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Pecuniary and non-pecuniary effects on teacher turnover and mobility

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Abstract

We investigate the determinants of teacher exits from and mobility within the Queensland state school system. In common with previous research we find that non-pecuniary factors, such as class size and location, affect movement decisions but our results suggest a significant role for pecuniary factors. In particular, higher wages reduce exits from the public sector, especially in the case of more experienced female teachers. Locality allowances paid to teachers in rural and remote schools, where non-pecuniary factors are less attractive, appear to have some success in attracting and retaining staff in these locations.

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1   INTRODUCTION

Understanding how the teacher labour market operates is of crucial importance
if effective policies aimed at the recruitment, training and retention of teachers
are to be designed. It is often claimed that teachers in the public sector exhibit
high levels of turnover[1], therefore most of the previous research on teacher
labour markets has focused on the factors that determine the decision to leave
the public school system (Murnane and Olsen 1989, Dolton 1990, Dolton and
van der Klaauw 1995, Stinebrickner 2002, Bonesronning et al. 2003, Hanushek
et al 2004). However, variations in teacher quality across public schools, and
the impact this has on teacher effectiveness and the human capital acquisition
of pupils, is also a major point of concern in a number of countries, such as the
UK (Chevalier and Dolton 2004), the US (Hanushek et al 2004) and Australia.
In spite of this concern, there has been relatively little research on teacher
mobility within the school sector. Exceptions are Bonesronning et al. (2003)
and Falch and Strom (2004), who both treat the turnover and mobility decisions
separately. As Hanushek et al (2004) argue, however, a proper understanding
of how the teacher labour market operates requires a simultaneous analysis of
teacher turnover and mobility decisions as they are part of the same decision
making process.

Most of the previous research on teacher turnover has also focused predomi-
nantly on early career decisions using a variety of cohort datasets (Murnane and

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[1] Although Harris and Adams (2006) demonstrate that teacher turnover is not noticeably
higher than in other professions.

Olsen 1989, Dolton and van der Klaauw 1995, Gritz and Theobold 1996, Mont and Rees 1996, Stinebrickner 1998, Stinebrickner 2002), where the emphasis has been on the effect of relative wages. These studies suffer from the absence of adequate controls for other working conditions, which may be correlated with wages. Moreover, although the relative wage has been shown to have some effect on teacher turnover, it has also been shown that both mobility within the public school system, and exits from that system, appear to be largely related to working conditions, or non-pecuniary factors (Bonesronning et al. 2003, Hanushek et al 2004, Falch and Strom 2004). Specifically, there is evidence that teachers sort between schools and the better qualified teachers move to better schools, as defined by student and staff composition and performance (Bonesronning et al. 2003, Clotfelter et al. 2004). It is clearly important from a policy perspective to know if pecuniary or non-pecuniary factors are more important determinants of teacher turnover and mobility, since this information can help in the design of compensation and human resource management policies to mitigate the worst effects of turnover and mobility.

In this paper we address three issues. First, we provide new evidence on the impact of pecuniary and non-pecuniary factors on teacher turnover and teacher mobility within the Queensland public school system. Our dataset refers to the population of teachers, which is mapped to student data, so giving a rich description of the the characteristics of students, working conditions, teacher composition and pay. Importantly, and unlike some previous research, such as Hanushek et al (2004), we focus on the characteristics of schools rather than

school districts, and we are able to distinguish between teachers on temporary contracts from those on permanent contracts. Second, and following the work of Hanushek et al (2004), we examine how the effects of pecuniary and non-pecuniary factors vary over the career, or life cycle, of teachers. Third, we investigate the effect of a labour subsidy, or locality allowance, on the mobility decisions of teachers, and in particular whether this subsidy serves the purpose for which it was designed, namely to encourage teachers to move to, and remain in, schools in rural and remote areas. This is particularly important in the Queensland context, because of the large geographical concentrations of Aboriginal and Torres Strait islander (ATSI) populations in the remote and rural areas of the state.

The analysis is conducted separately for males and females because they face different career decisions and may therefore respond differently to the pecuniary and non-pecuniary effects.

The remainder of the paper is set out as follows. Section 2 provides the institutional background on the Queensland state school system and an overview of the data source. Section 3 outlines the model and empirical methodology used in this study, and section 4 discusses the results. This is followed by our conclusions.

2   DATA AND INSTITUTIONAL BACKGROUND

This study uses a number of different data sources to construct a matched teacher-school database. First, we use personnel data from Education Queens-

land's human resource information system collected quarterly for the period 2001 to 2002. This covers all teachers employed in the Queensland state school system sector for Queensland.[2] For each teacher we have a record of their age, gender, educational qualifications, ethnic background (e.g. ATSI or non-english speaking background, NESB), tenure in the state teacher service, disability status, teacher's specialism, educational level and their wage. We predict each teachers outside wage using 2001 Census data. Additionally, our database records whether a teacher separated during this period. The longitudinal nature of the data means that it is possible to observe inter-school movements, both within and between school districts. Finally, the school at which the teacher was working is included, and along with occupational codes this allows us to distinguish between primary and secondary school teachers.

Queensland teachers can be employed under three different types of contracts - casual, temporary or permanent. Casual teachers are generally short term contract staff and used as 'relief' teachers who are not necessarily attached to a school in the standard manner, and who may enter and leave the teaching workforce on a regular basis. As a result we exclude this group from our analysis. In common with other forms of tenured position in the public sector, permanent teachers are very difficult to dismiss, and dismissal generally only occurs in cases of misconduct. As a result almost all exits from the teaching labour force by

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[2] The Australian school system is split into three sectors, government administered, independent private schools, and schools run by the catholic school board. As at 2000, 69 per cent of Australian students attended government schools, the others attend Catholic or Independent schools (Le and Miller 2003). A slightly higher proportion of Queensland students attend government schools.

teachers on permanent contracts are quits. Conversely, exits by teachers on temporary contracts are almost exclusively due to dismissal or non-renewal of contract. Finally, we explicitly observe exits from teaching due to retirement. These exits are not analysed, and teaching spells that end through retirement are right censored at that point.

Second, we utilise data drawn from Education Queensland school administrative database to provide information on teacher's workplaces. Specifically, we utilise student record data that covers all students in the Queensland state school system for 2001. One important aspect of our pupil database is that it contains information on student test score performance, which is used to construct measures of student quality. Queensland school students conduct standardized tests at year 3, year 5, year 7 and year 12 (the final year of school). For primary school students we use literacy scores for year seven (the final year of primary schooling), scaled to a national mean of 700, which is regarded as a measure of pupil quality. In fact, Queensland primary school literacy performance is below this benchmark. This is partly a reflection of the higher proportion of indigenous Australians in the state (Bradley et al. 2006). For secondary schools, year 12 test scores will not necessarily be an accurate representation of overall student quality or performance at the school. This is because: (a) poorer quality or less motivated students are likely to leave the school after the end of compulsory schooling (year 10); and (b) some students may choose to move to schools that are more successful to complete high school. To allow for this we utilise secondary school retention data covering the proportion of students who began

at the school in year 8 that also completed at the same school in year 12. We would expect that tenured teachers at poorly performing schools would be more likely to exit from the sector or move to another school.

Queensland covers a large area of land, and geographically remote areas generally have higher concentrations of indigenous Australians[3] and these people are, in socioeconomic terms, amongst the most disadvantaged of indigenous Australians. Other schools are in regional centres and there is an urban concentration of population in south east Queensland centred around the state capital of Brisbane. As we have the postcode of each school, we can identify urban, rural and remote schools. This data also allows us to include local labour market information such as the unemployment rate in the school's area.[4]

INSERT TABLE 1 & 2

Tables 1 and 2 reports summary statistics of teacher characteristics disaggregated by type of contract, and by whether they remained in the school, moved to another school or exited from the public school system during 2001-2002. Women dominate the teaching profession, especially at the primary school level. Temporary teachers have substantially lower tenure and wage rates than permanent teachers, and are more likely to be part-time. The majority of teachers hold a degree, although a substantial fraction of (primary) teachers have a teaching diploma. In contrast, a small, but not insubstantial fraction of male teachers possess a higher degree. Male teachers are also over-represented in

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[3] Overall, Queensland has the highest concentration of indigenous Australians among Australian States (figures). Only the (relatively small) Northern Territory has a higher proportion.

[4] Specifically, we use data drawn from DEWRSB's local area labour market dataset.

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Science and Engineering subjects, which are typically shortage areas. What is also of note is that male teachers tend to work in larger schools with slightly smaller average class sizes. There are few differences between male and female teachers with respect to pupil composition, or between temporary and permanent teachers, except in the case of rural schools where a higher proportion of permanent teachers are located.

In Table 3 we compute average annual transition rates over the period subdivided by tenure, or levels of experience. The motivation for this disaggregation follows Hanushek et al (2004) who rightly argue that the effect of pecuniary and non-pecuniary factors on teacher turnover and mobility decisions is likely to vary with experience. Family commitments, for instance, are more likely to constrain the mobility decisions of older, more experienced, teachers, whereas less experienced teachers are likely to be lower down the job hierarchy and therefore are more likely to move to seek a promotion and higher wages. It should also be borne in mind when reading Table 3 that the 0-2 and 2-5 year categories include the majority of workers on temporary contracts. What Table 3 suggests is that, less experienced teachers are more likely to move school and move district, suggesting that they are highly mobile. In fact, mobility falls more or less monotonically with the level of experience, which is consistent with a job matching process in which teachers and schools learn about each other and form long term matches or alternatively dissolve unsatisfactory matches. What is also interesting is that the magnitude of teacher mobility exceeds that of teacher turnover, reinforcing the justification for our analysis. Of those workers

who do exit the school system, involuntary separations are more likely. At first glance, this would appear to be a new finding, contrasting sharply with the view expressed in Hanushek et al (2004) that most turnover is voluntary. However, we know that most of this involuntary turnover is actually attributable to those teachers on temporary contracts being unable to find a suitable job match in the profession. In fact, for more experienced teachers, voluntary turnover does exceed involuntary turnover.

INSERT TABLE 3

In view of the high levels of mobility observed in Table 3, and given the geography of Queensland, Table 4 analyses the origin and destination of movers. For all teachers, the majority of movers, as expected, are from schools in urban areas (4,217) and represent 12% of all teachers in urban areas. However, these teachers overwhelmingly move to schools that are also in urban areas (84%), with only 7% being encouraged to move to the remote areas of Queensland. Similarly, there is substantial flight by teachers from rural and remote schools to schools in urban areas, which may be a reflection of higher pay, better working conditions or simply more job vacancies. Consequently, schools in remote and rural areas exhibit *higher* levels of teacher turnover, which is likely to impact adversely on pupil attainment. What is also apparent from Table 4 is that teachers with less experience and those on temporary contracts (see the lower panel) behave in more or less the same way as the average teacher.

INSERT TABLE 4

3 MODEL AND METHODOLOGY

3.1 A Model of Teacher Turnover and Mobility

We adopt the theoretical and methodological framework proposed by Hanushek et al (2004). They note that teacher decisions to move schools are often based on compensating variations related to improvements in non-pecuniary benefits such as better working conditions and environment rather than wage increases. These benefits are set against the costs of movement that comprise of direct expenditure and 'psychic costs'. The size of these benefits and costs are likely to be proportional to distance. For instance, a teacher contemplating an intra-school district move is unlikely to incur the costs associated with a change of residence and social circumstances, whereas inter-school district moves may incur these costs. Our theoretical model tries to explicitly capture this aspect of the decision process.

A teacher, i, located in school s^* searches the available set of alternative schools, s, and in so doing seeks to maximise the present value of expected discounted utility, as follows

$$\max_{s} \ pv[u^i(X_s, W_i, Z_i, L)] \tag{1}$$

given that

$$s^* \in \{s\}_i$$

and

$$c_s = c(Z_i, L| \ s^*)$$

where X_s are the characteristics, or non-pecuniary features, of the school, s, W_i is a vector of variables reflecting pecuniary factors, or teacher remuneration, including the predicted outside wage and locality allowance, Z_i captures the personal characteristics of the teacher and L refers to the location of the school. $\{s\}_i$ refers to the feasible set of alternative schools available to teacher i, and c_s represent the costs of moving from school s^* to school s. These pecuniary and non-pecuniary costs are expected to vary with the distance of the move, so that the costs of moving within the same school district are likely to be less than those associated with moves between schools and districts. If $s > 0$ then a teacher may move to an alternative school if the present value of expected discounted utiltity of s is greater than that from staying in s^* as well as considering outside opportunities.. If $s = 0$ then a teacher will consider only opportunities outside of the public school sector, and will exit the system if the present value of expected discounted utility of doing so is greater than that from remaining in school s^*.

Job matching is a stochastic process, and it is therefore possible to imagine that teachers will update their valuations of the alternative options over time, hence leading to the observation that at any particular time, t, a teacher, i, can be observed in one of three states: a non-searcher or stayer $(j = 1)$, an exiter from the school sector $(j = 2)$ or a mover $(j = 3)$. This represents the dependent variable, y, which is modelled as a function of the vectors of variables listed above in Equation (1).[5]

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[5] We observe teacher mobility within and between districts, however, there are too few

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The response variable is modelled as a multinomial logit, which takes the form:

$$\log \frac{P_j}{P_0} = x(\beta_j - \beta_0), \qquad j = 1, ..., 3$$

where j indexes the three states referred to above. P_j is the probability of observing a teacher in the jth state with characteritics x, which incorporates all of the effects listed in Equation (1). The maximum likelihood estimates of the β_j are difficult to interpret, and so we adopt standard practice and report marginal effects.

In terms of the covariates in the model, there are several variables in our data that reflect the characteristics of the school, X_s, including those relating to the quality of the student body, the teacher's peer group and those referring to the school itself. Since we do not estimate separate models for primary teachers and secondary teachers, we include a dummy variable for primary school teachers. This variable can be thought of as another proxy for the working conditions that the teacher faces insofar as younger pupils are typically easier to teach than teenagers. Moreover, primary school teachers would in general have less outside options as they have more sector specific human capital. Primary school teachers may therefore be less likely to exit the sector. Given that we are only able to measure the school's average literacy score for primary pupils and

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observations to allow us to disaggregate these movements in our modelling.

the school's average retention rate for secondary pupils, our measures of the quality of the student body are constructed as follows. Each school is ranked on either of the two measures and its position in the inter-quartile range identified. Primary schools in the top quartile with respect to literacy scores and secondary schools in the top quartile with respect to retention rates are denoted 'high perfoming schools'; schools in the bottom quartile are 'low performing schools'. It is expected that teachers in high performing schools will be less likely to exit the sector and also less likely to move from that school. We also include the average class size in the school, and it is expected that teachers get greater utility from teaching smaller classes or simply see it as compensation for low wages. Irrespective of the reason, the expectation is that teachers in schools with lower average class size are less likely to exit or move. School size is entered as a separate variable and it is uncertain what effect this variable will have on the turnover and mobility decisions of teachers. Larger schools may give the teacher the opportunity to specialise in their particular subject, rather than teaching more than one subject. They may also have less administration to perform because the school is more likely to be able to afford support staff, such as technicians, administrative and clerical workers. Moreover, there may be more promotion opportunities within the school, which means that a teacher may have a higher probability of moving up the career ladder *in situ*. For these reasons we can therefore expect that larger schools are associated with a lower exit rate from the public school system and less movement to other schools. However, there is a downside to working in a large school, which is

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that some teachers may feel divorced from their pupils and the decision-making processes in the school, leading to a feeling of alienation and demoralisation. If this effect outweighs the previous effects, then teachers in bigger schools may be more likely to exit the sector or simply move to another (smaller) school. Finally, two measures of the teacher's peer group are included in the model, the proportion of female staff in the school and the proportion of staff with a degree or higher degree. These variables capture teacher preferences for working in particular types of teams. Alternative opportunities, $\{s*\}$, are partly picked up by including a control for the number of private sector schools in the education district in which the teacher works, and by the local unemployment rate.

Pecuniary factors, W_i, are captured by the teachers own wage W_S and whether they receive an allowance for working in a geographically remote or rural school. Locality allowances were introduced by the Queensland government to induce teachers to move to schools in isolated areas, where teacher recruitment and retention are difficult. Higher wages, all else equal, should encourage teachers to remain in the public school system and reduce the probability of movement. The receipt of a locality allowance should also have a similar effect. Clearly, teachers may also look beyond the teaching profession for better paying opportunities in the private sector. To capture this effect, we compute the expected outside wage, W_0, using census data.[6] A higher expected outside wage should lead to an increased probability of exit from the public

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[6] We eschew the inclusion of the relative wage in our model (own wage divided by predicted outside wage) since we wish to observe which of the two pecunairy factors have the strongest effect on teacher turnover and mobility. This is important from a policy perspective.

school system, but should have no effect on movement within the system.

In terms of policy making, the crucial issue is whether the magnitude of the effects of pecuniary factors outweigh those from the non-pecuniary factors.

A number of variables are included to capture differences in teacher preferences, Z_i, such as their highest educational qualification (i.e. higher degree, degree or diploma), their field of specialisation (science, arts, health or other), gender and eithnic background (NESB by Asian, European and other, and ATSI).

Since we observe the postcode of every school, it is possible to determine its geographical location which is then classified into urban, rural or remote areas[7]. Together, these variables capture the location effects, L, referred to in equation (1). It is expected that schools located in rural and remote schools will have fewer amenities and services and hence be perceived by teachers as less desirable locations in which to work. This is perhaps particularly true of remote schools. Teachers from schools in remote and to a lesser extent rural schools are expected to exhibit a higher risk of turnover and mobility.

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[7]We eschew the distinction between intra and inter district moves in thie paper as the policy in use is focused on the urban-rural-remote disticntion. Clearly, moves between these areas are inter-district.

4 RESULTS

4.1 The effect of pecuniary and non-pecuniary factors on teacher turnover and mobility

Tables 5 to 7 report estimated marginal effects from multinomial logit models, where Tables 5 and 6 refer to female and male teachers on permanent contracts, respectively, and Table 7 refers to all temporary workers. It is important to note that the majority of teachers on temporary contracts are actually female.

In terms of pecuniary effects (W_i), we find that the higher the predicted outside wage the greater the risk of teacher turnover amongst males but there is no effect for females or those teachers on temporary contracts. The effect of the predicted outside wages on teacher mobility is negative and statistically significant for female teachers on permanent contracts, which is what one would expect insofar as the bulk of these teachers have taken a career decision to teach and also to remain in the public schooling system and those with greater potential earning power may be in more senior positions. The higher the wage paid to permanent teachers, the lower the risk of turnover and this effect is slightly greater for male teachers. The wage elasticities, evaluated at the overall sample means, are quite small but still larger than many of the elasticities for the non-pecuniary factors, and range from -0.04 for female movers to -0.08 for male teachers who exit the public school system. These finding are important because they suggest that, government can increase teacher wages as a means of reducing the outflow from the public school system, but the increases would have

to be quite large to see any sizeable response. The remaining pecuniary effect arises from the payment of an additional 'locality allowance' for teachers who work in, or move to, schools in rural and remote areas. These allowances appear to have the desired effect insofar as they reduce teacher turnover but encourage teacher mobility, although the latter effect is not large and only applies to female permanent teachers. It is also interesting to note that the locality allowance has a greater effect on female teachers, which is reflected by the size of the marginal effects. Furthermore, the largest effect is observed for temporary teachers, who are mainly females, with respect to teacher turnover where the marginal effect is -0.09.

INSERT TABLES 5, 6 AND 7

In terms of non-pecuniary effects (X_s), the quality of the student body is captured by the performance of the pupils. There is a small positive marginal effect of being in a school with low pupil performance on teacher turnover and mobility in the case of male teachers on permanent contracts (Table 5), and a similar effect on teacher mobility for female teachers on permanent contracts (Table 6). The estimates convert to elasticities that are much bigger than those for wages: for females these are 0.44 for exiters and 1.4 for movers, and the equivalent figures for males are 1.66 and 0.89. Thus, females respond to a poorer student body by moving whereas males tend to quit the public school system. What is more, these are large effects. The effect of working in a school with high perfoming students typically reduces teacher turnover and mobility but these effects are small and statistically insignificant in all models. The effects of school

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size and average class size are interesting insofar as they have equal and opposite effects with respect to teacher mobility. Thus, teachers are less likely to move from larger schools for reasons cited in the previous section. Conversely, teaching larger classes increases the risk of a teacher moving school, perhaps because they prefer smaller classes or because a smaller class is seen as compensation for lower wages (Hanushek, Kain and Rivkin, 2004). These effects are slightly larger for male teachers, and interestingly they are also observed for teachers on temporary contracts. However, note that the effects of school size and average class size are estimated in log points, which means that their absolute magnitudes are quite small when compared to the effects of the pecuniary factors discussed earlier.

There are also sectoral differences in the risk of teacher turnover, insofar as primary school teachers are less likely to leave the profession, whereas there is no difference between primary and secondary school teachers with respect to mobility. The estimates for exits from the school system convert to elasticities of -1.58 and -2.89 for females and males, respectively. Furthermore, the effect of primary school status is seven times stronger for temporary teachers - compare the marginal effect of -0.07 with that for permanent teachers of around -0.01. The primary school environment may be regarded as compensation for the uncertain nature of the temporary teachers contract. However, by far the largest non-pecuniary effect arises from part time contract status. Permanent teachers on this type of contract are more likely to exit the profession and almost twice as likely to move schools, especially in the case of males. The elasticities for each outcome and for each gender are around 2.6, the exception being male teachers

who move where the estimated elasticity is 5.25. Note, however, that there are only 8% of male teachers on permanent part time contracts. Nevertheless, these results imply that male and female teachers on these types of contracts either become disenchanted with their status as part timers and leave for full time contracts outside the teaching profession or inside the profession but at another school. Of course, the other possibility is that teachers on part time contracts are more mobile and simply move to other part time teaching jobs. Teachers on part time temporary contracts behave differently to permanent workers, insofar as they are less likely to move schools but they are more likely to leave the public school system (Table 7). Our data shows that all male exiters on part time temporary contracts were involuntary separations, whereas for females it was 274 out of 279. There are also clear gender differences in the reasons for part time teachers to move. For male teachers on part time contracts, 45 per cent move to take up full-time contracts, whereas the corresponding figure for females was 35 per cent. It is also worth noting in passing that a higher local unemployment rate, which reflects the availability of job opportunities in both the private sector and teaching profession, impedes permanent teacher mobility, especially in the case of male teachers.

An interim conclusion that arises from a comparison of the magnitudes of the pecuniary and non-pecuniary effects is that, unlike many other studies, we find that the pecuniary effects are important. The effect of the own wage is particularly strong, even though the elasticity is low, suggesting that teacher compensation policies can have an effect on teacher turnover and teacher mo-

bility. However, teachers are very responsive to non-pecuniary characteristics, especially in terms of the low quality of the student body, the sector in which they work and their contract status. Before we explore how the effects of pecuniary and non-pecuniary effects vary over teachers careers, it is worth briefly discussing the effects of location, L, and the personal characteristics of the teachers, Z_i.

The geographical location of the school has a mixed effect on teacher turnover and teacher mobility. Female teachers on permanent contracts and temporary teachers in remote schools are more likely to leave the public school system, when compared to their counterparts in urban schools, especially in the case of temporary teachers (see the large marginal effect of 0.10 in table 6). For female teachers on permanent contracts, the estimates convert to elasticities of 3.57 for those who quit the profession and 1.48 for those who move school, again suggesting that these teachers are highly responsive to poorer amenities in remote localities. Female teachers on permanent contracts in schools in rural areas are also more likely to leave the public school system but this effect is smaller than for those in remote schools. Similar effects are observed with respect to the decision to move schools. Here there is clear evidence of higher teacher mobility in schools in more isolated geographical areas, and this time the effect is larger for male teachers on permanent contracts (marginal effect = 0.05) than female teachers on permanent contracts (0.03). This is a worrying finding, in that it may impact on the quality of education in these schools, which tend to be comprised of mainly ATSI pupils. The results do not indicate

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whether this is teacher 'flight' from these schools to urban areas, this is an issue we address later.

A further interim conclusion from our analysis is that, whilst locality allowances reduce the risk of teachers exiting the public school system, they do not completely overcome the disincentives of working in schools in remote geographical areas. Moreover, whilst these allowances might initially encourage teachers to move to schools in remote parts of Queensland, they do not appear to have as big an effect in ensuring that teachers are retained in these schools. We explore the issue of teacher flight from rural and remote schools in more detail below. Note again, however, that the effects of location are not large in comparison to the pecuniary effects but they are bigger than most of the non-pecuniary effects, except for part time contract status.

Finally, turning to teacher preferences, reflected by their characteristics, there are some systematic effects with respect to the educational backgrounds of teachers. Teachers with a higher degree are more likely to move between schools, in fact they are twice as likely to move schools when compared to teachers with a degree (the marginal effects are 0.12 and and 0.05 for female teachers, and 0.7 and 0.3 for male teachers). The elasticities for female teachers who move range from 3.56 for those with a degree to 6.93 for those with a higher degree, and the male equivalents are 2.37 and 4.44. These are large effects and moves may be to take up promoted positions. Male teachers on permanent contracts with a diploma or better are slightly less likely to exit the public school system, whereas temporary teachers with a higher degree have a much greater risk of

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exiting (marginal effect = 0.21, Table 7). This presumably reflects their greater job opportunities in the private sector and the disincentive effect of temporary status. There are few systematic effects with respect to the teachers field of specialisation or their ethnicity, although temporary teachers who are from a non-English speaking background (NESB) are less likely to leave teaching but they are more mobile than white Australian teachers.

4.2 Pecuniary and non-pecuniary effects and teacher careers

In this section we explore how the effects of pecuniary and non-pecuniary factors vary over the career, or life cycle, of permanent teachers, reflected by the work experience gained in the profession. Average work experience is highly correlated with average age, so we can expect teachers with more work experience to be older. Tables 8 and 9 report the estimated marginal effects obtained from multinomial logit models that have been estimated separately for each experience group.

INSERT TABLES 8 AND 9

There are virtually no statistically significant effects of the predicted outside wage on teacher turnover, although as one might expect older and more experienced teachers are less responsive to higher outside wages than more junior colleagues. In fact, the only positive and statistically significant effect of the outside wage occurs for males with 0-2 years experience. There are no system-

atic effects of the outside wage on teacher mobility. The own wage is negative and statistically significant with respect to teacher turnover for female teachers, especially for workers with between 5-20 years. These effects are quite large and suggest that higher wages do reduce the risk of the most experienced, and presumably most valuable, female teachers from leaving the public school system. Smaller effects are observed for male teachers and these are statistically insignificant. A higher own wage has a positive effect on teacher mobility, but this effect is only statistically significant for the least and the most experienced female teachers. This result is counterintuitive, however, it is likely that the wage is picking up unobserved teacher quality, such as motivation, which leads to a higher risk of moving schools. There is a consistently negative and statistically significant effect of the locality allowance on teacher turnover, especially for females, implying that the payment of this additional allowance on top of the wage reduces exits from the public school system. This effect occurs for all experience groups but is particularly strong for the two intermediate experience categories (2-5 and 5-10 years - see Table 8). The locality allowance has a more muted effect on male teacher turnover, and its effect peters out for the most experienced groups. The payment of a locality allowance also increases the probability of a teacher moving school, especially for more junior teachers with up to 10 years of teaching experience. Once again, the effect of the locality allowance is stronger for female teachers, which can be seen by comparing the size of the marginal effects and statistical significance in Tables 8 and 9.

Many of the non-pecuniary effects have little, or no, effect on male or female teacher turnover. The effect of part time contract status is an exception, which increases the risk of exit from the school system. Moreover, this effect is stronger for the less experienced and declines almost monotonically across experience groups. This is most clearly observed for male teachers (Table 9) where the marginal effects are approximately 0.06 for the first two experience groups, declining to around 0.04 for the two intermediate groups and to 0.02 for those teachers with over 20 years of experience. These results imply that less experienced teachers do not prefer part time work and therefore choose to exit the teaching profession.

There are some effects of non-pecuniary factors on teacher mobility. This is most evident for school size and average class size, which exhibit a similar pattern to the pooled models discussed in the previous section. Teachers are less likely to move from larger schools, and this effect is roughly constant across all experience groups up to 20 years and both genders, the exception being male teachers with 2-5 years of experience where the effect is particularly large (marginal effect = 0.12). The school size effect declines a little for the most experienced teachers. The larger the average size of the class the more likely it is that teachers will move to another school. These effects are stronger amongst teachers at the early stages of their career, which is also the time when their wage is likely to be at its lowest, reinforcing the compensating differentials argument discussed in the previous section.

Female teachers working in a geographically remote school are more likely to exit teaching or move to another school. This effect is strongest for the least experienced female teachers, and a similar pattern emerges for those teachers in schools in rural areas. For male teachers the picture is very different with few systematic effects arising from working in a geographically remote school. The only significant effect arises for the least experienced male teachers who are more likely to move school.

In summary, there are differences in the effect of the pecuniary and non-pecuniary factors over the career, or life cycle, of teachers, reflecting the different constraints on decision making. Nevertheless, it seems that female teacher turnover is more sensitive to location, which could explain why their turnover is more strongly influenced by the locality allowance. By contrast, locality allowances appear to encourage mobility amongst teachers with up to 10 years experience. This may suggest that teachers are taking jobs with locality allowances but then moving on to other posts. Hence, it is not clear that the main policy objective is being achieved, we address this below.

4.3 Teacher flight and the effect of locality allowances

So far we have shown that the payment of a locality allowance in addition to the wage reduces the risk of teachers exiting the public school system, and it increases teacher mobility. These effects are particularly strong for the less experienced teachers. However, what we cannot judge so far is whether the allowance has the desired effect of encouraging teachers to stay in schools in

rural or remote areas, the latter being the prime focus of the policy. In this section we therefore invesigate the direction of teacher movement, and focus on the effect of the locality allowance. We estimate a multinomial logit model using only data for teachers who move schools, where the dependent variable is as follows: $j = 0$ move schools within an urban area, $j = 1$ move to a school in an urban area from a rural or remote location, $j = 2$ move to a school in a rural area from amy location and $j = 3$ move to a school in a remote area from any location. The base category is moved between two urban schools Dummy variables capturing the origin area (rural and remote) are included alongside the covariates from the previous models.

<div align="center">INSERT TABLES 10 AND 11</div>

The results of this analysis are presented in Tables 10 and 11 and some summary statistics are reported in Table A2 in the Appendix. Ignoring the effect of the locality allowance for the moment, it is clear that teachers from schools in rural or remote areas are more likely to move to schools in the same area or same type of area. For instance, the marginal effect on the remote school variable for outcome $j = 3$ is 0.41, which is very large (see Table 10). The equivalent figure for those female teachers originating in rural schools moving to a school also in a rural area is 0.56. Similar effects are observed for males, although there is more evidence here that teachers are more likely to move to schools in urban areas from remote schools. Excepting this latter finding, we can conclude that of those teachers who move school, there is a high probability that they will remain in the same kind of locality - rural or remote.

Locality allowances have the effect of increasing the probability of teachers moving to schools in remote areas, but this effect is only statistically significant in the case of female teachers. However, interacting the remote (origin) school variable and locality allowance leads to a large positive and statistically significant effect on the risk of male teachers moving to schools in rural areas (marginal effect 0.31) and a smaller positive effect with respect to schools in remote areas (marginal effect 0.17). This suggests that the locality allowance has some effect in retaining male teachers in schools in remote areas, but also encourages them to move from remote areas to rural areas. The insignificance of the interaction term for female teachers would suggest that the locality allowance is attracting teachers from outside remote areas to these schools.

In summary, it would appear that teachers who move schools are more like to remain in the same kind of locality, and the results for the locality allowance suggest that this policy has a positive effect in this regard. Female teachers are encouraged by the policy to move to schools remote areas, whereas male teachers in schools in remote and rural areas are encouraged by the allowance to remain in those localities. Clearly, our analysis of the effect of the locality allowance has been descriptive, and it would be incorrect to confuse correlation with causation, however, there is sufficient in our results to imply some kind of effect from this policy intervention which warrants further investigation.

5 CONCLUSION

In this paper, we provide new evidence on the impact of pecuniary and non-pecuniary factors on teacher turnover and teacher mobility within the Queensland public school system. Our dataset refers to the population of teachers, which is mapped to student data, so giving a richer description of the the characteristics of teachers, their working conditions and their pay. The main findings of this paper are as follows:

Pecuniary effects appear to be important determinants of both teacher turnover and teacher mobility, and the effect of the teacher's own wage is particularly important. Higher pay reduces the risk of exit from teaching. However, teachers working in geographically remote schools are more likely to exit teaching and more likely to move school, and the latter is more likely to be a move back to schools in urban areas where the local amenities are superior. For example, our analysis of non-pecuniary factors highlighted how teachers prefer to work in public schools that are larger and with a lower class size, these are both factors that could work against rural and remote schools. Hence, the interest in the effects of the policy of paying locality allowances to teachers in rural and remote locations. The payment of locality allowances on top of basic pay for teachers who move to rural and remote schools reduces the likelihood of turnover, especially in the case of female teachers. In addition, the allowance appears to encourage some movement of female teachers to remote and rural schools. Female teachers' location decisions are more sensitive to location. Examination of the pecuniary and non-pecuniary effects over the life cycle of teachers revealed

that locality allowances and wages play an important role for female teachers in mid-career, who could be important to retain in the system. Moreover, there is no evidence to suggest that the locality allowance is significantly linked to moves from rural and remote areas back to urban areas. Hence, the State government could possibly increase retention of staff in these schools with further supplements to these allowances.

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Table 1: Summary Statistics, Permanent Teachers

	Male			Female		
	Stayed	Moved	Exit	Stayed	Moved	Exit
Predicted Outside Wage	3.024	2.981	2.987	2.769	2.768	2.750
Log Hourly Wage	3.320	3.291	3.282	3.255	3.240	3.229
Locality Allowance	0.267	0.475	0.188	0.213	0.285	0.086
Age	41.803	42.287	38.683	38.748	37.663	36.106
Tenure	16.091	10.716	10.670	11.765	8.906	8.300
NESB - Asian	0.018	0.25	0.017	0.018	0.018	0.017
NESB - European	0.029	0.30	0.014	0.032	0.036	0.024
NESB - Other	0.068	0.068	0.070	0.068	0.067	0.052
Indigenous	0.010	0.018	0.012	0.009	0.006	0.004
Disability	0.097	0.075	0.087	0.060	0.047	0.057
Part-Time	0.054	0.149	0.253	0.204	0.289	0.376
Primary Teacher	0.443	0.579	0.366	0.685	0.741	0.610
Degree	0.489	0.511	0.427	0.481	0.499	0.451
Graduate Diploma	0.231	0.211	0.239	0.196	0.204	0.208
Higher Degree	0.047	0.063	0.048	0.031	0.042	0.026
Sciences & Engineering	0.133	0.109	0.161	0.038	0.038	0.031
Arts	0.079	0.076	0.108	0.093	0.089	0.131
Health	0.064	0.085	0.063	0.026	0.030	0.030
Other Specialisation	0.086	0.085	0.118	0.104	0.097	0.135
Log School Size	6.237	5.941	6.270	6.171	5.991	6.208
Log Class Size	2.200	2.215	2.155	2.321	2.307	2.288
High Performing School	0.283	0.230	0.251	0.285	0.249	0.276
Low Performing School	0.201	0.275	0.267	0.196	0.249	0.211
Non Govt Schools	1.261	1.186	1.051	1.302	1.282	1.387
Remote School	0.062	0.143	0.065	0.072	0.110	0.081
Rural School	0.146	0.191	0.149	0.147	0.181	0.159
Unemployment Rate	0.061	0.058	0.063	0.059	0.058	0.061
Proportion Teachers Female	0.682	0.712	0.664	0.734	0.744	0.718
Proportion Teachers Degree+	0.739	0.734	0.744	0.717	0.715	0.730
Observations	7566	411	1176	19144	978	3269

Table 2: Summary Statistics, Temporary Teachers

	Stayed	Moved	Exit
Female	0.781	0.703	0.763
Predicted Outside Wage	2.756	2.816	3.086
Log Hourly Wage	3.100	3.102	3.086
Locality Allowance	0.156	0.072	0.091
Age	39.304	39.590	38.483
Tenure	3.041	3.222	2.643
NESB - Asian	0.034	0.019	0.043
NESB - European	0.040	0.031	0.052
NESB - Other	0.038	0.034	0.043
Indigenous	0.010	0.008	0.009
Disability	0.033	0.031	0.021
Part-Time	0.364	0.325	0.257
Primary Teacher	0.699	0.559	0.645
Degree	0.422	0.469	0.498
Graduate Diploma	0.154	0.196	0.177
Higher Degree	0.031	0.61	0.035
Sciences & Engineering	0.038	0.074	0.047
Arts	0.108	0.127	0.135
Health	0.050	0.046	0.050
Other Specialisation	0.110	0.150	0.139
Log School Size	6.133	6.217	6.177
Log Class Size	2.325	2.256	0.2334
High Performing School	0.308	0.320	0.295
Low Performing School	0.212	0.198	0.193
Non Govt Schools	1.221	1.187	1.094
Remote School	0.058	0.060	0.043
Rural School	0.116	0.105	0.126
Unemployment Rate	0.062	0.061	0.061
Proportion Teachers Female	0.739	0.709	0.729
Proportion Teachers Degree+	0.713	0.733	0.719
Observations	1238	1115	654

Table 3: Average Annual Transition Rates of Teachers by Tenure, 2001-2002[8]

Teacher Tenure	Remains at Same School	Change School Within District	Change District	Voluntary	Exit Schools Involuntary	Retirement	Ave Number Teachers p.a.
0 to 2 years	0.73	0.08	0.12	0.01	0.06	0.00	8328
2 to 5 years	0.77	0.08	0.11	0.01	0.03	0.00	5284
5 to 10 years	0.82	0.06	0.09	0.02	0.01	0.00	4603
10 to 30 years	0.85	0.05	0.07	0.02	0.00	0.01	13004
30+ years	0.87	0.03	0.04	0.01	0.01	0.04	3021
All	0.81	0.06	0.09	0.01	0.02	0.01	32277

Table 4: Origin and Destination of Teachers Moving District, 2001-2002[9]

	Urban	Rural	Remote	Number Changing District	Percentage of Origin Teachers
All Teachers					
Urban	0.84	0.09	0.07	4217	0.12
Rural	0.41	0.50	0.09	1052	0.03
Remote	0.40	0.11	0.49	894	0.02
0 to 5 years Tenure					
Urban	0.83	0.10	0.07	1710	0.14
Rural	0.37	0.54	0.09	532	0.04
Remote	0.39	0.10	0.51	519	0.04

Table 5: The determinants of teacher turnover and teacher mobility - permanent workers, females[11]

Variable	Teacher turnover ($j = 2$)			Teacher mobility ($j = 3$)		
	Marginal effect	s.e.	Prob value	Marginal effect	s.e.	Prob value
Pecuniary effects (W_i)						
Predicted outside wage	-0.003	0.010	0.801	-0.088	0.020	0.000
Own wage	-0.052	0.008	0.000	-0.044	0.017	0.009
Locality allowance	-0.041	0.005	0.000	0.016	0.004	0.003
Non-pecuniary effects (X_i)						
Part time	0.027	0.002	0.000	0.053	0.005	0.000
High student performance	0.000	0.003	0.981	-0.006	0.006	0.290
Low student performance	0.003	0.003	0.285	0.024	0.006	0.000
(ln)School size	0.003	0.002	0.219	-0.033	0.004	0.000
(ln)Average class size	-0.003	0.003	0.225	0.031	0.005	0.000
%Female staff	-0.004	0.015	0.805	0.014	0.026	0.601
% of staff with $\geq$degree	0.014	0.013	0.284	0.031	0.022	0.168
No. of private schools	0.001	0.000	0.063	-0.001	0.001	0.205
Local unemployment rate	0.015	0.029	0.594	-0.099	0.059	0.091
Primary school	-0.011	0.005	0.015	0.003	0.009	0.702
Location (L)						
Remote school	0.023	0.005	0.000	0.029	0.009	0.001
Rural school	0.015	0.003	0.000	0.012	0.006	0.064
Personal characteristics (Z_i)						
Diploma	-0.003	0.005	0.573	0.069	0.010	0.000
Degree	-0.004	0.004	0.317	0.054	0.008	0.000
Higher degree	-0.003	0.009	0.765	0.125	0.017	0.000
Science specialist	-0.008	0.007	0.238	0.005	0.013	0.670
Arts specialist	0.012	0.004	0.000	-0.002	0.008	0.817
Health specialist	0.002	0.007	0.787	0.014	0.014	0.306
Other specialist	0.008	0.004	0.027	-0.006	0.008	0.467
Disability	0.001	0.005	0.809	-0.020	0.011	0.063
NESB - Asian	-0.001	0.009	0.899	0.006	0.017	0.738
NESB - European	-0.010	0.007	0.157	0.017	0.012	0.158
NESB - Other	-0.006	0.005	0.262	0.000	0.009	0.997
ATSI	-0.019	0.017	0.281	-0.060	0.028	0.032
Constant	0.067	0.035	0.055	0.227	0.071	0.001
No. of observations			22,969			
Chi-square			899.70			
Log likelihood			-12861.30			
Pseudo R^2			0.030			

Table 6: The determinants of teacher turnover and teacher mobility - permanent workers, males[13]

Variable	Teacher turnover ($j = 2$)			Teacher mobility ($j = 3$)		
	Marginal effect	s.e.	Prob value	Marginal effect	s.e.	Prob value
Pecuniary effects (W_i)						
Predicted outside wage	0.021	0.010	0.028	-0.025	0.017	0.131
Own wage	-0.077	0.015	0.000	-0.064	0.026	0.014
Locality allowance	-0.008	0.005	0.077	0.009	0.004	0.034
Non-pecuniary effects (X_i)						
Part time	0.061	0.005	0.000	0.121	0.010	0.000
High student performance	-0.003	0.005	0.574	-0.010	0.008	0.246
Low student performance	0.014	0.005	0.003	0.015	0.009	0.076
(ln)School size	0.007	0.005	0.131	-0.049	0.006	0.000
(ln)Average class size	-0.008	0.005	0.111	0.049	0.007	0.000
%Female staff	0.011	0.027	0.669	0.069	0.040	0.086
% of staff with $\geq$degree	-0.047	0.025	0.064	0.112	0.035	0.002
No. of private schools	-0.001	0.001	0.304	-0.002	0.001	0.213
Local unemployment rate	0.017	0.046	0.708	-0.254	0.084	0.002
Primary school	-0.018	0.008	0.030	0.006	0.012	0.623
Location (L)						
Remote school	0.009	0.009	0.324	0.053	0.013	0.000
Rural school	0.005	0.006	0.409	0.012	0.010	0.211
Personal characteristics (Z_i)						
Diploma	-0.013	0.006	0.040	0.035	0.012	0.004
Degree	-0.018	0.006	0.002	0.033	0.010	0.002
Higher degree	-0.012	0.010	0.253	0.073	0.017	0.000
Science specialist	0.006	0.006	0.269	-0.002	0.012	0.886
Arts specialist	0.014	0.006	0.029	-0.004	0.013	0.759
Health specialist	0.001	0.008	0.949	0.022	0.013	0.084
Other specialist	0.011	0.007	0.075	-0.004	0.013	0.746
Disability	-0.003	0.007	0.687	-0.020	0.013	0.121
NESB - Asian	-0.011	0.014	0.461	0.027	0.023	0.238
NESB - European	-0.031	0.015	0.040	0.008	0.020	0.692
NESB - Other	0.002	0.008	0.761	0.019	0.013	0.156
ATSI	0.005	0.017	0.789	0.024	0.028	0.382
Constant	0.101	0.053	0.053	0.128	0.086	0.134
No. of observations			8,983			
Chi-square			729.88			
Log likelihood			-4750.65			
Pseudo R^2			0.066			

Table 7: The determinants of teacher turnover and teacher mobility - temporary teachers (males and females)[15]

Variable	Teacher turnover ($j = 2$)			Teacher mobility ($j = 3$)		
	Marginal effect	s.e.	Prob value	Marginal effect	s.e.	Prob value
Male	0.062	0.025	0.012	-0.020	0.023	0.372
Pecuniary effects (W_i)						
Predicted outside wage	0.001	0.051	0.987	0.046	0.047	0.326
Own wage	-0.024	0.065	0.715	-0.055	0.057	0.340
Locality allowance	-0.094	0.031	0.002	0.004	0.022	0.855
Non-pecuniary effects (X_i)						
Part time	0.044	0.022	0.045	-0.053	0.020	0.008
High student performance	0.026	0.022	0.246	-0.028	0.020	0.159
Low student performance	0.003	0.026	0.913	-0.004	0.023	0.860
(ln)School size	0.014	0.019	0.474	-0.035	0.016	0.030
(ln)Average class size	-0.029	0.023	0.204	0.047	0.020	0.020
No. of private schools	0.002	0.004	0.743	-0.002	0.004	0.597
Local unemployment rate	0.005	0.248	0.983	-0.091	0.217	0.675
Primary school	-0.077	0.027	0.004	-0.015	0.024	0.526
Location (L)						
Remote school	0.106	0.046	0.021	-0.043	0.043	0.318
Rural school	0.023	0.033	0.486	0.006	0.028	0.834
Personal characteristics (Z_i)						
Diploma	0.090	0.031	0.003	0.027	0.027	0.312
Degree	0.072	0.024	0.003	0.028	0.021	0.185
Higher degree	0.210	0.052	0.000	-0.021	0.050	0.669
Science specialist	0.093	0.043	0.030	-0.053	0.042	0.203
Arts specialist	-0.009	0.031	0.781	0.005	0.027	0.866
Health specialist	-0.049	0.045	0.274	0.031	0.038	0.421
Other specialist	0.048	0.030	0.107	-0.019	0.027	0.487
Disability	0.027	0.059	0.650	-0.009	0.054	0.866
NESB - Asian	-0.234	0.065	0.000	0.084	0.048	0.077
NESB - European	-0.090	0.052	0.084	0.067	0.041	0.098
NESB - Other	-0.111	0.058	0.057	0.075	0.044	0.092
ATSI	-0.039	0.111	0.722	-0.026	0.096	0.787
Constant	0.040	0.229	0.860	0.096	0.204	0.637
No. of observations			2,591			
Chi-square			138.74			
Log likelihood			-2720.98			
Pseudo R2			0.027			

Table 8: Pecuniary and non-pecuniary effects by work experience - permanent workers, females[16]

Variable	Years of experience									
	0-2		2-5		5-10		10-20		20 years or more	
	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e
Teacher turnover										
Predicted outside wage	0.009	0.024	0.010	0.022	0.005	0.021	-0.002	0.017	-0.004	0.019
Own wage	0.023	0.021	-0.010	0.022	-0.131***	0.022	-0.165***	0.023	-0.048*	0.028
Locality allowance	-0.024**	0.008	-0.063***	0.012	-0.068***	0.011	-0.028***	0.009	-0.024**	0.010
Part time	0.037***	0.007	0.024***	0.006	0.014**	0.004	-0.003	0.005	0.021***	0.005
High student performance	0.013**	0.007	-0.008	0.007	0.007	0.005	-0.008	0.005	-0.001	0.005
Low student performance	0.010	0.007	-0.003	0.005	0.007	0.005	-0.005	0.006	0.009*	0.005
(ln)School size	0.008	0.006	0.004	0.007	-0.003	0.004	0.003	0.005	0.003	0.004
(ln)Average class size	-0.007	0.007	-0.001	0.008	0.001	0.004	-0.002	0.006	-0.005	0.005
Primary school	-0.009	0.009	-0.002	0.011	-0.020***	0.006	-0.016**	0.006	-0.009	0.006
Remote school	0.039***	0.010	0.014	0.007	0.018**	0.008	0.010	0.010	0.018**	0.009
Rural school	0.025***	0.008	0.017**	0.007	0.012**	0.006	0.007	0.007	0.006	0.007
Teacher mobility										
Predicted outside wage	-0.082*	0.050	0.014	0.057	0.057	0.061	-0.009	0.032	-0.052	0.037
Own wage	0.115**	0.042	0.025	0.054	0.084	0.057	0.069	0.054	0.130**	0.045
Locality allowance	0.016**	0.008	0.045***	0.013	0.027**	0.013	-0.006	0.007	0.004	0.007
Part time	0.054***	0.014	0.030**	0.016	0.017	0.015	0.015	0.011	0.026**	0.013
High student performance	0.020	0.013	-0.004	0.016	-0.016	0.015	-0.009	0.010	-0.005	0.009
Low student performance	0.011	0.014	0.045**	0.016	0.002	0.015	0.027**	0.011	0.026**	0.010
(ln)School size	-0.044***	0.009	-0.038***	0.011	-0.041***	0.010	-0.022**	0.008	-0.023**	0.007
(ln)Average class size	0.055***	0.012	0.031**	0.014	0.029**	0.012	0.025**	0.010	0.017**	0.009
Primary school	0.011	0.017	-0.021	0.020	0.039**	0.019	0.011	0.013	-0.001	0.012
Remote school	0.040**	0.021	0.017	0.024	-0.006	0.024	0.047**	0.017	0.010	0.019
Rural school	0.025*	0.015	0.032*	0.018	-0.013	0.018	0.002	0.013	-0.006	0.012

Table 9: Pecuniary and non-pecuniary effects by work experience - permanent workers, males[17]

Variable	Years of experience									
	0-2		2-5		5-10		10-20		20 years or more	
	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e.
Teacher turnover										
Predicted outside wage	0.087***	0.025	0.000	0.028	0.028	0.024	-0.066	0.096	-0.050	0.063
Own wage	-0.046	0.055	0.038	0.059	-0.032	0.028	-0.062	0.041	-0.026	0.023
Locality allowance	-0.031*	0.016	-0.000	0.010	-0.018*	0.011	-0.008	0.009	0.002	0.006
Part time	0.059**	0.019	0.065***	0.017	0.043***	0.012	0.034**	0.011	0.021**	0.011
High student performance	0.002	0.018	0.028**	0.014	-0.026**	0.011	-0.018**	0.008	0.004	0.006
Low student performance	0.007	0.017	0.023	0.015	0.007	0.009	0.017**	0.007	0.008	0.006
(ln)School size	-0.004	0.016	0.012	0.014	0.001	0.009	0.016*	0.009	0.005	0.006
(ln)Average class size	0.010	0.017	-0.015	0.015	-0.006	0.009	-0.020*	0.009	-0.000	0.007
Primary school	-0.037*	0.021	-0.005	0.019	-0.026**	0.012	0.001	0.011	-0.014*	0.008
Remote school	0.036	0.028	-0.013	0.027	0.024	0.015	-0.000	0.017	-0.026	0.023
Rural school	0.013	0.021	-0.003	0.017	0.023**	0.010	-0.015	0.013	0.005	0.008
Teacher mobility										
Predicted outside wage	-0.021	0.033	0.038	0.057	0.020	0.060	0.969**	0.326	-0.058	0.124
Own wage	0.063	0.082	-0.086	0.127	0.151	0.105	0.053	0.071	0.064**	0.033
Locality allowance	0.023*	0.013	0.015	0.016	0.038**	0.016	-0.005	0.008	0.003	0.006
Part time	0.136***	0.029	0.133***	0.041	0.048	0.045	0.046***	0.033	0.068***	0.019
High student performance	-0.010	0.027	-0.118**	0.038	-0.015	0.028	0.038**	0.015	-0.006	0.010
Low student performance	0.027	0.024	-0.011	0.032	0.037	0.027	0.029*	0.017	-0.000	0.012
(ln)School size	-0.050**	0.019	-0.121***	0.025	-0.044**	0.019	-0.050***	0.012	-0.029***	0.008
(ln)Average class size	0.057**	0.022	0.127***	0.029	0.040*	0.021	0.050***	0.013	0.027**	0.009
Primary school	0.068**	0.028	-0.048	0.038	0.044	0.031	0.015	0.019	0.016	0.013
Remote school	0.064*	0.035	0.054	0.045	0.022	0.042	0.068**	0.027	0.019	0.024
Rural school	0.012	0.028	-0.011	0.036	0.019	0.032	0.010	0.018	0.009	0.013

Table 10: The direction of mobility - females[18]

| | Moved to a school: | | | | | |
| | Urban area | | Rural area | | Remote area | |
Variable	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e.
Origin: remote school	0.142***	0.021	0.177**	0.065	0.408***	0.036
Origin: rural school	0.125***	0.014	0.561***	0.036	0.163***	0.022
Locality allowance	0.007	0.008	0.011	0.021	0.033**	0.014
Remote*locality	0.008	0.024	-0.023	0.095	0.050	0.040
Predicted outside wage	-0.034	0.034	0.025	0.070	-0.105*	0.057
Own wage	0.007	0.028	-0.198***	0.056	0.032	0.046
Part time	-0.005	0.009	-0.012	0.019	-0.026*	0.016
Temporary	0.002	0.013	-0.056**	0.026	0.002	0.022
High school performance	0.003	0.009	-0.019	0.020	-0.015	0.016
Low school performance	-0.004	0.010	-0.023	0.020	-0.022	0.016
(ln) School size	0.010	0.007	-0.024**	0.012	0.009	0.011
(ln) Average class size	-0.018**	0.008	0.035**	0.016	-0.004	0.014
%Female staff	-0.102**	0.039	-0.149*	0.082	0.022	0.072
% of staff with $\geq$degree	-0.024	0.034	0.007	0.070	-0.086	0.059
No. of private schools	0.000	0.007	0.004	0.003	0.003	0.002
Unemployment rate	0.063	0.097	0.297	0.198	0.055	0.163
Primary school	0.052***	0.015	0.043	0.030	0.021	0.025
Diploma	0.025	0.018	-0.010	0.037	0.064**	0.030
Science specialist	0.010	0.021	-0.004	0.045	0.024	0.034
Arts specialist	-0.021	0.016	-0.002	0.028	0.029	0.021
Health specialist	0.023	0.018	-0.025	0.045	0.024	0.033
Other specialist	0.015	0.013	0.006	0.028	-0.020	0.024
Degree	0.022*	0.014	-0.003	0.029	0.056**	0.024
Higher degree	0.058**	0.027	0.024	0.059	0.069	0.049
Disability	-0.011	0.021	0.022	0.037	-0.049	0.039
NESB	-0.022	0.015	0.022	0.025	-0.045*	0.024
Constant	-0.048	0.116	0.425	0.233		
No. of observations			3746			
Log Likelihood			-1808.60			
Chi-square(81)			511.19			

Table 11: The direction of mobility - males[19]

Variable	Moved to urban		Moved to rural		Moved to remote	
	Marg effect	s.e.	Marg effect	s.e.	Marg effect	s.e.
Origin: remote school	0.212***	0.043	0.098	0.153	0.385***	0.064
Origin: rural school	0.121***	0.028	0.697***	0.074	0.176***	0.044
Locality allowance	-0.000	0.011	0.002	0.031	0.023	0.018
Remote*locality	-0.075*	0.041	0.313*	0.193	0.167**	0.080
Predicted outside wage	-0.041	0.027	-0.152**	0.065	-0.174***	0.045
Own wage	0.019	0.046	0.150	0.111	0.130	0.082
Part time	0.014	0.020	0.072*	0.043	-0.032	0.038
Temporary	-0.040	0.030	0.031	0.055	-0.009	0.040
High school performance	-0.001	0.018	0.072*	0.039	-0.019	0.032
Low school performance	0.045**	0.016	0.039	0.038	0.046*	0.027
(ln) School size	-0.017*	0.010	-0.046*	0.025	0.037**	0.020
(ln) Average class size	-0.002	0.010	0.026	0.028	-0.050**	0.023
%Female staff	-0.086	0.068	-0.424**	0.178	-0.066	0.136
% of staff with $\geq$degree	-0.057	0.058	0.146	0.158	0.087	0.114
No. of private schools	0.003	0.002	0.004	0.005	0.005	0.004
Unemployment rate	0.099	0.156	0.844**	0.354	0.653**	0.257
Primary school	0.040*	0.024	0.091	0.057	0.060	0.043
Diploma	0.072**	0.026	0.126**	0.056	0.022	0.042
Science specialist	-0.029	0.025	-0.092	0.061	-0.092**	0.048
Arts specialist	-0.054	0.035	-0.126*	0.069	-0.050	0.047
Health specialist	0.003	0.023	0.037	0.053	-0.049	0.044
Other specialist	-0.039	0.029	-0.066	0.059	0.032	0.041
Degree	0.063**	0.023	0.089*	0.047	0.064*	0.034
Higher degree	0.057*	0.036	0.142*	0.075	-0.001	0.061
Disability	0.030	0.022	-0.053	0.063	-0.044	0.056
NESB	-0.004	0.021	-0.020	0.051	-0.012	0.039
Constant	-0.049	0.151	-0.153	0.368		
No. of observations			1326			
Log Likelihood			-613.23			
Chi-square(81)			190.71			