

Teachers' relative pay is a perennial issue: when it's low, graduates are less likely to enter the profession



Teacher shortage: another impending crisis?

How can the UK education system recruit and retain the high-quality teachers it needs, especially for the places and subjects where there are severe shortages? Arnaud Chevalier and Peter Dolton examine the role of pay and other incentives in getting people into the profession and keeping them.

Over the past 50 years, the UK has lurched from one crisis to another in the recruitment and retention of teachers, particularly for secondary schools. Now the shortage of teachers looks set to become even more of a problem as large numbers of people currently in the profession near retirement. Shortages are especially acute in subjects like maths, science and modern languages and in specific geographical areas like inner London, where there are many alternative careers. A growing body of economic research on the labour market for teachers is seeking to understand these shortages and provide insights into potential policy measures.

To some extent, the labour market for teachers functions like any other labour market, with schools acting as employers. But there are two notable characteristics shared with some other public service occupations like health care professionals. These are that the state has both monopoly power in the provision of credentials – the state determines who is qualified to teach – and near 'monopsony' (monopoli buyer) power in the recruitment of teachers – since most teachers are employed in state schools. What's more, teaching is highly unionised and the government generally determines pay.

The demand for teachers

The first key element in the demand for teachers is the demographic pattern of pupil numbers. The total number of primary and secondary pupils in state schools since 1946 has fluctuated considerably, from a low of three and a half million pupils in 1947 and 1985 to a high of nearly five million in the mid-1970s.

The second demographic trend affecting the demand for teachers is the age distribution of the stock of existing teachers. Figure 1 shows the age distributions of primary and secondary teachers in England in 2000. Currently, the official retirement age is 65 but teachers can retire as early as 55. There is a substantial fall in the number of teachers at the early retirement age of 55 and only a minimal number of teachers remain in the profession after the age of 60.

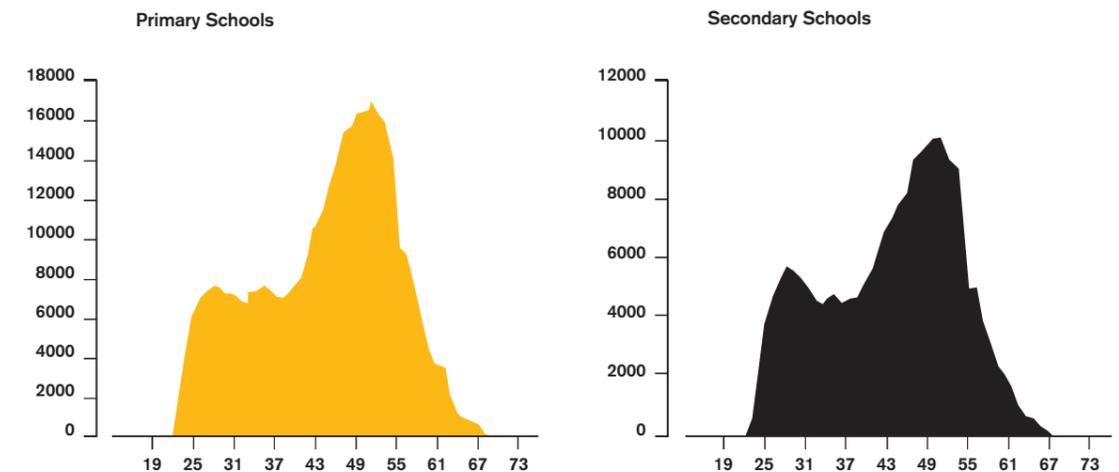
England has an ageing teaching profession, especially in primary schools. 40% of all teachers are aged 45-55, and those aged over 55 account for another 6% of the workforce. Within the next ten years, nearly 50% of the current workforce is likely to have retired. Since the number of pupils is not forecast to decrease significantly, at the current level of recruitment, there is likely to be a large shortage of teachers.

To some extent, the government can influence the retirement plans of existing teachers. For example, a change in the pension scheme in 1997 made it less financially advantageous for teachers to claim early retirement and led to a fourfold reduction in the proportion of teachers retiring before 60.

Several other features complicate the demand for teachers: ■ First, the financial administration of education at a local level is performed by local education authorities (LEAs). This means that although central government sets overall spending limits and determines teachers' pay, it does not have day-to-day control over how many teachers an LEA employs.

■ Second, since the 1988 Education Reform Act, schools may be financially autonomous with devolved budgets.

Figure 1: The age distribution of teachers in England in 2000



Source: Database of Teacher Records (England)

Nearly 50% of primary teachers may have retired within the next ten years



Hence it is at the level of the individual school where decisions about teacher recruitment are taken, using calculations of predicted income based on expected student numbers.

Finally, desired pupil-teacher ratios are influenced by educational criteria and pay negotiated with trade unions. So it is not surprising that the setting of pay scales and attempts to meet target pupil-teacher ratios could be incompatible with the constraints of government spending limits. In these circumstances, a school's capital budget for buildings and equipment may have to be cut to 'balance the books'. This also gives rise to relatively large variation in pupil-teacher ratios and per pupil funding across different regions of the country and compounds the difficulties of assessing the aggregate demand for teachers.

Calculating the exact size of the shortage of teachers is difficult. For example, government estimates are sometimes based on the number of existing vacancies. These are often inconsistent with figures for the shortfall of demand over supply based on using desired pupil-teacher ratios and their own published pupil numbers.

Figure 2 shows the demand for teachers calculated by taking desired pupil-teacher ratios as published by the government and multiplying them by actual pupil numbers. Teacher supply is taken from government data on the number of teachers in service, and the 'excess demand' – or teacher shortage – is the gap between demand and supply. This calculation suggests that in 2000, there was a national aggregate shortage of 34,000 teachers.

Figure 2 shows that there has been excess demand for teachers almost continuously throughout the post-war period. The main problem has been a shortage of secondary teachers, although the difference in excess demand between primary and secondary teachers disappeared towards the end of the 1990s. The 1970s were the only time in the post-war period when there was a (small) excess supply of teachers.

In some cases, the demand for teachers appears to change sharply from one year to the next. This is not due to demographic change but to modification of the official desired pupil-teacher ratio. Since a shortage of teachers

Today's teachers may be drawn from a lower part of the ability distribution than in the past

seems to be a permanent feature, the remaining discussion focuses on what determines the supply of teachers.

The supply of teachers: quantity

All teachers in the UK must be qualified. In England, a qualification can be obtained after a four-year university degree in education or a one-year post-graduate certificate in education (PGCE). Newly qualified teachers must register with the General Teaching Council and gain 'qualified teacher status' to work in the state sector. Ultimately, the government has some control over the stock of teachers since it can determine how many places there are on teacher training courses.

Many factors influence the choice of whether or not to become a teacher. Teacher training courses are not always filled and attendance varies by subject. In the mid-1990s, there were 20% fewer students training to be secondary teachers than the government had targeted, although this shortage has decreased to approximately 6% more recently. By subject, the shortage is biggest in maths, modern languages and geography with shortfalls ranging between 20% and 30% in 2000/1.

Measures to increase the retention of trainees and new teachers have been at the forefront of the political agenda on education. The most prominent measures are repayment of student loans for up to ten years and a hardship allowance for students in shortage subjects committing to become teachers, bursaries for completing the PGCE and 'golden hellos' of £4,000 for new teachers in shortage subjects.

The flow of newly qualified teachers does not necessarily indicate the level of overall supply. Focusing on those currently working as a teacher ignores individuals who are available to teach but not currently employed as teachers. Supply can be calculated as consisting of those entering the profession and those remaining in teaching from the previous year. For example, Dolton, Tremayne and Chung (2003) report that in 2000, 18,000 new entrants and 6,000 re-entrants joined the teacher workforce.

But the difficulty is not just recruiting teachers but keeping them in the classroom. Some trainees drop out and others decide not to become teachers. Smithers and Robinson (2003) find that of 100 registered trainees, 88 passed the final examination, but only 59 were teaching a year later. After three years, only 53 of the original trainees were still in the classroom.

This wastage not only adds to the costs of providing teacher training but also has negative effects on children's performance. Dolton and Newson (2003) find that inexperienced teachers are less effective in helping pupils achieve good educational outcomes.

The supply of teachers: quality

One of the most important debates in education is whether the quality of teachers is high enough. While teacher quality is notoriously difficult to measure, research suggests that some teachers do consistently perform better than others over time and that teacher effectiveness is an important determinant of pupil attainment.

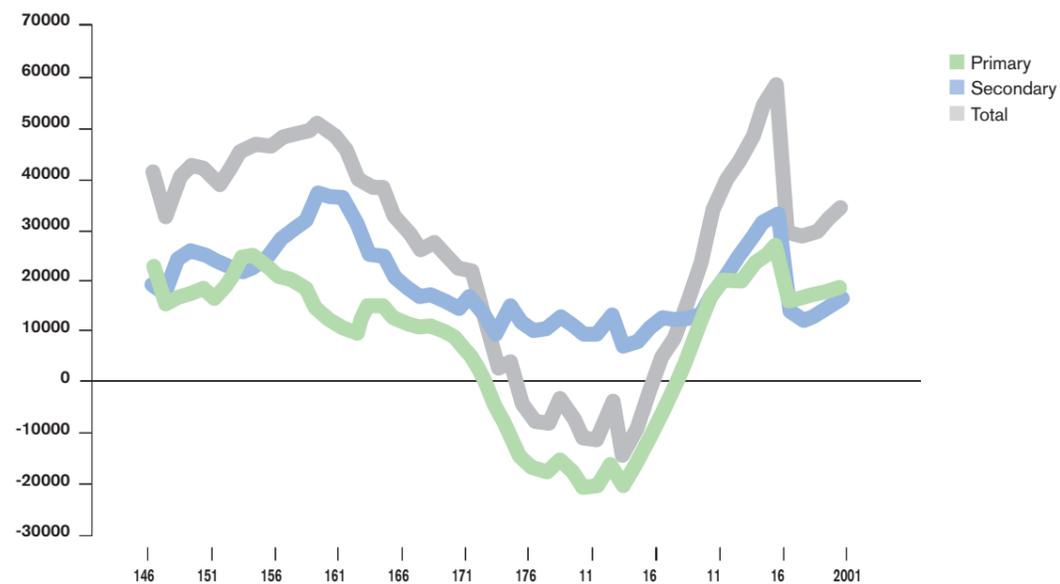
But even if it is unclear whether teachers with better academic records or qualifications are necessarily better teachers, we need to be concerned about recruiting teachers from the lower end of the ability distribution. There is some evidence in the UK (Chevalier et al, 2002; and Nickell and Quintini, 2002) that today's teachers are being drawn from a lower part of the educational achievement or ability distribution than they were in the past. This clearly matters for teacher recruitment and pupil performance.

The issue of how to recruit better teachers and provide them with appropriate incentives is thus an important one. It is this we turn to next, beginning with a discussion of what has happened to teachers' relative pay over time.

Teachers' pay

The main element of the UK's strategy to increase teacher recruitment and retention has been to offer financial incentives. Since teaching competes with all other professional occupations open to graduates, policy-makers clearly need to take account of changes in the graduate labour market when determining teachers' pay. It is not pay in teaching alone that matters but teachers' pay relative to potential 'forgone' earnings associated with an alternative career.

Figure 2: Excess demand for teachers 1946-2001



Source: Database of Teacher Records (England)



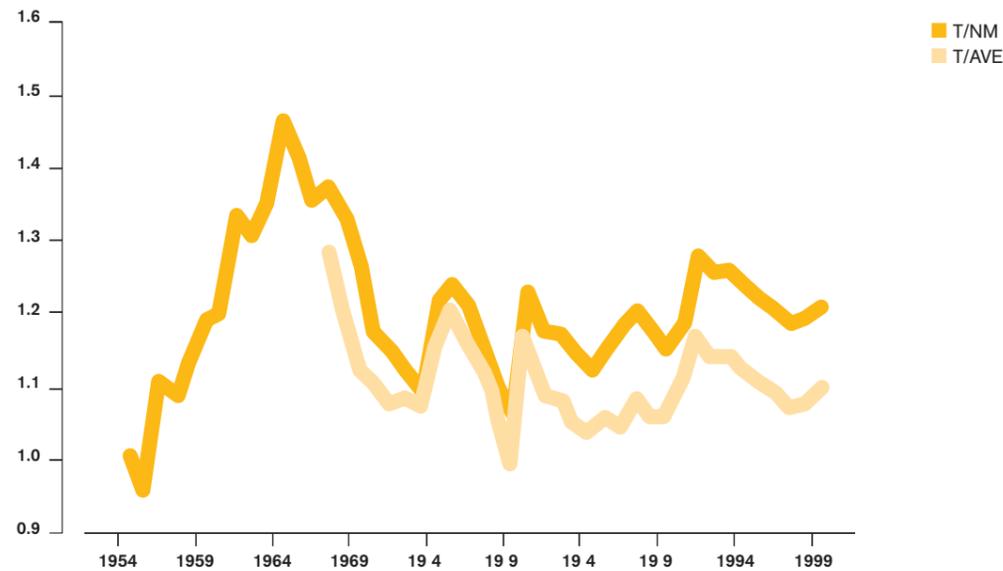
Figure 3 shows the decline in teachers' relative pay compared with average non-manual earnings between 1955 and 2000. Since 1992, teachers' pay has fallen by 6% relative to average non-manual earnings (although the decline 'bottomed out' in the late 1990s). Over the longer run, teachers' pay follows a repetitive cyclical pattern: a period of sustained decline followed by a dramatic increase, usually as a result of a major government report on the crisis in teacher supply.

Figure 3 shows the process of 'catch-up' following a decline in

Teachers in maths, languages and English are disproportionately more likely to resign

Graduates are considerably less likely to be teachers if they live in London

Figure 3: Teachers' relative pay 1955-2000



relative pay, the most notable example being the average pay rise of 29% following the Houghton report in 1974. This was followed by four or five years of decline in real pay before the Clegg Commission award of 1980 restored 1974 'relativities'. Compared with the earnings of other public service professions, teachers' pay has also declined: by 11% relative to police earnings since 1981 and by 25% relative to nurses since 1973.

Who becomes a teacher?

It is clear that relative pay in teaching has a marked effect on graduates' choice of occupation. In particular, the lower teachers' relative pay (or the growth of their pay), the less likely it is a graduate will choose teaching as a career. Relative pay affects both initial career choices and choices made later in an individual's career. Dolton (1990) finds considerable inertia in the profession and suggests that this may be partially due to different individuals' subjective evaluation of the relative pecuniary and non-pecuniary rewards to teaching.

Chevalier et al (2002) explain the market position for teachers



between 1966 and the mid-1990s using data from five separate cohorts of graduates. This makes it possible to simulate the effects of possible teachers' pay rises over time. They find that relative pay in teaching compared with alternative professions has a significant impact on the likelihood of graduates choosing to teach, although the impact depends on the market situation at the time.

The effect of pay on teacher supply is strongest when it is relatively low or following a period of decline. It is also strongest for individuals who have graduated more recently. For example, increasing teachers' pay by 10% would have led to an increase of nearly 10% in teacher supply in the mid-1980s but only 2% in the mid-1960s or early 1990s.

Labour market conditions at the time that occupational choices are made are also important. Dolton, Tremayne and Chung look at time series data over the whole post-war period and find that aggregate labour market conditions, particularly levels of unemployment, are important determinants of teacher supply. In particular, the supply of graduates to teaching is counter-cyclical with most

graduates' perception of teaching (and willingness to enter the profession), improving when graduate prospects are poor in alternative occupations and when graduate unemployment is high.

Relative pay affects both the decision to become a teacher and the decision to remain a teacher. Dolton and Van der Klaauw (1995) find that the higher is teachers' relative pay, the less likely they are to leave teaching. They examine the importance of relative pay in teacher turnover decisions by simulating a uniform 10% increase in relative monthly earnings. This leads to a 9% reduction in the probability of teachers leaving within five years of being in the profession, or a total retention rate of 69%. A 25% increase in pay raises the percentage of teachers still in teaching after five years to 73%.

Work using US data suggests that raising teachers' pay could improve teacher quality. But attracting more able students to teaching is not the only difficulty for policy-makers. Since individuals with higher ability generally command higher pay, high ability teachers are at more risk of leaving the profession than less talented teachers. To negate the lure of improved outside opportunities on 'able' teacher retention, fast track programmes have been introduced in the UK with the aim of recruiting and retaining the most able graduates by shortening pay scales while providing them with additional training, support and supervision.

The supply of women teachers

Another key aspect of teacher supply is the relative popularity of the profession with women graduates. A crucial aspect of the distinction between the occupational choices of men and women is that the latter are often making simultaneous decisions about starting a family and whether to participate in the labour market. This is particularly true in teaching, where a common view is that the profession has 'complementarities' with family formation, notably the ease of returning to teaching after a career interruption.

Dolton and Makepeace (1993) find that the choice of teaching as a career is intimately related to women's decision to participate in the labour market. This is true in the sense that unobserved factors, which make a woman more likely to select a career outside teaching, make them less likely to participate in the labour market and vice versa. This generates a positive correlation between the decision to work and the choice of teaching as a career.

Feminisation of the teaching profession does add some



difficulties to planning teacher supply as many women will at some point interrupt their career for family reasons. Smithers and Robinson find that 12% of primary teachers who resign do so for maternity or family reasons. Women are also more likely to leave teaching than men so policies to facilitate work and child-rearing, such as subsidised child-care or reduced workload, may increase teacher supply. Analysis of non-pecuniary factors in occupational choice by Dolton, Makepeace and Van der Klaauw (1989) finds that such factors are generally very important in the choice of teaching, and they are more important for women graduates.

Performance-related pay

While the evidence is that raising pay has a positive effect on teacher supply, it remains very difficult to design a pay package that would guarantee a supply of high quality teachers. Numerous authors criticise across-the-board pay increases for existing teachers as inefficient since they are unlikely to improve performance radically. Instead, over the years, there have been various attempts at introducing differential pay for teachers. Since 2000, this mainly focuses on performance-related pay (PRP), which is intended to boost teachers' pay while making increases dependent on teachers demonstrating effective performance in their jobs.

The system of performance management in the UK has two main elements. First, each teacher is appraised annually by his or her senior line manager on the basis of previously agreed objectives. At the second performance review stage, the assessment is used by the head teacher as a basis for decisions on pay in the coming year.

PRP currently applies only to the most experienced teachers, those who have reached the 'threshold' at the top of the pay scale for classroom teachers (usually six or seven years into their careers). The idea is that individuals who can prove themselves effective teachers, assessed against a set of nationally agreed criteria, will 'cross the threshold', receiving an immediate £2,000 pay rise and access to a new higher pay scale for classroom teachers. Around 80% of teachers who were eligible for the threshold payment when PRP was introduced in 2000 applied and around 97% actually received it.

It is unclear whether PRP is the appropriate vehicle to solve problems in recruitment and retention of teachers. For example, PRP may not be the best vehicle to improve teacher performance, since the outcome of interest – pupil

Pay is not the only cause of teachers' dissatisfaction with their work

achievements – is multi-dimensional and depends on the efforts of a group of teachers rather than individuals.

Of course, it is by and large an empirical question as to whether PRP actually improves teacher performance. Evaluation for the UK is not possible since the scheme was introduced nationally but evidence from elsewhere in the world tends not to support PRP schemes. In fact, over time, most schemes for teachers have collapsed and there is evidence that the ability of PRP to motivate staff is limited.

Teacher shortages in specific subjects and geographical areas

The fact that teachers' pay and conditions are determined for the whole market presents problems with teacher supply in particular subjects and geographical areas. For example, training places for teachers of subjects like physical education are always over-subscribed. But there are always unfilled places for teachers specialising in maths and modern languages despite the wealth of financial incentives to induce people to enrol. And because outside options for teachers with high ability in maths or languages tend to be higher, they are also more likely to leave the profession.

Smithers and Robinson find that teachers in maths, information technology, languages and English are disproportionately more likely to resign. What's more, among all graduates, there is evidence that the average return to a maths degree is higher than for many other subjects (Walker and Zhu, 2001). This means that the opportunity cost of teaching may be a lot higher for a maths graduate than a history graduate in terms of the forgone earnings in alternative jobs.

As with other public service professions, there have also been shortages of teachers in certain areas of the country, most markedly in inner London and the South East. Official vacancy rates are two to three times higher than the national average in London despite it being the area that relies most on temporarily filled positions.



Chevalier et al (2002) estimate that an average graduate is 15 percentage points less likely to be a teacher if he or she lives in London. Smithers and Robinson find that teachers in London are also more likely to leave or transfer to other schools than teachers in other geographical areas. Official turnover and wastage rates in 2002 were respectively 20% and 11% in London compared with 15% and 9% for England.

Recruiting difficulties in London are thought to stem from the better alternative careers for potential teachers and the upward pressure on living costs associated with a more competitive labour market. But it is possible that recruiting difficulties in London have more to do with the job conditions in inner city schools than outside job opportunities and living costs.

Nevertheless, from April 2003, a specific pay scale has been defined for the capital to replace the previous London allowance: on the lower pay scale, teachers in London are paid £3,500 more than in the rest of the country; and the pay differential for teachers on the PRP scale is up to £6,000. And budgets permitting, schools have greater flexibility with teachers' pay. A range of recruitment and retention allowances – £1,000-5,400 – can be offered to assist towards relocation, travel to work or provision of care for dependents. Schools will be able to offer this allowance to a new or established maths teacher but not to other teachers in the same school.



Non-financial incentives for teachers

Most government policies to retain teachers concentrate on financial incentives. But surveys of teachers reveal that pay is not the only determinant of their dissatisfaction. Chevalier et al (2003) find that teachers are less satisfied in their jobs than many comparable graduates working in other fields and are particularly dissatisfied with hours of work. Compared with other graduates, teachers are 12 percentage points more likely to claim to be dissatisfied with their hours. Compared with other

Performance-related pay is unlikely to solve the problem of teacher recruitment

employees, teachers' hours are concentrated during term time with an average working week of 52 hours.

It has long been asserted that many people become teachers because of the non-pecuniary benefits, long summer holidays being the classic example. But more recently, with the advent of the 'quasi-market' and increased accountability, these non-pecuniary benefits may have become less attractive. For example, the national curriculum and the rigours of inspection procedures may have given teachers an excessive administrative burden.

Interviews with teachers leaving the profession confirm that heavy workloads and other characteristics of schools rank higher than pay as a reason for quitting. For over 40% of the leavers surveyed by Smithers and Robinson, nothing could have made them stay. For the others, changes in workload or pupil behaviour were more likely to be cited than pay as an inducing factor to stay. To get a high quality teaching profession in place, all of these difficult issues need to be addressed.

This article summarises 'The Labour Market for Teachers' by Arnaud Chevalier and Peter Dolton, chapter 3 of *What's the Good of Education? The Economics of Education in the UK* edited by Stephen Machin and Anna Vignoles (Princeton University Press, forthcoming, 2005).

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