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DOES PRIVATE SCHOOLING PAY?

Evidence and Equity Implications for Australia

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Contents

Abstract

How effectively different schools prepare young people for future social and economic engagement has important implications for education practice, funding allocations and social equity, as well as for parental decision making. This paper uses data from waves 2001-2014 of the Household, Income and Labour Dynamics in Australia Survey to analyse the returns to having attended a Catholic or Independent private school as opposed to a government school. Based on wage equations estimated by random-effects panel models, Australians who attended Catholic schools are observed to enjoy an hourly wage premium of around 10 per cent, and other private schools a premium of around 15 per cent relative to those who went to a government school. Just over half of this premium can be accounted for by the greater level of educational attainment students ultimately achieve in the case of Catholic schools; and around three-quarters in the case of private schools. Cohort analysis shows these premiums have remained relatively stable over time, despite rising levels of Year 12 completion and higher education participation. Overall the results suggest that private schooling continues to be an important mechanism by which socio-economic advantage is transmitted between Australian generations, largely due to enhanced access to higher education. The extent to which this is a 'causal' effect of differential school quality remains contentious.

Introduction

A 'better education' is strongly associated with better outcomes across a range of life's domains and educational attainment is commonly used as a marker of socio-economic status. Universal access to quality early childhood, primary and secondary schooling, followed by equitable access to further and higher education, is critical to ensuring children from different backgrounds have equal economic and social opportunity. The benefits of education may derive not only from the level of education attained and the student's academic performance, but also from the prestige of the schools and institutions attended and the associated social capital passed on to the individual.

Within Australia, education in schools is primarily a responsibility of State and Territory governments and pre-school, primary and secondary schooling is available universally free of tuition fees through the government-run public school system. However, parents may opt to pay to send their children to one of a number of non-government or 'private' schools, which are broadly categorised as Catholic schools or non-Catholic Independent schools. According the Australian Bureau of Statistics, around two-thirds of all students in 2015 attended government schools (ABS 2016), with 20% attending Catholic schools and 14% in Independent schools. Fees to attend such Catholic and private schools can be substantial. Data compiled the by Australian Curriculum, Assessment and Reporting Authority show annual fees paid to Catholic schools in 2012 averaged $3,107 per student, and $9,345 per student for Independent private schools (ACARA 2012: 58).

The question as to whether the private school sector provides a better education is of great importance to parents, students and providers, and for government policy. It is known that Independent school students come from higher socio-economic status (SES) backgrounds, on average, than Catholic school students, who in turn come from higher SES backgrounds than students of government schools (Watson & Ryan, 2010). This raises concerns of the existence of a 'two-tier' school system that limits inter-generational mobility in SES. Consequently there is a considerable empirical literature comparing public and private schools in terms of academic outcomes at both the school and student level, including school test scores, university entrance and performance at university. In contrast, this paper focuses on whether there is a wage premium associated with private schooling in Australia, using data from the Household, Income and Labour

Dynamics in Australia survey. Outcomes in other selected life domains are also explored: namely household income, neighbourhood socio-economic status and life satisfaction. To the best of the author's knowledge the existence and extent of a public-private divide for these post-education outcomes life has not previously been analysed in Australia.

Background

School attended may systematically influence students' outcomes in three main ways:

1. The quality of education provided (or 'what schools do') – some schools may have superior resources or methods, resulting in students achieving better educational outcomes than they would have achieved at an 'average' school.
2. The quality of the student body ('who attends') – if schools attract enrolments of students with superior cognitive and non-cognitive attributes, relative to the general population, there may be a peer group effect in which the behaviours displayed and standards achieved by the group lift the performance and achievements of others.
3. Social capital – independently of educational achievement at school, students may benefit in pursuing post-school endeavours (such as employment) if the school they attend has a prestigious reputation or if networks developed among the students provide added opportunities.

The first two of these influences should primarily affect students' school results. In 1966, a major report into equality of educational opportunity in the United States was prepared for the US Congress (Coleman et al. 1966). The key and surprising finding of the Coleman Report, as it since became known, was that once one rigorously controls for who attends schools and for students' own backgrounds, what schools do has minimal impact on their educational achievement. Subsequent research has broadly upheld this finding, with factors such as school resourcing, class sizes and teaching practices seemingly having minimal independent effects on student performance (Card & Krueger 1992; Fertig & Wright 2005; Marks 2010).

Australian based research has suggested that attendance at private schools is associated with a greater likelihood of completing school/school retention (Marks 2007, 2014; Marks et al. 2000); is inconclusive in regards to the effect on school achievement or grades (Cardak & Ryan 2009; Mahuteau & Mavromaras 2014; Rodgers, Neri & Moran 2016; Ryan 2013); and is associated with a greater likelihood of entering university (Marks et al 2000; Cardak & Ryan 2009). Conditional on gaining entry to university, however, studies have found that students from government schools perform better at university than those from private schools (see Li & Dockery 2015 for a recent review). A key methodological issue in determining the presence or otherwise of sector effects is whether selection effects into different school sectors, which may often be unobservable to the analyst, are properly controlled for. Moreover, any such effects may have changed over time as enrolment shares have changed and retention to Year 12 increased (Li & Dockery 2015: 78).

Marks (2007: 433) reviews a number of studies from the 1990s and early 2000s showing that in Australia early school leaving is lowest in Independent schools, followed by Catholic schools, and highest in government schools, and these sector effects are additional to the effects of students' socio-economic backgrounds and pre-existing academic performance. His own analysis was based on the 2003 cohort of the Longitudinal Surveys of Australian Youth (LSAY), which provided controls for student socio-economic background and their scores on tests conducted as part of the Organisation for Economic Co-operation and Development's (OECD's) Program for International Student Assessment (PISA). The PISA test scores, measured in Year 9, proved to be the strongest influence on school completion, while socio-economic background was also found to have a strong

effect. After controlling for these and a range of other individual-level and school level variables, Marks (2007) found attending an Independent school to be associated with reducing a student's odds of leaving school early by 1.8 times compared to attendance at a government school. Attendance at a Catholic school rather than a government school was also estimated to reduce early school leaving, but this effect was not statistically significant.

In a more recent study, Marks (2014) used administrative data covering all students who were in Year 9 in the state of Victoria in 2008 – around 70,000 students. In this sample multivariate estimates show the odds of a student reaching Year 12 was largest for Catholics schools: 1.6 times the odds of government school students, while for Independent school students the odds were 1.2 times higher compared to government schools. These estimates are both highly significant and obtained from models which included controls for Year 9 NAPLAN scores and parental occupation and education. A much larger 'raw' school sector effect is shown to be strongly mediated by parental socio-economic background and achievement at Year 9. Performance on test scores in Year 9 was again found to be the strongest predictor, in this case based on the NAPLAN reading and numeracy scores (Marks 2014).

Based on the 1995 Year 9 cohort of the LSAY, Le and Miller (2005) found that attending a Catholic school was associated with the greatest likelihood of completing Year 12, followed by independent schools. This is consistent with Marks' 2014 result. Using data from 5 different cohorts graduating between 1980 and 1998, Marks et al. (2000) find that school sector differences in rates of participation in Year 12 had decreased markedly over time as overall school retention rates to Year 12 increased.

While those in independent schools, followed by Catholic schools, achieve better results on average, there is uncertainty as to whether this holds given the pre-existing attributes of the respective student bodies, such as socio-economic background or earlier assessed ability. Miller and Voon's review of Australian studies suggest that there are school sector differences, and these are reduced but not eliminated by controls for socio-economic background and prior achievement (2012: 150-151). Based on data from the Longitudinal surveys of Australian Youth, Marks, McMillan and Hillman (2001) find average ENTER scores to be higher for youth from non-government schools, and the about half of that difference can be accounted for by controlling for Year 9 achievement scores and student background. This is reinforced by Miller and Voon's (2012) analysis of NAPLAN data from 2008 and 2009 for tests conducted for students in Years 3, 5, 7 and 9. Across the test domains of grammar, numeracy, reading, spelling and writing, average school results were highest for Independent schools, followed by Catholic schools and government schools. Differences in NAPLAN results were only partially explained by differences in the socio-economic background of students' families, and the 'unexplained' school sector differences widened by Year 9. Miller and Voon suggest this widening may arise due to more intense selection processes into non-government schools at the higher school levels (2012: 164).

A further body of literature examines the 'efficiency' with which schools convert inputs, such as funding and teaching resources, into educational outputs such as student results relative to production possibility frontiers established through Data Envelop Analysis or Stochastic Frontier Analysis. These studies also tend to find that private schools are the most efficient in generating improved student outcomes, followed by Catholic and then public schools (see Nghiem, Nguyen & Connelly 2016, Ryan 2013).

In contrast, Mahuteau and Mavromaras (2014) analyse 2009 PISA scores using multilevel regression to find the main driver of the differences in PISA scores between sectors is the differences in the socio-economic background of students in the various sectors. Once selection on

the basis of socio-economic background is controlled for, they find no significant difference in 'school quality' between sectors, with the one exception that students from Catholic schools appeared to perform better than those from both government and Independent schools in mathematics. Ryan's (2013) analysis of PISA scores suggested attendance at private schools was associated with better mathematics and reading scores relative to government schools in 2003, but that differential had declined such that there were no noteworthy differences in 2006 and 2009 after controlling for schools' socio-economic background.

In multivariate analyses Marks et al. (2000) find that students attending private high schools in 1980 were 3.6 times more likely to later attend university, declining to 2.4 times for those in Year 9 in 1999, with rates also higher for Independent schools than Catholic schools. As completion of Year 12 is one of the main entry paths to university, Le and Miller (2005) also modelled university entry conditional upon Year 12 completion. Having attended a Catholic or Independent school had positive and highly significant effects on the probability of entering university, relative to having graduated from a government school. However, analysing the same data, Cardak and Ryan (2009) find that after controlling for socioeconomic background and either the student's ENTER scores or early academic achievement (rather than just Year 12 completion), there were no significant effects of school sector on the likelihood of an individual going to university. Thus Cardak and Ryan (2009) conclude that measures to address the lower opportunity to participate in higher education for youth from low socio-economic backgrounds would need to impact upon achievement by Year 9.

Australian studies have consistently found that prior academic achievement is a very strong predictor of performance at university (Li & Dockery 2015: 79). They also tend to find that once prior academic performance is taken to account, students from private schools actually perform worse than their counterparts from government schools. These studies include Win and Miller (2005) and Birch and Miller (2007) using administrative data on first year students at the University of Western Australia and including ATAR scores; Dobson and Skuja for first year students attending Monash University between 2000 and 2003, and Li and Dockery (2015) based on weighted average marks of first year students from 2011 to 2013 contained in administrative data from an anonymous Australian university. These findings are consistent with private schools either inflating their graduates' ENTER scores given their ability or otherwise inflating their probability of entry to university given their ability, relative to government schools.

In contrast to the body of literature that suggests various indicators of school quality have minimal effects on student achievement, Card and Krueger (1992) find that rates of return to education are positively associated with a range of indicators of school quality, including teacher-student ratios and prevalence of private schools. Men who were educated in areas in the US with higher quality schools receive a larger increase in earnings for each additional year of schooling. Furthermore, they estimate that this effect dominates effects of the socio-economic background of the parent generation in those areas. In light of this paradox – that school quality seems not to affect student achievement in test scores but does affect post-school earnings – Card and Krueger pose the question as to what is the appropriate yardstick in measuring the effectiveness of education. To the best of the author's knowledge, post-education differences in outcomes for graduates from the different school sectors have not been specifically analysed in Australia.

Data and some descriptive statistics

HILDA is a nationally representative household panel survey in which respondents are interviewed annually. The panel was established in 2001 through a random sample of private households in Australia, and within those households all persons aged 15 and over are interviewed. Around 13,000 individuals from over 7,000 households have responded each year, with year-on-year

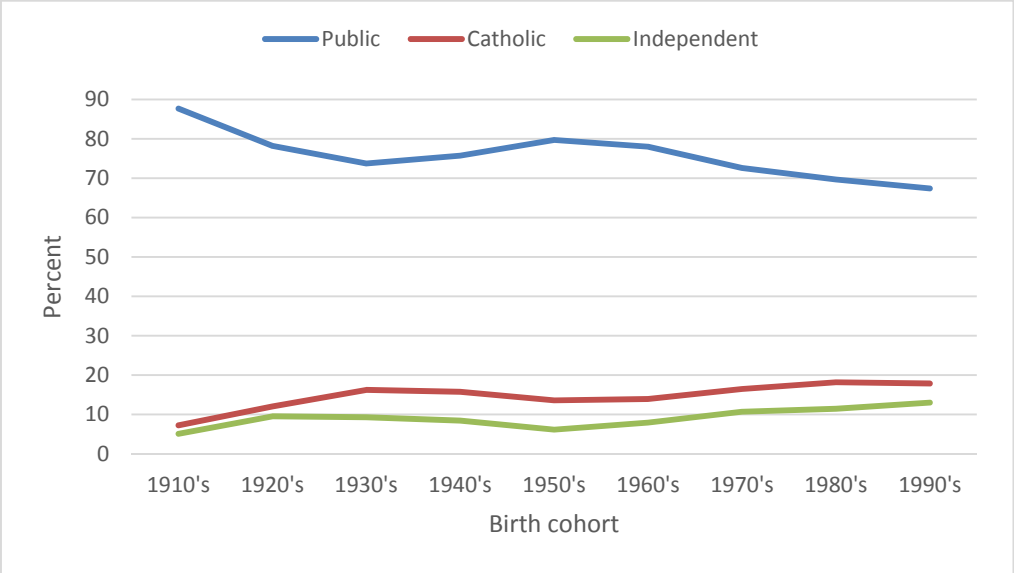
attrition rates averaging below 10%. In 2011 a top-up sample of 2,153 households encompassing 4,009 responding individuals was recruited to the survey (See HILDA Survey Annual Reports, http://www.melbourneinstitute.com/hilda/). Data from Waves 1 to 14 (2001 to 2014) were available for the analyses contained in this paper.

HILDA collects a wealth of data on respondents' demographic characteristics, personal and family circumstances and the nature of their employment, including hours worked and earnings. When people are first interviewed they are asked the highest level of school they completed and to select "Which of the following types of school best describes the type of school you were attending in your last year?" with the options of government school, Catholic non-government school, other non-government school and an 'other' category. If the person attended more than one school in their final year, they were instructed to answer with respect to the last school attended. For people who are still at school, they are asked what type of school they are currently attending. Once they leave school the 'type of school attended' is updated in the following year's survey.

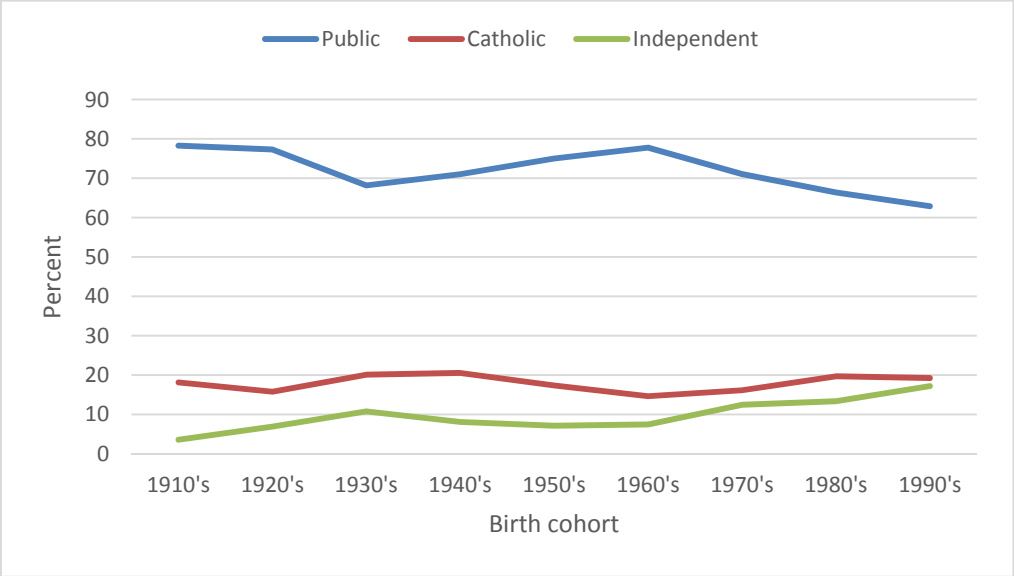
Throughout the analysis the sample is restricted to people who have left school and hence the type of school attended is fixed for each individual. The sample is also restricted to people who completed their last school year in Australia. This gives 151,568 pooled observations for 21,873 individuals over the 14 years. Figure 1 shows the proportion who completed school by sector across 10-year birth cohorts. Of the HILDA sample, around 73 per cent reported having attended a government school, 17 per cent a Catholic school and 10 per cent an Independent private school. Patterns of attendance are broadly similar for males and females, at least for those born from 1930 onwards. The government sector appears have substantially lost share among both males and females born since the 1960s, notably among women for whom attendance at Independent schools has grown.

Figure 1: type of school attended by birth cohort

(a) Males



(b) Females



Note: Proportions calculated using HILDA responding person weights.

In assessing differences in outcomes conditional on school sector attended, the sample is further restricted to persons aged 25 and over in order to abstract from participation in post-school education and training. This reduces the sample to 131,045 pooled observations over the 14 years for 17,826 individuals and with school sector attended identified for around 99.5 percent of those individuals. While the focus of the paper is on wages, Table 2 presents means for selected indicators of outcomes across a range of domains by school sector. All the differences in the means between those who attended the government and Catholic schools and between government and Independent schools are highly significant based on the standard t-test. On all indicators, those from Catholic and Independent private schools report more favourable average outcomes than those who went to public schools (the one potential exception being that a lower proportion of females from Catholic schools than from governments schools are married). This is most starkly apparent in terms of educational attainment. Almost half of those who were in an Independent school in their final year of school went on to gain a tertiary degree, compared to just under one-in-three from Catholic schools and less than one-in-five for those from government schools. The privileges associated with having attended a private school extend to employment status, wages and household income, neighbourhood socio-economic status and self-assessed health and life satisfaction. With few exceptions, those from Independent schools display the most favourable outcomes, followed by those from Catholic schools and then public school graduates.

Table 1: Means of selected outcomes by type of school attend in final year: pooled data from 2001 to 2014

Variable	Catholic	Independent	Government	All
Males				
Tertiary educated	0.30	0.43	0.17	0.21
Finished year 12 or equiv.	0.56	0.72	0.36	0.42
Married/defacto	0.73	0.75	0.71	0.72
Labour force status[a]				
Employed	0.86	0.88	0.82	0.83
Unemployed	0.020	0.017	0.031	0.028
NILF	0.119	0.106	0.149	0.141
Real hourly wage ($)	36.91	40.30	33.11	34.35
Real annual household income ($'000)[b]	126	142	113	117
SEIFA (1-10)	6.14	7.10	5.27	5.57
Self-assessed health (1-5)[c]	3.40	3.48	3.25	3.29
Life satisfaction (0-10)[d]	7.89	7.86	7.80	7.82
Females				
Tertiary educated	0.31	0.48	0.18	0.23
Finished year 12 or equiv.	0.47	0.71	0.37	0.42
Married/defacto	0.66	0.72	0.69	0.68
Labour force status[a]				
Employed	0.73	0.74	0.67	0.69
Unemployed	0.015	0.020	0.024	0.022
NILF	0.253	0.239	0.303	0.288
Real hourly wage ($)	32.25	34.56	29.40	30.40
Real annual household income ($'000)[b]	116	143	104	110
SEIFA (1-10)	5.97	6.93	5.29	5.56
Self-assessed health (1-5)[c]	3.39	3.55	3.28	3.32
Life satisfaction (0-10)[d]	8.01	8.02	7.92	7.95

Notes: Means calculated using HILDA responding person weights. a. restricted to persons aged 65 and under; b. bottom-coded as $1; c. Based on responses on scale of 1=poor, 2=fair, 3=good, 4=very good and 5=excellent; d. based on responses on 11-point scale ranging from 0=totally dissatisfied to 10=totally satisfied.

Earnings Equations

To investigate the association between school sector attended and earnings, panel versions of the standard Mincerean wage equation are estimated with the log of the hourly wage as the dependent variable. Hourly wages are calculated by dividing usual weekly gross earnings by usual hours worked per week, with the amounts indexed by the Australian Consumer Price Index to be expressed in current (2014) dollars. As the data comprise repeat observations on individuals, random effects models of the following general form are estimated:

$$LnY_{it} = \alpha + \beta S_i + \gamma X_{it} + \nu_i + \epsilon_{it}$$

Where:

- Y_{it} represents hourly earnings of individual at time t (t=2001 to 2014)

- S_i is a vector of three dummy variables representing school sector attended: Catholic, Independent or 'other', with associated vector β of coefficients to be estimated
- X_{it} is a vector of other control variables affecting wages, with associated vector of coefficients γ to be estimated
- v_i is an individual specific component to the error term, distributed with mean zero across individuals, and ϵ_i the classical error term distributed with mean zero across all observations.

The inclusion of the individual specific and time-invariant error term in the random-effects model introduces controls for unobservable and time-invariant characteristics of individuals that impact upon wages. Note, however, use of the fixed-effects model that more rigorously controls for unobservable individual effects is not feasible in this instance, since all time-invariant covariates are differenced out of the fixed-effects model. Hence estimates for school sector attended, which is constant for each individual, could not be obtained using the fixed-effects specification.

Initially a model is estimated including only basic demographics along with dummy variables for school sector. The covariates control for survey wave, the individual's age and its quadratic, the country of origin, and the presence of a long term disability or health condition that limits the type of work the individual can do – variables considered largely exogenous to school sector attended. Models are estimated separately for males and females to allow for the possibility that the effects of covariates, and in particular school sector effects, may differ by gender. The initial estimates indicate that those who attend a school in the private sector earn substantially higher wages than those who completed their highest year of schooling in the public school system. The coefficient of 0.106 on the variable for having attended a Catholic school in Table 2(a) indicates that, conditional upon being in employment, males who attended a Catholic school earn approximately 10.6 per cent more per hour than those who attended a public school. The wage premium for males associated with having attended an Independent private school is 12.9 per cent. For females the estimated raw wage premiums are 9.8 per cent for Catholic schools and a very large 16.6 per cent for Independent private schools. Each of these estimated effects associated with attendance at a Catholic or Independent private school are highly significant in statistical terms.

The middle columns of results in Tables 2a and 2b are from models with an additional control for the socio-economic background of the individual's family. Unfortunately HILDA does not contain a rich set of historical measures of socio-economic background. The education levels of respondents' parents were not collected from the start of the survey, and for the waves in which the highest qualification of parents was asked, the level is unknown for a large proportion of cases. Here we utilise a question on the occupation of the job in which the respondent's mother and father worked in when the respondent was aged 14. These occupations have been coded to the 'AUSEI06' socio-economic index of occupations in accordance with McMillan, Beavis and Jones (2009), in which the index ranges from zero for the lowest socio-economic status occupation to 100 for the highest status occupation (Medical Practitioners) based on Census data on the levels of education and income earned by workers in each occupation. For individuals not in work 'occupational potential' is imputed based on their level of education where available.

The variable used in the regression models is based on the SES of the father's occupation where available, and the SES of the mother's occupation is used where the father's score is missing. This specification is chosen for two reasons. First, because historically Australian society has been characterised by a 'male breadwinner/female carer' model in which the male's career within a couple has typically taken precedence over the female's (Broomhill & Sharp 2005), and hence father's occupational standings are a stronger indicator of family socio-economic status. Second, there are far fewer missing values for father's occupation. Within the sample, the SES index of

occupation averaged 41.0 for the parents of people who attended government schools, 47.8 for Catholic schools and 60.3 for Independent schools.

Table 2: Wage equation results, HILDA, 2001-2014

(a) Males

	Base model		Add control for family background		Add controls for education	
Log hourly wage	β	P>|z|	β	P>|z|	β	P>|z|
Constant	2.411	0.00	2.254	0.00	2.351	0.00
Wave (1-14)	0.021	0.00	0.020	0.00	0.019	0.00
Age (years)	0.034	0.00	0.035	0.00	0.033	0.00
Age squared	-0.037	0.00	-0.037	0.00	-0.035	0.00
Has disability	-0.018	0.01	-0.018	0.02	-0.016	0.03
Born in:						
Australia	—		—		—	
English speaking country	0.044	0.09	0.026	0.32	0.011	0.66
Non-English spkg country	0.027	0.31	0.028	0.30	-0.019	0.45
Attended:						
Government school	—		—		—	
Catholic school	0.106	0.00	0.079	0.00	0.033	0.04
Independent School	0.129	0.00	0.066	0.01	-0.001	0.97
Other school	-0.067	0.34	-0.078	0.27	-0.041	0.50
Parental Occ. Status at age 14			0.003	0.00	0.002	0.00
Highest qualification						
Post-graduate					0.369	0.00
Degree					0.252	0.00
Diploma					0.111	0.00
Certificate III/IV					—	
Completed Year 12					-0.002	0.92
Did not complete Year 12					-0.120	0.00
N(observations)	38441		37487		37487	
N(individuals)	6547		6373		6373	
Obs. per person						
minimum	1		1		1	
average	5.9		5.9		5.9	
maximum	14		14		14	
Wald chi-sq	1227	0.00	1322	0.00	1735	0.00
R-sq: within	0.06		0.06		0.06	
between	0.05		0.07		0.16	
overall	0.05		0.07		0.15	

Table 2: Wage equation results, HILDA, 2001-2014

(b) Females

Log hourly wage	β	P>|z|	β	P>|z|	β	P>|z|
Constant	2.549	0.00	2.390	0.00	2.366	0.00
Wave (1-14)	0.018	0.00	0.018	0.00	0.015	0.00
Age (years)	0.026	0.00	0.027	0.00	0.027	0.00
Age squared	-0.030	0.00	-0.030	0.00	-0.029	0.00
Has disability	-0.010	0.16	-0.010	0.17	-0.009	0.22
Born in:						
Australia	—		—		—	
English speaking country	0.035	0.16	0.014	0.58	0.000	0.99
Non-English spkg country	0.072	0.00	0.067	0.01	0.037	0.09
Attended:						
Government school	—		—		—	
Catholic school	0.098	0.00	0.075	0.00	0.034	0.01
Independent School	0.166	0.00	0.104	0.00	0.026	0.14
Other school	-0.266	0.02	-0.281	0.01	-0.288	0.01
Parental Occ. Status at age 14			0.003	0.00	0.002	0.00
Highest qualification						
Post-graduate					0.372	0.00
Degree					0.270	0.00
Diploma					0.102	0.00
Certificate III/IV					—	
Completed Year 12					0.058	0.00
Did not complete Year 12					-0.065	0.00
N(observations)	36616		36047		36047	
N(individuals)	6345		6229		6229	
Obs. per person						
minimum	1		1		1	
average	5.8		5.8		5.8	
maximum	14		14		14	
Wald chi-sq	877	0.00	1032	0.00	1798	0.00
R-squared: within	0.04		0.04		0.04	
between	0.04		0.06		0.16	
overall	0.03		0.05		0.15	

The inclusion of the occupational status of parents markedly reduces the estimated premiums associated with attendance at a private school. For both males and females the estimated Independent school premium falls by around 6 percentage points; and by 2 to 3 percentage points in the case of Catholic schools. This suggests that a substantial proportion of the higher wages observed for those from the private school sector are attributable to the pre-existing advantages of family background, and hence would have been attained irrespective of school sector attended. These results are likely to underestimate the full influence of family background given the imperfect measures used. We have, for example, no direct indicator of family wealth or prosperity. A variable

indicating whether or not the individual was living in a sole-parent family at age 14 was also tested, but proved insignificant in all models.

When controls for the individual's own educational attainment are added, it can be seen that the estimated earnings premiums observed for those from non-government schools are substantially further reduced and in fact become insignificantly different from zero in the case of Independent schools. Modest premiums remain for having attended a Catholic school (3.3 per cent higher wages for males and 3.4 per cent for females). This indicates that much of the higher wages enjoyed by those from the private school sector can be accounted for by the higher levels of education ultimately accrued by those who attended a school in the private sector, and any Independent school effect on wages is fully accounted for by the effect of school attended on the level of education attained.

Table 3 summarises how the estimated coefficients on schools sector vary as controls for family background and the individual's own educational attainment are included separately in the models, and jointly (final column). It can be seen that more than half of any school sector effect can be attributed to the associated higher level of overall education attained (either because attendance at a private school increases educational outcomes or because of higher familial socio-economic background increasing educational attainment).

Table 3: Effects of controls for parental occupational status and own educational attainment on estimated wage effects by school sector

Sector	Estimated wage effect from base models	With controls for:		
		Parents' occupational status	Own educational attainment	Both parents' occupation and own education
Males				
Catholic	0.106***	0.079***	0.044***	0.033**
Independent	0.129**	0.066**	0.024	-0.001
Females				
Catholic	0.098**	0.075***	0.042***	0.034**
Independent	0.166***	0.104***	0.051***	0.026

Notes: ***, ** and * indicate that the estimated coefficient is significant at the 1%, 5% and 10% levels, respectively.

To investigate how school sector effects may have varied over time, wage equations were estimated for two cohorts: those born after 1970 and those born in 1970 or earlier. Individuals born in 1970 or before made up 58 per cent of the sample used for the wage equations, with those individuals contributing two-thirds of the pooled observations. Table 4 reports the coefficients on the school sector variables for both the base models and those with controls for the parents' occupational status and the individual's own level of education. The estimated effects are in fact quite similar for the younger and older cohorts, and the same observation applies for all groups that family background and educational attainment account for the bulk of the differences in hourly earnings by school sector.

Table 4: School sector wage premiums by cohort

	Base model			With controls for parental occupational educational attainment		
	All	Born 1970 or before	Born after 1970	All	Born 1970 or before	Born after 1970
Males						
Catholic	0.106***	0.102***	0.113***	0.033**	0.032	0.046**
Indep.	0.129***	0.155***	0.105***	-0.001	0.006	0.004
Females						
Catholic	0.098***	0.083***	0.116***	0.034***	0.031	0.037**
Indep.	0.166***	0.158***	0.170***	0.026	0.020	0.028

Notes: ***, ** and * indicate that the estimated coefficient is significant at the 1%, 5% and 10% levels, respectively.

Further models were estimated with the inclusion of a wide range of additional controls capturing aspects relating to the individual (family status, region of residence, prior time in unemployment), their workplace, job and contractual status (Appendix Table A1). This does account for a small proportion of the estimated wage premiums by school sector, suggesting the school effects are partially transmitted through these labour market and other outcomes. The key finding, however, is that people who attended a non-government school earn substantially higher wages – between 11 to 17 percent higher wages, than those who were schooled in the public system, and this can mostly be attributed to higher average level of education achieved by those who came through the private school system.

Returns to years of education

In the previous section educational attainment has been captured by a series of dummy variables reflecting the highest qualification held. This specification is chosen because of the particular interest in modelling and controlling for the effect of achieving a tertiary education (university degree and post-graduate degree) given the attention in the existing literature on the potential role private schools play in increasing their students' propensity to gain entry to university. In challenging the common finding that school effects had minimal influence on student outcomes, Card and Krueger (1992) looked not at total earnings, but at the *rate of return* to years of schooling. They find that a number of measures of school quality by state, such as student teacher ratios and teaches' wages, are associated with higher returns to education for males from those states.

To assess whether Australians who attended private schools receive a higher return to each year of education, we replace educational attainment with an estimate of the years of schooling and of education undertaken. HILDA reports the highest level of schooling completed. For this analysis years of schooling has been bottom coded to 7, and can range up to 12 for completion of 'Year 12 or equivalent'. For persons who gained qualifications after leaving school, years of post-school education are imputed according to the level of their highest qualification, ranging from 0.5 years for a Certificate level I or II through to 8 years for a Doctorate.[2] Total years of education is calculated as the sum of years of schooling and years of post-school education. The existence of differential returns to years of schooling and education for students from the private schools sector is tested by including interaction terms between sector and years of schooling and total years of

[2] Specifically, the assignment rule used was 0.5 years for Certificate I/II or not fully defined; 1 year for a Certificate III/IV; 1.5 years for a Diploma; 2 years for an Associate degree or Advanced Diploma; 3.5 years for a Bachelor Degree (which can include Honours); 4 years for a Graduate Certificate or Graduate Diploma; 5 years for a Master's Degree or post-graduate qualification not fully defined; 8 years for a Doctorate.

education. The results of wage equations estimated with years of schooling or education interacted by school sector in place of highest qualification attained are reported in Table 5.

Table 5: Returns to years of schooling and total years of education; wage equations, HILDA 2001-2014 (Dependent variables = log of hourly wages)

	Years of schooling				Years of education			
	Males		Females		Males		Females	
	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Constant	1.127	0.00	1.248	0.00	1.523	0.00	1.628	0.00
Wave (1-14)	0.018	0.00	0.015	0.00	0.017	0.00	0.013	0.00
Age (years)	0.038	0.00	0.030	0.00	0.035	0.00	0.027	0.00
Age squared	-0.037	0.00	-0.030	0.00	-0.035	0.00	-0.027	0.00
Has disability	-0.015	0.04	-0.007	0.29	-0.015	0.04	-0.006	0.37
Born in:								
Australia	—		—		—		—	
English speaking country	0.014	0.59	0.004	0.86	0.007	0.77	0.006	0.79
Non-English spkg country	-0.005	0.85	0.046	0.05	-0.021	0.41	0.036	0.10
Parental Occ. Status. age 14	0.002	0.00	0.002	0.00	0.001	0.00	0.001	0.00
Years of schooling:	0.101	0.00	0.098	0.00				
x attended Catholic Sch.	0.004	0.01	0.005	0.00				
x attended Indep. School	0.001	0.56	0.005	0.00				
Years of education:					0.067	0.00	0.065	0.00
x attended Catholic Sch.					0.002	0.10	0.002	0.04
x attended Indep. School					-0.001	0.76	0.002	0.21
N(observations)	37476		36045		37182		35001	
N(individuals)	6371		6227		6329		6091	
Obs. per person								
Minimum	1		1		1		1	
Average	5.9		5.8		5.9		5.7	
maximum	14		14		14		14	
Wald chi-sq	1573	0.00	1319	0.00	1765	0.00	1728	0.00
R-squared: within	0.06		0.04		0.06		0.04	
Between	0.12		0.11		0.17		0.17	
Overall	0.11		0.09		0.15		0.15	

Following this specification the coefficient on the interaction terms indicate whether there is an additional effect of years of education for people from that sector, over and above the effect of years of education on earnings for those who were not educated at a private school. Commencing with the first model for males, the average return to each additional year of schooling is a 10.1 per cent increase in hourly earnings. Among males who completed their schooling at a Catholic school, earnings are estimated to increase by a further 0.4 per cent for each year of school, with that estimate being significantly different to zero. Hence the estimated increase in earnings for each year of schooling completed by males in the Catholic sector is 10.5 per cent, compared to 10.1% in the public school sector. No significant differential effect is observed for those who completed school at an Independent private school. For females the estimates imply a higher return of 0.5 per

cent hourly earnings to every year of schooling for those from both Catholic and Independent schools, over and above the 9.8% increase per year of schooling observed for those from the non-private sector.

When total years of accumulated education, incorporating both schooling and post-school education are modelled, an added return of 0.2 per cent hourly earnings is observed for each year of education completed by those who attended a Catholic school, but there is no significant evidence of a differential return to education for those from Independent Schools.

Non-wage outcomes

To see whether those who attend private schools experience better outcomes in domains beyond the labour market, multivariate models were also estimated for annual household income, neighbourhood socio-economic status and life satisfaction. For household income the model is estimated by linear regression with the log of household income as the dependent variable. The small proportion of households with zero or negative incomes are bottom coded as having annual household income of $1 (or log of household income of zero).

Socio-economic status of the neighbourhood is measured using the Australian Bureau of Statistics' Socio-economic Indicators for Areas (SEIFA) index of relative socio-economic advantage/ disadvantage. HILDA respondents' residential addresses are allocated to deciles based on a ranking of areas according to data on income, education and occupation from the 2001 Census, and that decile ranking available as a derived variable in the HILDA data. A decile of 10 indicates the individual lives in an area in the highest 10% of areas by socio-economic status. Life satisfaction is reported on a scale ranging from 0 (totally dissatisfied) to 10 (totally satisfied) in response to the question "All things considered, how satisfied are you with your life?". Life satisfaction and the SEIFA decile of neighbourhood advantage are also modelled using linear regression. A linear specification has the advantage of the results being much easier to interpret, and results tend to be very similar whether such dependent variables are treated as cardinal variables or the more technically correct ordered logit or probit specifications are used (see Kristoffersen 2010, Ferrer-i-Carbonell & Frijters 2004). Estimation by the ordered probit model gives qualitatively the same results as those reported here.

Similarly reduced-form models as those reported for wages in Table 2 are estimated, however, additional control variables are incorporated in the base models for family status and whether the individual resides in an inner-regional or outer-regional area as opposed to one of the major metropolitan cities. For completeness results from the full models are reported in appendix Table A2 – note that in the analysis of outcomes in these other domains the sample is no longer restricted to employed persons. Table 6 summarises the coefficients relating to school sector. After controlling for basic demographics, it can be seen that those who went to Independent private schools have markedly higher household incomes (an estimated 15% higher for males and 19% higher for females) than those who attended a government school. They also live in more prestigious neighbourhoods – on average around 1.5 deciles higher on the SEIFA index for socio-economic advantage. The advantage in terms of household income can be largely attributed to the greater educational attainment achieved by those who went to Independent schools, with some contribution also associated with having come from a family background of higher socio-economic status. The higher neighbourhood socio-economic status is largely unexplained by either family background or educational attainment. One way or another, private school graduates sort their way into more prestigious neighbourhoods. This may reflect a number of factors: higher preferences for living in such areas, marrying more affluent partners, or the effect of maintaining geographically

close networks with family and peers who disproportionately reside in more prestigious neighbourhoods.

Similar but less pronounced effects are observed for the SEIFA areas of those who attended Catholic schools. The higher average household incomes of around 10% observed for those who attended Catholic schools can mostly be attributed to higher educational attainment. Both men and women who attended Catholic schools report higher life satisfaction than those who attended a government school and, in the case of males, also greater satisfaction than those who attended an Independent school. This apparent Catholic school effect on life satisfaction is possibly associated with religiosity, as the estimates are almost completely unaffected by controlling for family socio-economic background or own educational attainment. Males who attended Independent schools report no greater levels of life satisfaction than those from government schools after controlling for basic demographics, while marginally elevated levels of subjective wellbeing are observed for women who attended Independent schools compared to government schools.

Table 6: Summary of estimated coefficients for school sector: panel regressions for (log of) household income, socio-economic status of neighbourhood and self-assessed life satisfaction

Sector	Estimated effect from base models	Plus controls for: Parents' occupational status	Own educational attainment	Both parents' occupation and own education
Household income				
Males				
Catholic	0.117***	0.093***	0.042**	0.036**
Independent	0.151***	0.087***	0.019	0.000
Females				
Catholic	0.085***	0.064***	0.035*	0.028
Independent	0.193***	0.126***	0.072***	0.047*
SEIFA				
Males				
Catholic	0.851***	0.635***	0.601***	0.463***
Independent	1.700***	1.173***	1.267***	0.908***
Females				
Catholic	0.636***	0.483***	0.486***	0.390***
Independent	1.583***	1.064***	1.240***	0.873***
Life satisfaction				
Males				
Catholic	0.115***	0.103***	0.111***	0.101***
Independent	0.041	0.033	0.035	0.030
Females				
Catholic	0.085***	0.082***	0.081***	0.080**
Independent	0.080**	0.068*	0.068*	0.061

Notes: ***, ** and * indicate that the estimated coefficient is significant at the 1%, 5% and 10% levels, respectively. Models also include controls for wave, age, age-squared, disability status, born in English or non-English speaking country as opposed to Australia, marital status and presence of dependent children, and whether lives in inner or outer reginal area (see Appendix table A2).

Discussion and Conclusion

Employed Australians who completed their final year of schooling at a private school earn substantially higher wages than those who completed their schooling at a government school. Those who attended Independent private schools earn around 15 per cent more per hour, and those who attended a Catholic school around 10 per cent higher hourly wages than those who graduated from the public school sector. The statistical evidence of the presence of these wage premiums is very strong. The more vexing questions are how these premiums materialise within the labour market and what role schools play in creating them.

Of the three school sectors, students who attended Independent schools come from the most privileged backgrounds. It is difficult to fully capture the effects of family background, but even using a relatively simple proxy based on the occupation of respondents' parents accounts for over 6 percentage points of the higher earnings enjoyed by those who attended Independent schools, and for around 2-3 percentage points of the higher wages observed for those from Catholic schools. For both males and females, the increased level of educational attainment associated with having been to a private school accounts for more than half of this wage premium; and almost all of the premium in the case of males from independent private schools. These benefits associated with a private school education appear to have remained quite stable over time.

Note that even where higher earnings can be accounted for by the higher levels of education attained by those who went to private schools, it does not necessarily follow that this is a causal effect of schools. Those students may have already been more likely to gain higher qualifications, possibly due to unobserved differences in cognitive or non-cognitive abilities, or other unobserved characteristics associated with higher SES background that lead people to gain higher levels of educational attainment. However, on the basis of existing studies reviewed above on the effects of school sector on the probability of entering university in Australia, it seems likely that there is a causal relationship in which attending a private school increases the propensity to enter university, which in turn contributes to higher wages. For people who attended Catholic schools, an estimated wage premium of just over 3 per cent persists even after accounting for family background and educational attainment. It is unclear why this should be, particularly given existing evidence that students from private schools perform no better at university compared to students who enter university from government schools. Mathematically, the effect can be seen in a higher rate of return to years of schooling within the Catholic sector compared to years of public schooling, something that is not observed for males for years of schooling in an Independent school, and the evidence is ambiguous for independent schooling for females. Possibly there is some synergy between the social capital available to those from Catholic schools and educational qualifications that increases the return to each year of schooling and post-school education.

It must be borne in mind that in focussing on wages the results are conditional on people being in employment, and the analysis has not attempted to control for selection into employment or labour market participation. Sample means show that those from private schools are also more likely to be participating in the labour force and more likely to be employed. A cursory look at other outcomes shows those who attended private schools do end up in more well-to-do households and neighbourhoods and have higher life satisfaction. Again there is much to be done to differentiate any causal school sector role from parental background and other factors.

In summary the evidence here suggests a private school education is associated with better outcomes, and access to higher education plays a key role in how those benefits materialise. Previous literature suggests this is at least partially a 'causal' effect associated with attendance at a private school. For independent private schools, there is little to suggest that there is any school

‘quality’ effect on wages over and above that associated with increasing student’s education attainment, and notably their prospects for entering university. For people who attended Catholic schools, however, there is some evidence of positive effects on earnings over and above that attributable to the ultimate level of education attained which is suggestive – though not proof - of a school quality effect.

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Appendix Table A1

Wage equation results with expanded set of control variables, HILDA, 2001-2014

	Males		Females	
Log hourly wage	β	P>|z|	β	P>|z|
Constant	2.440	0.00	2.405	0.00
Wave (1-14)	0.018	0.00	0.015	0.00
Age (years)	0.031	0.00	0.025	0.00
Age squared	-0.034	0.00	-0.028	0.00
Has disability	-0.021	0.00	-0.005	0.45
Born in:				
Australia	—		—	
English speaking country	0.001	0.96	0.001	0.98
Non-English spkg country	-0.025	0.31	0.032	0.14
Attended:				
Government school	—		—	
Catholic school	0.022	0.16	0.020	0.12
Independent School	0.004	0.86	0.022	0.20
Other school	0.040	0.52	-0.286	0.01
Parental Occ. Status at age 14	0.001	0.00	0.001	0.00
Highest qualification				
Post-graduate	0.326	0.00	0.332	0.00
Degree	0.203	0.00	0.235	0.00
Diploma	0.088	0.00	0.093	0.00
Certificate III/IV	—		—	
Completed Year 12	-0.011	0.57	0.047	0.00
Did not complete Year 12	-0.087	0.00	-0.062	0.00
Family status:				
Married with dep. Children	—		—	
Married no dep children	-0.023	0.00	0.024	0.01
Single with dep. Children	-0.053	0.00	-0.015	0.19
Single no dep. children	-0.044	0.02	-0.050	0.00
Lives in: Major capital city	—		—	
Inner regional	-0.083	0.00	-0.072	0.00
Outer regional/remote	-0.086	0.00	-0.075	0.00
Firm sector: Private for-profit				
Private not-for profit	-0.045	0.01	-0.010	0.34
Government business	0.012	0.34	0.064	0.00
Public sector	0.009	0.47	0.063	0.00
Other	-0.083	0.01	-0.021	0.31
Workplace size:				
Small (1-19 workers)	—		—	
Medium (20-99 workers)	0.040	0.00	0.018	0.01
Large (100+ workers)	0.098	0.00	0.054	0.00
Operates from single location	-0.057	0.00	-0.030	0.00
Employment contract:				
Self-employed/employer	-0.191	0.00	-0.043	0.14
Fixed term contract	0.031	0.00	0.011	0.18
Casual contract	-0.022	0.05	-0.012	0.18
Permanent/ongoing	—		—	
Other	-0.016	0.77	-0.027	0.66
Works part-time	0.175	0.00	0.124	0.00

Appendix Table A1, continued

	Males		Females	
Log hourly wage	β	P>|z|	β	P>|z|
Union member	0.057	0.00	0.021	0.00
Years in current occupation	0.005	0.00	0.005	0.00
Years in occupation squared	-0.009	0.00	-0.008	0.00
Employed by labour hire firm	0.093	0.00	0.093	0.00
Has supervisory responsibilities	0.029	0.00	0.020	0.00
LM History: % unemployed	-0.695	0.00	-0.711	0.00
N(observations)	36451		35146	
N(individuals)	6171		6096	
Obs. per person				
minimum	1		1	
average	5.9		5.8	
maximum	14		14	
Wald chi-sq	3119	0.00	2961	0.00
R-sq: within	0.10		0.07	
between	0.27		0.22	
overall	0.24		0.19	

Appendix Table A2

Results for panel regressions models for (log of) household income; socio-economic status of neighbourhood and self-assessed life satisfaction

	Log of household income p.a.				SEIFA decile of neighbourhood advantage (1-10)				Self-assessed life satisfaction (0-11)			
	Males		Females		Males		Females		Males		Females	
	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Constant	10.907	0.00	10.944	0.00	4.238	0.00	4.207	0.00	8.177	0.00	8.238	0.00
Wave (1-14)	0.022	0.00	0.022	0.00	-0.005	0.12	-0.012	0.00	-0.013	0.00	-0.015	0.00
Age (years)	0.030	0.00	0.027	0.00	0.025	0.01	0.028	0.00	-0.017	0.00	-0.016	0.00
Age squared	-0.041	0.00	-0.038	0.00	-0.022	0.01	-0.022	0.00	0.028	0.00	0.027	0.00
Has disability	-0.133	0.00	-0.081	0.00	-0.084	0.00	-0.054	0.00	-0.223	0.00	-0.265	0.00
Born in:												
Australia												
English speaking country	-0.016	0.59	0.014	0.63	0.021	0.86	-0.160	0.18	-0.097	0.09	-0.033	0.57
Non-English spkg country	-0.085	0.01	-0.034	0.34	-0.117	0.36	0.042	0.72	0.003	0.96	-0.056	0.32
Attended:												
Government school												
Catholic school	0.036	0.05	0.028	0.15	0.463	0.00	0.390	0.00	0.101	0.00	0.080	0.01
Independent School	0.000	1.00	0.047	0.05	0.908	0.00	0.873	0.00	0.030	0.51	0.061	0.12
Other school	-0.007	0.95	0.022	0.80	0.308	0.49	-0.225	0.55	-0.297	0.24	-0.140	0.61
Parental Occ. Status at age 14	0.001	0.00	0.002	0.00	0.020	0.00	0.021	0.00	0.000	0.93	0.000	0.79
Highest qualification												
Post-graduate	0.430	0.00	0.390	0.00	0.990	0.00	0.657	0.00	0.089	0.08	0.092	0.11
Degree	0.310	0.00	0.276	0.00	1.033	0.00	0.788	0.00	0.002	0.96	0.034	0.35
Diploma	0.147	0.00	0.123	0.00	0.575	0.00	0.331	0.00	0.016	0.69	-0.017	0.69
Certificate III/IV												
Completed Year 12	0.059	0.01	0.048	0.03	0.423	0.00	0.221	0.01	-0.005	0.89	-0.031	0.41
Did not complete Year 12	-0.182	0.00	-0.108	0.00	-0.338	0.00	-0.131	0.06	0.000	0.99	0.024	0.51

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Appendix Table A2, continued

	Log of household income p.a.				SEIFA decile of neighbourhood advantage (1-10)				Self-assessed life satisfaction (0-11)			
	Males		Females		Males		Females		Males		Females	
	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Family status: Married with dep. Children												
Married no dep children	-0.089	0.00	-0.105	0.00	0.008	0.83	-0.044	0.24	0.078	0.00	0.077	0.00
Single with dep. Children	-0.551	0.00	-0.688	0.00	-0.073	0.18	-0.028	0.62	-0.487	0.00	-0.359	0.00
Single no dep. children	-0.380	0.00	-0.537	0.00	-0.177	0.02	-0.174	0.00	-0.525	0.00	-0.530	0.00
Lives in: Major capital city												
Inner regional	-0.158	0.00	-0.157	0.00	-1.466	0.00	-1.666	0.00	0.031	0.27	0.116	0.00
Outer regional/remote	-0.182	0.00	-0.209	0.00	-1.765	0.00	-1.801	0.00	0.146	0.00	0.133	0.00
N(observations)	59816		67919		59811		67912		59786		67880	
N(individuals)	8313		9001		8313		9001		8309		8998	
Obs. per person												
minimum	1		1		1		1		1		1	
average	7.2		7.5		7.2		7.5		7.2		7.5	
maximum	14		14		14		14		14		14	
Wald chi-sq	4418	0.00	6120	0.00	2295	0.00	2000	0.00	965	0.00	1019	0.00
R-sq: within	0.02		0.03		0.03		0.04		0.01		0.01	
between	0.33		0.38		0.33		0.30		0.10		0.10	
overall	0.21		0.26		0.29		0.28		0.08		0.08	