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Teaching and the Teacher Labour Market: The Case for Reform

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1. Introduction

This article considers long-standing grievances in teachers' labour markets regarding chronic shortages of qualified mathematics and science teachers and the loss of the best youth instructors from the teaching service. We first look at evidence for the existence of chronic shortages of certain types of teachers, secondly, the major relevant factors creating this situation and, finally, what reasonably can be done to address these situations. Cross-sectional Australian data are used for evidence and these are supplemented, where appropriate, with pertinent overseas findings.

2. The Issues

Teaching, mentoring youth and other services associated with formative investments in human capital tend to be accepted, largely on a priori grounds, as imparting a social value over and above their economic value. While teaching is neither a highly paid nor a highly specialised profession, the common understanding among parents and pupils is that the quality of teachers, and indeed the attributes of particular teachers, matter for the way people learn, their attitudes to further study and the foundation skills they use later in life. This article does not challenge these assumptions. Instead we argue that the current labour market conventions for teachers have not encouraged some of the most sought-after graduates to enter or remain in teaching. Specifically, we suggest that strict adherence to rigid pay scales is causing chronic shortages of qualified mathematics and science teachers, periodic shortages in specific schools, and is preventing schools in general from keeping some of the most talented instructors in the classroom.

These concerns are well known in the industry and, to differing degrees, have formed the subject of many government inquiries.[1] Unfortunately, these inquiries typically require the research staff to report within short timeframes, which obliges them to rely upon existing, and at times ad hoc, data sources. A thorough study of the motivations and calibre of teachers requires the collection of longitudinal data on the reasons for entering, or not entering teaching, the forces which attract teachers to specific schools, and factors triggering the departure of the most desired teachers from the profession. These surveys take considerable time to accomplish and imply a long-term commitment from governments. However, they are needed if governments are to estimate the most cost-effective way to improve the calibre of teaching services. A panel dataset of this nature does not exist in Australia, and until we have this form of data, we cannot know how suboptimally the teaching labour markets are performing and how efficient contemporary policies to address supply problems are. Nonetheless, longitudinal teacher studies do exist overseas, and analytic findings from studies using these data are not wholly irrelevant to the Australian situation.

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3. Chronic Problem Areas in the Teaching Labour Markets

One of the most commonly ignored aspects of teaching is that it is not a single labour market but many discrete segmented labour markets. Segments, which occur when one type of labour cannot be substituted for another (without considerable loss of productivity), are found between primary and secondary school trained teachers, and within the secondary school sector, between disciplines. Teaching labour markets are not segmented by jurisdiction since a teacher who is skilled to teach in the Catholic system is equally skilled to teach in the government and independent system and vice versa. Segmentation implies that the parameters of demand for and supply of teachers in each segment are likely to be different and may even be wholly unrelated. The supply of science teachers, for example, is clearly associated with the number of science graduates and this need have no bearing on the numbers graduating from the arts and social science faculties.

Anecdotal evidence of shortages of qualified mathematics and science teachers has a long history, and recent surveys of teacher shortages support the position that these shortages still remain. A teacher shortage exists when employers cannot fill their ex ante demand with appropriately qualified teaching staff at the going wage. Faced with a shortage, schools generally do not turn away pupils, but instead respond by limiting the number of school students who can take subjects with shortages, reducing the (supervised) class hours for students below normal, employing teachers to teach subjects they are not fully qualified for (including through the use of relief teachers), or raising the size of classes beyond normal. Evidence of these behaviours is accordingly an indicator of a teacher shortage and a reduced level of service to students. It is thus not correct to assume that since there is a teacher in front of every class that shortages do not exist.

Most of the recent Australian surveys on teacher shortages do not collect data on the extent to which schools are resorting to these second-best behaviours, opting instead to ask principals simply whether they have found it difficult to recruit qualified teachers. While this is not the best method for collecting evidence on shortages, the data that are collected suggest that shortages exist in secondary school science (physics and chemistry), mathematics, information technology and technology subjects, languages other than English and in some rural locations. The Ministerial Council on Education, Employment, Training and Youth Affairs (2003, p. 58), for example, reports that 30 per cent of Year 12 mathematics and 20 per cent of Year 12 science teachers have not completed mathematics or science respectively to at least the third year of university. Anecdotally, these shortages are most extreme for schools where pupils are less academic and therefore more difficult to teach, and in working class and rural regions. Indeed, chronic shortages in mathematics and science, and in poor or remote schools, appear to be a worldwide phenomenon (see Milanowski 2003).

Concern in developed countries about the loss of the best teachers of any discipline is a more recent issue that has not been studied intensively and has received no known quantitative attention in Australia. Indeed, identifying who is a superior teacher has a greater subjective component than examining numerical shortages, thus making it more difficult to analyse using administrative data. This does not mean that suitable data cannot be collected and constructed to study this phenomenon—there is a long tradition in sociology, psychology and management of quantifying quality characteristics—but surveys to do this need to be purpose built. Given the newness of this issue there is limited overseas information on the qualitative features of teachers who leave the profession and most studies concentrate on the well-recognised characteristics and disregard the important 'unmeasured' professional qualities. Nonetheless, these studies, all from the United States, show that teachers with the highest test scores (SAT and National Teacher Exam) are most likely to leave (Schlecty and Vance 1981; Weaver 1983; Murnane et al. 1991; Henke, Chen and Geis 2000). In addition, Murnane et al. (1991) found that among secondary school teachers, those qualified in

physics and chemistry and those receiving the lowest pay had the highest attrition rates. Personal reasons and lack of job satisfaction (including poor earnings) account for most of the reasons for leaving teaching in the United States.

4. Forces Governing the Supply of Teachers in These Chronic Problem Areas

Non-pecuniary factors influence people's career decisions and we expect, and indeed find, that teachers are similar to the rest of the population. However, many of these non-pecuniary motivations and preferences are either part of the individual's intrinsic personal preferences or relate to characteristics of the student body over which school administrators and policy makers have no control. As such, while interesting, measuring the significance and sensitivity of the supply of potential teachers to these factors is of little use for policy makers. For the record, Australian, US and UK empirical studies have identified plans for family formation (Dolton, Tremayne and Chung 2003; Bempah 1994), the desire to work with children (Committee for the Review of Teaching and Teacher Education 2003; Tusin 1999; Milanowski 2003), and altruistic motives (Young 1995) as factors affecting the decision to enter the teaching profession. Once trained, the choice of school was affected, inter alia, by the characteristics of the potential pupils such as family income, race and academic ability (Hanushek, Kain and Rivkin 1999), home ownership (Bempah 1994), and the leadership style of the school administrator (Bempah 1994).

From a policy perspective, however, it is how sensitive teachers' decisions are to variations in pay or other employment conditions, such as the level of administrative support and teaching aides, which is most relevant. More specifically, it is the motivations of (potential or actual) teachers of mathematics and science, teachers in the less desirable schools, and high performing teachers which should be the focus of policy attention. Again, for similar reasons discussed above concerning data, there is virtually no Australian evidence on these issues and overseas material must be used as the best available proxy. Overall, these studies, primarily from the United States and United Kingdom, have found that either recruitment or retention are elastic with respect to variations in pay, all other things equal (Zabalza, Turnbull and Williams 1979; Manski 1987; Dolton 1990; Murnane and Olsen 1990; Murnane et al. 1991; Dolton and Makepeace 1993; Dolton and Mavromaras 1994; Dolton and van der Klaauw 1995; Gritz and Theobald 1996; Hanushek et al. 1999; Dolton and van der Klaauw 1999; Dolton et al. 2003; Milanowski 2003). However, this finding is not universal. Fritjers, Shields and Wheatley-Price (2004), for example, found that teachers' quit decisions were quite insensitive to pay. On the other hand, no broadly based studies have examined the effects of employment conditions on labour supply.

Disaggregating these effects according to teacher quality correspondingly is hindered by the non-availability of data on 'unmeasured' professional characteristics. Distinguishing among teachers based on their observable characteristics is consequently more common. Both Figlio (2002) and Murnane and Olsen (1989, 1990) have found that salaries affect the quality of education of the selected teachers while both Stinebrickner (2001) and Goldharber and Lui (2003) have found that, once qualified, teachers with higher academic ability scores were less likely to enter teaching and more likely to leave teaching for other occupations since their potential earnings in other occupations were higher than their earnings from teaching. Milanowski (2003) has argued that mathematics and science college graduates are more highly motivated by earnings, compared with humanities and social science graduates, and generally few of them ascribe much value to the non-pecuniary rewards from teaching. If this is generally true, then the shortage of mathematics and science teachers may arise because the pool of mathematics and science graduates who are attracted to the type of work teaching involves is smaller than the pool attracted to teaching in the humanities and social science disciplines.

There is tolerable evidence that shortages are neither across all disciplines or due solely to

comparable earnings. While no data exist on the motivations and perceptions of teachers who leave teaching compared with those that remain, we do have Australian data that compare the relative satisfaction of remaining teachers across pay and employment conditions. These data, which are drawn from the first wave of the Household, Income and Labour Dynamics in Australia (HILDA) Survey (conducted in 2001), represent respondents' ratings on a 0 to 10 scale of how satisfied they were with their job overall and with five specific aspects of that job (see Watson and Wooden 2004). A summary of these data disaggregated once again by occupation categories is reported in Table 1.

Compared with other employees, and especially other professional employees, school teachers are more satisfied with the security of their job (only health professionals score higher) but relatively dissatisfied with the hours they work and how their working hour arrangements impact on their ability to balance work and non-work commitments. When all aspects of the job are considered, however, school teachers are relatively satisfied. Close to two-thirds of school teachers score 8 or above on the 0 to 10 scale, suggesting very high levels of job satisfaction in the main. Moreover, their mean level of satisfaction is higher than in most other professions, though with the exception of nurses, such differences are not statistically significant. This is further confirmed by regression analysis (reported in Webster, Wooden and Marks 2004). When job satisfaction was regressed against a wide range of personal characteristics (such as age, sex, marital status, educational qualifications and health) as well as occupation, no evidence was found that teachers were any more or less satisfied than workers in most other occupations (with again the possible exception of nurses).[2]

So far we have assumed that the motivations of the individual are the main force governing labour supply, but it is also possible that institutional forces, such as the provision of teacher training positions, have been a limiting factor. This possibility, however, was recently examined by the Victorian Government and found not to apply to the main occupations with shortages (Auditor General Victoria 2001). This inquiry found that where subject sub-quotas exist in the major training institutions, they are not filled in the major shortage areas of mathematics, science, information technology, economics, geography and visual arts.[3]

5. Attracting and Retaining Scarce Teachers

Efficient policies to attract labour should only target the teachers, or groups of teachers, who are in short supply. Since there is no evidence of overall teacher shortages, policies which apply indiscriminately to all teachers will be more costly than is necessary.

Table 1 Job Satisfaction by Occupation: Mean Score (0–10 Scale), 2001

	Satisfaction with					
Occupation	*Pay*	*Job security*	*Work itself*	*Hours worked*	*Flexibility to balance work and non-work*	*Overall job*
School teachers	6.87	8.32	7.87	7.06	6.50	7.73
Other educational professionals	6.77	7.41	8.17	7.00	7.44	7.58
Nursing professionals	5.86	8.62	7.32	6.81	6.92	7.18
Other health professionals	7.19	8.59	8.03	7.40	7.34	7.87
Science, building etc. professionals	6.60	7.16	7.85	6.96	7.79	7.59
Business, information professionals	6.88	7.29	7.58	7.14	7.61	7.46
Social professionals	7.13	7.86	7.98	7.15	7.69	7.84
Associate professionals	6.72	7.85	7.74	6.96	7.23	7.62
Other occupations	6.58	7.60	7.54	7.14	7.43	7.62

Source: HILDA Survey, Wave 1.

Almost no evidence on the responsiveness of teacher supply to variations in their employment conditions exists and therefore the magnitude of effects to use this medium to attract teachers is highly uncertain. However, since there is reasonable evidence that teacher attraction and retention is elastic with respect to pay, the most obvious policy is to vary school budgets so principals can offer more remuneration to teachers with scarce skills.

In theory, identifying the actual teachers who warrant specific incentives is relatively straightforward once the list of teaching disciplines with shortages and schools with chronic shortages are agreed upon. However, even after these lists are established, achieving an effective set of specific incentives in practice is more challenging. Workplace norms of wage equivalence between teachers of the same level of experience and service, regardless of discipline, are strongly entrenched in the teaching professions, especially the government sector. For this reason, surveys have found that almost no government school principals claiming a teacher shortage had offered incentive payments (only 2 to 5 per cent of teachers were affected; see Department of Employment, Education and Training, various). Historically teacher unions have opposed allowing variation in the pay of teachers in different secondary subjects to be enshrined in awards or certified agreements on the grounds that teachers should be paid the same rate for the same work. However, teaching in one market segment is not the same as teaching in another. They require different skills and acquired sets of knowledge. The fact that different teachers cannot be substituted for one another, without loss of productivity, is objective evidence that they are *not* doing the same work. The fact that some teaching segments are in greater relative demand (or shortage) is indicative that the work is *not* of the same value. The grounds for maintaining that pay should not vary by subject or year level appear to be heavily based on accepted habit and customs rather than incentive structures designed to ensure labour market balance.

Using higher pay to retain high performing teachers has the additional difficulty of identifying the appropriate teachers. There is a considerable body of overseas, but not Australian, literature on the use and abuse of testing pupils' achievements for this purpose. In fact, using these tests to reward teachers has become a national standard for primary schools in both the United States, since 2001,[4] and in the United Kingdom, since 2000 (see Burgess et al. 2001). To appear fair, these tests have to measure teacher 'value added' but there have been innumerable difficulties with achieving this. Characteristics such as the students' social and socio-economic background and ability need to be measured and controlled for in addition to other external factors such as private tutoring. In the United States, it has been found that using these tests for teacher appraisal has led, in some cases, to teachers 'teaching the test' and encouraging pupils to perform poorly on the initial test (Deere and Strayer 2001; Ladd 1999; Klein et al. 2000; Jacob and Levitt 2002; Jacob 2002). Moreover, results have been found to be very sensitive to small random occurrences caused for example by the inclusion or exclusion of as few as two or three very high or very low performing students.

For these reasons, formal 'objective' testing does not appear to be a fruitful method to identify and reward the best performing teachers. However, to the extent that the individual teacher is important to student outcomes, and to the extent that these teachers are liable to leave teaching for other occupations, there will be a social gain if more can be done to selectively raise teacher retention. Increasingly, many workplaces are introducing performance loadings and these are usually based on the recommendation of supervisors. There is no reason to suppose that teacher labour markets are any different from other labour markets and no reason why this approach would not work in schools.

6. Conclusion

It is hard to refute assertions that there is and have been continual shortages in teachers for secondary school mathematics and science, and for all teachers in particular localised regions within Australia despite the evidence being somewhat ad hoc. Furthermore, there is

informal evidence that the personal and more subjective professional qualities of individual teachers matter for pupil outcomes and therefore positive social gains can be made if these individuals are identified and kept in schools as instructors.

Similar to other occupations, many factors that motivate graduates to enter the teaching profession and remain there are intrinsic in nature and not immediately amenable to manipulation by public policy. However, on both a priori and evidential grounds, we argue that selectively enhancing the pay and conditions for teachers in scarce supply should increase supply and enhance the quality of teaching services to young people at school.

To estimate which type of policy—varying pay or varying conditions—is most cost-effective from a government budget point of view requires a longitudinal survey of actual and potential teachers. Given the current size of national education budgets this is likely to be a financially prudent undertaking. However, whichever policy is pursued, two enabling factors are required. First, school budgets should be increased to allow salary premiums to be paid and, second, teachers within schools should recognise and accept that in the interests of better educational services for young people, wage (or employment) differentials between teachers need to change.

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Endnotes

1. Most state governments conduct regular surveys as part of their teacher labour market forecasting and planning functions. At the national level, the Department of Employment and Workplace Relations produces forecasts (on behalf of the CESCOE Working Party on Supply and Demand for Teachers; see Preston 2000 and Ministerial Council on Education, Employment, Training and Youth Affairs 2003). Historic records of shortages of secondary mathematics and science teachers can be found in Department of Employment and Youth Affairs (1979) and Department of Employment and Industrial Relations (1982).

2. Estimation was undertaken using ordinary least squares (adjusted R-squared = 0.28). When re-estimated using an ordered probit model the results were qualitatively unaffected.

3. This information was derived from La Trobe University, the University of Melbourne and Monash University.

4. See the No Child Left Behind Act 2001. Prior to this, there had been a number of performance-based teacher or school incentive schemes in the United States. During the 1980s these were individual teacher based but they fell from favour and by 1990 were largely absent (see Burgess et al. 2001). The recent resurgence has been in school-based schemes, but there can be trickle down effects on individual teachers' pay within the school.

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