

**GREENACRE EDUCATIONAL
PUBLICATIONS (GEP)**

Economics Working Paper Series

**Teachers' Pay: Linking To
Market Conditions Rather
Than 'Performance'?**

Anthony R. Stokes and Sarah J. Wright

Working Paper: 07002

Abstract

Teachers' Pay: Linking To Market Conditions Rather Than 'Performance'?

Anthony Stokes and Sarah Wright

Discussions in regards to how much should teachers be paid have gone on for decades. The most recent debate involves 'performance pay' for teachers and developing models to measure 'teacher performance'. Analysis of declines in the quality of teachers and potential teacher shortages shows there is a need for increased pay for teachers but some teachers need to be paid more, not based solely on performance but rather on the demand and supply for teachers in the labour market. This paper considers a cost-benefit approach to measure the overall return to a university degree by adopting a Private Rate of Return (PRR) model to demonstrate the reasons why there are major shortages of teachers in some discipline areas and over-supply in others. It also provides some policy options to increase wage flexibility in the teacher labour market and thereby overcome the shortages.

About the Authors

Anthony Stokes is Senior Lecturer in Economics in the School of Arts and Sciences, Australian Catholic University.

Sarah Wright is Lecturer in Economics in the School of Arts and Sciences, Australian Catholic University.

Teachers' Pay: Linking To Market Conditions Rather Than 'Performance'?

Anthony Stokes and Sarah Wright

Discussions about how much teachers should be paid have gone on for decades (Correy, 2007). The most recent debate involves proposals to measure 'teacher performance' and reward 'performing' teachers accordingly. Federal Education Minister, Julie Bishop, stated in early 2007

I'll be taking a number of options to the State Education Ministers meeting in April, to convince State Labor Governments and, through them, the unions, that performance pay is a significant element in attracting and retaining effective teachers to raise standards(Bradford, 2007).

While the use of an appropriate performance pay scheme could increase the quantity and quality of teachers, there is considerable debate about the type of model to apply. However, the performance pay issue is only one consideration in the issue of how pay can attract and keep quality teachers. This paper argues that there are more fundamental economic concerns that need to be addressed in determining teachers' pay. In particular, emphasise is placed on:

- the fact that there is not a single market for teachers but a large number of different labour markets for teachers,
- the inflexibility of the current payment scales for teachers, and
- the relatively low wages that teachers receive, compared to alternative occupations.

The Labour Market for Teachers in Australia

Participants in any labour market comprise those who have a demand for labour, the employers and those who supply the labour, the workers. The purchasers of the labour and the suppliers of the labour have a personal relationship between each other. The workers, as human beings, will have personal preferences in regard to the conditions under which they work. Thus the labour market is not only dependent on wages and on-

costs, but on non-financial factors that are largely absent from other markets. These factors include the safety and quality of the work environment, the hours of work, opportunities for promotion, the status and public perception of the job and the attitude of management and fellow employees. The importance of these factors varies with the individual preferences of workers.

The aggregate labour market for teachers is comprised of individual labour markets segmented according to such factors as geographical and political regions (states and territories), primary and secondary schools and fields of qualifications. Each of these areas has a distinct teacher labour market. The demand and supply of physics or mathematics teachers is very different from the demand and supply of art teachers or infants' teachers. These in turn vary from state to state and region to region. In addition, the teacher labour market in Australia is distinctive because of the presence of three major employer groups. The main employers of teachers in Australia are the governments, through their Departments of Education and Training (DET). These governments are also partly responsible for the funding of Catholic and independent schools in Australia. The governments are faced with limitations on their ability to fund education and teachers' wages, in particular, because they are constrained by their budgets and the political repercussions of increases in taxation or cuts in the governments' expenditure in other areas. This has a major influence on the operation of the teacher labour market in Australia. The limited funding and the monopsonist employer position of the governments has led to a situation of market disequilibrium, with wage levels insufficient to attract teachers at least in some discipline areas and locations.

The free operation of market forces would lead to wages rising and falling in response to changes in demand and supply. This does not occur in the Australian teacher labour market, at this time, but does so in countries such as the USA. Research in the USA (National Center for Education Statistics, 1996, 1997), where there is a relatively flexible labour market for teachers, shows that employee compensation reflects, at least in part, the forces of demand and supply. The effects on wages of particular teacher

characteristics, such as qualifications and experience, reflect a combination of the perceived value of the attribute to the employer and the availability of that attribute in the market. In teaching areas where there were perceived shortages or competition from the private non-school sector, there tends to be higher wages, as economic theory would suggest in a flexible labour market.

Why is there a need to increase teachers' pay?

There are a number of reasons why teachers' pay need to be increased, at least for some areas of teaching, and the pay scales made more flexible. The case largely depends on the demand for a certain type of teacher in a particular location being greater than the supply of those teachers. These factors are reflected in:

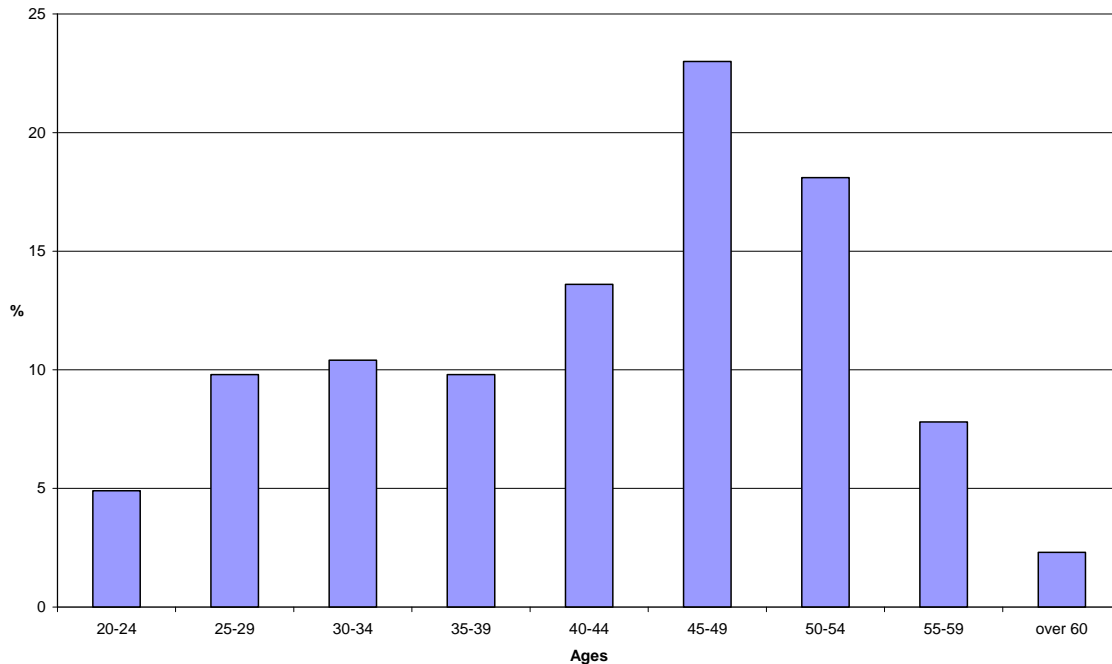
- the ageing teacher workforce,
- a growing teacher shortage, especially in certain secondary school discipline areas,
- the declining quality of teacher entrants at university, and
- the decline in teacher wage relativities.

We consider each factor in turn.

(i) The ageing teacher workforce

The average age of the teacher workforce is older than the remainder of the workforce. It has been estimated that 50 percent of the current secondary school teacher workforce in NSW will leave the teaching profession in the next ten years and that the numbers of new teachers entering the profession will fall well short of that number. The greatest shortfalls of staff are likely to occur in government schools. In the government sector throughout Australia 28 percent of primary school teachers were aged over 50 in 2003 (Figure 1) (MCEETYA, 2004). In addition a further 23 percent were aged 45-49. Similarly in the government sector throughout Australia 32 percent of secondary school teachers were aged over 50 in 2003 (Figure 2). In addition a further 21 percent of government secondary teachers were aged 45-49. The situation is worse in some states with South Australia having 16.8 percent of government secondary school teachers over 55 years old

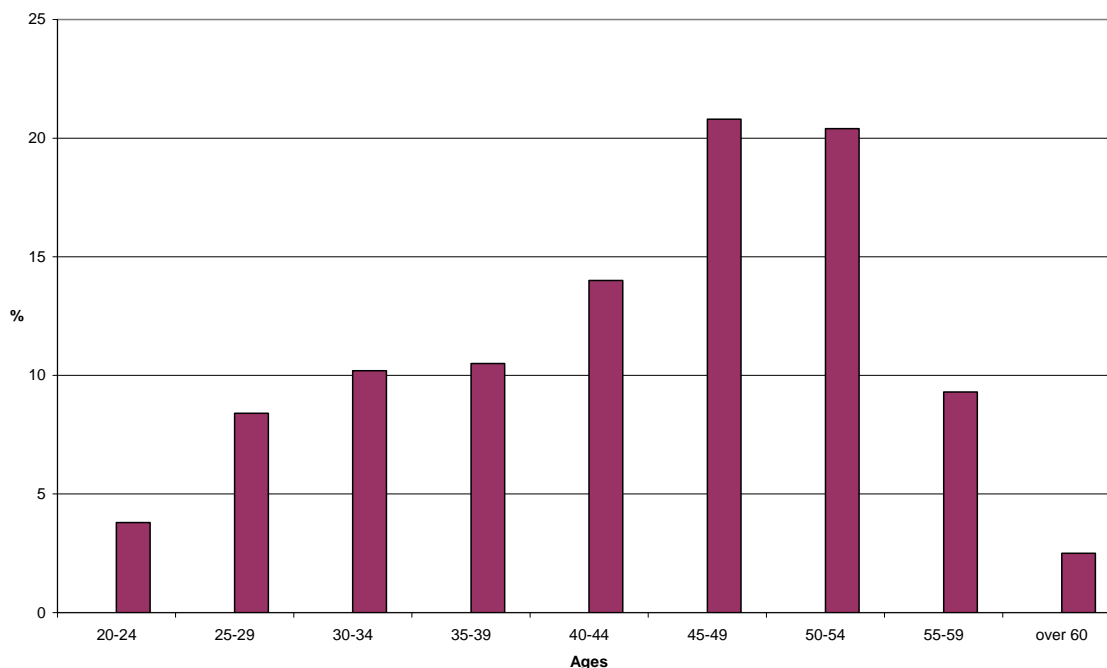
and only 7.4 percent under 30 years of age. In New South Wales 11.3 percent of government secondary school teachers are aged over 55 and only 9.5 percent are under 30 years of age.



Source: Government Schools Staffing Survey, DEST, 2004

Figure 1 Age distribution of government sector primary school teachers, Australia 2003

While the situation is not as critical in the non-government schools sector, the numbers of teachers projected to leave in the next 10 years are greater than the current rate of entrants to the sector. In the non-government sector throughout Australia almost a quarter of primary school teachers were aged over 50 in 2004 (MCEETYA, 2004). In addition a further 17 percent were aged 45-49. Similarly in the non-government sector throughout Australia 27 percent of secondary school teachers were aged over 50 in 2004. In addition a further 15 percent of secondary teachers were aged 45-49. Overall the current entry rate of new teachers especially in secondary schools will not match the retirement rate in the years ahead. In addition as independent schools are already offering wages often up to 20 percent greater than government and Catholic schools they are least likely to be affected by the shortages, with the burden falling on the government and Catholic schools.



Source: Government Schools Staffing Survey, DEST, 2004

Figure 2 Age distribution of government sector secondary school teachers, Australia 2003

(ii) Areas of Teacher Shortage

Apart from an overall looming shortage of teachers throughout Australia, there are already shortages of teachers in selected areas in Australia with the biggest areas of concern being in secondary schools. Currently these are only in particular fields and geographical locations, but there are projections that these could become more widespread. The States and Territory Skills in Demand Lists for Australia (2006) show that there is a nation wide shortage of secondary school teachers in:

- Manual Arts/Tech Studies (Technological and Applied Studies);
- Maths;
- Physics/Chemistry; and
- General Science.

In addition there are shortages of secondary school teachers in individual states in the areas of:

- Languages;

- Home Economics;
- Design and Technology;
- Information Technology;
- Special Needs, and
- Physical Education.

A number of studies on teacher supply and demand undertaken by Preston (MCEETYA, 2003, 2004), commissioned by the Australian Council of Deans of Education, also identified particular shortages in identified subject areas and locations. Preston's analysis has also been confirmed by the Australian review of teacher education in Science and Mathematics (Kwong Dow, 2004).

Despite the growing number of successful university completions in Australia, fewer newly qualified graduates are entering the teacher labour market. The Commonwealth Department of Education, Science and Training (DEST, 2006) reported that while the overall number of people graduating from university in Australia increased over the decade to 2005, the number of people completing a university qualification in the field of teacher education decreased by 27 percent to 16,250 in 2005. Three-quarters of the students who completed university courses in 2005 in the field of teacher education were women. Similar patterns occur in the number of people commencing and continuing study in teacher education courses. From 1986 to 2005 the proportion of higher education students studying education declined from 21.3 percent to 10.2 percent. This pattern has continued across Australia, with the actual number of teacher education students falling from 73,510 in 1996 to 63,194 in 2005.

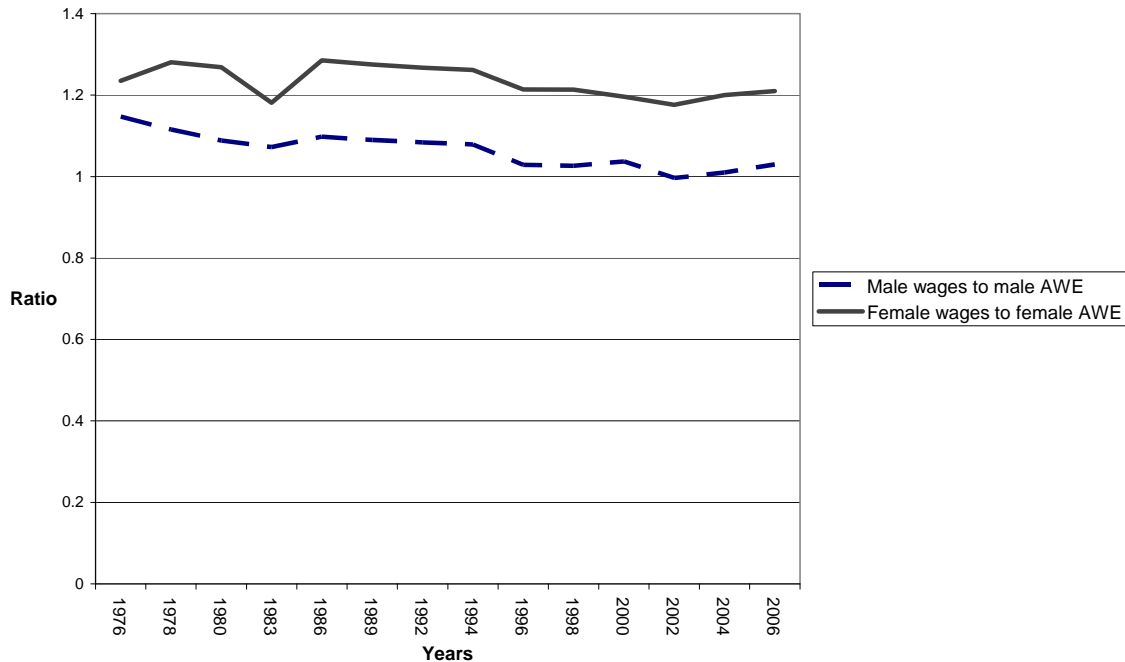
(iii) The declining quality of teacher entrants at university

The aptitude of new teachers appears to have fallen in recent decades. While there are still many capable students entering teacher education and going on to become teachers, Leigh and Ryan (2006) report that between 1983 and 2003 the average percentile rank of those entering teacher education fell from 74 to 61. At the same time the average percentile rank of new teachers fell from 70 to 62. This is supported by the decline in the

University Admission Indices (UAI's) required to enter many teaching courses in recent years. This is most serious in regards to secondary education where the greatest declines have occurred.

(iv) The decline in teacher wage relativities

Part of the reason for the decline in the number of students studying to be teachers is the decline in the relative wage that a teacher gets paid compared to other workers. The following time series study shows the average weekly earnings of male and female teachers in Australia compared with the level of average weekly earnings for all adult males and females in Australia¹. As can be seen in Figure 3, there has been a general decline in the relative earnings of both male and female teachers in the period.



Source: Australian Bureau of Statistics, Employee Earnings and Hours, Cat. No. 6306.0.

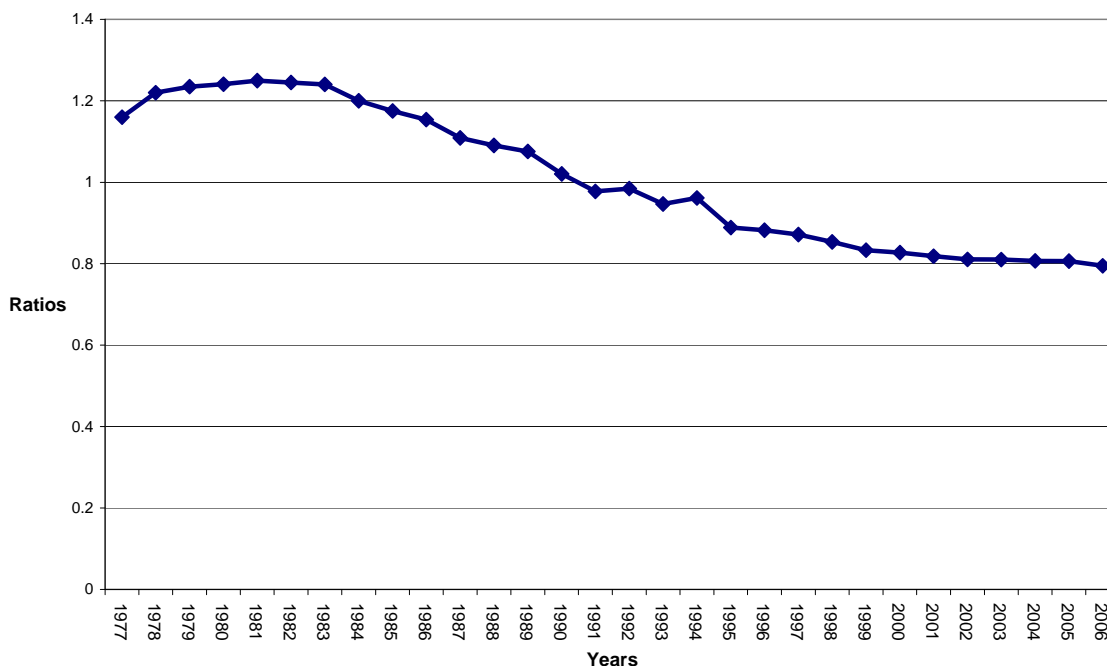
Figure 3: The relative average weekly earnings of male and female teachers in Australia 1976-2006

¹ Due to changes in ABS classifications in the period 1977 to 2003 the average wages for males and female teachers are for all teachers, not just secondary school teachers. For years with data specifically on secondary school teachers the average wages are five to six percent higher than that for primary teachers. Changes in teacher salaries have generally been similar over the time period between states.

In 1976 the average earnings of a male teacher was 14.7 percent higher than male average weekly earnings; and for a female teacher it was 23.5 percent greater than average female weekly earnings. By 2002 the average weekly earnings of male teachers had fallen to less than male average weekly earnings (-0.3 percent), while female earnings had declined to be 17.6 percent more than female average weekly earnings. The relative earnings of male teachers declined 20 percentage points in the period 1976 to 2002, while the relative earnings of female teachers declined by only 5.9 percentage points. Since 2002 wage agreements have led to increases in teachers' pay, with the proportion of average male teachers' earnings rising to 1.027 of male average weekly earnings and female teachers' to 1.21 of female average weekly earnings. While the difference between 1976 and 2006 for females has been a decline of 2.5 percentage points, for male teachers it has fallen by 12 percentage points.

In the period 1977 to 2003 the number of secondary school teachers in NSW increased 42.4 percent. The number of female secondary school teachers increased by 70 percent, while the number of male teachers rose by only 18.7 percent. In 1977 the ratio of male teachers to female teachers in NSW secondary schools was 1.16 to 1, rising to 1.25 to 1 in 1981. The decline in the male/female teacher ratio began after the 1983 economic recession. By 1991 there were more female teachers in NSW secondary schools than male teachers (as shown by Figure 4). By 2006 the ratio of male to female teachers had fallen to 0.79 in secondary schools, and to 0.25 in primary schools throughout Australia (ABS, 2006).

The decline in the relative number of male teachers accompanied the relatively larger decline in relative earnings for male teachers. The relative earnings of female teachers was not only greater in absolute terms, but had also declined by a smaller proportion than the relative earnings for male secondary school teachers during the period.



Source: Australian Bureau of Statistics, Schools Australia, Cat. No. 4221.0

Figure 4: The ratio of males to female teachers in secondary schools in NSW, 1977–2006

Since 1988 there has been a decline in absolute terms in the number of male teachers in NSW secondary schools by 2.7 percent from 17,961 to 17,610 and an increase in the number of female teachers in NSW secondary schools by 31 percent from 16,474 to 21,580. At the same time the relative wage for male teachers declined by 10 percentage points. There appears to be a link between the time series data on relative wages and the quantity of teachers, at least in the case of males. The decline in the relative wage of males is associated with fewer males teaching in secondary schools in NSW. The relationship with female teachers is more complex as the decline in the relative wage of females has been less and the relative wage of female teachers is still more than 21 percent higher than other females in the workforce. These factors would tend to make teaching an attractive proposition for females, at least for the time being. The proportion of male teachers in NSW secondary schools was highest when the relative wage of male teachers was at least ten percent higher than male average weekly earnings.

This issue has been recognized by many of the independent schools in NSW who are offering wages up to 20 percent higher than that offered under the enterprise agreements in NSW public and Catholic schools. This is attracting many of the best teachers into the independent schools system. In addition, these teachers are being offered considerably higher levels of pay for academic qualifications such as honours, masters and doctoral degrees.

The problem that is not being dealt with under the current wage system is how to provide qualified teachers in the areas of shortage. A relative wage increase of 5-10 percent would most likely lead to sufficient supply of teachers to match total demand in Australian schools (Stokes, 2005). Such a wage increase would also likely improve the overall quality of teachers (Leigh and Ryan, 2006). What a wage rise of this magnitude will not do is to provide sufficient qualified teachers in some disciplines and some geographical locations.

The Private Rates of Return for Teachers

To overcome the problem of teacher shortages in specific disciplines and geographic locations greater wage flexibility is needed. Wages have to be linked more closely to the returns that teachers in specific discipline areas would receive in other areas of employment that would be open to them as a result of their qualifications. A teacher salary relativity benchmarking approach developed by Horsley and Stokes (2005) showed that teachers in certain fields were paid ‘substantially less for comparable work and responsibilities’ to similar skilled areas in the private sector. This research showed that this situation was pronounced in the areas of IT, Science and Mathematics, which are areas of noted teacher shortages.

This paper applies a cost-benefit approach to measure the overall return to a university degree. It is not sufficient just to measure the differences in wages between teachers and alternative areas of employment. Such a comparison does not consider the cost of education and the level of foregone income to gain that qualification. It needs to be recognised that students will consider the duration and costs of their degrees, their loss of

current income while studying and their expected future incomes when deciding what courses to study and what careers to follow. A Private Rate of Return (PRR) model can take account of these factors and demonstrate the reasons why there are major shortages of teachers in some discipline areas and over-supply in others, leading to over a quarter of beginning teachers teaching outside their areas of training (ASPA, 2007). The PRR model measures the return a university graduate receives, compared to someone who left school at the end of year 12 and gained no further qualifications. The cost of a university degree is the opportunity cost of an individual studying at university and the return is the income premium the university graduate receives. The summary statistic that uses a discount rate to compare the total cost of study with the net benefits of higher education is known as the Private Rate of Return. The aim of this study is to compare the rates of return of various university qualifications for 2005 and what impact they would have on the likelihood of someone becoming a teacher.

The Methodology of the PRR Model

Estimates of rates of return are based on the Mincer equation of the PRR (Mincer, 1958). The specific rates of return in this study are calculated using Formula 1 (Borland, 2002: 2), as follows:

$$PV_C = \sum_{t=1}^n C_t / (1+r)^t \quad (1)$$

$$PV_B = \sum_{t=n+1}^m B_t / (1+r)^t$$

Then:

$$PV_B - PV_C = 0 \quad \text{and solve for } r.$$

Where:

C_t = opportunity costs for university degree in year t ;

B_t = benefit of university degree in year t ;

n = length of education;

$m - n =$ years in workforce; and
 $r =$ rate of return.

This study measures the income of a university student, a year 12 graduate and a university graduate, based on data from the *ABS Household Expenditure Survey (HES) and Survey of Income and Housing (SIH) 2003-04 Confidentialised Unit Record Files (CURF)*. The study uses person level, rather than income unit level, data as it takes into consideration the participation in employment of the university graduates and year 12 leavers with no non-school qualifications. The *ABS Household Expenditure Survey (HES) and Survey of Income and Housing (SIH) 2003-04 CURF* contains a sample of dwellings surveyed throughout Australia from July 2003 to June 2004. The 22,286 persons interviewed were asked questions regarding personal and household characteristics such as, marital status, student status, qualifications, birthplace and detailed information on their income, assets and liabilities (ABS, 2006).

The methodology follows that of Borland (2002), except that the sample used to obtain the estimates include male and female wage and salary earners age 18-60 years working part time and full time. The base cases used in this study to measure the rates of return are single males and females with no dependents. Average earnings in the job with main employer are calculated for disaggregated age workforce groups- - 18, 19, 20, 21, 22, 23, 24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54 and 55, 56, 57, 58, 59, 60 years. It is assumed that age-earnings profiles derived using the 2003-04 HES and SIH CURF data apply over the future time period encompassed in this study. Real earnings growth for both high school and university graduates is assumed to be one percent per annum equal to the average annual change in real Average Weekly Earnings (AWE) for the years 1983 to 2005.

(i) Measuring the costs of higher education for a student

The first stage in measuring the costs of higher education is to measure the income a student forgoes while studying. The net forgone student income is equal to the difference between the income of a year 12 graduate and that of a university student. The

opportunity cost of studying at university is the net forgone student income plus education costs, including HECS fees and tuition costs. In measuring education expenses the cost of books, tuition and extra travel are taken to be equal to Borland's (2002) estimation indexed to the CPI Tertiary Education Cost Index. The student outlay for books, tuition and extra travel are estimated at \$2360 for 2005. Table 1 provides a summary of how this is calculated in this model.

Table 1: Summary of costs incurred while studying at university

Forgone income
Income of a year 12 graduate <i>minus</i>
The income a student earns while studying (including employee earnings and income from scholarships and youth allowance)
Education expenses
HECS <i>plus</i>
Tuition expenses
Total Expenses
Forgone income <i>plus</i>
Education expenses

Table 2 shows the total cost of various university degrees based on gender. Net forgone income is equal to the income a student earns while studying minus the income of a year 12 graduate. As can be seen in Table 2, for all degrees the net loss is greater for a male student than a female student. The cause of the difference is not the tuition costs or HECS fees, rather the net forgone income. However, Table 2 shows that there is little difference between the total income a male student earns while studying and the total income a female student earns while studying - at approximately \$1000. The difference lies in the income a male student has to forgo while studying compared to a female student. For example, a male student studying a three year business degree in 2005 forgoes a total income of \$68,546 whereas a female student forgoes a total income of \$50,417, a difference of \$18,129. The difference is greater for longer degrees such as a five year degree at band two, where a male student forgoes an additional \$29,774 compared to the female student. The minimum net loss for a student undertaking a university degree in 2005 is \$52,583 for a female and \$66,030 for a male.

Table 2 shows that, from 2005, females for the first time can incur a net loss in excess of \$100,000. For females to incur a net loss of more than \$100,000 they would have to study a five year degree with a band three HECS level, such as a degree in medicine. However, males would only need to study a four year degree at a band two HECS level to incur a loss of more than \$100,000. This means males wanting to become high school teachers in the fields of business/economics, maths/science or computing would incur a net loss of around \$100,000, whereas the net loss for a male studying a three year business degree is \$75,902.

Table 2: The net loss for a university student under three durations of study and three HECS rates, 2005

Costs	Length of degree		
	Three year bachelor degree	Four year bachelor degree	Five year/ post-graduate degree
Total cost (tuition plus HECS)			
Band 1	\$21,504	\$28,672	\$35,840
Band 2	\$27,627	\$36,836	\$46,045
Band 3	\$31,134	\$41,512	\$51,890
The net income loss for Year 12 male graduate	-\$48,275	-\$65,096	-\$81,724
The net income loss for Year 12 female graduate	-\$31,079	-\$41,810	-\$52,461
Net loss for male students			
Band 1	-\$69,779	-\$93,768	-\$117,564
Band 2	-\$75,902	-\$101,932	-\$127,769
Band 3	-\$79,409	-\$106,608	-\$133,614
Net loss for female students			
Band 1	-\$52,583	-\$70,482	-\$88,301
Band 2	-\$58,706	-\$78,646	-\$98,506
Band 3	-\$62,213	-\$83,322	-\$104,351

(ii) The benefit of the university degree

The monetary benefit of a university degree is the wage premium. This is the difference between the income a university graduate earns and the income they would have earned if they entered the workforce after year 12. The results also show considerable difference in earnings between males and females and between qualifications. Completing year 12 significantly affects the income of a female - more than twice as much as the income of a male. For a male who does not complete year 12, his income on average is 5.26 percent lower than males who do, whereas a female who does not complete year 12 has an income on average 11.90 percent lower than females who do. Likewise, the impact of a bachelor degree on the income of a female is also significantly greater than the impact of a bachelor degree on the income of a male. Females with no non-school qualifications have incomes 13.32 percent lower than females with a bachelor degree. Males have incomes 11.93 percent lower than males with a bachelor degree. However, the value of a post-graduate degree or graduate diploma is not as great for a female as it is for a male. The average income for a female with a post-graduate degree or graduate diploma is 4.81 percent higher than the income of a female with a bachelor degree, whereas the average income of a male with a post-graduate degree or graduate diploma is 11.74 percent higher than the average income of a male with a bachelor degree.

The PRR for Various Qualifications and Occupations

The PRRs for the various qualifications and occupations are measured assuming that students will defer their HECS payments until they complete their degrees. In addition, no adjustments are made in these calculations for screening effects or innate ability. The results in Table 3 show that those graduates who have education qualifications have the second lowest PRR after creative arts. This suggests that creative arts graduates would earn a higher income and subsequently a higher rate of return on their degree by becoming teachers but those with other qualifications would not. The results also show that there is a considerably higher incentive for a female to become a teacher than a male, which is supported by the earlier relative income data in this study.

This study goes further than previous Australian studies (Miller 1982, Borland 2002) as it measures the private rates of return to both different qualifications and different occupations. This allows for comparisons to be made between the PRR of a particular qualification with the PRR for an occupation where the qualification is needed - for example, the PRR to an education degree compared to the PRR to a secondary teacher. Further, secondary school teachers are divided into two categories; those who pay HECS band one, such as humanities teachers, and those who pay HECS band two to become economics, business, science, mathematics and computing teachers.

Table 3: The PRR to different qualifications for males and females who defer their HECS repayments, 2005

	Males	Females
Creative arts	0.31	10.08
Commerce	11.25	16.11
IT	13.43	16.26
Education	9.92	14.80
Engineering	10.82	16.00
Science	12.47	16.29
Society and culture	10.40	18.68

This study also considers the PRR for the occupations of economist, nurse and the two HECS bands of school teachers. The private rates of return to different occupations for males and females who defer their HECS repayments are shown in Table 4. The most rewarding occupation for males who defer their HECS repayments is the occupation of an economist/finance specialist at 18.53 percent. In 2005 the PRR for a male who defers their HECS repayments to become an economist/finance specialist is more than double that of a male secondary school teacher. The lowest PRR is for males who defer their HECS repayments to become a secondary teacher who specialises in HECS band two subjects at 8.46 percent. Amongst those who pay band two HECS are those training to be teachers of economics. The higher PRR to economics has led to a shortage of economics teachers in schools and a growing number of teachers teaching economics who are formally not qualified in the subject area.

Table 4: The PRR to different occupations for males and females who defer their HECS repayments, 2005

	Male	Female
Economics/finance	18.53	24.35
Nurse	10.93	16.70
Secondary teacher- HECS band one	8.72	14.05
Secondary teacher- HECS band two	8.46	13.74

In regard to female occupations, economics/finance graduates who deferred their HECS repayments have the highest PRR at 24.35 percent, and the lowest PRR is for a band two secondary teacher at 13.74 percent. For all occupations the rates of return for females are greater than the PRR for males. For example, the PRR for females who defer their HECS repayments to become a secondary teacher specialising in band 2 subjects is 5.28 percentage points higher than the PRR for males in the same occupation.

While school teachers are paid the same salaries, the rate of return they receive differs depending on their band of study. The teachers who studied band 2 subjects have a lower private rate of return than their fellow teachers who studied band 1 subjects. In turn other university graduates who studied band 2 subjects tend to get higher PRR's than those who studied band 1 subjects. These factors combine to provide a greater disincentive for those who study mathematics, science, IT, business or economics to become school teachers. This in turn is reflected in the areas of teacher shortage.

It should also be noted that the findings in Tables 3 and 4 also show that the PRR to a secondary teacher is lower than the PRR to the qualification, education, for both males (9.92) and females (14.80). The differences in the rates of return suggest that both male and female graduates with an education degree have higher rates of return, if they work in areas other than secondary school teaching.

The results in Table 4 suggest that the PRR to a nurse for both males and females has improved, when compared to estimates by the Productivity Commission (1997). The Productivity Commission (1997) calculated that the PRR to a nurse for 1996/97 was 6.5 percent for a male and 13.0 percent for a female. The results in this study suggest that the

PRR to a nurse has increased 4.43 percentage points for a male, and 3.70 percentage points for a female. This is a result of the increase in relative wages that nurses have received over time.

Like this study, the Productivity Commission (1997) also found that the PRR to a secondary teacher would be greater for those who specialised in band 1 subjects such as humanities, visual arts, or languages than those who specialised in band 2 subjects such as maths, science or economics. The Productivity Commission found that the PRR for a secondary teacher who specialises in maths, science or economics was 6.1 percent for a male and 13.0 percent for a female. Meanwhile, the PRR for a secondary teacher who specialises in humanities was 6.5 percent for a male and 13.2 percent for a female. Although the Productivity Commission's estimates suggest that it is more worthwhile for an individual to become a secondary teacher rather than a nurse, the results in this study suggest the opposite. This is partly because the salary increases that nurses have received over time have been much greater than the return teachers have received. According to Macken (2006:21), between 1986 and 2005 the salary of nurses increased by 244 percent compared to 205 percent for secondary teachers. At the same time the salaries of economists increased over 400 percent, which makes it difficult to attract economics graduates and others with qualifications with high PRRs such as IT, mathematics and science graduates to teaching.

Conclusion

The current discussions about 'merit pay' and 'performance pay' for teachers are a small part of the issue of paying teachers sufficient salaries to improve the overall quality and quantity of teachers in areas of geographical and subject area shortages. A relative wage increase of 5-10 percent would most likely lead to sufficient supply of teachers to match total demand in Australian schools (Stokes, 2005). Such a wage increase would also likely improve the overall quality of teachers (Leigh and Ryan, 2006). However, it will not prevent shortages of teachers in particular subject areas and in certain geographical locations. The answer to the problem lies in greater teacher wage flexibility.

The cost-benefit approach of the PRR model in this study shows that graduates in most fields can achieve higher rates of return from their qualifications than teachers do. Science, IT, mathematics and economics/business graduates are subject to an additional minimum cost of \$25,000 for a male and \$20,000 for a female (Table 2) to complete the one year Graduate Diploma in Education to become a teacher. If they complete a Masters of Teaching/Education, this cost more than double while the top of the teacher salary scale remains the same. In addition they receive an income that is also lower than that achieved in the private sector for their initial bachelor's degree. The only graduates in this study who were rewarded by a higher PRR for undergoing teacher training and working as a teacher were those from creative arts (as shown in Table 3). It is therefore not surprising that there is a general plentiful supply of visual arts teachers while there is a general shortage of teachers in the subject areas with the higher PRR's outside of teaching.

Twenty four percent of beginning teachers reported that they will leave the profession within five years (ASPA, 2007). The numbers of teachers retiring in the next 10 years especially in secondary schools in Australia is currently unlikely to be matched by new entrants to teaching. Attempts to increase the quantity of teachers by offering more university places have tended to lower the University Admission Index Scores and the quality of entrants and will not guarantee that they will pursue careers as teachers. In addition ASPA (2007) reported that over a quarter of beginning teachers were teaching outside their field of expertise. Requiring teachers to teach outside their field of study is a disincentive to teachers, as well as a disadvantage to the overall quality of education provided (Stokes, 2005). This could further worsen the teacher shortages in some areas.

The Productivity Commission (2007:252) states that 'Price signals have not been able to communicate the shortage in the teaching profession due to the inflexible nature of teachers' pay structures'. The Productivity Commission goes on to suggest that the solution to the problem would involve 'increasing pay rates for some teachers relative to others (253)'.

In a competitive market, salary differentials can be an indicator of relative teacher shortages in a field or subject area. A shortage would then put upward pressure on the wage offered to teachers in that field. Such a situation has existed for a number of years in the USA. A National Center for Education Statistics (NCES) study (1996) found that teachers who majored in certain fields of study received above average wage levels. In the public school sector people with education majors in business, vocational education and special education received above average wages. For non-education majors, teachers of business studies received a wage more than two percent above the average, along with mathematics, music, performing arts, and social science. The private sector did display some differences but overall, mathematics, business, and special education teachers received higher wages in both sectors. The results show that the US teacher labour market does respond, at least partially, to changes in demand and supply for particular fields by altering the wage level and as a result reducing teacher shortages in particular discipline areas.

There are a number of ways that increased wage and labour market flexibility could increase the availability and quality of staff in schools in Australia. First, schools in Australia should be given finances that reflect their particular circumstances. Schools in more socially disadvantaged areas that have difficulty attracting teachers should be given greater funding per pupil to improve resources and to pay higher salaries for teachers to teach in those school. School principals should have the financial resources to attract staff by offering higher salaries to teachers in areas of geographical and discipline shortages.

Second, in areas where there are teacher shortages, teachers could receive paid overtime to take extra classes. It is better for a specialist in an area to take a class than someone teaching out of their field. This may require some restructuring of the traditional school day of 9am to 3pm, eg. to one of 8am to 4pm. There is already considerable evidence that many teachers work in outside employment to earn additional income (Stokes, 2005). Many would probably welcome the opportunity to earn additional income from teaching rather than in outside employment such as cleaners or waiters. This would be budget

neutral, as the teachers are replacing other less qualified teachers who would have been employed to take the classes. This would not only be a benefit to the teachers but also to the pupils.

Without improvements in teacher salaries, especially in areas of discipline or geographical shortages, the quality of teachers and the quality of education will decline. The shortages of quality teachers could subsequently have detrimental effects on the labour market and the economy. In a submission to the Productivity Commission (2007:254) the Business Industry and Higher Education Council stated:

Investment in primary and high school science education, and in training and retaining high quality science teachers is an important part of long term capacity building. It appears that the quality of science, engineering and technology teaching in schools may act as a limiting factor in the long term capacity to graduate students suitably qualified to meet the high expectations of industry. Quality high school maths and science teaching has a critical flow on effect on students' choices and success at university.

This study supports the view that teachers should be paid different salaries based on the level of their qualifications, fields of qualifications and geographical area of teaching. Allowing for the overall projections of future teacher shortages, higher wages should be paid to attract high quality graduates into teaching and to retain quality graduates in teaching. The level of these wages should more accurately reflect private sector payments. This issue has been recognized by many of the independent schools in NSW who are offering wages up to 20 percent higher than that offered under the enterprise agreements in NSW public and Catholic schools. This is attracting many of the best teachers into the independent schools system. The problem of greater shortages of teachers will worsen in the years ahead, if increased wage flexibility is not applied to all school systems.

References

Australian Bureau of Statistics (ABS) (various) *Employee Earnings and Hours*. Cat.No. 6306.0. Canberra.

Australian Bureau of Statistics (ABS) (2006) *Household Expenditure Survey and Survey of Income and Housing- Confidentialised Unit Record Files, 2003-04*. Cat. No. 6540.0.00.001. Canberra.

Australian Bureau of Statistics (ABS) (various) *Schools Australia*. Cat.No. 4221.0. Canberra.

Australian Bureau of Statistics (ABS) (various) *The Labour Force*. Cat.No. 6203.0. Canberra.

Australian Secondary Principals Association (ASPA) (2007) *Beginning Teachers' Experiences*, viewed 10 April 2007, <http://aspa.asn.au/images/surveys/2007beginningteachersreport.pdf>

Boland, J. (2002) *New Estimates of the Private Rate of Return to University Education in Australia*, Melbourne, University of Melbourne.

Bradford, G. (2007) "Bishop pushes for performance pay for teachers", *AM*, ABC Radio, broadcast 21 February 2007, <http://www.abc.net.au/cgi-bin/common/printfriendly.pl?http://www.abc.net.au/am/content/2007/s1852773.htm>

Correy, S. (2007) "Testing the teachers", *Background Briefing*, ABC Radio National, broadcast 25 February 2007, <http://www.abc.net.au/rn/backgroundbriefing/stories/2007/1852400.htm#transcript>

Department of Education Science and Training (DEST) (2006) "Higher Education Statistics Collection." Department of Education Science and Training, viewed 15 March 2007, <http://www.dest.gov.au/highered/statpubs.htm>.

Department of Employment and Workplace Relations (DEWR) (2006) "Skills in Demand Lists States and Territories, viewed 10 March 2007, <http://www.workplace.gov.au/NR/rdonlyres/35D58940-96FF-4260-AB85-23D9BF7CAF64/0/SkillsinDemandSeptember2006.pdf>

Horsley, M. and A. Stokes (2005) "Teacher salaries: A benchmarking approach." *Journal of Australian Political Economy*, 55 (1): 94-122.

Kwong Dow, L. (2004) Review of Teaching and Teacher Education, *Australia's Teachers: Australia's Future – Advancing Innovation, Science, Technology and Mathematics*, Canberra, DEST.

Leigh, A. and C. Ryan (2006) *How and Why has Teacher Quality Changed in Australia?* Centre for Economic Policy Research, Canberra, Australian National University.

Macken, D. (2006) "Best-paid jobs: How to work your way to the top". *The Australian Financial Review*. 18th-19th November 2006:19-21.

Miller, P. (1982) "The rate of return to education: Evidence from the 1976 Census". *Australian Economic Review*, 3rd quarter: 23-32.

Ministerial Council on Employment, Education, Training and Youth Affairs (MCEETYA) (2003, 2004) *Demand and Supply of Primary and Secondary School Teachers in Australia*. Melbourne, prepared by the CESCEO National Teacher Supply and Demand Working Party.

National Center for Education Statistics (NCES) (1996) *The Patterns of Teacher Compensation*, USA Department of Education.

National Center for Education Statistics (NCES) (1997) *Job Satisfaction Among American Teachers*, USA Department of Education.

Productivity Commission (1997) *Submission to the Review of Higher Education Financing and Policy*, viewed 1 August 2005,
<http://www.pc.gov.au/ic/research/submission/highered/>

Productivity Commission (2007) *Public Support for Science and Innovation*, viewed 8 April 2007, <http://www.pc.gov.au/study/science/finalreport/science.pdf>

Stokes, A. (2005) *The Influence of Wages and Nonwage Amenities on the Labour Market for High School Teachers in New South Wales*, Sydney, Greenacre Educational Publications.