienced teachers who left for another job were more likely than early-career teachers who left for another job to move into a teaching role that is outside of schools in England. The vast majority of teachers in this category are those who go from being employed by a school to being employed by a local authority, which may reflect why experienced teachers are much more likely to move into this role than inexperienced teachers.[8] Experienced teachers who left for another job were also more likely than early-career teachers to move into further and higher education. In contrast, early-career teachers who left for another job were more likely to become teaching assistants, private-sector teachers or enter lower-than-professional-level occupations outside of education.

While there was little difference between the proportion of each group that moved into professional or managerial occupations outside education in the first few years after leaving, early-career

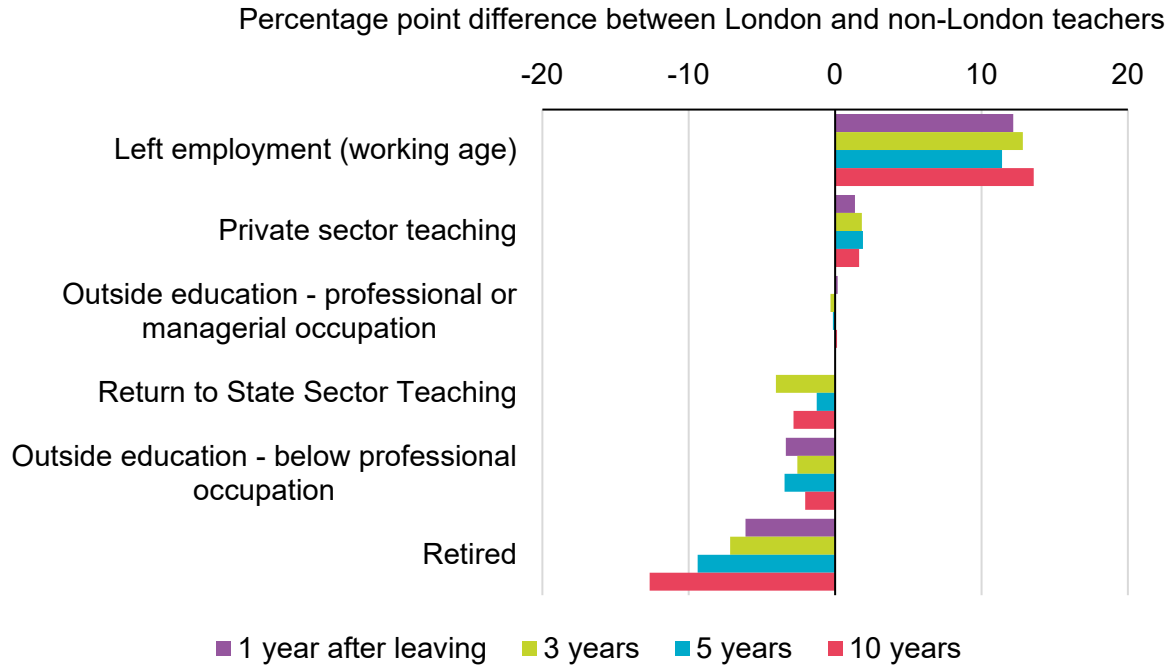
[8] In addition to teachers employed by the local authority, this category also picks up the state-sector teachers who become teachers in vocational training or other 'not-elsewhere-classified' educational institutions such as driving or flying schools.

teachers who left for another job were much more likely to be in a professional or managerial occupation outside education ten years after leaving. This may reflect early-career teachers seeing the prospect of leaving teaching to invest in a different professional career as a more viable option than experienced teachers. However, the absolute numbers of individuals entering professional or managerial occupations outside education was small in both groups: just four per cent of early career teachers who left, and only two per cent of experienced teachers who left, were in these occupations ten years after leaving.

1.1.1.3 Differences by geographical region

Figure 4 describes the extent to which teachers were more or less likely to move into particular destinations after leaving state-sector teaching in England, depending on whether or not they were employed as a teacher in London. A positive value means that leavers from London were more likely than non-London leavers to move into that destination, whereas a negative value means that non-London leavers were more likely than London leavers to move into that destination.

Figure 4 London teachers who left were more likely to be in private-sector teaching, whereas non-London teachers who left were more likely to be in a lower-than-professional occupation



Source: NFER analysis of ASHE data.

The data shows that teachers in London who left were more likely than teachers outside of London who left to leave employment at working age, whereas non-London teachers who left were more likely to have retired. This is likely to reflect the younger demographic of London's teachers as well as a higher attrition rate of young teachers in London (Worth, *et al.*, 2018). However, it could reflect other factors such as London teachers needing to stay in employment (e.g. in a different occupation) for longer before retiring or having more alternative employment opportunities in

London. London teachers who left were slightly less likely to return to teaching compared to non-London teachers.

The employment destinations of London and non-London teachers are very similar, with very small differences evident in many occupational destinations. There are a few notable differences, such as non-London teachers who left being slightly more likely to move into a lower-than-professional-level occupation and London teachers being slightly more likely to move into private-sector teaching. However, there is no difference between the proportions of London and non-London who left for professional or managerial occupations, even after ten years. This is somewhat surprising, given the higher concentration of professional and managerial occupations based in London.

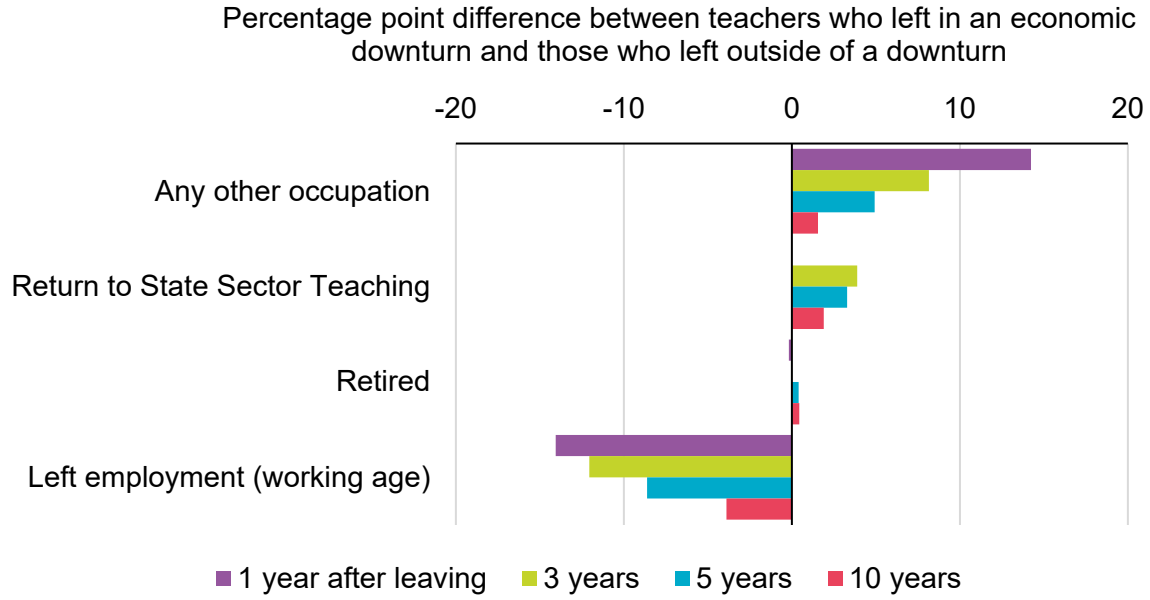
1.1.1.4 Differences by macroeconomic context

Figure 5 describes the extent to which teachers were more or less likely to move into a destination after leaving state-sector teaching in England, depending on whether or not they left during an economic downturn. A positive value means that leavers during a downturn were more likely to move into that destination than leavers who left outside of a downturn, whereas a negative value means the reverse. Our definition of a downturn is a year in which the UK unemployment rate rose a quarter of a percentage point above the five-year rolling average. According to this definition, downturns occurred in 1992-1994 and 2009-2013.

The data shows that teachers who left during a downturn were less likely than teachers who left outside of a downturn to leave employment and more likely than teachers who left outside of a downturn to move into a new job. This may seem counterintuitive as a downturn period is when the unemployment rate is high and when the number of vacancies falls and jobs become more competitive.

However, unlike in many other industries, teaching is counter-cyclical and so tends to behave in an opposite way to the wider economy. Job security in teaching tends to remain high throughout recessions as the demand for teachers is primarily determined by pupil numbers and school budget positions rather than the state of the economy. Previous research has shown that teacher retention tends to be higher when the unemployment rate is higher (Hutchings, 2011). The findings may therefore suggest that during a recession, working-age teachers are more likely to stay in teaching and delay a decision to leave employment, unless they have already secured another job to move into.

Figure 5 eachers who left during a downturn were more likely to move into another occupation and to return later, but less likely to leave employment at working age



Source: NFER analysis of ASHE data.

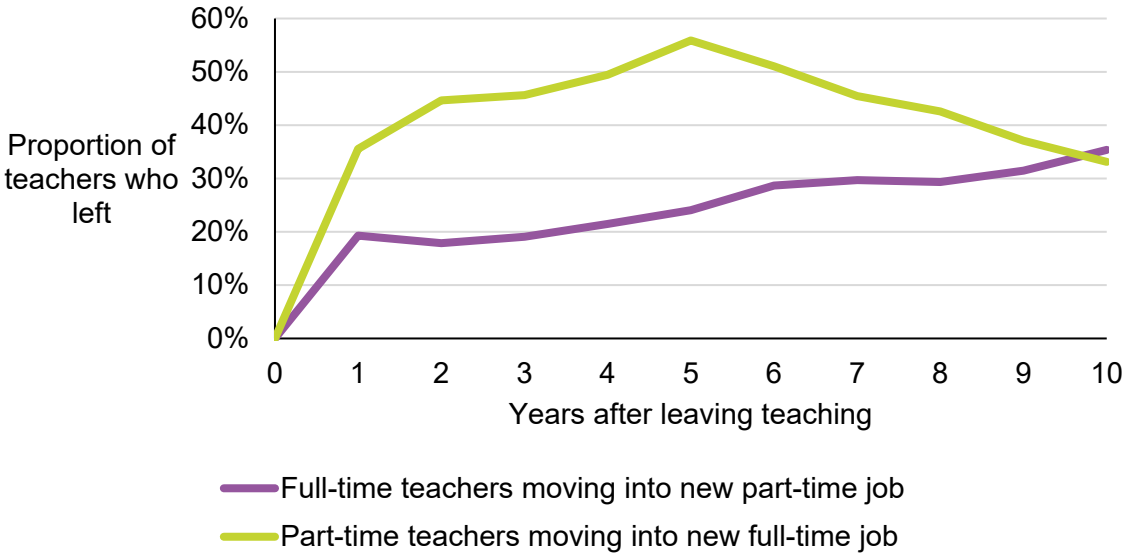
2.4 Changes in working pattern

Many of those teachers who left state-sector teaching in England for another job also changed their working pattern. Using employer-reported contracted hours from ASHE data, we can identify job changes that were from full-time to part-time work, and vice versa.

Figure 6 shows the proportion of teachers who left state-sector teaching in England for another job who switched working pattern after leaving. The data is divided according to whether they were working full-time in the year before they left (purple line) or part-time (green line), and shows the proportion who were subsequently working part-time (purple line) and full-time (green line), respectively. More of those who left were working full-time before they left than working part-time.

The data shows that around a fifth of full-time teachers who left moved into part-time work in their new job and just over a third of part-time teachers who left moved into full-time work in their new job. Part-time teachers who were in employment several years after leaving teaching continued to move into full-time positions, although this peaked around five years after leaving. After nine years a third were working full-time. The flow of full-time teachers into part-time work continued over time at a slower rate, with around a third in part-time work ten years after leaving teaching.

Figure 6 Substantial numbers of teachers switched working pattern when they left



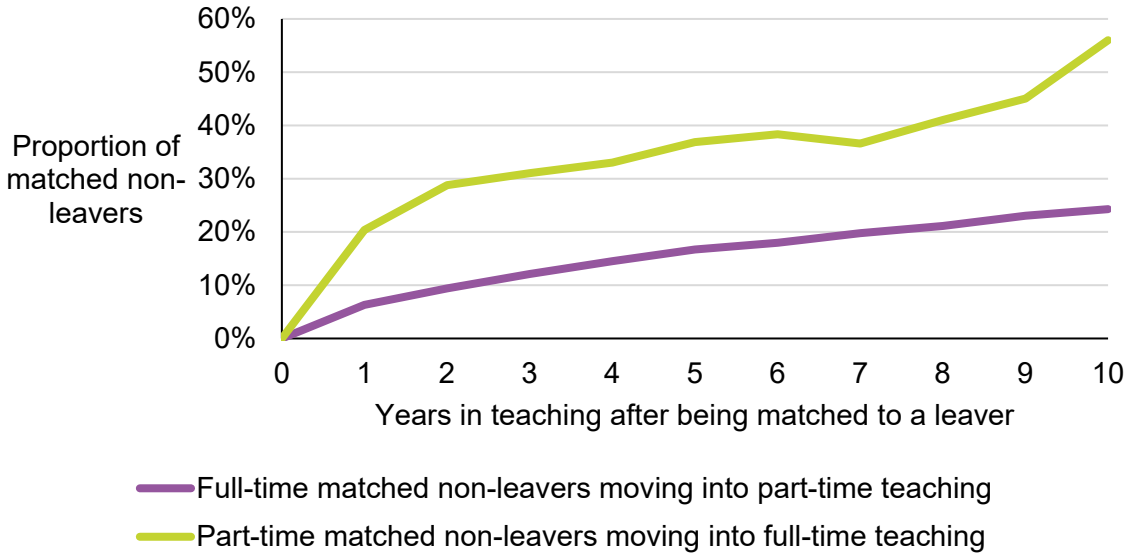
Source: NFER analysis of ASHE data.

Figure 7 shows the respective movements of full-time and part-time teachers who did not leave, respectively, into part-time and full-time work. This group of 'matched' non-leavers has the same set of characteristics to the group of leavers, including the same gender, experience, working pattern and regional profile as leavers in their last year as a teacher (see section 3.4.1 on the matching methodology).

However, the data shows that matched non-leavers have somewhat different working pattern trajectories to those who left. Similar to leavers, around a fifth of those who were working part-time when they were matched to a leaver moved to full-time work the following year and transitions into full-time work continued, up to around 60 per cent after ten years. In contrast to leavers however, matched non-leavers who were working full-time were much less likely than leavers to move into part-time work as teachers. Only around six per cent were working part-time in the first subsequent year in teaching and the proportion rose to 24 per cent after ten years.

This data reveals different changes in working patterns among teachers who leave and teachers who stay in teaching, particularly related to transitions from full-time to part-time work. More generally, teachers who stay are more likely to change from part-time to full-time working, and much less likely to move into part-time work, compared to those who left. The findings may therefore reveal differences in the availability of part-time working in teaching as compared to outside, as found in previous research (Sharp *et al*., 2019; DfE, 2019).

Figure 7 Substantial numbers of part-time teachers who don't leave switch back into full-time working, but there is less movement of full-time teachers into part-time teaching

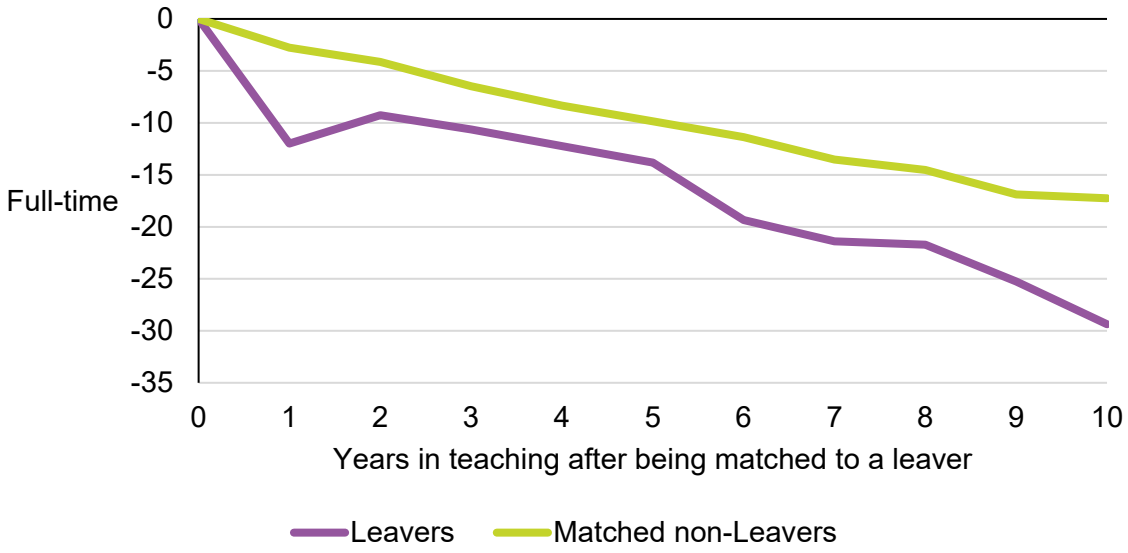


Source: NFER analysis of ASHE data.

To explore this further, we compare the changes in working patterns of teachers who leave with the working patterns of the matched group of teachers who stay in teaching and have a set of similar characteristics. Figure 8 shows data on the net change in the proportion working full-time, relative to the proportion that were working full-time before the group of leavers left. A positive value indicates that more teachers moved from part-time working to full-time working and a negative value indicates that more teachers moved from full-time to part-time working.

The data shows that overall, teachers who left were more likely to switch from full-time working to part-time working when they moved from state-sector teaching into a new job than they were to move from part-time working into full-time work. In the first year after leaving, around 12 per cent more teachers who left made the switch from full-time to part-time than changed the other way, and this increased over time. Matched non-leavers were also slightly more likely to move from full-time teaching into part-time than to switch the other way, but only by about three per cent, also increasing over time. In each year after leaving, leavers were substantially more likely to move into part-time teaching than the other way around. This seems to confirm that one of the reasons why teachers may have left state-sector teaching was to change to a part-time working pattern, perhaps because they were unable to arrange part-time or flexible working as a teacher in a state school.

Figure 8 Over time, both teachers who leave and similar non-leavers were more likely to switch to part-time than the other way around, but leavers were substantially more so



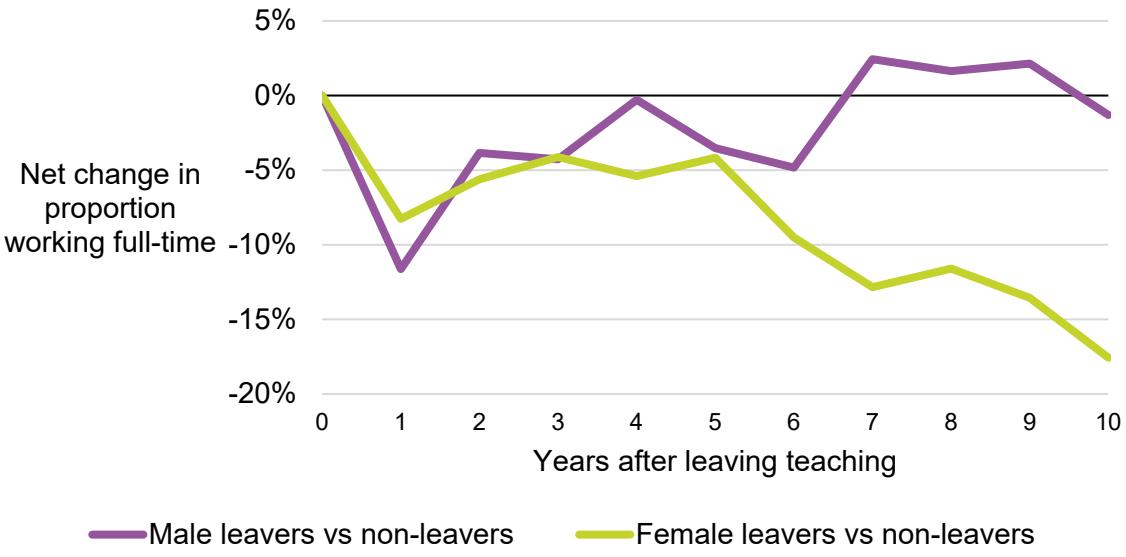
Source: NFER analysis of ASHE data.

Figure 9 plots the difference in net changes in the proportion working full-time between leavers and matched non-leavers (i.e. the net change in full-time working for leavers, over and above the net change in full-time working for matched non-leavers), separately for male and female teachers.

The net change into part-time work outside teaching was initially slightly higher for male leavers than female but decreased in magnitude over time, meaning that male teachers who left for part-time work outside teaching tended to move back into full-time work over time. Female teachers were much more likely than matched non-leavers to move into part-time work outside teaching, and were more likely to do so the longer they had been out of the profession.

Figure 10 shows how these patterns differ between primary and secondary teachers. The data shows that the two groups had a similar propensity to change from full-time to part-time working, with a net change into part-time work of around ten per cent for both secondary and primary teachers who left. The net proportion of leavers working full-time remains between five and ten per cent lower than matched non-leavers throughout the subsequent ten years for secondary teachers and falls slightly to around 15 per cent for primary teachers. Notably, the net change in full-time working status for primary teachers who leave follows quite a similar pattern to female teachers (Figure 9), which likely reflects the fact that the proportion of female teachers in primary schools is higher than in secondary schools.

Figure 9 Female teachers were more likely to move into part-time work than matched non-leavers, while male leavers were less likely than females to change working pattern

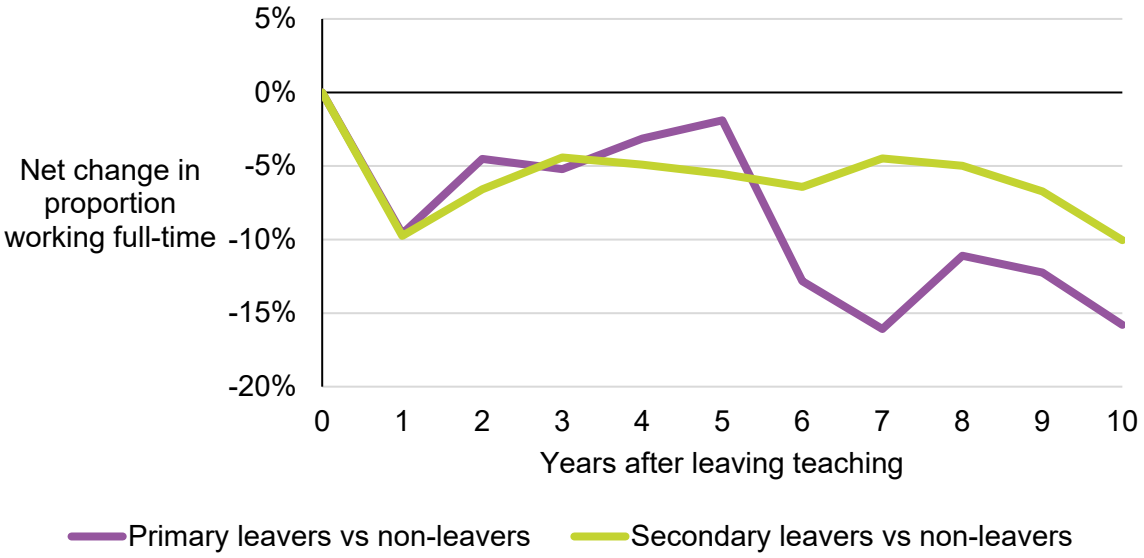


Previous research has found differences in transitions from full-time to part-time working between primary and secondary teachers, with secondary teachers who left being more likely to move into part-time work, but primary teachers no more likely to do so (Worth *et al.*, 2018). However, several differences between the previous analysis and this analysis may explain why the same pattern is not evident here. First, Worth *et al.*, (2018) analysed data from the UK Household Longitudinal Survey (UKHLS), which includes transitions into self-employment as well as employment, whereas the ASHE data does not include the self-employed. Second, the UKHLS analysis was based on self-reported working hours, where the definition of part-time was working less than 30 hours. The ASHE data uses an employer-reported measure of full-time or part-time status, so may be more accurate at identifying part-time workers[9].

Finally, Worth *et al.*, (2018) study the changes in working patterns of teachers who left teaching during the period 2009-2015. Using ASHE data, we are able to study individuals who left teaching from 1990-2017 encompassing a longer period during which there have been changes to the prevalence of part-time working arrangements, both in teaching and in the wider economy.

[9] For example, some part-time teachers may work more than 30 hours per week.

Figure 10 Both primary and secondary teachers who left were more likely to move into part-time working than matched non-leavers

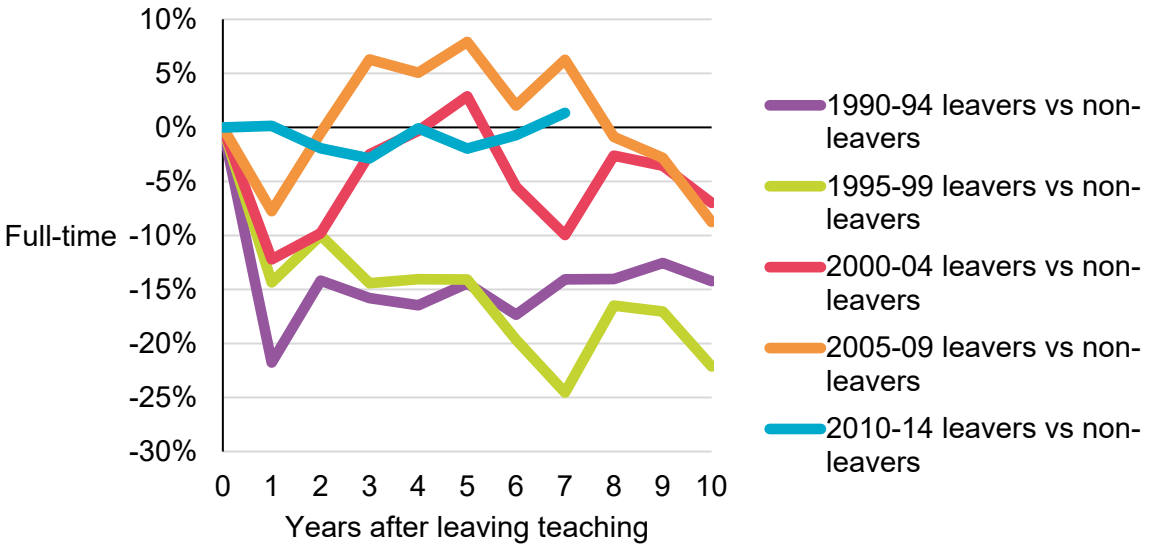


Source: NFER analysis of ASHE data.

Figure 11 plots the difference in net changes in the proportions working full-time between leavers and matched non-leavers, separately for teachers who left in different five-year periods between 1990 and 2014. The data shows that teachers who left in the 1990s had a high propensity to move from full-time to part-time working compared to matched non-leavers. The net proportion in full-time work decreased by between 15 and 20 per cent in the first year for those who left in the 1990s and remained between 15 and 25 per cent over the next ten years. In contrast, the net proportion in full-time work decreased by around ten per cent in the first year for those who left in the 2000s, began to increase, and then decreased once more to settle around five per cent after ten years. Finally, the net proportion in full-time work decreased by less than five per cent in the two years for those who left in the early 2010s and had recovered to about the same rate as matched non-leavers within a few years.

This suggests that the opportunities for part-time working in teaching may have improved over the last three decades and that a lack of part-time working opportunities may be a less important reason for why teachers leave now, compared to in the past.

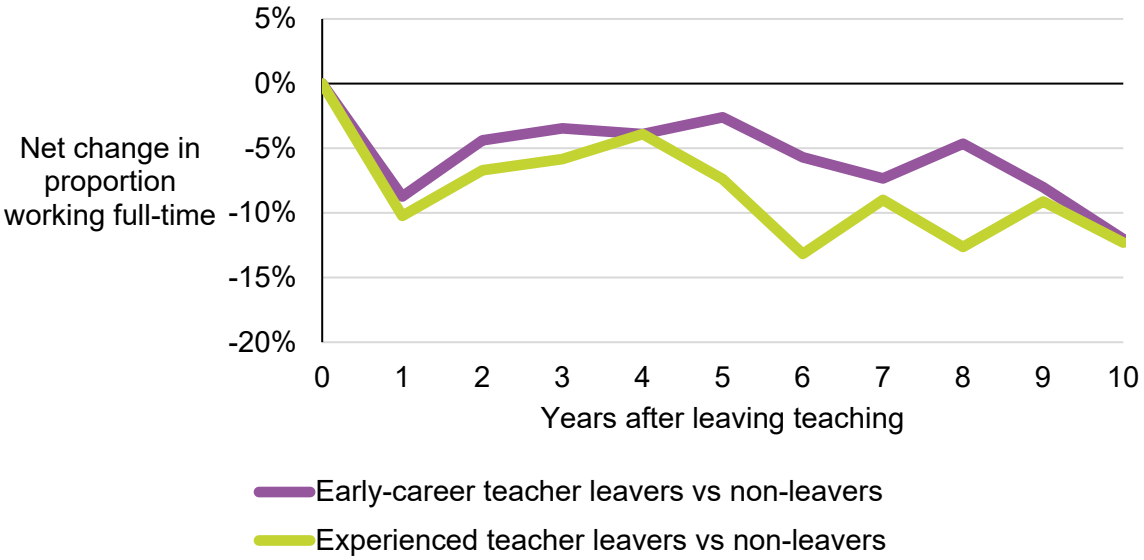
Figure 11 Teachers who left in the 1990s were more likely to move into part-time work relative to matched non-leavers, when compared to teachers who left in the 2000s or early 2010s



Source: NFER analysis of ASHE data.

Figure 12 shows the difference in net changes in the proportions working full-time between leavers and matched non-leavers, separately for early-career teachers who left and experienced teachers who left. The data shows that experienced teachers who left were more likely than early-career teachers who left to switch into part-time working after leaving teaching, compared to matched non-leavers. This suggests that the availability of part-time working opportunities is more of a factor affecting retention decisions for experienced teachers, perhaps due to managing childcare or other caring responsibilities, or a desire for phased retirement.

Figure 12 Experienced teachers who left were more likely to move into part-time work relative to matched non-leavers, when compared to early-career teachers



Source: NFER analysis of ASHE data.

2.5 Conclusions

Among the teachers who left state-sector teaching in England for another job, the most common type of destination was to work in the wider education and childcare sector. This included working as a teacher outside of schools (for example, as a tutor or for the local authority), outside England or in the private sector and also working in further or higher education, and childcare related occupation or as a teaching assistant.

Very few teachers who left worked in high-paying professional or managerial occupations outside education, either straight after leaving or ten years after. This finding raises a question about whether the pay level in other professions represents a valid benchmark for understanding the outside option for teachers who are considering whether to leave or stay. This is a theme we explore further in the sections that follow, particularly section 5.

Teachers who left also tended to change their working patterns, with greater movement from full-time into part-time work than movements the other way. This was particularly the case compared to a group of teachers with otherwise similar characteristics, but who stayed in teaching for the next ten years. The latter group was more likely to stay working full-time or to move from part-time into full-time work.

This seems to confirm the findings from previous research that one of the reasons why teachers may have left state-sector teaching was to change to a part-time working pattern, perhaps because they were unable to arrange part-time or flexible working as a teacher in a state school (Worth, et al., 2018). This may be particularly true for female teachers, who, in the long term, were

substantially more likely than males to transition to part-time work outside of teaching. However the ASHE data suggests that the association between leaving teaching and switching to part-time work has lessened considerably in the last decade, relative to the 1990s and 2000s.

3 How much do teachers earn after they leave teaching?

3.1 Key findings

In this section we look more closely at the earnings of teachers who left teaching and moved into another job outside of state-sector teaching in England. We also compare the earnings trajectories of otherwise similar teachers who did not leave with the earnings trajectories of those who left and explore differences in earnings trajectories for different types of teacher.

We find that, relative to their last year in teaching, the earnings of teachers who left teaching tended to increase in real terms after they left. However, when we compare the earnings trajectories of teachers who left with the earnings trajectories of otherwise similar teachers who stayed, we find that the teachers who left had lower subsequent earnings growth than those who stayed.

Underlying differences between the two groups, not least the difference in earning levels in the year before they left, means we should exercise some caution in interpreting these differences as the causal impact of leaving on earnings, relative to what they otherwise would have been. Nonetheless, the similarity in earnings growth rates before the leavers left and the similar non-leavers began a ten-year spell in teaching suggests the comparisons may be informative in indicating the earnings growth that leavers may have experienced if they had stayed.

The data suggests that, overall, even though the earnings of teachers who left teaching for another job continued to grow after they left teaching, they may well have been higher had they stayed. While this may suggest that pay is not a major factor for teachers' decisions about whether or not to stay, our results do not necessarily imply that retention is unaffected by changes to teachers pay.

There were some differences between different types of teachers who left in terms of their earnings trajectories compared to what they might otherwise have earned by staying as teachers. In particular, female teachers, primary teachers and experienced teachers faced a greater fall in their real earnings trajectory after having left, compared to similar non-leavers. This was true even after adjusting for those teachers moving to fewer hours of work. These differences are likely to be driven, at least in part, by moving into lower-paying occupations. It may suggest that these types of teachers have less lucrative outside options compared to male teachers, secondary teachers and early-career teachers.

3.2 Motivation

This section focusses on the question of how real-terms, full-time equivalent (FTE)-adjusted earnings for those who left teaching in the state sector in England for another job tended to evolve before and after they left teaching.

Previous research has shown that teachers who left experienced, on average, lower real-terms earnings once they moved into other occupations, but had increased job satisfaction (Worth *et al.*, 2018). This suggests that pay may not a primary factor in most teachers' decisions to leave

teaching and their decisions are instead driven by a multitude of reasons, including wanting to reduce stress and workload or to work flexibly.

However, previous research only measured the pay of ex-teachers for a few years after they left. Earnings outcomes in the long-term are equally as important to fully understanding teacher retention, as decisions about whether to stay or leave teaching may represent an *investment* in a new career. This investment may pay positive dividends, and therefore justify short-term pay decreases in the long-run if future earnings prospects are higher than in teaching.

As we are able to use the longitudinal ASHE data to measure the earnings and contracted working hours of teachers for many years after they leave teaching, we can further add to these previous findings by examining several key questions.

First, we examine the earnings trajectories of teachers who left teaching and moved into another job outside of state-sector teaching in England. We track earnings before and after leaving teaching to determine whether, relative to their last year of teaching, earnings tended to rise or fall after leaving. We assess whether this is any different in the long-term and whether there are significant differences in earnings trajectories for different types of teacher.

We then estimate the earnings growth of teachers who are otherwise similar in observed characteristics (i.e. gender, region, age, full-time status, etc. See section 3.4.1 for more detailed discussion) who did not leave and compare their average earnings trajectories with those who left. This serves as a counterfactual measure, to help determine whether earnings for leavers tended to increase or decrease relative to what their earnings may have been had they not left teaching.[10] We explore differences in how earnings of teachers who left evolved relative to earnings for similar teachers who did not leave in the short term and the long term, as well as any differences between types of teachers.

Key insights on these questions will add nuance to our understanding of teacher attrition and also set the stage for the analysis in section 4 of expected 'outside' earnings for teachers.

3.3 Earnings trajectories of teachers who leave for another job

3.3.1 Overall earnings trajectories for leavers, relative to teacher earnings

To determine how earnings change after leaving teaching for another job, we analyse the real-terms, FTE earnings of all teachers identified as having left teaching between 1990 and 2017.

In the analysis presented in this section we focus only on the data for teachers who left for other jobs outside of state-sector teaching in England. If a teacher returned to state-sector teaching in a subsequent year then we do not include their earnings data from their return spell to teaching within the analysis. To ensure that our comparison of earnings is based on leavers who are

[10] This matching process relies only on the variables we observe in the ASHE. As we note in section 3.4, other unobserved characteristics related to earnings growth and promotion prospects may confound this comparison, but the fact that earnings growth is relatively similar between non-leavers and leavers in the years prior to leaving (see section 3.4.1) suggests that the groups are comparable enough to offer broad insights into how leaving may be expected to affect earnings growth.

consistently working in a new job outside of teaching, we also exclude those who retire within ten years of leaving teaching, or those who we observe to be outside of employment for seven or more of the first ten years after leaving.

To simplify comparisons between teachers who leave teaching in different years, we define a reference year (denoted year zero) as the last year of teaching for all teachers who we can identify as having left. We then observe their earnings in their last three years of teaching and earnings in their new job up to ten years after leaving. For each leaver, we compute the percentage difference in earnings in each year (from two years before they left and up to ten years after they left), relative to their earnings in their last year of teaching.

Figure 13 shows how the average[11] earnings of teachers who left for another job between 1990 and 2017 has tended to evolve, relative to their earnings in their last year of teaching. The results suggest that, overall, the earnings of teachers who left tended to be higher in the first year after leaving than in their last year of teaching, and continued growing over time.

Earnings for teachers who left rose the fastest in the first year after leaving, where average FTE-adjusted earnings for leavers were about seven per cent higher in real terms than in their last year of teaching. A substantial amount of this earnings growth was driven by teachers who were relatively low-earning in their last year of teaching. Specifically, teachers whose earnings were in the bottom 25 per cent of all teacher earnings in their last teaching year experienced earnings growth of 15 per cent in their new job, compared to four per cent for teachers whose earnings were above the bottom 25 per cent (see Appendix C for the full series).

These relatively low-earning teachers consist largely of early-career teachers whose earnings before leaving are near the bottom of the pay scale and initially rise faster than those more experienced teachers with higher earnings (see section 3.3.2 for the full earnings trajectory of early-career teachers who leave). Indeed, the overall seven per cent average earnings growth one year after leaving teaching is roughly similar to the 7.3 per cent pay progression that early-career teachers outside of London would have experienced moving between the first and second spine points of the main teacher pay scale in the 2021/2022 academic year (DfE, 2021).

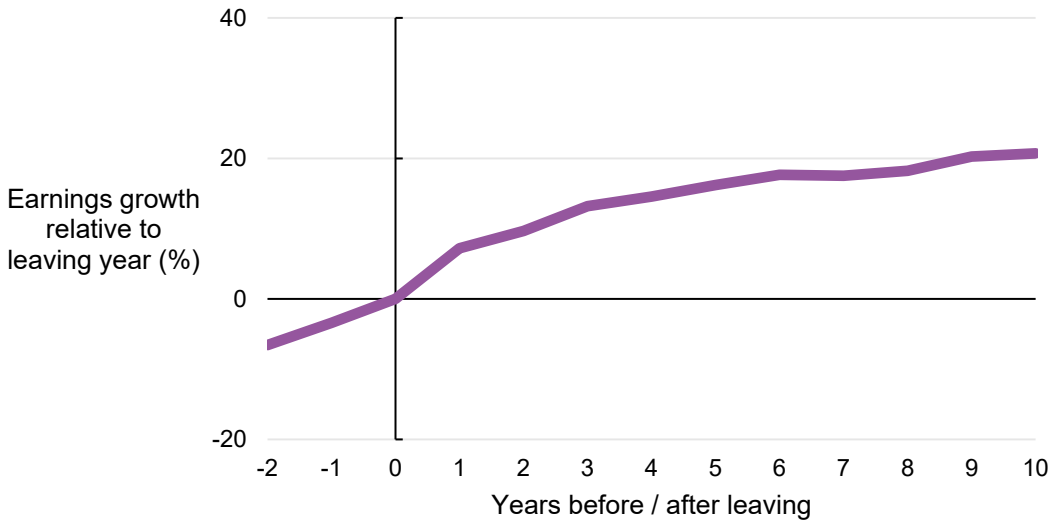
Relative to the last year before they left, earnings continued to grow in real terms in the ten years after leaving teaching, although not as quickly as in the first year after leaving. Three years after having left, overall average earnings of teachers who left were 13 per cent higher in real terms than their earnings in their last year in teaching, representing an average annualised growth rate of 4.3 per cent. Five and ten years after leaving, average earnings for leavers were 16 and 21 per cent higher than their earnings as teachers, representing average annualised rates of 3.2 and 3.0 per cent, respectively.

Unsurprisingly, leavers also tended to experience growth in their earnings prior to leaving teaching, as they received pay scale increases and progressed through the teacher pay scale. Specifically,

[11] We do observe a few instances of particularly large changes in earnings from year-to-year, which are likely due to coding errors in the data or extraordinary circumstances. To ensure our results are more representative of the average leaver, we exclude those observations of percentage earnings growth that are above the 99th percentile and below the 1st percentile of the distribution of earnings growth in each year.

soon-to-be leavers experienced an annualised percentage growth rate of around 3.3 per cent in the two years preceding the year that they left. This suggests that earnings growth in the first year after they left teaching was higher than in teaching, but the average earnings growth rate over the entire ten years after leaving tended to be fairly similar to the average growth rate while they were in teaching.

Figure 13 Earnings for teachers who leave tended to be higher after leaving, and continued to grow over time



Source: NFER analysis of ASHE data.

The data stands in seeming contrast to previous research, which showed that the earnings of teachers who left fell in the years after they left teaching for another job (Worth, *et al*., 2018). However, a few key factors may explain the difference between these results. First, previous research used data from the 2010s, which was a period marked by subdued wage growth across the economy and particularly in the public sector due to pay restraint. The ASHE data we use here also covers periods during the 1990s and 2000s, which saw real-terms pay growth across the economy, including for teachers.

Second, the previous research included teachers who moved into self-employment, whereas ASHE does not include earnings data for (or even identify) the self-employed.

Finally, the previous report also did not report earnings adjusted for full-time equivalence. We opt for adjusting the earnings for those working in part-time jobs for this analysis as it enables like-for-like comparisons for those that transition between full-time and part-time work. Thus, for the remainder of this report, in order to maintain comparability between full-time and part-time teachers, the FTE adjustment is included in all further earnings calculations. However, despite teachers who left tending to be more likely to move into part-time work, the FTE adjustment does not make a substantial difference to the earnings trajectories of teachers who left (see Appendix C for more discussion of this point).

3.3.2 Differences in earnings trajectories by teacher characteristics

Overall, while teachers appeared to earn more in their new job after having left teaching, there was considerable variation in the earnings trajectories of different types of teachers. Compared to the respective earnings in their last year of teaching, teachers who were working full-time[12] who left experienced earnings growth of 20 per cent five years after leaving and 23 per cent ten years after leaving.

In contrast, earnings for teachers working part-time when they left also rose after leaving teaching,[13] but at a slower rate than full-time teachers who left. Five and ten years after leaving, the average earnings of part-time teachers were four per cent and 12 per cent more than what they were earning as teachers, respectively. Unlike for full-time teachers who left, the earnings growth of part-time teachers who left was more sluggish.

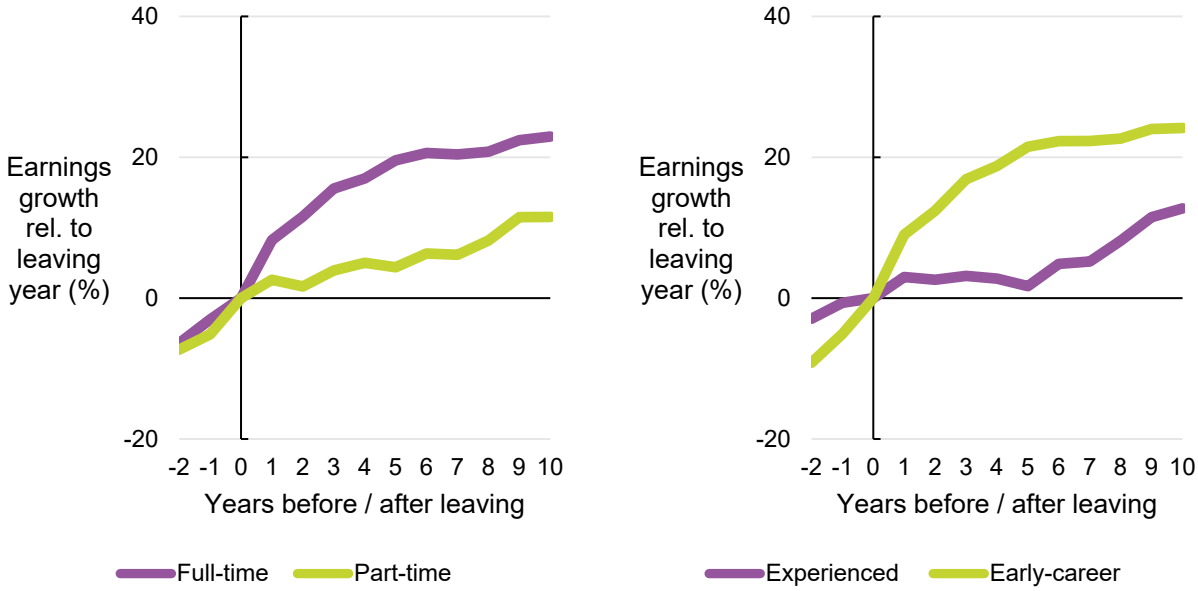
Early-career teachers who left state-sector teaching earned more in their new occupation than in their last year teaching, with real earnings rising by 9, 21, and 24 per cent in the first one, five and ten years after leaving, respectively. Early-career teachers, being less experienced, would have been lower on the pay scale than more experienced teachers when they left. Earnings growth for early-career teachers who left teaching flattens out substantially four to five years after leaving.

In contrast, earnings growth for experienced teachers who left was fairly flat initially. This likely reflects that more experienced teachers were higher up the teacher pay scale when they left and tended to move into jobs where their earnings were only marginally higher, on average, than their earnings as teachers. The earnings growth increased a little after around five years, however, such that earnings were two and 13 per cent higher than their earnings as teachers, five and ten years after leaving.

It is also worth noting that, even in the years before leaving teaching, earnings growth is higher for early-career teachers than for more experienced teachers. This suggests, unsurprisingly, that early-career teachers tend to move up the pay scales faster than more experienced teachers, and this rapid earnings growth tends to continue outside of teaching as the teacher leaves.

[12] These individuals were working full-time in their last year in teaching, but may have been working part-time before that or subsequently.
[13] The earnings for part-time teachers and those that transition into part-time jobs after leaving teaching, are scaled up to full-time equivalent so as to compare those whose hours changed after leaving.

Figure 14 Earnings growth for full-time and early-career teachers who leave teaching is higher than part-time and experienced leavers



Source: NFER analysis of ASHE data.

Figure 15 shows the earnings trajectories separately for primary and secondary teachers who left. The shape of both earnings trajectories is fairly similar for teachers who left both phases, although the earnings growth for secondary teachers is slightly higher from the third year onwards. This may reflect secondary teachers who left teaching being slightly more likely to move into relatively higher-paying occupations such as private-sector teaching and professional occupations, compared to primary teachers who left.

The data suggests that earnings for teachers in London who left rose at around the same rate as those outside of London during the ten years after leaving. Earnings growth for leavers in London was 15 and 17 per cent after five and ten years, compared to 16 and 21 per cent for non-London teachers.

The fact that earnings growth among teachers in London who left is not substantially different than non-London regions is somewhat surprising given the higher concentration of higher-paying jobs in the London labour market. However, these groups are defined by the region they were in when they left teaching, and teachers who left London may be disproportionately likely to have left for non-teaching jobs that were outside of London (Worth *et al.*, 2018). Such a move is likely to come with a reduction in earnings due, for example, to London weightings not being applied, but also to reduction in the cost of living. Therefore, the overall financial implications of leaving a teaching job in London may not be fully captured by this data.

Figure 15 Earnings growth for primary and secondary teachers, and London and non-London teachers were similar in the first five years after leaving

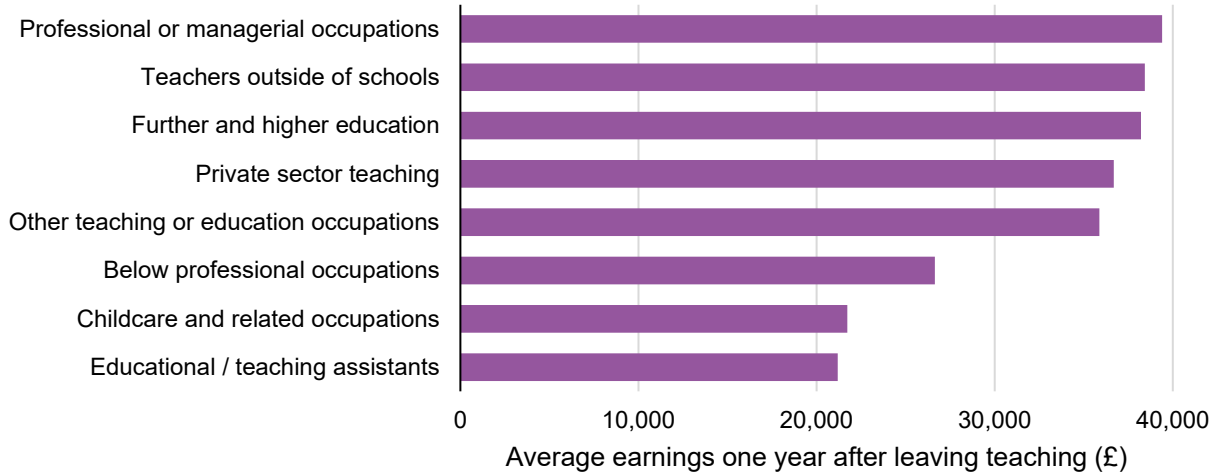
Source: NFER analysis of ASHE data.

3.3.3 Differences by destination occupation

As discussed in section 2, there are substantial differences in the occupations that different types of teacher tended to move into. For example women and early-career teachers were more likely to move into teaching assistant and below-professional occupations than male and experienced teachers, respectively. Typical earnings vary in the different types of occupations that teachers tend to move into, and therefore may be driving some of the patterns we see between different types of teachers in section 3.3.2.

In Figure 16, we show the average earnings one year after leaving for teachers who moved into each type of occupation. Those who moved into professional occupations after they left teaching tended to, on average, earn the most after having left, at around £39,000 (in FTE and real-terms). Average earnings for teachers who moved into further or higher education, professional, private-sector teaching and other education sector occupations also tended to be relatively high, with each at more than £35,000 one year after having left. Teachers who left for below-professional, childcare and teaching assistant occupations, meanwhile, tended to earn substantially less, with teaching assistant occupations having the lowest average earnings of £21,000.

Figure 16 Teachers who moved into professional, teaching outside schools, further and higher education and private-sector teaching occupations tend to earn more after leaving teaching than others



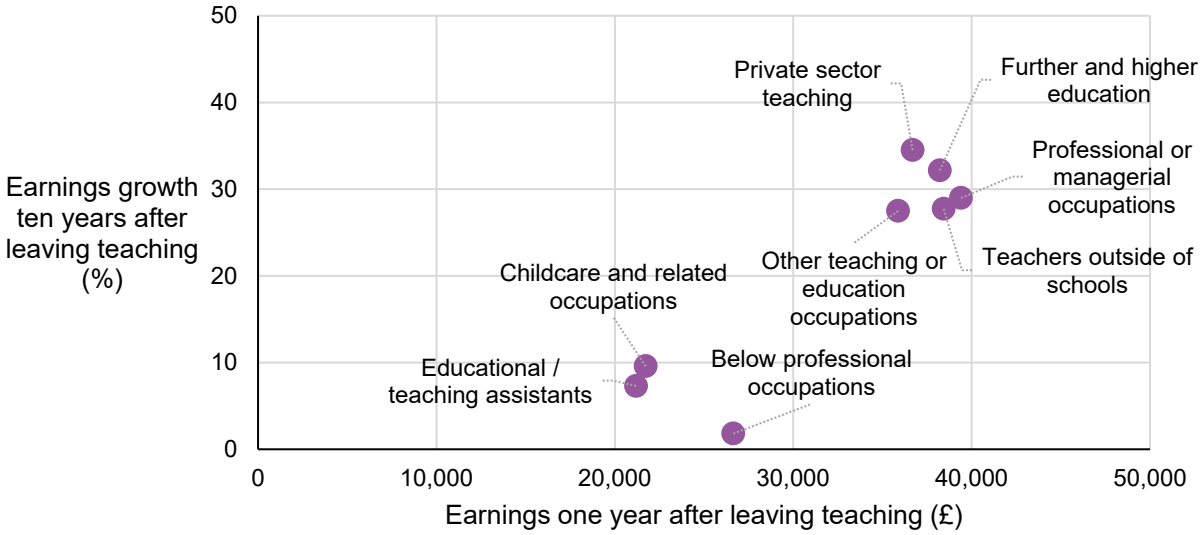
Source: NFER analysis of ASHE data.

Part of this gap is due to differences in experience. Teachers who moved into relatively low-paying occupations tended to be younger and have fewer years of experience than those who moved into professional and further or higher education occupations. Nonetheless, in Figure 17, we show how earnings one year after leaving (on the horizontal axis) is related to earnings growth ten years after leaving (on the vertical axis).[14] If gaps in age and experience are, initially, the reason why teachers who leave for below professional, childcare and teaching assistant occupations earn less, then we would expect to see relatively high earnings growth over time as these individuals gain experience.

Instead, we observe the opposite. The results suggest that teachers who transitioned into below professional, teaching assistant and childcare occupations experienced both relatively low earnings in the year after leaving and also relatively low earnings growth ten years after leaving, compared to other occupations. Those who transitioned into private-sector teaching, professional occupations, further and higher education and other teaching occupations not only earned more immediately after leaving teaching, but also experienced higher earnings growth ten years after leaving.

[14] Estimating earnings growth for teachers who left teaching and stayed in the same destination occupation category for ten years leads to sample sizes that are too small to be usable. Therefore, this average is based on the sample of teachers who left teaching in a given year, and were in a particular destination occupation ten years after leaving. Comparisons of earnings growth across destination occupational groups are imperfect as some teachers who left teaching switched between different destination occupations. However, while there was some movement over time between each of the occupation categories, occupational groups after leaving teaching were relatively stable over time. Specifically, the average teacher who was in a particular occupation ten years after leaving teaching had been in that same occupation for nearly half (four years) of all of the ten observed years after leaving.

Figure 17 Teachers who transition into professional, teaching outside schools, further and higher education and private-sector teaching occupations tend to experience higher earnings growth than others



The data suggests that the occupation into which a teacher enters after leaving teaching is important in determining how their earnings evolve over time. Different occupational choices therefore help to at least partially explain some of the differences in earnings trajectories we observe in section 3.3.2, particularly for full-time, early-career and secondary teachers who left.

3.4 Comparing the earnings of leavers and similar non-leavers

3.4.1 Defining 'similar' non-leavers

In section 3.3, we found that the average earnings of state-sector teachers who left teaching between 1990 and 2017 tended to increase after leaving for another job, compared to the earnings in their last year as a teacher. However, examining only the earnings growth for teachers who left for another job only tells part of the story.

A richer understanding of the benefits and opportunity costs for potential leavers requires comparing earnings growth for leavers to otherwise similar teachers who did not leave teaching. Given that real-terms earnings grew across the economy during much of the time period we are studying, we need to know how earnings for leavers evolved against what they *may have* been if the teacher had instead stayed in teaching.

In order to make this comparison, we estimate how the earnings of teachers who did not leave teaching evolved between 1990 and 2017. We define teachers who did not leave as those who began a ten-year uninterrupted[15] spell in state-sector teaching in England in any year between

[15] This includes teachers who experienced single missing ASHE survey responses, which could be short career breaks or survey non-response by the employer (see section 1 and Appendix B).

1990 and 2017.[16] As before, to simplify comparisons between teachers who begin a ten-year teaching spell in different years, we define a reference year (denoted year zero) to mark the beginning of a teaching spell.[17]

As we observed in section 3.3, average earnings and real earnings growth rates for teachers who leave teaching vary according to characteristics such as experience, region, phase, etc. Of course, this is true for teachers who do not leave teaching as well.

This means that comparing the overall average earnings growth for leavers and non-leavers involves comparisons between groups that may differ in their underlying characteristics. These differences may then drive differences in earnings growth, potentially making comparisons less meaningful for understanding teachers' decision-making.

Consequently, we estimate the average earnings growth of non-leavers separately across groups defined by the gender, phase, full-time status and region (aggregated to London versus non-London regions) variables. We then match each teacher who left to a group of non-leavers with the same characteristics, within the same year of ASHE data. This enables us to compare the earnings growth of, for example, male, full-time, primary, early-career teachers in London who left teaching in 2005 to the average earnings growth of male, full-time, primary, early-career teachers in London who then completed a ten-year teaching spell from 2005.

Even after matching on characteristics, however, there are still differences between leavers and non-leavers that make direct comparisons somewhat challenging. In particular, the earnings of teachers who left were lower than for otherwise similar teachers who do not leave. This suggests that teachers who eventually left tended to be earning less than other, similar teachers when they left teaching.

One example of how this may occur within our matching is matching early-career teachers who left with early-career teachers who stayed. We define early-career teachers as those within their first five years of teaching. Teachers are most likely to leave in their first year and become less likely to leave in subsequent years. Therefore, we may be disproportionately more likely to be matching first-year teachers who leave (and who tend to be earning less) with fifth-year teachers who stay (and who tend to be earning more).

There could also be other reasons for why leavers tend to earn less before they left than those who stayed, for example teachers who left feeling disaffected with teaching in the years before they left and being less likely to seek out career advancement, compared to seemingly similar non-leavers.

To partially resolve this, in addition to matching on teacher characteristics, we also restrict our comparisons of leavers and non-leavers to only leavers whose earnings in the year that they left is

[16] In order to avoid skewing the sample of non-leavers towards the earlier years in the sample, a teacher is still flagged as a non-leaver if they begin an uninterrupted spell in teaching after 2009 but do not complete ten years of teaching before the end of the ASHE panel time series in 2019.

[17] Teachers who undergo a teaching spell of more than ten years are marked as a non-leaver beginning a ten-year spell multiple times. However, their earnings growth would only be computed for the ten years following the beginning of a particular spell. For example, if someone was a teacher from 1992 to 2005, they would be identified as a non-leaver in 1992, 1993, 1994 and 1995. We would then calculate their earnings growth separately from 1992 – 2002, 1993 – 2003 etc.

not more than £10,000 away from the average earnings of the matched group of non-leavers. This substantially reduces, but does not eliminate, the average earnings gap in the years before leaving to be around 9 per cent in the year before leaving. We were unable to reduce this restriction any further as the sample size would be too small.

While the level of earnings between the two groups is somewhat different, the earnings trajectories (i.e. the growth rates of their earnings) prior to the group of leavers leaving teaching was very similar (as shown below). Therefore, while the difference in earnings levels gives some caution in interpreting the difference between leavers and similar non-leavers as the causal effect on the pay of leavers, the similarity in their pay trajectories before leaving gives some reassurance that comparing their trajectories after leaving is valid and provides some insight into the possible counterfactual.

3.4.2 Comparing leavers and similar non-leavers

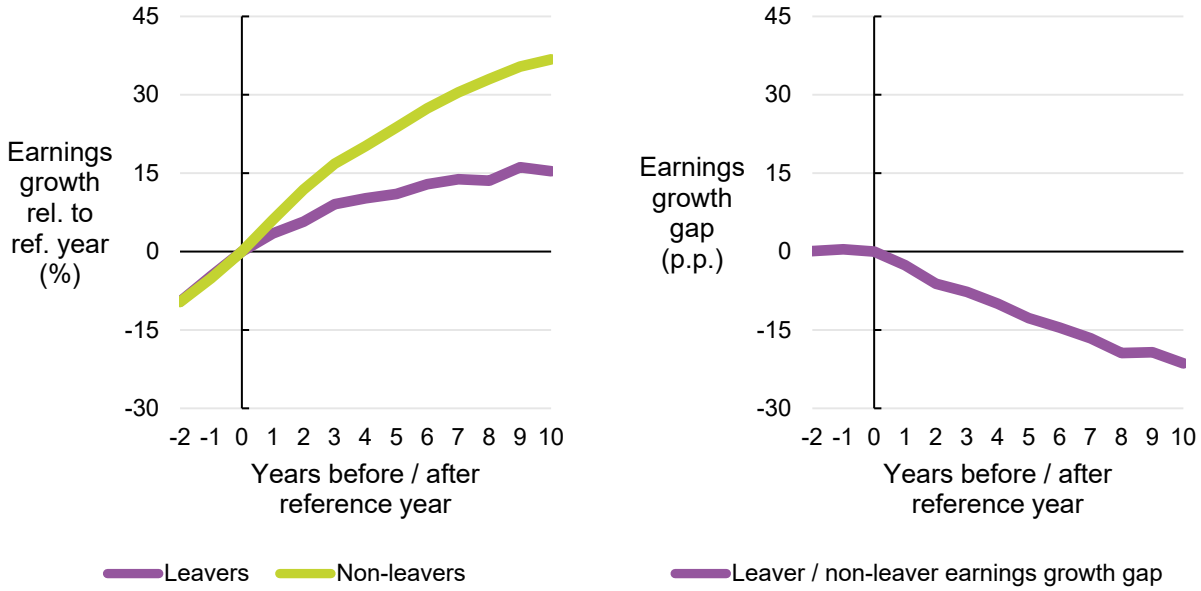
On the left panel of Figure 18, we separately plot the earnings growth of the sample of teachers who left and the earnings growth of the groups of similar non-leavers. All earnings growth estimates are relative to what individuals were earning in the year in which they either left (for leavers) or began a ten-year teaching spell (for non-leavers) and, as before, are in full-time equivalent and real terms.

The results indicate that earnings growth for matched leavers was lower than non-leavers. The earnings of leavers were three per cent higher one year after leaving, which was lower than the seven per cent growth in the unmatched sample as the matching put relatively less weight on over-represented early-career teachers in the leavers group.[18] This three per cent earnings growth for leavers was lower than similar non-leavers, whose earnings increased by about six per cent over the same period. The gaps widen further after more years: leavers were earning 11 and 15 per cent, respectively, five and ten years after having left teaching, compared to similar non-leavers who were earning 24 and 37 per cent higher, respectively.

In the right panel, we plot the percentage point difference in growth rates between leavers and similar non-leavers. As average earnings growth for similar non-leavers was higher than leavers, this ‘gap’ measure is below zero after the reference year, which reflects higher earnings growth for those teachers who stayed in the profession.

[18] In addition, due to the imposed restriction that earnings between the matched groups must be within £10,000 of each other, we excluded those in the bottom percentiles of the earnings distribution for teachers who leave who tend to experience relatively high earnings growth after leaving (see section 3.3), reducing our estimate of earnings growth.

Figure 18 Earnings growth of teachers who left for another job was lower than otherwise similar teachers who did not leave



Source: NFER analysis of ASHE data.

Figure 18 shows that the gap in growth rates between leavers and non-leavers was virtually zero both one and two years before leaving, meaning that, before leaving, earnings for teachers who left grew at the same rate as similar teachers who did not leave.[19] As noted above, this is an important reassurance that the outcomes of the two groups are somewhat comparable after time point zero, as there was no difference in their trajectories prior to leaving (even though there were differences in earning *levels* prior to leaving).

The data therefore suggests that, overall, even though the earnings of teachers who left teaching for another job continued to grow after they left teaching, they may well have been higher had they stayed. However, while this may suggest that pay is not a major factor for teachers' decisions about whether or not to stay, it does not imply that changes to teachers pay would have no effect on retention. The findings could imply that teachers who leave may be willing to sacrifice a lower earning trajectory in return for other benefits, which may include a more manageable workload or better opportunities for part-time or flexible working. However, everything else equal, an increase in teacher pay may still encourage some teachers to consider staying when weighed up against the relative merits of all the other factors influencing a decision of whether to leave or stay.

[19] This was true across each five-year span of time periods of our analysis (i.e. 1990-1994, 1995-1999, etc.)

3.4.3 Earnings growth gaps by teacher characteristics

Earnings growth gaps between teachers who do and do not leave also vary by different teacher characteristics. As in section 3.3.2, we plot these differences, where negative values indicate that earnings growth for leavers is less than that of similar non-leavers in real terms and positive values indicate leavers having higher earnings growth compared to similar non-leavers. Comparing between two different types of teacher, an earnings gap in one group that is higher in magnitude (or 'more negative') than another suggests that earnings for leavers in that group fell further relative to similar non-leavers.

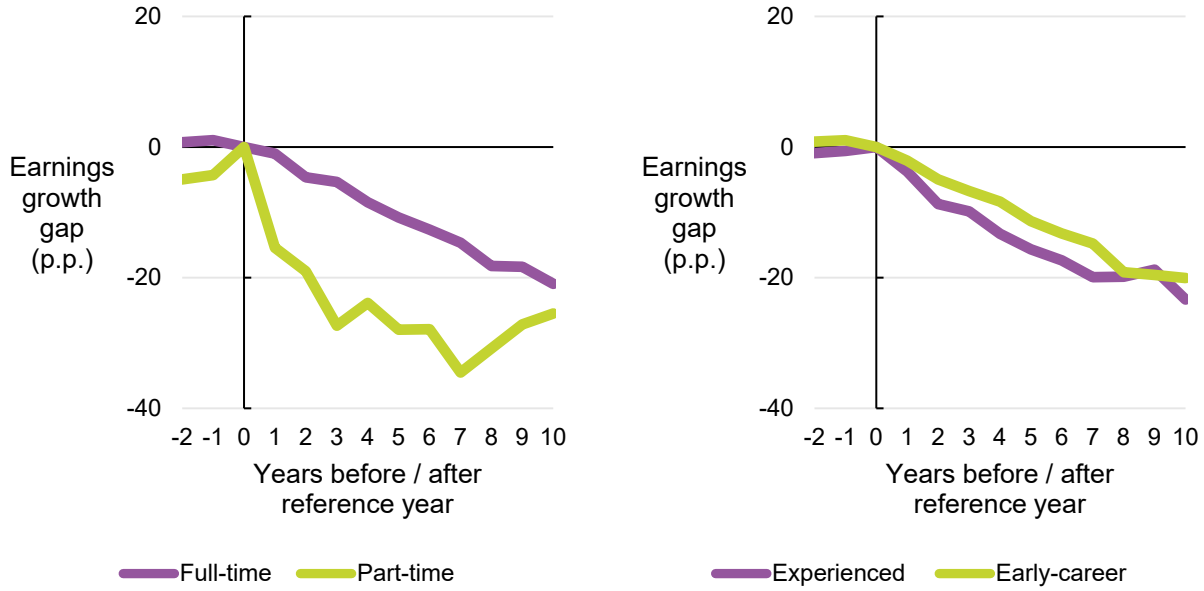
Figure 19 shows the percentage point differences between leaver and non-leaver earnings growth, separately for full-time and part-time teachers (left panel) and early-career and experienced teachers (right panel). The earnings gap for both part-time and full-time teachers who left teaching was negative and, increased in magnitude over time, meaning that earnings for both part-time and full-time teachers who left teaching were lower than similar non-leavers over the ten years after they left.

The earnings of part-time teachers who left fell significantly more relative to similar non-leavers than full-time teachers, and this was true for each of the ten years after leaving.[20] This is likely to be driven by part-time teachers who left being more likely than full-time teachers to move into lower-paying occupations (as shown above). However, these occupational choices meant that, while earnings growth for both full-time and part-time teachers fell relative to similar non-leavers, earnings for part-time leavers had fallen about 14 percentage points more relative to non-leavers than full-time teachers. This difference remained roughly consistent for about the first seven years after leaving.

In section 3.4.1 we showed that the earnings growth of all teachers who left and similar non-leavers were virtually identical before leaving teaching, which means that we can have some confidence that earnings growth gaps that emerge after leaving can be interpreted as related to the earnings they might have expected if leavers had stayed. However, in the case of part-time teachers, the gap in earnings growth in the two years before leaving is negative (about -5 and -4 percentage points two and one year(s) before leaving. Some caution should therefore be exercised in interpreting these earnings growth gaps as this suggests that, the earnings growth of part-time teachers who left was already on somewhat different trends from part-time teachers who stayed.

[20] To reiterate, this estimate measures changes in real terms, FTE-adjusted earnings, which account for lower hours worked in part-time jobs.

Figure 19 Earnings growth relative to similar non-leaver teachers is lower for part-time and experienced teachers who leave



Source: NFER analysis of ASHE data.

The data shows that the earnings of early-career teachers who left teaching decreased relatively less than experienced teachers who left teaching. Within one year of leaving teaching, earnings growth relative to similar teachers who did not leave had declined by about two percentage points more for experienced teachers than early-career teachers. This difference then increased to about four percentage points and remained roughly constant until about eight years after leaving.

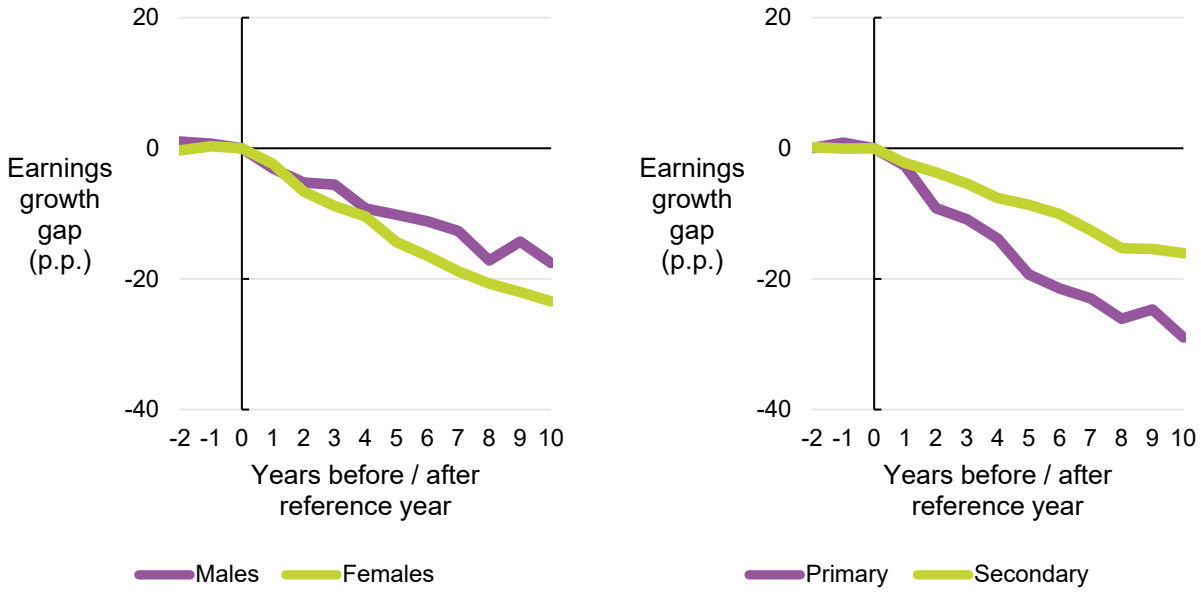
The data suggests that both early-career and experienced teachers who left may have had higher earnings if they had stayed, compared to what they earned after they left. Indeed, it suggests that experienced teachers may face a slightly higher earnings penalty from leaving, perhaps due to their higher earnings as teachers, and greater difficulty in earning similarly if they switch careers.

Figure 20 shows similar patterns between teachers of different gender (left panel) and in different phases (right panel). After leaving teaching, both men and women tended to earn less in their new occupations than they likely would have done as teachers, with a similar earnings growth gap in the first two years after leaving. Within the next several years, differences in the earnings growth gap began to emerge between the genders. Five years after leaving, earnings growth for female teachers who left teaching relative to similar non-leavers was about four percentage points less than male teachers, and about six percentage points less by ten years after leaving. This difference is likely to be linked to women tending to be more likely to move into occupations that are lower-paying, as shown above.

Similar patterns are observed for relative earnings growth gaps between primary and secondary teachers who left. In the first year after leaving, earnings growth relative to similar non-leavers is the same for primary and secondary teachers. After the first year however, earnings growth relative to similar non-leavers begins to favour secondary teachers, by 10 and 13 percentage points five

and ten years after leaving. As with female teachers who leave, this is also likely due to primary teachers having the tendency to transition into relatively lower-skilled and lower-paying occupations.

Figure 20 Earnings growth relative to similar non-leaver teachers is lower for female and primary teachers who leave



Source: NFER analysis of ASHE data.

In Figure 21, we also find that region (left panel) and whether the teacher left during an economic downturn[21] influence how earnings for teachers who leave teaching evolve over time, though considerably less than other demographic characteristics.

The earnings growth gap relative to similar non-leavers was roughly the same for London teachers as teachers outside London. Teachers who left teaching in London experienced roughly the same earnings growth relative to similar non-leavers than in other areas.

[21] For the purposes of this project, our definition of an economic downturn is a year in which the annual unemployment rate rose above its five-year rolling average. (See Appendix A).

Figure 21 Earnings growth relative to similar non-leaver teachers is slightly lower for non-London teachers five years after leaving; the wider economic environment has little impact on earnings growth

Source: NFER analysis of ASHE data.

In a similar vein, we found that teachers who left teaching during an economic downturn tended to experience roughly the same earnings growth after leaving to similar non-leavers, as compared to teachers who left outside of a downturn. This suggests that, overall, conditions in the outside labour market appear to have only a small effect on the earnings trajectories for teachers who leave teaching, and any effect that exists is short-lived.

However, we might expect that, all else equal, when jobs outside of teaching were relatively abundant, more teachers would leave the profession and vice versa. Indeed, this is what is observed in the data as, over the last 30 years, the rate of teachers who either left the workforce or moved to a job outside teaching each year was about five percentage points higher on average during the years outside of an economic downturn than during a downturn (18.5 per cent compared to 13.5 per cent).[22] Therefore, while the overall macroeconomic context seems to have only a small effect on the earnings trajectory for teachers who leave the profession, it remains likely to have a bearing on the *availability* of outside opportunities and therefore be a factor affecting the decision of whether or not to leave.

[22] The years considered to be in an economic downturn are 1992-1994 and 2009-2013.

3.5 Conclusions

In conclusion we find that, relative to their last year in teaching, the earnings of teachers who left teaching tended to increase in real terms after they left. However, when we compare the earnings trajectories of teachers who left with the earnings trajectories of otherwise similar teachers who stayed, we find that the teachers who left had lower subsequent earnings growth than those who stayed.

Underlying differences between the two groups, not least the difference in earning levels in the year before they left, means we should exercise some caution in interpreting these differences as the causal impact of leaving on earnings, relative to what they otherwise would have been. Nonetheless, the similarity in earnings growth rates before the leavers left and the similar non-leavers began a ten-year spell in teaching suggests the comparisons may be informative in indicating the earnings growth that leavers may have experienced if they had stayed.

The data suggests that, overall, even though the earnings of teachers who left teaching for another job continued to grow after they left teaching, they may well have been higher had they stayed. While this may suggest that pay is not a major factor for teachers' decisions about whether or not to stay, it does not imply that changes to teachers pay would have no effect on retention.

There were some differences between different types of teachers who left in terms of their earnings trajectories compared to what they might otherwise have earned by staying as teachers. In particular, female teachers, primary teachers and experienced teachers faced a greater fall in their earnings trajectory after having left, compared to similar non-leavers. These differences were likely to be driven, at least in part, by moving into lower-paying occupations. It may suggest that these types of teachers have less lucrative outside options compared to male teachers, secondary teachers and early-career teachers.

4 Defining a measure of teacher relative 'outside' earnings

4.1 Key findings

Teacher pay is often benchmarked to earnings in other professional, graduate occupations to assess its competitiveness. However, our findings from section 2, indicate that the vast majority of teachers who leave teaching for another job do not move into professional or managerial occupations outside of teaching, which raises a question about whether the pay level in other professions represents a valid benchmark for understanding the 'outside option' for teachers who are considering whether to leave or stay.

We derive a new measure of outside pay for teachers, which is designed to measure what a teacher who left for another job typically earned, and how this changed over time between 1991 and 2020. We draw comparisons between changes in teacher pay and changes in this benchmark to assess the changing competitiveness of teacher pay compared to what teachers might earn outside of teaching. We also draw comparisons between changes in teacher pay and changes in professional pay, as this is a conventional benchmarking approach.

The findings suggest that benchmarking teacher pay against professional pay leads to some similar findings to benchmarking teacher pay against the type of occupations teachers tended to actually move into when they left. Both benchmarks suggest that the relative competitiveness of teacher pay rose during the period before the 2008 recession and that it has fallen during the 2010s, as a likely result of public sector pay caps. Both measures also suggest that the relative competitiveness of early-career teacher pay has fallen over the last three decades.

However, benchmarking teacher pay against outside pay rather than professional pay also highlights some slight differences in conclusions, particularly for specific sub-groups of teachers. Our measure of outside pay suggests that the competitiveness of pay for experienced teachers over the last decade has been higher in the 2010s than it has been in other periods and has not deteriorated as a result of the public sector pay restraint, as much as for other groups. These findings may provide some evidence in support of targeting a greater share of finite fiscal resources towards improving early-career teacher pay, to improve its competitiveness and early-career retention, and targeting less at increasing experienced teacher pay, due to its relatively high competitiveness compared to outside pay.

4.2 Motivation

Teacher pay is often benchmarked to earnings in other professional, graduate occupations to assess its competitiveness. Setting pay at a competitive level is important for attracting and retaining sufficient numbers of teachers. From the perspective of considering the attractiveness of teaching to potential recruits into the profession, benchmarking teacher pay to pay in professional, graduate occupations is sensible as it best represents the alternative pay option available to those who are considering teaching alongside other professional career routes.

However, our findings from section 2 indicate that the vast majority of teachers who leave teaching for another job do not move into professional or managerial occupations outside of teaching. Most

teachers who left for another job moved into jobs in the wider education sector, or into jobs outside of education that were below professional level.

This therefore raises a question about whether the pay level in other professional occupations represents a valid benchmark for understanding the outside option for teachers who are considering whether to leave or stay. However, since benchmarking pay in order to understand competitiveness remains an important part of informing decisions on setting the teacher pay structure, the use of pay in other professions should not be abandoned without a clearly superior alternative.

In this section we combine results from sections 2 and 3, to introduce a new benchmark measure of teachers' 'outside' earnings that is based on the occupations that teachers actually tend to move into when they leave teaching for another job. It therefore should better represent the level of earnings that the average teacher who leaves teaching may anticipate earning and thus be more closely tied to the opportunity cost for teachers of staying in the teaching workforce.

4.3 Methodology

Our measure of outside pay for teachers is designed to measure what a teacher who left for another job typically earned, and how this changed over time between 1991 and 2020. The measure is constructed by calculating the earnings that correspond to the type of occupation teachers who left tended to move into, at the position in the earnings distribution for their new occupation that teachers tend to moved into, weighted by the frequency with which teachers tended to move into that type of occupation.

As an artificial example, consider state-sector teachers in England who move into a job in private-sector teaching between 1995 and 2005. Perhaps, in this time period, immediately after transitioning into private-sector teaching, the median teacher making this transition tended to find themselves earning at the 40th percentile of the overall earnings distribution for private-sector teachers, and transitions into private-sector teaching accounted for 10 per cent of all of the transitions out of state-sector teaching into other jobs. Outside pay for this occupational transition would then consist of the earnings at the 40th percentile of the overall earnings distribution for private-sector teachers, weighted by 10 per cent.

Performing the same steps across each of the post-transition occupational groups[23] and summing the weighted, percentile earnings estimates together yields our final estimate of outside pay. See Appendix D for a formalisation of these steps. We then replicate this procedure across each year of data from 1991 to 2019, which illustrates how expected earnings in the occupations teachers leave teaching for has evolved over time.[24]

[23] As a sensitivity check, we re-generated these measures using different post-transition occupational groupings, in particular splitting out professional and non-professional occupations into more granular categories, but it was not found to substantively change the results.
[24] We calculate the components of the measure (the weights and percentiles) as ten-year moving averages. That is, to calculate outside pay in the year 2000 for example, we calculate the average occupational group frequencies and median percentiles between 1995 and 2005. This is to ensure we have adequate sample

We also calculate a measure of average earnings in professional occupations, as it is often currently used for benchmarking. [25]

4.4 Results

4.4.1 Overall time series of teacher pay and outside pay

Figure 22 shows data from the three measures of pay: average teacher pay (green line), average professional pay (blue line) and our new 'outside pay' measure (purple line) described above. The new 'outside pay' measure measures the pay of a typical teacher who left for another job in the type of job they left to do in the first year after leaving.

It is important to emphasise that the underlying populations of each of these series is different. The teacher pay series describes the real-terms FTE pay of the average teacher and the professional pay series describes the real-terms FTE pay of the average professional. The two series have not been adjusted for other underlying differences in characteristics, such as age or experience profile, gender or geographical region. For example, teachers are more likely to be female, and professionals more likely to be concentrated in London and the south east of England. We should therefore be very cautious about deriving any meaning from comparing the *levels* of these series.

Similarly, the outside pay measure describes the real-terms FTE pay of the average teacher who left for another job, in their new job the year after leaving. The characteristics between this group and the average teacher in the workforce are also very different: teachers who left for another job were likely to be less experienced than the average teacher, and therefore earning less than the average teacher when they were a teacher and a year later in their new job. Again, this means we should be very cautious about comparing the *levels* of these series. It certainly does not imply that the average teacher who left would experience a drop in pay equivalent to the size of the gap between teacher pay and outside pay. Indeed, section 3 has clearly demonstrated that this is not the case.

A key point to note from the data shown in Figure 22 is that all three series tend to change together over time. All three series were fairly flat through the mid-1990s, rose during the late 1990s and 2000s, and fell after 2010. The correlation between each of the three series is around 0.97, so they are almost identical in broad shape. This implies that the state of the wider economy is the most important factor driving pay changes, irrespective of which measure of outside pay is used to compare with teacher pay.

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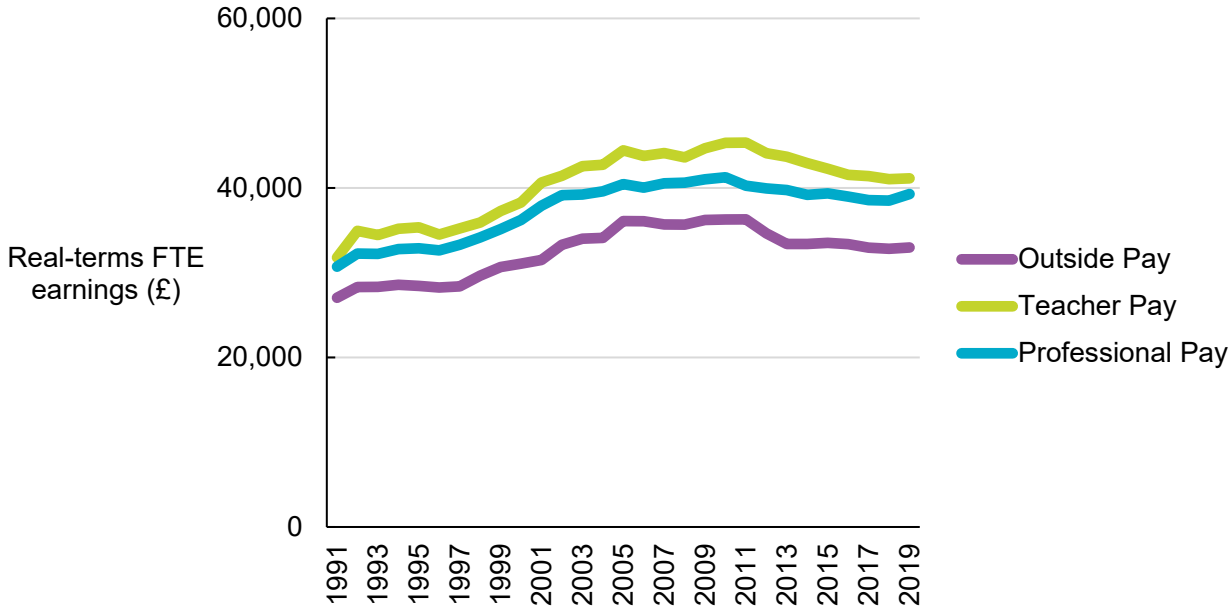
sizes, to account for differences in transition rates and pay for teachers who leave over the years, and also to account for changes in SOC code definitions (for example, we are unable to distinguish private-sector teachers from state-sector teachers prior to 1996.)

[25] Professional occupations are those occupations which fall into Group 2 of the nested SOC structure. Due to inconsistencies in classifying professional occupations before and after changes in SOC code definitions, we set the list of professional occupations to be with respect to professional occupations in the 2010 SOC. That is, we include some non-Group 2 occupations in the grouping of professional occupations if, among those in the same job before and after a code set change, large numbers of individuals are identified as being in a professional occupation after the change. Our benchmark of professional earnings is calculated as annual averages of earnings for all individuals in occupations deemed to be professional by this criteria.

Figure 22 Teacher pay, professional pay and our new measure of outside pay follow very similar trends between 1991 and 2019



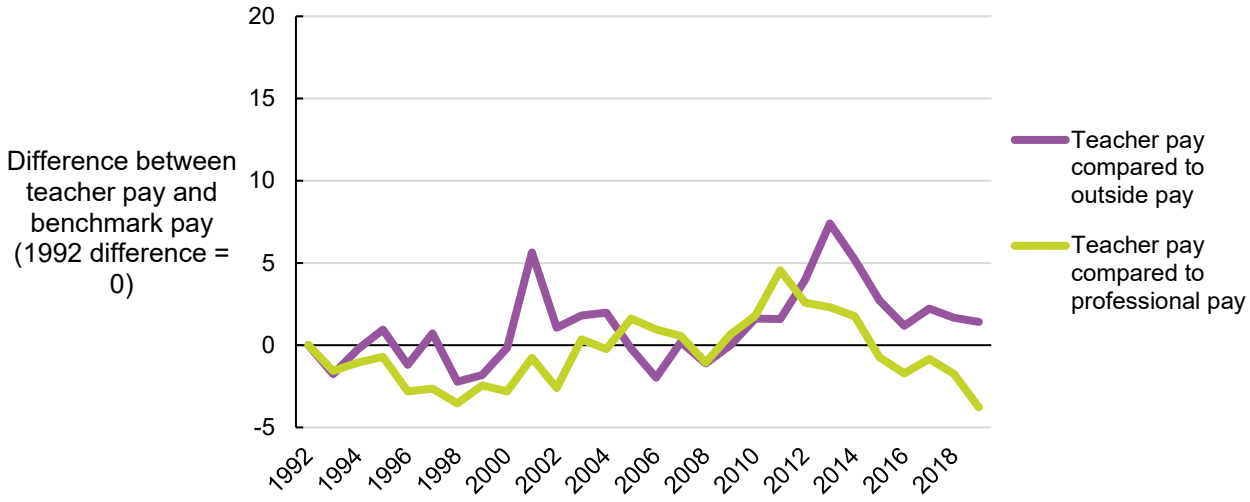
Source: NFER analysis of ASHE data.

In Figure 23, we plot the difference between the teacher pay and outside pay series, and the difference between the teacher pay and professional pay series. As discussed above, the levels of the three series are different but this is likely to be driven at least in part by differences in composition. In Figure 23, we therefore set the two series showing the difference between teacher pay and the two benchmark measures to be zero in 1992[26]. This focuses us on how the series *change* over time relative to one another.

A value above zero means that the average pay of a teacher has risen, compared to the benchmark measure of pay. This suggests that it may have risen in competitiveness relative to the benchmark, compared to 1992. In contrast, a negative value means that, relative to 1992, the competitiveness of teacher pay compared to that benchmark is lower.

[26] We exclude data from 1991 as it coincided with a significant change in codesets and, as shown in Figure 22, a resulting 'spike' in teacher pay in the following year.

Figure 23 The relative competitiveness of average teacher pay compared to the two benchmarks appears to have risen slightly in the 1990s and 2000s, before falling during the 2010s



Source: NFER analysis of ASHE data.

The data shows that the trends in the differences between teacher pay and the two benchmarks are relatively similar. They are both fairly flat, having not substantially deviated over the last thirty years. However, some trends are apparent, including the slight increase in the difference between teacher pay and professional pay (relative to the size of the difference in 1992) in the late 1990s and 2000s. This was a period of above-inflation increases to teacher pay alongside increases in school funding by the Labour government.

The same pattern is less clear in the difference between teacher pay and our measure of outside pay. There is a noticeable spike in the data in 2001, which is most likely to be due to a change in occupation codes that occurred in 2001. We attempted to smooth the impacts of codeset changes on the measures in our analysis, but it was not entirely possible to maintain complete consistency due to changes in definitions. Indeed, both series are somewhat bumpy throughout, suggesting that since they are based on samples from surveys, they are subject to a degree of statistical 'noise'.

Another noticeable pattern in both series is the fall in the differences between teacher pay and the two benchmarks after 2010. This was a period of public sector pay restraint following the 2008 recession, which led to teacher pay freezes and later below-inflation caps on pay growth. Other research has identified that average teacher pay has become less competitive compared to professional pay during the 2010s (STRB, 2020; Worth and Faulkner-Ellis, 2021).

This is confirmed by both differences between teacher pay and the two benchmarks, although the fall in the difference between teacher pay and outside pay starts later, from around 2013. As shown in Figure 22, this was due to real-terms 'outside pay' falling faster than teacher pay from 2011 to 2013. As there were no major codeset changes around this period, this may suggest that pay in the wider education sector (where most teachers who left moved to – as explained in

section 2) was even more adversely affected by the aftermath of the recession than teacher pay, at least during the early part of the decade.

4.4.2 Differences in relative teacher pay by teacher characteristics

We explore the differences between teacher pay and both benchmarks of outside pay, split by different teacher characteristics. We focus on two key areas of particular relevance for setting pay: region (as London has a set of different pay scales to the rest of England) and level of experience (as early-career teachers tend to be on the main pay range, while more experienced teachers tend to be on the upper pay range and above).

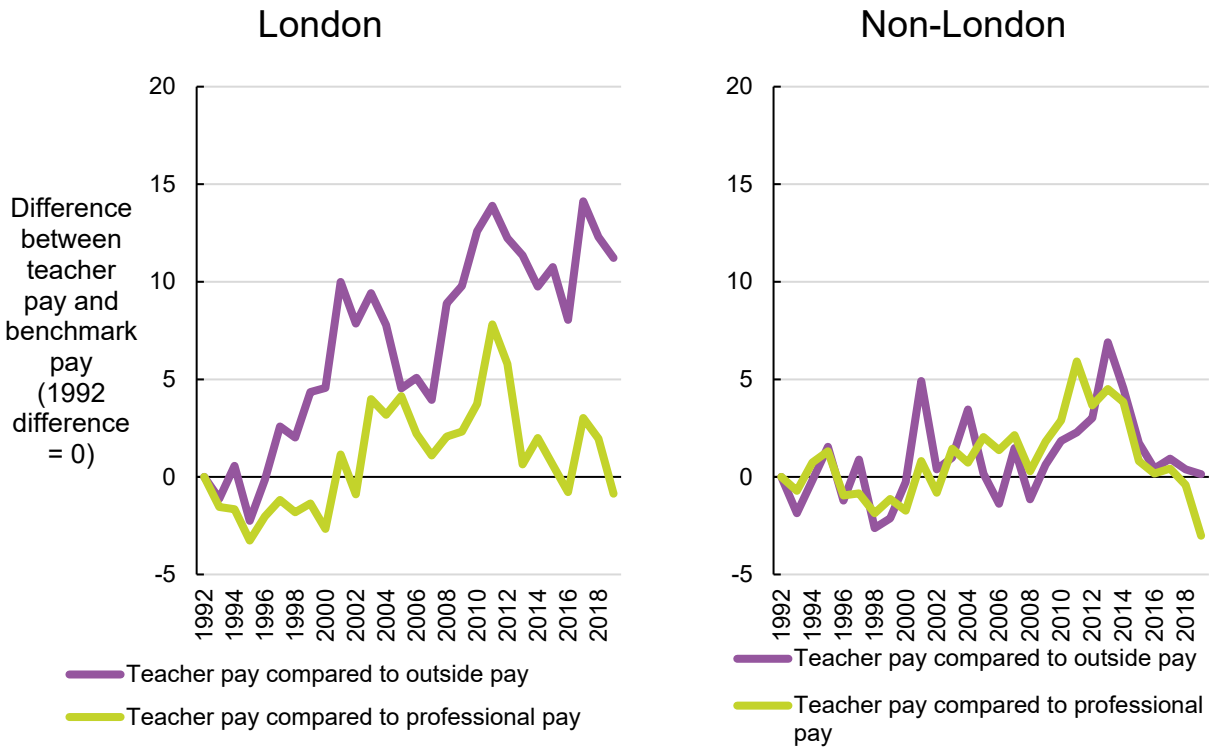
The measure of teacher pay is the median pay of teachers among that group and the professional pay is the median within that group (for example, the professional benchmark for early-career teachers is the pay of individuals who are in a professional occupation and have been in any professional occupation for less than five years). The measure of outside pay is also tailored to that group, representing the type of occupations that teachers from that group typically enter after having left and the pay level they experienced when they entered that new occupation.

Again, where we take the difference between the two series (e.g. teacher pay and a specific benchmark) we set the difference to be zero in 1992. This is because any difference in *levels* is likely to be driven by compositional difference, and is of little relevance to this assessment of relative competitiveness over time. A value above zero means that the average pay of that type of teacher has risen, compared to the benchmark measure of pay and relative to the difference between teachers and the benchmark in 1992.

Figure 24 shows the differences between teacher pay and the two benchmarks over time for London (left panel) and non-London teachers (right panel). The difference between teacher pay and professional pay in London appeared to rise during the 2000s, before falling during the 2010s. The level of difference in recent years is similar to the level of difference in the 1990s, suggesting that teacher pay is no more or less competitive than professional pay in London than it was in the 1990s. However, the difference between teacher pay and outside pay in London rose by more over time up until 2010, after which it stayed roughly constant. In contrast to benchmarks against professional pay, this suggests that the pay of London teachers in the 2010s appears to be more competitive than it was in the 1990s, based on occupations that London teachers actually tended to move into when they left.

The differences between teacher pay and both benchmarks for teachers outside of London are broadly flat through the last three decades. Overall, the level of difference between teacher pay and both benchmarks for teachers outside of London appears to be similar in recent years compared to the level of difference in the early 1990s. As in London, differences between teacher pay and both benchmarks fell during the 2010s, reflecting the general fall in the competitiveness of teacher pay due to public sector pay caps. The data suggests that the competitiveness of teacher pay outside London is relatively similar compared to what it was two decades ago.

Figure 24 The pay of London teachers appears to have been more competitive in recent years compared to the 1990s, when compared to an 'outside' pay benchmark

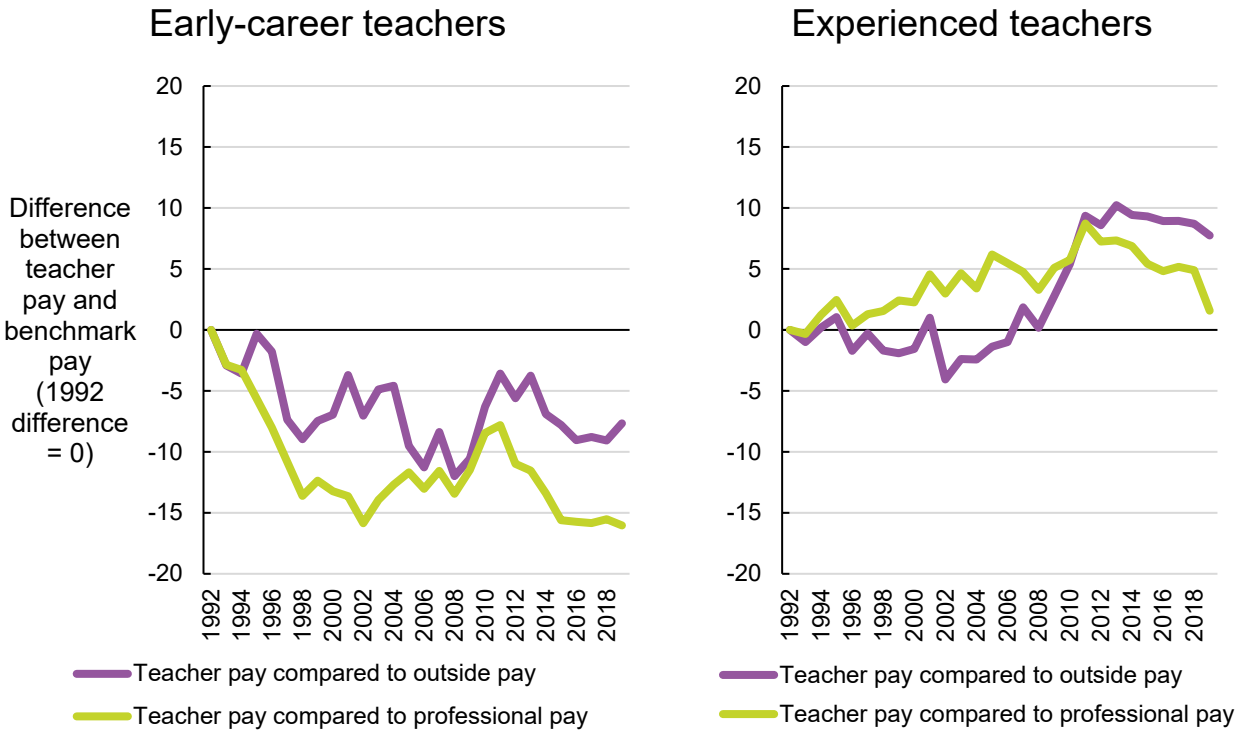


Source: NFER analysis of ASHE data.

Figure 25 shows the differences between teacher pay and the two benchmarks over time for early-career teachers (left panel) and experienced teachers (right panel). The difference between teacher pay and both benchmarks for early-career teachers appears to be lower in recent years compared to the level of difference in the early 1990s and similar to the level in the 2000s. Differences between teacher pay and both benchmarks fell during the 2010s, reflecting the general fall in the competitiveness of teacher pay due to public sector pay caps. The data suggests that the competitiveness of pay among early-career teachers is relatively low compared to what it was two decades ago, particularly compared to professional pay but slightly less so compared to outside pay.

In contrast, the difference between teacher pay and outside pay among experienced teachers appeared to rise in favour of teacher pay between the mid-2000s and 2013 and remained higher than the level of difference in 1992 during the 2010s. The difference between teacher pay and professional pay among experienced teachers also rose over time up until 2010, before it fell during the 2010s. Both measures appear to suggest that the competitiveness of experienced teacher pay has fallen in recent years, especially compared to professional pay. However, it also suggests that the competitiveness of experienced teacher pay is relatively high compared to what it was two decades ago, especially for outside pay.

Figure 25 Early-career teacher pay appears to have been less competitive in recent years compared to the 1990s, according to comparisons with both benchmarks



Source: NFER analysis of ASHE data.

4.5 Conclusions

Taken together, these findings suggest that benchmarking teacher pay against professional pay leads to some similar findings to benchmarking teacher pay against the type of occupations teachers tended to actually move into when they left. Both benchmarks suggest that the relative competitiveness of teacher pay rose during the period before the 2008 recession and that it has fallen during the 2010s, as a likely result of below-inflation public sector pay caps. Both measures also suggest that the competitiveness of early-career teacher pay has fallen over the last three decades.

However, benchmarking teacher pay against outside pay rather than professional pay also highlights some slight differences in findings, particularly for sub-groups of teachers. Our measure of outside pay suggests that the competitiveness of experienced teachers over the last decade has been higher in the 2010s than it has been in other periods and has not deteriorated as a result of the public sector pay restraint, as much as for other groups.

These findings may provide some evidence in support of targeting a greater share of finite fiscal resources towards improving early-career teacher pay, to improve its competitiveness compared to outside pay, and targeting less at increasing experienced teacher pay. This was a key part of the Government's three-year plan for raising the pay of early-career teachers by more than

experienced teachers, initiated in 2019, to support an increase in their retention rates, which tend to be lower than for experienced teachers. However, flattening the teacher pay structure could also have other effects, such as reducing the incentive to progress and take on extra responsibility, which would need careful consideration alongside the effects on teacher supply.

Comparing teacher pay to our measure of outside pay for London teachers also suggests that the competitiveness of teacher pay in London has been slightly higher in the 2010s compared to the level in the 1990s, than is suggested by benchmarking against professional pay. However, these findings would not necessarily provide support for de-prioritising increases in London teacher pay. London has been the focus of concern about teacher shortages throughout the last three decades, particularly due to higher teacher leaving rates than other parts of the country (Worth *et al*., 2018). Any reduction in the London teacher pay premium would therefore need a very careful assessment of the impacts on teacher supply in London.

5 Predicting teacher leaving rates

5.1 Key findings

In the discussion of our new measure of outside pay for teachers in section 4, we have shown that, when compared to teacher pay, the measure seems to behave similarly to a benchmarking exercise using professional pay as the comparator. However, a key question in assessing the usefulness of a new measure for benchmarking teacher pay for the purposes of understanding teachers' decisions about whether to stay or leave teaching, is how predictive it is of teacher labour market behaviour.

We use a statistical regression model to analyse the likelihood of leaving state-sector teaching in England, including personal characteristics, the state of the economy and relative pay as potential explanatory factors. We particularly focus on the extent to which different measures of teacher pay relative to an 'outside option' benchmark explains attrition rates.

The findings suggest that, contrary to our hypothesis from the research literature, the association between teacher relative pay and teacher attrition is not statistically significant from zero. This does not imply that increases to teacher pay are unlikely to lead to improvements in retention: a more compelling explanation for why our results do not align with the existing literature is measurement error.

There is little evidence that teacher pay relative to professional pay is any more predictive of attrition, compared to teacher pay relative to our measure of outside pay. Therefore, our research does not provide a strong reason for abandoning making comparisons between teacher pay and professional pay in order to understand the likely impacts of relative competitiveness on attrition, in favour of our new measure.

5.2 Motivation

In the discussion of our new measure of outside pay for teachers in section 4, we have shown that, when compared to teacher pay, the measure seems to behave similarly to a benchmarking exercise using professional pay as the comparator. However, it also highlighted some different conclusions on how the competitiveness of teacher pay has evolved over the last three decades, particularly relating to experienced teachers and London teachers.

A key question in assessing the usefulness of a new measure for benchmarking teacher pay for the purposes of understanding teachers' decisions about whether to stay or leave teaching, is how predictive it is of teacher labour market behaviour. In other words, if our new measure of outside pay for teachers is a better measure of the opportunity cost of leaving or staying compared to a benchmark with professional pay, then we might expect that changes in teacher pay competitiveness using our new measure would be a more powerful predictor of teacher retention rates over time.

From the previous research literature on the *pay elasticity* of teacher retention – in other words, how responsive teachers' leaving decisions are to changes in pay competitiveness – we would

expect that increases in teacher pay relative to an appropriate benchmark of outside pay would be associated with lower levels of attrition. To assess the predictive qualities of the two measures of relative pay, we compare the extent to which they explain variance in teacher leaving rates.

5.3 Methodology

We estimate a statistical model using the ASHE data to assess the extent to which each of the two measures of relative pay predict whether or not a teacher leaves teaching in the state-sector in England in the following two years. We control separately for a number of personal characteristics for which we have data, and which we know from the previous literature are predictive of attrition.

For this section of the analysis, we use a statistical regression model to analyse the relationship between a measure of whether a teacher left in the subsequent two years, demographic variables and relative outside pay. Demographic variables include age, experience, gender, region, phase and working pattern, as well as the region-specific unemployment rate (as a measure of the macroeconomic context). As our attrition variable is binary (i.e. it is a yes/no variable indicating whether a teacher leaves or not in a particular year), we use a specific type of regression model known as a logistic regression model.

We include the entire set of leavers and non-leavers from teachers from 1991 to 2017[27] in the estimation sample (n = 87,888). This means that many teachers will be in the estimation sample multiple times. To account for this we cluster our standard errors to the level of the individual. In order to control for long-term changes in leaving rates, we also include a variable indicating whether the observation is from before or after 2005.[28]

As we seek to determine how individual leaving decisions are associated with the variables in our dataset, we estimate several different versions of the model including different sets of explanatory variables. The first specification includes only the demographic variables in the model. The second model specification adds the outside labour market indicators: including the unemployment rate and our overall measure of teacher earnings relative to outside pay. A third model explores the association with teacher pay relative to professional pay, to assess how predictive the two different measures of relative pay are of teacher attrition.

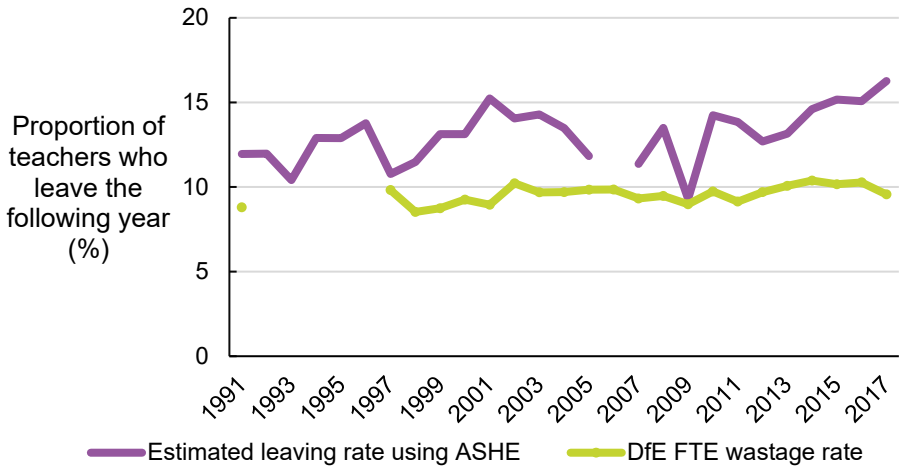
[27] 1991 is the first year in the estimation sample because of difficulties in estimating relative outside pay on the non-standard occupation codes prior to 1991. 2017, rather than 2019, is the final year in the sample as it is the last year we are able to identify leavers according to our two-year leaver definition (see section 1).
[28] 2005 was an arbitrary choice, chosen as it is the halfway point of our relative outside pay time series. Robustness checks suggest that choice of cut-off year for the fixed effect variable does not substantively change the results.

5.4 Results

5.4.1 Time series of leaving rates

Before discussing the modelling results, it is helpful to briefly describe the variable marking teachers as leavers, which we use in the model. Figure 26 shows the proportion of the teacher workforce who we identify as leavers – i.e. the leaving rate – in each year. As discussed in section 1 and Appendix B, our definition of a teacher who leaves teaching is a teacher who is identified as working in a state-sector school[29] in England in a particular year and who either leaves teaching for another job the following year, or leaves the workforce altogether for two consecutive years. We also show how our estimates of the leaving rate compare to Department for Education (DfE) estimates, which they refer to as the 'wastage rate'. This is derived from teacher pensions data and then the School Workforce Census from 2011, so is from the population of state-sector teachers.

Figure 26 The estimated leaving rate for teachers from ASHE data is higher than the DfE estimates and is a statistically noisy measure



Note: 2006 is omitted from the regression modelling due to the ASHE sample size cut in that year

Source: NFER analysis of ASHE data.

[29] As we are unable to distinguish between state-sector and private schools before 1996 (see Appendix B), the annual leaving rate between 1991 and 1996 is estimated for all state-sector and private school teachers combined. The effect of this pooling is likely very small as the relative proportion of teachers in England in the private sector was about 10 per cent from 1996 to 2017, and the average difference between the leaving rate for all teachers in England and state-sector teachers in England was less than one half a percentage point between 1996 and 2017. To avoid a spike in the estimated leaving rate in 1996, we removed from the pooled sample those teachers who were considered a state-sector teacher in England in 1995 but then a private-sector teacher in 1996, as they were likely private-sector teachers all along that we were unable to distinguish.

Three key points are evident from the ASHE data estimates of attrition rates, and from comparing it to DfE population estimates of attrition rates.

First, our estimates from the ASHE data are higher than the estimates from the DfE data. This is most likely to be due to more occurrences of leaving being measured in the ASHE data than actually occurred. As mentioned in section 2, teachers could be erroneously counted as having left if their employer fails to respond to two consecutive ASHE surveys and we are unable to impute any records from information in subsequent ASHE survey responses. Some of these instances of teachers leaving may be where they are still a teacher, but their school fails to respond to ASHE surveys. This would cause the leaving rate to be over-stated. There may also be coding errors (e.g. miscoded occupation codes) that lead us to count a movement out of teaching that is not the case. However, as discussed in section 2, these issues are difficult to resolve using the data available in ASHE. Under the assumption that such measurement errors occur in the data at random, it remains valid to analyse trends in attrition rates, since the measurement error will affect the data similarly across years.

Second, the trends in the two series appear to follow some of the trends observed in the DfE wastage rate figures. In particular, the increase in leaving rates throughout the late 1990s and early 2010s appear to coincide with one another, as does the drop in leaving rates in 2009. The correlation between the two series is 0.41, which is positive, above zero and statistically significant.

However, finally, the correlation between the two series is fairly low. The ASHE-based measure of attrition appears to have a substantial degree of statistical ‘noise’ associated with it. This means it tends to move up and down from year to year more than the DfE series. This is due to the ASHE leaving rate relying on survey data rather than census data and is therefore susceptible to sampling error.

The ASHE-based measure is also subject to fluctuations due to changes in occupational codesets and other survey methodology changes. We removed the year 2006 from all of the following analysis, as the sample of the ASHE was temporarily reduced in that year, leading to a considerable number of teacher longitudinal records being stopped in that year, and a big spike in the number of teachers identified as leavers. We have also made adjustments to account for other data inconsistencies, which are described in Appendix C. This is likely to have reduced measurement error issues, but not eliminated them entirely. This means that while our measure does seem to be picking up broad changes in attrition trends over time, it does so with a degree of statistical noise.

5.4.2 Model estimates with demographic variables only

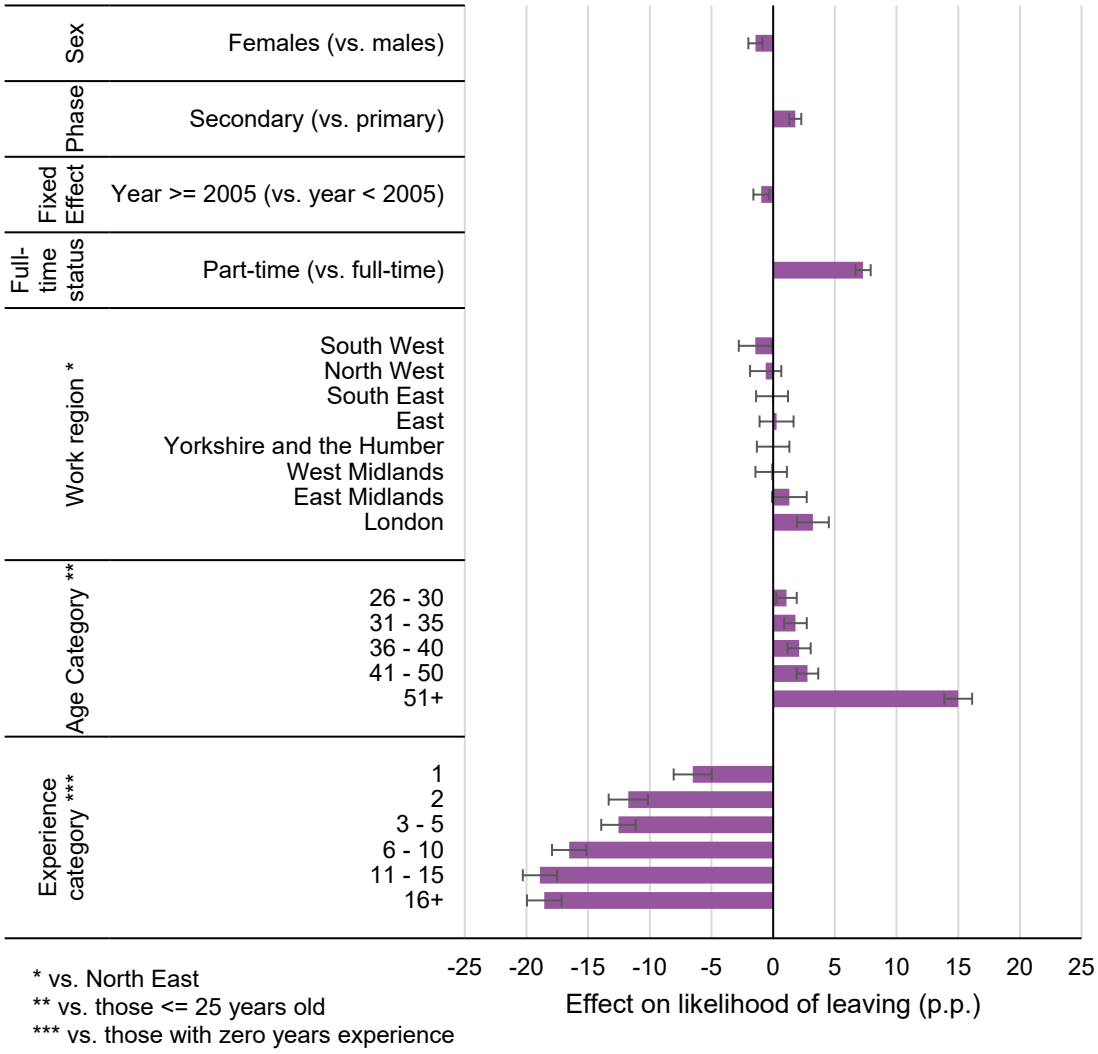
The first specification of the model includes the personal characteristics explanatory variables. The coefficient estimates are shown in Figure 27, along with bars corresponding to the 95 per cent confidence intervals. Associations are considered statistically significant where the estimated 95 per cent confidence interval does not overlap the zero line on the vertical axis.

The estimates themselves represent the estimated association between each of the variables and the probability of leaving teaching, holding all other observable variables constant. As each of these variables are categorical, the interpretation is with respect to a base category. For example,

part-time teachers are about 7 percentage points[30] more likely to leave teaching than full-time teachers, holding constant all other characteristics in the model.

The results from of the estimation of the first specification are in line with previous findings in the literature. Part-time, secondary and less experienced teachers, and teachers aged over 50, are each more likely to leave teaching than other teachers.

Figure 27 All else held constant, being a part-time, secondary, London, inexperienced teacher, or a teacher age over 50 is associated with a higher likelihood of leaving teaching in the next two years



Source: NFER analysis of ASHE data.

[30] For ease of interpretation, we have converted estimates from changes in log-odds to percentage point differences, by estimating average marginal effects.

Female teachers were slightly less likely to leave teaching than male teachers, after controlling for other factors, while secondary teachers were slightly more likely to leave than primary teachers. Teachers who were working part-time were seven percentage points more likely to leave than full-time teachers. The likelihood of leaving is significantly higher for those aged over 50, after holding other factors including years of experience constant, compared to younger teachers. This is when teachers are most likely to retire.

Holding constant age and other factors, teachers are substantially less likely to leave the workforce as they gain experience. Across the experience bands, teachers in their first year of teaching are the most likely to leave, and with experience, their probability of leaving falls by 12 percentage points within the first two years, with respect to a teacher of similar characteristics and less than one year of experience. Estimated associations across each of these variables are statistically significant at the five per cent level.

Inclusion of the variable measuring whether the observation is from the first or second half of the time series suggests that there have been some broad changes in teacher retention over time – namely that teachers who are working in teaching from 2007 onwards are about one percentage point less likely to leave teaching than teachers from earlier years, and this difference is statistically significant.

5.4.3 Estimated association between the unemployment rate and relative teacher pay

To develop the model further we include variables measuring the regional unemployment rate for each teacher's region and our measure of teacher pay relative to the outside option.

Our estimates of the association between the unemployment rate and the teacher attrition rate is close to zero and not statistically significant. This is surprising given that the previous literature has found associations between teacher attrition rates and the unemployment rate, albeit small ones (Hutchings, 2011). The literature suggests that when the unemployment rate is higher, teacher attrition tends to fall.

The results from the model also suggest that the association between teacher relative pay and teacher attrition is not statistically significant from zero. This does not imply that increases to teacher pay are unlikely to lead to improvements in retention: the research literature shows a clear, albeit modest, relationship between relative teacher pay and retention, across a number of studies.

A compelling explanation for why our results do not align with the existing literature is measurement error and resulting attenuation bias. Measurement error is where a variable contains a lot of statistical 'noise' and relatively little information. Where any variable, whether it is the outcome variable or the explanatory variable, contains measurement error, estimates of the relationship between variables is likely to be closer to zero. In this case, we have a substantial amount of 'noise' in our dependent variable due to unavoidable gaps in the data (see section 5.4.1 and Figure 26).

It is also the case that our model has a degree of statistical 'noise' in the explanatory variable for teacher pay as well. Both the teacher pay and outside pay time series are somewhat bumpy, and we are using the variation over time to explore the associations in this model. It is unfortunately the

case that these estimates are unlikely to be valid estimates of how responsive teachers are to relative pay and the unemployment rate.

5.4.4 Estimating the model with teacher pay compared to professional pay

We also explore the association between teacher pay compared to a professional pay benchmark, to assess how well it predicts labour market behaviour compared to our new measure. Table 2 shows a summary of the estimates from our regression modelling, covering the three key labour market explanatory variables.

Estimating the model by instead measuring teacher pay relative to the pay in professional occupations results in slightly different findings. When we include the difference between teacher pay and professional pay as an explanatory variable, we find that the association between relative pay and attrition is negative and statistically significant. This perhaps suggests that teachers' leaving decisions are more influenced by the pay of professional occupations rather than the range of occupations used in our new measure. However, it could also reflect less measurement error in the measure of teacher pay relative to professional pay. This measure is based on larger sample sizes in the data, so this may be a significant explanation.

However, despite being statistically significant and in the expected negative direction (i.e. higher relative teacher pay is associated with less attrition, all else equal) the effect is very small. The estimates imply that a one per cent increase in teacher pay, over and above professional pay, is associated with a 0.02 percentage point reduction in attrition. This is much lower than the estimates of pay elasticities from the research literature.

Indeed, there is little evidence that teacher pay relative to professional pay is any more predictive of attrition, compared to teacher pay relative to our measure of outside pay. The R-squared – a measure of how well the statistical model fits the data – is very low for both models (0.0431 for the outside pay model and 0.0433 for the professional pay model). Therefore, we find no evidence that either our new measure of outside pay or professional pay are superior to one another at predicting attrition. In fact, neither are very predictive at all. As explained above, this is most likely due to key variables (such as job satisfaction) remaining unobserved, in addition to significant measurement error.

Table 2 Our estimated elasticities of attrition to relative teacher pay and unemployment were very small, probably due to measurement error

Model	Estimated effect (in percentage points) of a:			Estimated model R-squared
	£1000 increase in teacher pay, all else constant	*One per cent increase in teacher pay, all else constant*	*One p.p. increase in the unemployment rate, all else constant*	
Teacher pay relative to 'outside' occupations	-0.076	-0.002	-0.011	0.0431
Teacher pay relative to professional pay	-0.669***	-0.020***	0.034	0.0433

Note: *, **, and *** denotes statistical significance at the 10, 5, and 1 per cent levels respectively.

Source: NFER analysis of ASHE data

5.5 Conclusions

The findings from this section do not provide a strong reason to abandon making comparisons between teacher pay and professional pay in order to understand the likely impacts of relative competitiveness on attrition, in favour of our new measure. Measurement error, particularly in the attrition variable but also in the pay variables, means that our modelling does not contain enough meaningful variation to properly assess the superiority of one measure of relative teacher pay, compared to another.

Indeed, there is weak evidence that a professional benchmark performs very slightly better at predicting teacher attrition rates. Additionally, the larger sample sizes available for measuring professional pay in survey datasets such as ASHE, the Labour Force Survey, and others makes it a useful benchmark to continue deriving.

6 Conclusions and discussion

6.1 Conclusions

A key finding from this research is that most teachers do not necessarily move into higher-paying jobs outside of teaching when they leave. A large proportion leave employment (although this may be overstated in the ASHE data due to methodological issues in identifying moves out of employment) or retire, and a majority of those who left moved into other teaching roles (such as for the local authority or in the private sector) or jobs in the wider education sector. Even when teachers left for jobs outside of the education and childcare sector, they were more likely to be in lower-than-professional occupations.

When teachers left the state-sector in England and moved into new jobs, their FTE pay tended to, on average, continue rising in real-terms. However, when compared to otherwise similar non-leavers who remained in teaching, their earnings grew at a slower rate. While there are some issues of comparability between these two groups, this comparison gives some indication that a move out of teaching was unlikely to have resulted in higher pay than they might otherwise have expected to earn had they stayed in teaching.

This suggests that pay may not be a major factor in most teachers' decisions about whether to leave the profession, and other factors such as workload and opportunities for part-time and flexible working could be more significant factors that are weighed up against pay by teachers who are considering leaving. Indeed, we find that teachers who left were more likely to move into part-time work than to move from part-time to full-time work, suggesting that opportunities to work part-time were one factor of importance for teachers considering leaving. The findings on pay do not imply that, all else equal, changes to teacher pay would not encourage more teachers to stay. However, they highlight that other factors are significant for teachers, as also indicated in research asking ex-teachers why they left (DfE, 2017).

Significantly slower growth in pay compared to what teachers might have been expected to earn in teaching if they had stayed was the case for many different types of teacher. However, there were some differences in the extent of the change in the earnings trajectories of different types of leavers, compared to the earnings trajectories of otherwise similar non-leavers. Female teachers, primary teachers and experienced teachers faced a greater fall in their earnings trajectory after having left, compared to similar non-leavers. These differences were likely to be driven, at least in part, by moving into lower-paying occupations. It may suggest that these types of teachers have less lucrative outside options compared to male teachers, secondary teachers and early-career teachers.

Another finding from our research is that very few teachers who leave state-sector teaching in England enter professional or managerial occupations outside of teaching. Only two per cent of teachers who left were in professional or managerial occupations outside of teaching one year after leaving. There was also limited evidence of teachers 'investing' in a move out of teaching and into a different professional or managerial occupation: only three per cent of teachers who left were in a professional or managerial occupation outside teaching ten years after leaving.

Early-career teachers who left, who we might expect to be more likely to invest in an alternative professional career if it appears more relatively financially attractive than teaching, were a little more likely than experienced teachers who left to switch into professional or managerial occupations outside of teaching. However, it remained rare, even among early-career teachers who left: only around four per cent of early-career teachers who left, and only two per cent of experienced teachers who left, were in professional or managerial occupations ten years after leaving.

This raises a question about whether the pay level in other professions represents a valid benchmark for understanding the outside option for teachers who are considering whether to leave or stay. Benchmarking to professional pay is often used in the teacher pay-setting process. We set out to define a measure of outside pay that better reflects the type of occupations that teachers tended to move into after they left, and the earnings that they tended to receive in those occupations.

However, there was limited evidence that our measure of outside pay was superior to using professional pay as a pay benchmark. Our measure of outside pay had a similar profile over time to professional pay, suggesting that they were both driven over time by very similar economic trends. There was also no evidence from our regression modelling that our measure of teacher pay relative to outside pay was more predictive of teacher attrition than a measure of teacher pay relative to professional pay.

Therefore, our research does not provide a strong reason to abandon making comparisons between teacher pay and professional pay in order to understand the likely impacts of relative competitiveness on attrition. Indeed, the larger sample sizes available for professionals makes it a useful benchmark to derive from a number of different datasets, such as ASHE, the Labour Force Survey, and others.

Furthermore, as teaching is a graduate professional occupation, it makes sense to continue to continue benchmarking against professional occupations to also understand the ‘outside option’ considered by graduates deciding whether or not to enter teaching (i.e. informing the impact of teacher pay changes on recruitment).

6.2 Implications for policy

A key question for current policy is whether the existing level and structure of teacher pay is appropriate for attracting and retaining sufficient numbers of high-quality teachers into teaching. The teacher supply challenges that developed through the latter part of the 2010s raised questions about whether the level and structure of teacher pay were sufficiently generous to meet supply needs.

Our findings suggest that teachers’ pay became less competitive compared to benchmarks of outside pay during the post- 2008 recession period, which is likely to have contributed in part to the increase in leaving rates and persistent under-recruitment to initial teacher training. This suggests that higher pay increases for teachers during this period may have helped to ease the supply challenges. However, other factors were also significant, such as the growth in secondary pupil

numbers increasing the need for teachers, and whether schools could have afforded to employ more teachers with their funding situation.

While teacher supply challenges have been considerably eased in the short term due to the economic recession induced by the Covid-19 pandemic, there remains a longer-term question of whether the existing level and structure of teacher pay will be adequate for attracting and retaining sufficient numbers of high-quality teachers once the wider labour market recovers. Over the longer-term, there is a strong argument for at least maintaining the competitiveness of teacher pay, if not increasing it, in order to stave off future challenges with supply.

Another key part of the Government's 2019 proposals for a set of three-year teacher pay increases was to direct higher pay increases to early-career teachers and lower pay increases at experienced teachers, thereby flattening the pay structure. This was aimed at particularly increasing the competitiveness of early-career teacher pay to boost retention rates (which tend to be lower for early-career teachers) and increase recruitment.

Our findings suggest that the competitiveness of experienced teachers over the last decade may have been higher in the 2010s than it has been in other time periods and had not deteriorated as a result of the public sector pay restraint, as much as for other groups. In contrast, the competitiveness of early-career teacher pay was lower in the 2010s than it had been in previous periods, and further lost competitiveness during the decade. We also find that experienced teachers faced a greater fall in their earnings trajectory after having left, compared to similar non-leavers; more so relative to early-career teachers.

These findings may provide some evidence in support of targeting a greater share of finite fiscal resources towards improving early-career teacher pay, to improve its competitiveness compared to outside pay, and targeting less at increasing experienced teacher pay. However, flattening the teacher pay structure could also have other effects, such as reducing the incentive to progress and take on extra responsibility, which would need careful consideration alongside the effects on teacher supply.

6.3 Further research

This research highlights some areas where further research could be beneficial in assisting policymakers with teacher pay-setting in the current context. First, the economic context and the level and structure of teacher pay is also like to have an impact on levels of recruitment to teacher training as well as retention. Therefore, understanding the responsiveness (or *elasticity*) of teacher recruitment to these factors is also important in assessing whether a particular policy change is likely to be adequate to ensuring there is sufficient teacher supply in future years.

Second, and relatedly, there is currently a paucity of research about the impacts of flattening the teacher pay structure – i.e. increasing early-career teacher pay at a faster rate than experienced teacher and leadership pay. While such changes may have benefits in terms of attracting and retaining new teachers to the profession, particularly within a constrained funding envelope, reducing the pay differential between these career stages may dampen the incentives for experienced teacher retention and/or leadership progression. Little is known about these impacts.

Finally, this study adds to the small but growing literature of longitudinal research on teachers' careers Longitudinal research can reveal rich insights on career decisions that cross-sectional research studies are unable to gain and is key to better understanding teachers' decisions to leave the profession. As we have highlighted throughout this report, there are several factors beyond pay alone, such as workload, which are likely to influence retention decisions, though to what extent is not yet well-understood. Therefore, the DfE's nascent Longitudinal Survey of Teachers is a welcome development, and a potentially rich resource for researchers working in this area.

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This work was produced using statistical data from ONS. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

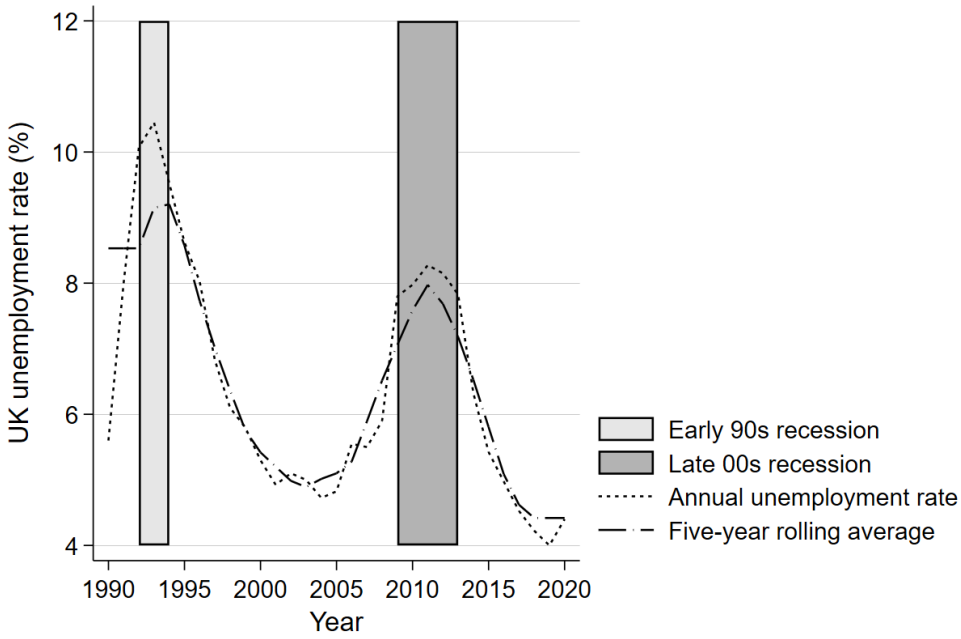
Appendix A Definition of an economic downturn period

Our definition of an economic downturn is based on trends in the unemployment rate in the UK labour market. We use unemployment as an indicator of a downturn rather than gross domestic product (GDP) growth, as unemployment is more closely linked with the relative scarcity or abundance of jobs and hence, the relative difficulty for teachers of finding a new job after leaving teaching.

Indeed, Dolton *et al*., (2003) in a study of UK teachers, suggests that GDP growth has no statistically significant relationship with short-term teacher supply changes. We observe the unemployment rate in England at the regional level from 1990 to 2020.[31]

Figure A.1 shows how the overall unemployment rate in England has evolved over this time period.

Figure A.1 Increases in the UK unemployment rate from 1990 to 2020 serve as our identification of economic downturns



Source: Office for National Statistics; Boland, *et al* (1992).

We define a downturn as a year in which the UK unemployment rate has risen by at least a quarter of a percentage point higher than the five-year rolling average. While this definition is somewhat arbitrary, it identifies the years 1992 – 1994 and 2009 – 2013 as downturn years. We consider all other years as being outside of a downturn.

[31] Estimates from 1992 to 2020 are provided by the Office for National Statistics. Estimates from 1990 to 1992 are provided by the Employment Gazette, accessed from the London School of Economics archives.

Appendix B Data and Methodology

B.1 Occupation and industry codes for identifying teachers

This research relies on SOC and SIC codes to identify teachers in the state sector in England within the ASHE data. The sets of identifying codes change periodically as SOC and SIC codes were updated. The specific codes used, and the years when they are active, are as follows:

Table B.1 SIC code definitions of being employed in a school

Years	Code	Description	Included/ Excluded?
1982 – 1995	9310	Higher education	Excluded
	9320	School education (nursery, primary and secondary)	**Included**
	9330	Education n.e.c. and vocational training	Excluded
	9360	Driving and flying schools	Excluded
1996 – 2008	80.10	Primary education	**Included**
	80.21	General secondary education	**Included**
	80.22	Technical and vocational secondary education	Excluded
	80.3x	Higher education	Excluded
	80.4x	Adult and other education n.e.c.	Excluded
	85.32	Child day-care activities	Excluded
2008 – 2019	85.10	Pre-primary education	Excluded
	85.20	Primary education	**Included**
	85.31	General secondary education	**Included**
	85.32	Technical and vocational secondary education	Excluded
	85.4x	Higher education	Excluded
	85.5x	Other education (sports, recreational, cultural, driving education, etc.)	Excluded
	85.60	Educational support activities	Excluded

Table B.2: SOC code definitions of being employed as a teacher

Years	Code	Description	Included/ Excluded?
1980 – 1989	0110	Teachers n.e.c.	**Included**
	010x	Teachers in higher education	Excluded
	012x	Vocational and industrial trainers, education officers, social and behavioural scientists	Excluded
1990 – 1999	230	University and polytechnic teaching professionals	Excluded
	231	Higher and further education teaching professionals	Excluded
	232	Education officers, school inspectors	Excluded
	233	Secondary (and middle school deemed secondary) education teaching professionals	**Included**
	234	Primary (and middle school deemed primary) and nursery education teaching professionals	**Included**
	235	Special education teaching professionals	**Included**
	239	Other teaching professionals n.e.c.	Excluded
2000 – 2009	2311	Higher education teaching professionals	Excluded
	2312	Further education teaching professionals	Excluded
	2313	Education officers, school inspectors	Excluded
	2314	Secondary education teaching professionals	**Included**
	2315	Primary and nursery education teaching professionals	**Included**
	2316	Special needs education teaching professionals	**Included**
	2317	Registrars and senior administrators of educational establishments	Excluded
	2319	Teaching professionals n.e.c. (incl. driving teachers, flying teachers, tutors, etc.)	Excluded
2010 - 2019	2311	Higher education teaching professionals	Excluded
	2312	Further education teaching professionals	Excluded
	2314	Secondary education teaching professionals	**Included**
	2315	Primary and nursery education teaching professionals	**Included**
	2316	Special needs education teaching professionals	**Included**
	2317	Senior professionals of educational establishments	**Included**
	2318	Education advisers and school inspectors	Excluded
	2319	Teaching and other educational professionals n.e.c.	Excluded

B.2 Identifying teachers who leave teaching

Once we identify teachers using these SOC/SIC code combinations, we use the longitudinal data to identify teachers who leave teaching. That is, teachers who leave teaching can either be:

- A state sector teacher in England in time period *t*, but does not have any ASHE records in time periods *t + 1* ***and*** *t + 2*.
- A state sector teacher in England in time period *t*, but identified as a non-teacher (meaning they have an ASHE record but it is in a non-state-sector-teaching occupation) in time period *t + 1*.

Our definition uses the two consecutive years definition in order to reduce the instances of employer non-response being erroneously identified as leaving. Our assumption is that if a teacher has no ASHE records for two years, it is more likely that they left the workforce in time period *t + 1*, than their employer failing to respond to the survey for two consecutive years. As the ASHE is unable to distinguish those who truly leave the workforce from those who leave the UK or leave for self-employment, these individuals will be considered as having left the workforce.

Any teacher who meets either of these definitions will be identified as having left teaching, and their final year as a teacher will be recorded as year *t*.

B.3 Imputing records

Since we rely on SOC, SIC and Inter-Departmental Business Register (IDBR) sector codes to identify state-sector teachers and any transitions they make out of teaching, our definitions are liable to identify spurious cases of teachers being identified as leavers either when code definitions change, or in years where variables were unavailable. For example, SOC and SIC codes changed their definitions roughly every ten years and the IDBR variable was unobserved completely between 1990 and 1996 (meaning we cannot distinguish between private-sector and state-sector teachers in this period).

We impute variables with missing values where we can and, for those teachers who are identified as leavers because of changes to SOC/SIC codes or the IDBR variable being observed only after 1996, we set the flag marking them as leavers to missing so as to remove any large spikes in leavers in years with variable changes.

We do not remove any teachers whose records we were able to impute or who were unaffected by variable changes (i.e. teachers identified before 1996 and continue to be identified as state-sector teachers afterwards are unaffected). We also do not remove all records for affected teachers from the dataset as, in particular, we wish to keep all observations associated with their identified teacher records in the estimation sample for the section 5 modelling. Our main imputation strategies are outlined in Table B.3:

Table B.3: Main imputation rules

Variables Adjusted	Under What Condition	Imputed to	Years
Age, gender	Missing in *t*, lag of variable = lead of variable + 2 (for age)	Age: Lag of age + 1 Gender: Modal gender	All
SOC/SIC, *idbrsta, wgor*	Missing in *t*, lag of variable = lead of variable, same job in *t + 1*.	Lag or lead of variable	All
SOC/SIC, *idbrsta, wgor*	Still missing in *t*, same job in *t + 1*.	Lead of variable	All
SIC	Still missing in *t*, imputed record	Lead of variable	All
Teacher Flags	Non-teacher in year *t – 1*, teacher in year *t*, non-teacher in any year > *t*.	0	1996, 2010, 2011
Teacher Flags	Teacher in *t*, missing in *t + 1* and *t + 2,* teacher in *t + 3,* same job in *t + 3.*	1 in *t + 1* and *t +2*	1988, 2006
Leaver/Switcher Flags	If 1(2) period switcher/leaver in *t*, but same job in *t + 1* (and t + 2) and lead of SOC = lag of SOC (and double lead of SOC = lag of SOC).	Missing	1982, 1995, 1996, 2010, 2011
2 Period Switcher Flag	England SS teacher in 2006, missing in 2007, non-teacher in 2008	Missing	2006

B.4 Real-terms and FTE-adjusted earnings adjustments

To ensure that we are able to make valid comparisons in real earnings across time, we adjust earnings using the gross domestic product (GDP) deflator, calculated by the Office for National Statistics. The deflator is a macroeconomic index measuring changes in price levels over time. It is typically indexed to be 100 in a particular year and allows for comparisons in prices of goods in different years, absent the effects of inflation. In our case, as the deflator is indexed to 2019, the value of the index is less than 100 before 2019, meaning that all nominal earnings observations in the dataset from 1990 to 2018 are scaled up, in order to account for the fact that inflation has increased price levels during that time period. The GDP deflator for each record is matched into the dataset based on year and real earnings are calculated as $real\ earnings = \frac{nominal\ earnings}{GDP\ deflator} \times 100$.

In order to compare earnings for individuals who work full-time and part-time, we scale up earnings for part-time workers to be in full-time equivalent (FTE) terms, reflecting the number of weekly hours that full-time employees tend work in their given occupation. Earnings for workers observed as full-time are unchanged.

Full-time hours for teachers are contractually defined as 32.5 hours, and this is supported by analysis of the ASHE data, which indicates that the modal number of hours worked for teachers each year after 1988 is 32.5. All part-time teachers therefore have their earnings scaled up to equivalent earnings for 32.5 hours. This scaling factor is equal to full-time hours divided by the observed number of weekly hours that the part-time individual worked. For example, if a part-time teacher worked 16.25 hours per week, we would calculate their FTE-adjusted earnings as double their raw real earnings.

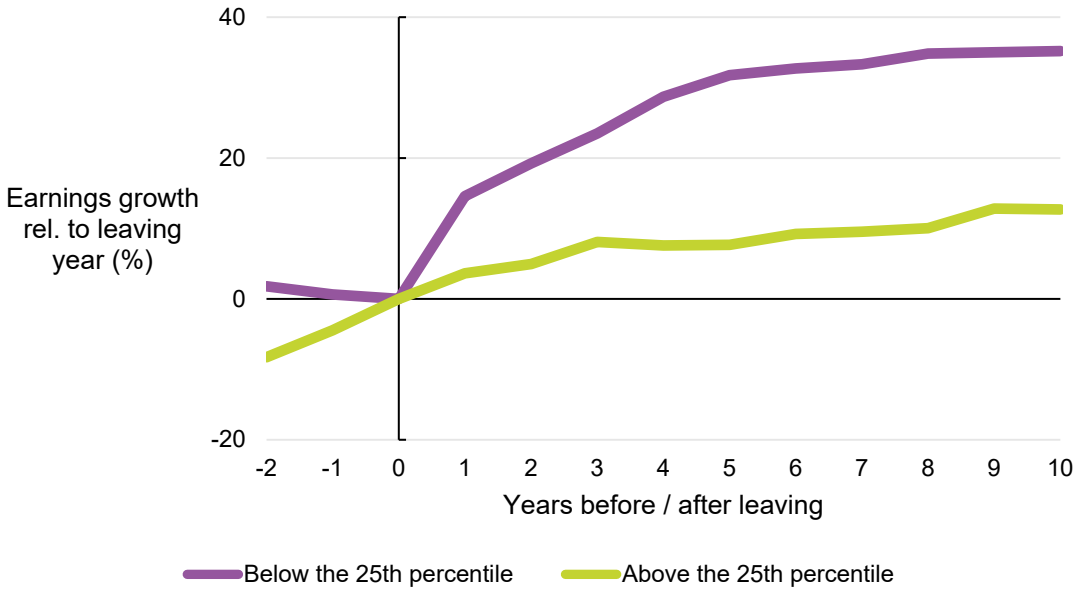
We estimate full-time hours for non-teachers as the modal number of hours worked in their SOC category in a given year and adjust their earnings accordingly. For example, if the majority of workers in professional occupations (SOC category 2) in 1995 tended to work 35 hours per week, then we scale up earnings for part-time workers in SOC category 2 to reflect 35 hours. Any earnings measurements for individuals who work more than the modal number of full-time hours for their occupation are unchanged, and not adjusted downwards.

Appendix C How much do teachers earn after they leave teaching?

C.1 Earnings growth at different points in the teacher earnings distribution

In section 3.3.1, we assert that most of the positive earnings growth after leaving teaching can be attributed largely to leavers whose earnings as teachers were much lower than others. We can see this clearly if we plot separately the earnings trajectories for teachers whose earnings were below the bottom 25th percentile of teacher earnings, and those whose earnings were above the 25th percentile. Specifically, in Figure C.1, earnings growth for leavers whose earnings were below the 25th percentile as teachers was about 15 per cent in their first year after leaving. Those whose earnings were above the 25th percentile experienced earnings growth of about four per cent.

Figure C.1 Leavers whose earnings as teachers were below the 25th percentile experienced higher earnings growth after leaving



Source: NFER analysis of ASHE data

C.2 How does adjusting for full-time equivalence (FTE) influence our findings?

In section 3.3.1, we discuss how earnings for teachers who left teaching tended to change in the first ten years after leaving. In order to facilitate comparisons amongst teachers whose working patterns change after they leave (i.e. they move from full-time teaching to a part-time job outside of teaching, or vice versa), we scale up earnings to represent full-time equivalent earnings (see Appendix B.4).

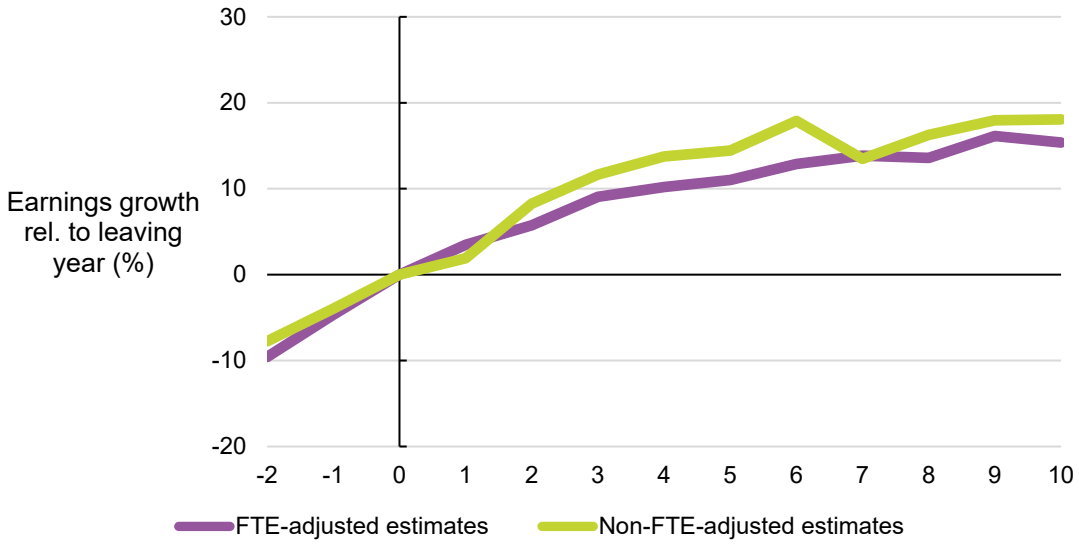
Our FTE adjustment scales up the earnings for those working part-time, increasing overall average earnings (in levels) by between 10 and 15 per cent. As a result, we would also expect the adjustment to affect our estimates of earnings trajectories for those teachers whose working patterns change after leaving teaching.

Specifically, as we saw in section 2.4, there are substantially more full-time teachers who leave teaching and move to part-time jobs, than move the other way. We may therefore expect that removing the FTE adjustment should reduce the estimated earnings growth trajectories for leavers, compared to measuring growth with FTE-adjusted earnings. This is because without accounting for reduced hours, earnings would be observed to have fallen for most of the large numbers of teachers who left for part-time work outside teaching.

However, as shown in Figure C.2, which compares the FTE-adjusted earnings growth of leavers and the non-FTE-adjusted earnings of leavers, this is not the case. The difference between the two is small, and the non-FTE-adjusted earnings are even slightly higher than the FTE adjusted earnings from two years after leaving onwards.

This is because the magnitude of the difference is dependent not only on the relative *proportions* of teachers moving from full-time into part-time non-teaching jobs (and vice versa), but also on the relative differences in earnings for individuals making these transitions and also their change in total hours.

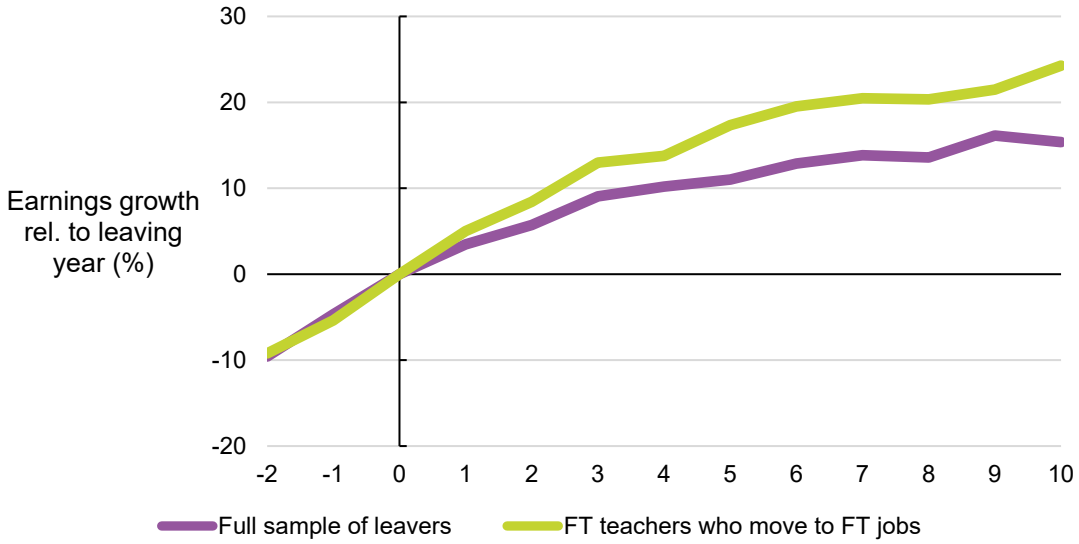
Figure C.2 Adjusting average earnings growth for changes in working pattern yields broadly similar results to not adjusting them



Source: NFER analysis of ASHE data

We also explore how average earnings growth evolved over time for only those full-time teachers who transitioned into full-time jobs outside of teaching. Figure C.3 shows that average earnings growth for these teachers in the matched sample was considerably higher than the FTE-adjusted average earnings growth for the whole matched sample.

Figure C.3 Average earnings growth for full-time teachers who left for full-time jobs outside teaching was higher than the FTE-adjusted full sample



Source: NFER analysis of ASHE data

This suggests that, even after adjusting for hours worked, full-time jobs outside of teaching seem to be higher-paying than part-time jobs. Therefore, teachers who transition into part-time jobs are a subset of leavers who are of particular importance, both because they are substantial in numbers, and also have fairly distinct earnings trajectories after they leave.

Appendix D Deriving a measure of relative outside earnings

We calculate a measure of relative outside earnings for teachers in each year *y* from 1991[32] to 2019 using the following steps:

Step 1: For each occupational group (private-sector teachers, professional occupations, non-professional occupations, etc.,)[33] that teachers tend to transition to, *g*, calculate the median percentile of post-transition earnings between the years *y – 5* and *y + 5*.

Step 2: Estimate percentiles of the earnings distributions for all post-transition occupational groups *g* in each year *y* from 1991 to 2017.

Step 3: for each *y,* we calculate the average frequency by which teacher leavers tend to transition from teaching to each group *g*, over the same ten-year moving window.

Step 4: With our estimate of the median percentile of post-transition earning in each group *g*, for each year *y*, we compute the actual level of real earnings corresponding to that percentile, from the overall ASHE.

Step 5: We then average over each of these earnings measurements, weighting by group *g* transition frequencies.

More formally, the procedure follows the formula below:

$$\boldsymbol{Outside\ Pay_y} = \sum_{\boldsymbol{g}} \boldsymbol{w_{g,\bar{y}}} \times \boldsymbol{earnings_{g,y}}\left(\boldsymbol{P_{g,\bar{y}}}\right)$$

$\bar{y}$: $Set\ of\ years\ between\ y-5\ and\ y+5$

$w_{g,\bar{y}}$: $Average\ transition\ frequency\ to\ group\ g\ in\ \bar{y}$

$P_{g,\bar{y}}$: $Median\ percentile\ -for\ leavers\ -of\ the\ post-transition\ earnings\ distribution\ of\ g\ in\ \bar{y}$

As a final step, we take the difference between average teacher pay and *outside pay* in year *y* to derive *relative outside pay:*

$$\boldsymbol{Relative\ Outside\ Pay_y} = \boldsymbol{Average\ Teacher\ Pay_y} - \boldsymbol{Outside\ Pay_y}$$

[32] We begin the series in 1991 as between 1975 and 1990, occupations in the ASHE were not coded according to the SOC classification and so are difficult to compare with codes which became commonplace starting in 1991.

[33] In addition to the standard post-transition occupation classifications, as a sensitivity check we also split out professional and non-professional occupations into more granular categories. Re-calculating relative outside pay yielded estimates that were not discernibly different from the coarse occupational groupings.

Appendix E Modelling the leaving decisions of teachers

In section 4 of this report, we seek to determine what, if any, relationship exists between an individual teacher's decision to leave teaching, and the demographic and relative teacher pay variables we have in our sample. Since the individual leaving decision is a dichotomous variable, we use a logit model for the analysis, which takes the following econometric specification:

$$\boldsymbol{Pr}\left(\boldsymbol{Leaving\ Teaching}_{\boldsymbol{y,i}}\right) = \frac{\boldsymbol{exp}(\boldsymbol{z})}{\boldsymbol{1} + \boldsymbol{exp}(\boldsymbol{z})}$$

$$\boldsymbol{z} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1 X_{y,i}} + \boldsymbol{\beta_2 Unemployment_{y,i}} + \boldsymbol{\beta_3 Relative\_Outside\_Pay_{y,i}} + \boldsymbol{\varepsilon_i}$$

In this case, $\boldsymbol{X_{y,i}}$ is a vector of dichotomous demographic variables, namely age categories, experience categories, gender, work region, full-time status and phase. We also include continuous measures of regional unemployment rate, and our relative teacher pay measure. $\boldsymbol{\varepsilon_i}$ is an idiosyncratic error term. We estimate the model using maximum likelihood estimation and, since individual teachers are included multiple times in the estimation sample, we estimate cluster-robust standard errors at the individual teacher (variable name *piden*) level.

Given the relative complexity of interpreting the default log-odds coefficients output by the logit model, we convert these coefficients into more easily-interpretable average marginal effects. For the dichotomous variables, we estimate the average marginal effect of a unit change using the Stata command *margins, dydx(.)*. For the continuous variables such as unemployment rate and relative teacher pay, we estimate the average marginal effect both in terms of a one-unit change (using *margins, dydx(.)*) and also a semi-elasticity (using *margins, dyex(.)*). It is important to note that this is only approximately equal to the true semi-elasticity, but since each of the estimated coefficients are very small, the approximation is very good. Standard errors for the average marginal effect estimates are calculated using the delta method.

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