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Long-Run Effects of Catholic Schooling on Wages

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Abstract

Previous studies have linked Catholic schooling to higher academic achievement. We add to the literature on Catholic schooling by examining its effect on long-term wage rates in Australia, independent of effects on academic achievement. Using panel data from the Household, Income and Labour Dynamics Australia (HILDA) Survey and fixed effects estimation, we find that during the prime-time of a career, wage rates for Catholic school graduates progress with labor market experience at a greater rate, on average, than wage rates for public school graduates. Importantly, we find no evidence to suggest that these benefits are peculiar to Catholic schooling, with similar benefits estimated for graduates of independent private schools. These findings suggest that private schooling may be important in not only fostering higher academic achievement, but also in better preparing students for a working life.

Introduction

There is a substantial body of evidence, mostly from the United States, on the positive outcomes of Catholic schooling on test scores, school completion and college enrollment compared to outcomes from attending public schools.[1] However, academic achievement is only one measure of the success of an educational system. Other important measures may include civic engagement, law abidance, happiness and personal traits (such as conscientiousness) of a system's graduates. Evidence that Catholic schooling affects outcomes other than education outcomes is scarce. Two studies in this area, one by Figlio and Ludwig (2012) and one by Dee (2005), find that Catholic schooling is negatively associated with engagement in risky behaviors and positively associated with civic participation respectively.

In this study, we add to the literature on Catholic schooling by examining whether it improves readiness for work, measured by long-run impacts on wage trajectories over and above those that accrue due to higher levels of education attainment. There may be several channels through which Catholic schooling may effect long-run wage trajectories besides effects transmitted through higher levels of education. First, because Catholic education is faith-based, it may put greater emphasis on the development of 'non-cognitive' or 'soft' skills that are important in explaining labor market outcomes (Brunello and Schlotter, 2011; Heckman et al., 2006). Second, because those who attend Catholic schools are from more advantaged backgrounds, Catholic school graduates may have richer networks than public school graduates that have higher payoffs in the labor market. Having broad and resource rich connections is well known to be an advantage in the labor market (Calvo-Armengol and Jackson, 2004; Calvó-Armengol and Jackson, 2007). Third, attending a Catholic school may signal the presence of personal traits, such as a strong work ethic, that may be valued by employers. In this study, we do not explore the mechanism(s) through which any labor market effects from Catholic schooling are transmitted.

As far as we are aware, only Vella (1999) has estimated the effects of Catholic school-

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[1]See Sander and Cohen-Zada (2010) for a brief review of the literature.

ing on labor market outcomes, independent of education attainment (measured as year of education). Vella (1999) found no significant labor market benefits, but his study concentrated on short-run outcomes only. We build on this study in two important ways. First, we examine wage outcomes over a working life, including effects for those with more than 30 years of labor market experience. Taking a long-term view is important because, arguably, many of the potential benefits from Catholic schooling, such as non-cognitive skills, may take time to be realized in the labor market.[2] A previous study by Kim (2011) has found that Catholic school graduates earn considerably more than public school graduates, 17 and 35 years after graduating, but the author did not examine whether any benefits were independent of academic achievement. Second, we put any estimated benefits of Catholic schooling into perspective by comparing outcomes from Catholic schooling to those from from independent private schools.[3] This is important in helping to identify the source of any wage effects.

To estimate the long-run effects of Catholic schooling, we follow the fixed effects aproach suggested by Wooldridge (2002, Ch. 10) to identify the difference in gender specific wage rate projections over several periods. Under this approach, the effect of schooling type on wage rates is estimated by interacting a dummy of (time-invariant) school type with (time-varying) years of labor market experience within a fixed effects panel model. The estimated coefficient on the interaction term measures the difference in the wage rate projections (over years of employment experience) between employed people who attended a Catholic school and employed people who attended other types of schools relative to the base period. The use of fixed effects is important to control for time-invariant factors, such as family background, that may affect both the choice of Catholic schooling and wage rate projections. Estimation is based on 10 waves of panel data (2001-2010) from the Household Income and Labour Dynamics Australia (HILDA).

The use of Australian data is important. The Australian school system is much like

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[2]Unlike cognitive skills, non-cognitive skills are difficult for employers to measure, and hence, they may take considerable time to be rewarded in the labor market through higher wages.

[3]Independent private schools, like Catholic schools, generally have far greater autonomy than government schools. The main points of difference are that independent private schools are not associated with the Catholic church, they generally charge higher fees and are less dependent on government funding.

that in other English speaking countries, in that there is no tracking of students and the primary focus is on general education. Like in the United States, there is evidence of large significant Catholic school effects on education outcomes (Vella, 1999; Le and Miller, 2003), although studies using more recent data has found much smaller effects (Marks, 2007; Cardak and Vecci, 2013). An important point of differences is that Australia has a relatively large private school sector, including large Catholic and independent private sectors, which allows for comparison of outcomes within the private sector. In Australia, 34% of all school students are enrolled in private schools (20% in Catholic and 14% in independent) (Department of Education and Workplace Relations, 2011) compared to around 10% in the United States (USDOE, 2012). The relatively large private schooling sector in Australia is due, in part, to government subsidies to private schools that account for around 80% of Catholic school and 45% of independent private school net recurrent income per student (Department of Education and Workplace Relations, 2011). Total expenditure per student in Catholics schools is on par with per student expenditure in government schools (A$10,000 per student per year), but is less than in independent private schools (A$12,000) (ABS, 2006).

We find that while there is no difference in wage rate projections by school type early in a career, during prime-time—15 to 25 years of employment experience—wage rate growth for Catholic school graduates is, on aveage, 12% higher than growth for public school graduates. This result is robust to a range of alternative model specifications. Importantly, we also find greater wage rate growth during prime-time for independent private school graduates relative to public school graduates. The wage benefits of Catholic schooling relative to public education are not statistically different from those attained from independent private education.

Data

Analysis conducted in this study is based on 10 annual waves of the unbalanced HILDA dataset, covering the period from 2001-2010. HILDA is a large, nationally representative

panel dataset of Australian Households that contains detailed education and labor market information, similar to the U.S. Panel Study of Income Dynamics (PSID). Following Kortt and Dollery (2012a), who estimated the impacts of religion on wages in Australia using HILDA, we restrict the sample of analysis to employed males aged 25 to 53, dropping those who are not employed or who are self-employed. To ensure that we are estimating long-run labor market impacts, we also restrict the sample to those with at least 5 years of employment experience since leaving full-time education for the first time. In the sensitivity analysis below, we examine whether this restriction affects the results.

The main variable of interest in this study is hourly wage rate. Hourly wage rate is constructed as the ratio of individual real weekly wages and salaries in all jobs (in Australian dollars, 2010 prices) to hours usually worked per week in all jobs.[4] In a given wave, individuals for whom we do not observe a wage because they are not employed are omitted from the sample. If these same individuals return to work at a later date, they may re-enter the sample. A small number of cases were also omitted because they either did not report their wages or hours of work. Overall, our sample contains 19129 observations (Table 1).

INSERT TABLE 1

The type of secondary school attended is identified in HILDA by asking respondents which of the following best describes the type of school they attended in their last year of school: government school, private Catholic, other private school and other school. For the purposes of this study, we group the small number of respondents who chose other school type with independent private schools. Overall, 15% of the 19129 observations in our sample are from people who attended Catholic schools (2904), 10% from people who attended independent private schools (1836) and 85% are from people who attended public schools (14389) (Table 1).[5]

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[4]Using a constructed wage rate can lead to biased results (Borjas, 1980). However, estimates using reported weekly wages as the dependent variable and hours of work and hours of work squared as explanatory variables produced consistent results. These results are available upon request from the corresponding author.

[5]The proportion of our sample who are private school educated is less than the proportion currently enrolled in private schools (Department of Education and Workplace Relations, 2011) because of a recent drift away from public education (see Watson and Ryan (2010) for a discussion).

INSERT FIGURE 1

Raw statistics from our sample on the average log of hourly wage rate by school type and years of employment experience are presented in Figure 1. From Figure 1, it appears that initially, people who attended either type of private school have a higher wage rate than people who attended a public school. Furthermore, as years of employment experience grow, especially beyond 10 years, the gap widens, before narrowing again after 25 years. There may be a number of factors that explain the differences in raw outcomes by school type – one may be the differences in educational attainment. As Table 1 shows, people who attended public schools are much less likely than people from private schools to have attained qualifications higher than upper secondary or equivalent[6] – 42% compared to 58% for Catholic schools and 65% for independent private schools.

Empirical strategy

To estimate the impacts of Catholic schooling on wage rates we estimate a typical human capital model where the log of hourly wage rate for individual i in wave t depends on measures of education qualifications, employment experience, school type and personal attributes, including aspects of religion:

$$
\begin{aligned}
\boldsymbol{LogWage}_{it} = {} & \gamma \boldsymbol{School}_i + \alpha \boldsymbol{Religion}_i + \delta \boldsymbol{Education}_{it} + \sigma \boldsymbol{Exp}_{it} \\
& + \theta \boldsymbol{Exp_{it}.School}_i + \beta \boldsymbol{X}_{it} + \tau \boldsymbol{Wave}_t + u_{it}.
\end{aligned}
\tag{1}
$$

In equation (1) $\boldsymbol{School}$ represents school type; $\boldsymbol{Religion}$ includes denomination (including no religion), frequency of attendance at religious services and importance of religion; $\boldsymbol{Education}$ is the highest qualification level attained; $\boldsymbol{Exp}$ is years of employment experience since leaving full-time education for the first time; $\boldsymbol{X}$ is a vector of individual characteristics (described below); $\boldsymbol{Wave}$ is a time trend and u_{it} is a random error term.

In this study, we use the coefficient of the interaction between employment experience and school type, θ, to measure the long-run labor market effects of school type, indepen-

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[6]International Standard Classification of Education (ISCED) 1997 levels 3A/3C

dent of the qualifications attained. We allow the effect of school type on wage rates to vary with employment experience because different benefits may be realized at different points in a career and persist for different lengths of time. For example, assuming that the payoffs to non-cognitive skills are greatest for people in positions of management, wage benefits from this source may be greatest during prime-time. In contrast, the benefits of networks may be present throughout a working life, but be more evident early in a career when the strength of ties with school peers is greatest. Employment experience enters the model as six categorical variables (in five-year groups, commencing with 5-10 years of employment experience and ending with 30 or more years) rather than as a continuous variable to enable greater flexibility of estimation. The chosen reference period is working for between 5 and 10 years.

In the first instance, we estimate equation (1) by pooling the sample and estimating OLS. However, this approach does not control for bias due to endogenous sorting into school type. Such bias is present if there are unobserved factors, such as family traits, that are correlated with both school type selection and wage outcomes. We control for the effect of unobserved time-invariant factors that affect school type selection and wages by estimating equation (1) using individual fixed effects estimation.[7] Using this approach, the θ term represents the percentage difference in wage rate growth with employment experience across school types. This approach is consistent with that suggested by Wooldridge (see 2002, Ch. 10) to identify differences in wage projections by gender.

With fixed effects estimation, the random error term u_{it} is broken into a time invariant

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[7]A number of previous studies have tried to correct for selection on unobservables using religious affiliation as an instrument, including Evans and Schwab (1995); Neal (1997); Grogger et al. (2000). Concerns over the validity of this approach have been raised in a number of studies, including Altonji et al. (2005); Cohen-Zada and Sander (2008); Cohen-Zada and Elder (2009). Cohen-Zada and Elder (2009) and Kim (2011) dealt with these concerns by demonstrating that being Catholic has no effect on wages among sub-samples of individuals who live in regions where attending a Catholic school is not an option. In the context of this study, we do not attempt instrumental variables estimation because of a lack of valid instrument in the data. In particular, we cannot test the validity of using Catholic affiliation as an instrument as suggested by Cohen-Zada and Elder (2009) because there is no information in HILDA about the location of family residence as a child. Even if there was, because of the long history of Catholic education in Australia (pre-dating government provision), it is widespread.

individual unobserved heterogeneity term α_i and a stochastic error ε_{it}:

$$
\begin{aligned}
\boldsymbol{LogWage}_{it} = {} & \delta\boldsymbol{Education}_{it} + \sigma\boldsymbol{Exp}_{it} \\
& + \theta\boldsymbol{Exp_{it}.School}_i + \beta\boldsymbol{X}_{it} + \tau\boldsymbol{Wave}_t + \alpha_i + \varepsilon_{it}.
\end{aligned}
\tag{2}
$$

The impact of all time-invariant factors over our period of analysis are subsumed into the α_i term. In model (2), identification depends on differences in within-individual **LogWage** growth by school type. This means that the estimated θ coefficients represent local average treatment effects (LATEs) for individuals whose employment experience changes over the period of analysis (Imbens and Angrist, 1994). From Table 1, we can see that there are ample observations in each of the five-year experience groupings. Thus, identification of each of the θ coefficients does not appear to be limited by a small number of observations that may not be representative of the average treatment effects on the treated. Sensitivity analysis (below) addresses whether there is enough within-individual variation in experience across school types to produce robust results. Importantly, descriptive statistics presented in Table 3 also shows that there is variation in education levels within each experience and school type grouping. This means that we can identify the effect of school type on wage projections separately from the effect of initial education.

INSERT TABLE 3

A key assumption underlying the use of fixed effects is that time-varying unobserved factors (ε_{it}) are uncorrelated with both wages and school type (common unobserved time trends). We test the robustness of our results to this assumption in the sensitivity analysis.

Control variables

In estimating the long-run effects of the school type on wage rates, we control for a number of observed factors that may be correlated with both the choice of school type and labor market outcomes. Some of these factors are time-invariant and are subsumed into α_i in fixed effects estimation. For completeness, we discuss all of the controls used

in the analysis, regardless of whether they change over time.

Important time-invariant controls are characteristics of religion, which are time invariant because they are only observed at the time individuals are first surveyed in HILDA. Past studies have shown that Catholic men in the United States and Australia earn a wage premium relative to their protestant counterparts (see Steen (2004); Kortt and Dollery (2012b) respectively). The Catholic wage premium may stem from broader networks and/or from personal traits, such as self-discipline. As a result, without controls for religion, OLS estimates of Catholic school effects are likely to be biased. In this study, we categorize religious affiliation as protestant (Anglican, Presbyterian/Reformed, Uniting Church, Lutheran, Baptist and other protestant), Catholic, non-Christian (Buddhism, Hinduism, Islam, Judaism, other non-Christian), other religion and no religion. We are able to control for religious affiliation because being Catholic in Australia is not perfectly correlated with attending a Catholic school. Indeed, around 71% of Catholic school attendees, 14% of public school attendees and 11% of independent private school attendees report being Catholic (Table 1). We also control for the importance of religion (measured on an 11-point scale where 0 means religion is the least important thing in your life and 10 is the most important thing) and religious observance. Religious observance is measured by the number of times the respondent attends a religious service, from every day through to less than once a year, or never.

Other time-invariant co-variates include the number of siblings, whether or not an individual reports being an indigenous Australian, country of birth, father's occupation, family information at age 14 and marital status.

The rest of the controls are time varying. Most important are controls for education level, measured by the highest ISCED 1997 education qualification level attained at the time of interview. We group education levels into the following ISCED categories: less than ISCED 3, which is less than a secondary school qualification; ISCED 3A and 3C, which is an upper-secondary school qualification or vocational equivalent; ISCED 4B, which is a high-level vocational qualification; ISCED 5B is a Diploma level qualification and ISCED 5A and 6, which is a bachelor degree or higher qualification (ABS, 2001). It

is important to note that while the education levels are time varying, because most of our sample is first observed well after leaving school, there is limited variation in education levels over time.

Another important time-varying control is age. Age enters the model as six categorical variables, each spanning a five-year interval, commencing with 25-30. Controls for age are important so that our long-run estimates of schooling type are independent of cohort effects that might arise due to differences in the quality of education over time. Descriptive statistics presented in Table 2 show that while experience and age are correlated, there is considerable overlap in the age distribution across the employment experience categories, which allows us to control for age, independent of the effect of experience.

Other time-varying controls that are used in both OLS and fixed effects estimation are reported disability status, full-time/part-time employment status, union membership, state of residence (state fixed effects) and time-trend dummies (time fixed effects).

INSERT TABLE 2

Results

Key results from the log wage rate model, estimated using OLS and fixed effects are presented in Table 4. Standard errors, clustered at the individual level, are presented in parentheses below each of the key estimated coefficients. In models A and B, OLS results without interaction terms show that there is no estimated difference in wage rates by school type, regardless of controls for years of work experience. In model C, we examine whether the effects of school type varies with work experience by introducing interaction terms into the OLS models. The statistically significant and positive interactions results for model C suggest that there are wage benefits from Catholic and independent private schooling relative to public education.[8] In model D, we introduce individual fixed effects to the model C specification, and if anything, the positive interaction terms are larger.

The interaction results from model D suggest that, early on in a career, Catholic schooling is estimated to have no significant effect on wage growth, which is consistent

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[8]It is important to point out that the interaction effects are not the marginal effects of school types.

with Vella (1999). However, during the prime-time of a career (15-25 years experience), wage rate growth of those from Catholic schools is around 12 percentage higher than those from government schools. The higher wage rate growth is not estimated to persist beyond 25 years of experience. Expressed in level terms, we estimate that initially, after 5-10 years of labor market experience, average predicted wage rates for Catholic and government school attendees are much the same – A\$24/hour and A\$23/hour respectively. By 15-20 years, a gap of over A\$3/hour has opened up (A\$30/hour, compared to A\$27/hour), which is at least sustained until after 30 years of experience. For an individual who works 40 hours per week, an extra A\$3/hour equates to A\$120 per week extra, or 11% of the average weekly pay, which is a reasonably large effect.[9]

An important observation from the fixed effects results in Table 4 is that people who attended independent private schools also appear to have higher wage rate growth during prime age than people who attended public schools. However, the effects are not as precisely estimated as those for Catholic schools. Results may be less precise for independent private schools because there are fewer observations in the data, but also because there is likely to be more variation in the practices of independent private schools. As for Catholic school graduates, we estimate the opening of a A\$2/hour gap in wage rates relative to public school graduates after 15 years of experience, which grows to A\$3/hour after 20 years of experience.

An F-test indicates no significant differences in the interaction effects for people who attended Catholic and people who attended independent private schools. This discredits the notion that there is something unique about Catholic schooling that gives their graduates an advantage in the labor market.

The divergence in wage rate growth between private and public school graduates after 15 years of employment experience may be explained by differences in the likelihood of being promoted into management jobs. This is likely to occur quite frequently around this time in the career. Private school graduates may be more often promoted to management roles if they have higher non-cognitive skills or richer networks. While we cannot test

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[9]This is based on an average wage rate of A\$27.8 in the data.

which, if either, of these explanations is correct, differences in non-cognitive skills may be a better explanation for the jump in wages at this time. To the extent that they exist, network effects from Catholic education should present most strongly in the early part of a career when graduates still maintain close ties with their school peers. In contrast, non-cognitive skills developed during school may take time to be realized in the labor market because they may only be fully assessed with work experience. Even after they are observed, they may not be rewarded in the labor market until school graduates apply for management positions[10] that require high levels of non-cognitive skills.

INSERT TABLE 4

Sensitivity analysis

As discussed above, there are two key assumptions that underpin our results. First, that there is adequate movements between the employment experience categories to allow for identification of the differential effects of employment experience by school type using fixed effects. Second, that there are no differences in post-school time trends across groups who attended different school types that would explain the divergence in wage projections. The validity of these assumptions are examined below.

Estimation using alternative treatments of work experience

If identification of the main results in the fixed effects estimation is based on changes in experience categories of a small number of individuals, then model estimates might be sensitive to the choice of employment experience categories. To test this, we re-estimate the fixed effects (model D) results from Table 4, but change the employment experience categories and the minimum work experience restriction for inclusion in the sample. In model D.1 in Table 5, we include individuals with less than 5 years of work experience, but maintain the standard employment experience categories, except we treat 0-5 years as the reference period. In model D.2, we exclude those with 0-3 years of experience, but maintain five-year experience categories starting with 3-8 and chose a reference period of

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[10]Management position may have minimum work experience requirements for applicant to be eligible.

0-3 years. Model D.3 is the same as model D.2, except we include those with 0-3 years of experience and make the reference period 0-8 years. Results using the alternative employment experience categories (models D.1-D.3) in Table 4 are much the same as those in the standard specification (model D). Thus, there is no evidence to suggest that our results are sensitive to the choice of employment experience categories and the exclusion of individuals with less than 5 years of work experience.

INSERT TABLE 5

Estimation using alternative controls for possible time-varying unobserved factors

The main results from the fixed effects model (model D in Table 4) may be biased if there are unobserved time-varying factors that lead to different wage projections by school type attended. In the analysis below, we examine the sensitivity of our results to uncontrolled-for factors from three sources. The first of these is associated with being Catholic. The effect of being Catholic on wages, as found in the literature (Steen, 2004; Kortt and Dollery, 2012b), may be related to unobserved factors, such as networks, that can have varying payoffs over a working life. To test how sensitive our results are to possible differences in unobserved factors related to being Catholic, we re-estimate results from model D (Table 4), but restrict the analysis to Catholics in our sample. Results from fixed effects estimation on a sub-sample of Catholics (model D.i in Table 6) are much the same as those estimated on the entire sample, which suggests that the estimated Catholic school wage rate effects are not associated with differences in time-varying unobserved factors related to being Catholic.[11]

The second possible source of omitted variable bias that we examine is possible differences in wage projections associated with differences in education levels by school type. On average in our sample, around 40% and 50% of those who attended Catholic and independent private schools have a bachelor qualification or above, compared to 24% of public school attendees (Table 1). Because they have higher initial education levels,

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[11]This exercise is informative insofar as the following assumption holds: Catholics who do not attend Catholic school are similar (on unobservables) to Catholics who do attend Catholic school.

ongoing skill-biased technological change over the period of analysis means that people who attended private schools may have experienced greater growth in the demand for their labor. To test the sensitivity of our results to changes in the returns to education over the period of analysis, we include an interaction term between the time trend and education level ($\boldsymbol{Education_{it}.Wave_t}$) into equation (2) used to generate results from model D (Table 4). Interaction results from this model maintain the same pattern and significance, although the magnitude of the impacts are smaller (model D.ii in Table 6). These results suggest that while some of the divergence in wage projections by school type may have been due to stronger labor market demand growth for Catholic school graduates, because they attain higher qualification levels, it represents only a small part.

Despite this result, differences in qualifications attained may still explain divergent wage trends, for example, because they are associated with unobserved time-varying factors affecting educational attainment level. For example, differences in education levels may be associated with differences in the nature of occupations. Those without post-school qualifications are more likely to work in low-skilled jobs that have little wage progression; in contrast, many professional jobs (outside of heavily regulated professions such as nursing and teaching), offer opportunities for progression throughout a working life. To address this concern, we re-estimate model D (Table 4) separately on sub-samples with the same highest qualification level: those with qualifications no higher than upper-secondary school or equivalent and those with at least bachelor degrees. Estimating models on sub-groups with the same qualification levels better controls for unobserved differences associated with qualification attainment that may affect wage trends.[12] Results from these models (Model D.iii and D.iv) in Table 6 show that the Catholic school effect during prime-time still persists, albeit imprecisely estimated because of the small sample size, among those with at least a bachelor degree. Given that professionals typically have greater prospects for wage progression than those without qualifications, it makes sense that the Catholic school effect should be greater for this group. To the extent that higher education qualification holders are more likely to move into management

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[12]We do not estimate a model for those with vocational education and training qualifications at the ISCED 4 or Diploma levels because there are too few observations in the data for robust estimation.

roles than those with no more than upper-secondary qualifications, this result supports our hypothesis that the divergence in wage growth by school type is associated with divergent chances of becoming a manager.

There is also evidence of a positive effect for independent private schools among those with at least a bachelor degree, but it is not precisely estimated.

Conclusion

Although a previous study by Kim (2011) has shown that Catholic education is associated with higher long-run wage rates, this is the first study to demonstrate that the effects are not just linked to higher education attainment. We find positive wage effects from Catholic education during the prime age of a working life, between 15 and 25 years of labor market experience. It is estimated that Catholic education during this period is associated with around 12% higher growth in real hourly wages compared to wage projections for those who attended government schools. The presence of positive effects only in prime age underscores the importance of taking a longer-term view of wage effects from Catholic schooling. A previous study by Vella (1999) found no significant short-run labor market benefits from Catholic schooling, independent of those from higher education attainment.

Another important contribution of this paper is in being able to put labor market outcomes from Catholic education into perspective. We show that attendees of independent private schools also have higher wage projections than public school attendees and that there are no significant differences in wage projections between the two groups of private school attendees. This suggests that any labor market benefits pertain to private schooling and not just Catholic education.

These findings have some important policy implications. In particular, the presence of labor market benefits from private schooling, independent of education outcomes, raises the issue of whether current methods of measuring school performance are sufficient. While education outcomes are linked to post-school outcomes (including labor market

outcomes), our results suggest that there may be other important school outcomes that could be used to measure school performance. At present, because they are relatively easy to measure, there is a risk that school systems are devoting too many resources to improving academic outcomes, potentially as the expense of other aspects of education. However, to develop alternative measures that are effective in improving long-run outcomes, a better understanding is needed of the channels through which wage effects are transmitted. Given that we find that the gap in wage growth between private and public schools does not eventuate until after 15 years of employment experience and is more pronounced among those with at least a bachelors degree, a possible explanation is that the benefits are associated with differences in non-cognitive abilities that are important for promotion into management roles. Other explanations, such as better networks, may be realized early-on in a career and may not depend to the same extent on higher education qualifications. Future research to further explore and understand these potential mechanisms will be informative.

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1 Tables

Table 1: **Summary Statistics of Pooled Data (2001-2010),**
Males 26-53 years

Variable	Public School Mean	Public School Std. Dev.	Catholic School Mean	Catholic School Std. Dev.	Independent School Mean	Independent School Std. Dev.
Religion related Information						
Religion						
Protestant	0.41	0.49	0.07	0.25	0.44	0.50
Catholic	0.14	0.35	0.71	0.45	0.11	0.32
Non-Christian	0.03	0.17	0.02	0.13	0.06	0.24
Other Religion	0.01	0.10	0.01	0.09	0.03	0.18
No Religion	0.41	0.49	0.20	0.40	0.35	0.48
Importance of Religion in life						
(0 least imp. -10 most imp.)	2.87	3.26	4.18	3.20	3.46	3.64
Religious attendance						
Never	0.55	0.50	0.32	0.47	0.40	0.49
Less than once a year	0.14	0.34	0.14	0.35	0.18	0.38
About once a year	0.10	0.30	0.16	0.37	0.13	0.33
Several times a year	0.09	0.28	0.17	0.38	0.11	0.31
About once a month	0.02	0.13	0.04	0.20	0.02	0.13
2-3 times a month	0.02	0.15	0.03	0.18	0.03	0.18
About once a week	0.06	0.24	0.11	0.31	0.07	0.26
Several times a week	0.02	0.14	0.02	0.12	0.04	0.20
Every day	0.00	0.06	0.00	0.05	0.02	0.14
Educational Qualification						
Less than ISCED3	0.22	0.42	0.12	0.32	0.08	0.28
ISCED3a,3c (secondary cert./equiv.)	0.37	0.48	0.30	0.46	0.27	0.44
ISCED4b (high vocational cert.)	0.08	0.26	0.06	0.24	0.04	0.20
ISCED5b (diploma)	0.10	0.30	0.11	0.31	0.11	0.31
ISCED5a,6 (bachelor and above)	0.24	0.42	0.41	0.49	0.50	0.50
Labor Market Experience (in years)						
5-10	0.09	0.29	0.12	0.32	0.17	0.38
10-15	0.16	0.37	0.18	0.39	0.22	0.42
5-20	0.18	0.38	0.19	0.39	0.20	0.40
20-25	0.20	0.40	0.19	0.39	0.17	0.37
25-30	0.19	0.39	0.18	0.39	0.13	0.34
30+	0.18	0.39	0.14	0.35	0.11	0.31
Age Group (years)						
25 - 30	0.11	0.31	0.11	0.32	0.16	0.37
30 - 35	0.17	0.38	0.19	0.39	0.21	0.41
35 - 40	0.19	0.39	0.21	0.41	0.19	0.40
40 - 45	0.20	0.40	0.20	0.40	0.17	0.37
45 - 50	0.20	0.40	0.17	0.38	0.15	0.36
50 - 55	0.13	0.34	0.11	0.32	0.11	0.31
Other Individual level Information						
Marital Status						
Married/Defacto	0.77	0.42	0.84	0.37	0.81	0.39
Separated/Divorced/Widowed	0.08	0.27	0.04	0.19	0.06	0.24
Never married	0.15	0.36	0.13	0.33	0.12	0.33
Sibling Number	2.61	1.92	3.02	2.12	2.23	1.67
Indigenous	0.01	0.12	0.00	0.06	0.00	0.04
Disability status	0.15	0.36	0.15	0.35	0.15	0.36

(—Continued on next page—)

Table 1 – continued from previous page

Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Employment Information						
Employed Full-time	0.94	0.24	0.94	0.23	0.94	0.23
Employed Part-time	0.06	0.24	0.06	0.23	0.06	0.23
Percent time employed	0.93	0.11	0.93	0.11	0.91	0.12
Public Sector employed	0.18	0.39	0.22	0.42	0.20	0.40
Union membership	0.27	0.44	0.28	0.45	0.21	0.41
Fathers' Occupation						
Professional	0.23	0.42	0.27	0.44	0.42	0.49
Skilled	0.15	0.35	0.14	0.35	0.06	0.23
Clerical	0.05	0.21	0.06	0.24	0.03	0.18
Semi-skilled	0.08	0.28	0.07	0.25	0.03	0.17
Unskilled	0.08	0.27	0.05	0.21	0.02	0.13
Other	0.41	0.49	0.41	0.49	0.45	0.50
Country of Birth						
Australian born	0.78	0.41	0.85	0.35	0.73	0.45
Indigenous Australian	0.11	0.31	0.05	0.21	0.11	0.31
Migrant form English speaking country	0.09	0.29	0.10	0.30	0.16	0.37
Other migrants	0.01	0.12	0.00	0.06	0.00	0.04
Family situation at age 14						
Living with both parent	0.87	0.33	0.90	0.30	0.91	0.29
Single Parent	0.11	0.31	0.08	0.26	0.07	0.25
Father Employed	0.91	0.29	0.92	0.27	0.93	0.25
Region Unemployment rate	5.11	1.23	5.08	1.21	4.94	1.16
Regional (Not major city)	0.37	0.48	0.28	0.45	0.23	0.42
Socio-economic status of area (SEIFA)[†]	5.67	2.80	6.48	2.65	6.89	2.71
State						
New South Wales	0.29	0.45	0.29	0.45	0.25	0.43
Victoria	0.23	0.42	0.31	0.46	0.32	0.47
Queensland	0.22	0.41	0.21	0.41	0.17	0.37
Southern Australia	0.09	0.29	0.05	0.22	0.11	0.31
Western Australia	0.11	0.31	0.07	0.26	0.08	0.28
Tasmania	0.03	0.17	0.03	0.17	0.02	0.15
Northern Territory	0.01	0.10	0.01	0.08	0.02	0.12
Australian Capital Territory	0.02	0.15	0.03	0.16	0.04	0.20
Wave						
Wave 1 (2001)	0.10	0.30	0.10	0.30	0.09	0.29
Wave 2 (2002)	0.10	0.30	0.10	0.30	0.09	0.29
Wave 3 (2003)	0.10	0.30	0.10	0.30	0.10	0.30
Wave 4 (2004)	0.10	0.30	0.10	0.30	0.10	0.30
Wave 5 (2005)	0.10	0.30	0.10	0.30	0.10	0.30
Wave 6 (2006)	0.10	0.30	0.10	0.30	0.10	0.30
Wave 7 (2007)	0.10	0.30	0.10	0.30	0.10	0.30
Wave 8 (2008)	0.10	0.29	0.10	0.30	0.10	0.30
Wave 9 (2009)	0.10	0.29	0.10	0.30	0.11	0.31
Wave 10 (2010)	0.10	0.29	0.10	0.30	0.11	0.31
N	14389		2904		1836	

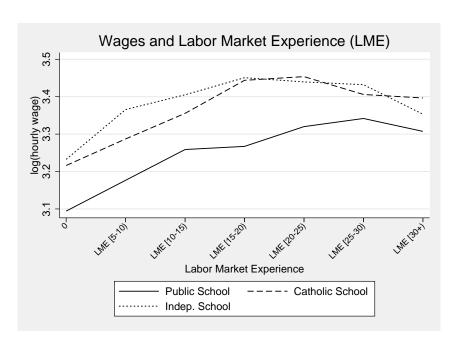† Index of Relative Socio-Economic Disadvantage

Figure 1: Average Log hourly Wage by Labor Market Experience for School Type

Table 2: **Proportion of data by Age Group and Labor Market Experience (LME)**

Labor Market Experience (in years)	Age Group (in years)						N
	25-29	30-34	35-39	40-44	45-49	50-54	
5-10	67.23	28.18	3.89	0.55	0.05	0.10	2,005
10-15	24.49	53.87	18.04	3.09	0.46	0.06	3,271
15-20	0.09	30.80	50.23	15.55	2.87	0.46	3,448
20-25	0.00	0.21	35.20	47.82	14.07	2.70	3,739
25-30	0.00	0.03	0.46	40.13	48.14	11.24	3,444
30+	0.00	0.00	0.00	0.22	40.91	58.88	3,222
Total	2,415	3,447	3,755	3,839	3,626	2,416	19,129

Table 3: **Education by Labor Market Experience (LME), Pooled Data, Males 26-53 years**

	Public School		Catholic School		Independent School	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**
LME, 5-10 years						
No higher than ISCED3a,3c	0.332	0.471	0.161	0.368	0.175	0.381
ISCED5a,6	0.335	0.472	0.616	0.487	0.638	0.481
LME, 10-15 years						
No higher than ISCED3a,3c	0.327	0.469	0.203	0.403	0.207	0.406
ISCED5a,6	0.244	0.429	0.482	0.500	0.461	0.499
LME, 15-20 years						
No higher than ISCED3a,3c	0.341	0.474	0.208	0.406	0.240	0.427
ISCED5a,6	0.253	0.435	0.442	0.497	0.484	0.500
LME, 20-25 years						
No higher than ISCED3a,3c	0.317	0.466	0.227	0.419	0.271	0.445
ISCED5a,6	0.243	0.429	0.385	0.487	0.476	0.500
LME, 25-30 years						
No higher than ISCED3a,3c	0.294	0.456	0.261	0.440	0.242	0.429
ISCED5a,6	0.229	0.420	0.312	0.464	0.508	0.501
LME, 30+ years						
No higher than ISCED3a,3c	0.329	0.470	0.298	0.458	0.231	0.423
ISCED5a,6	0.135	0.341	0.237	0.426	0.437	0.497

Diploma (ISCED 5b) and higher-level vocational education and training (ISCED 4b) qualification holders are excluded.

ISCED3a,3c is the attainment of an upper-secondary certificate or a vocational equivalent.

ISCED5a,6 is the attainment of a bachelor degree or higher.

Table 4: **OLS and Fixed Effects Results: Dependent variable is log of hourly wage rate of Males aged 26-53 years**

	Model A	Model B	Model C	Model D
School type attended				
Catholic School	0.026	0.024	-0.037	
	(0.018)	(0.019)	(0.034)	
Indep. School	0.006	0.004	0.014	
	(0.022)	(0.023)	(0.040)	
Labor Market Experience[†]				
10-15 years		0.041**	0.034*	0.024
		(0.017)	(0.018)	(0.019)
15-20 years		0.004	-0.021	-0.010
		(0.026)	(0.027)	(0.027)
20-25 years		0.007	-0.007	-0.016
		(0.031)	(0.032)	(0.033)
25-30 years		-0.003	-0.012	-0.012
		(0.036)	(0.037)	(0.037)
30+ years		0.001	-0.002	-0.012
		(0.042)	(0.043)	(0.042)
School Effects by Labor Market Experience[‡]				
10-15 years*Catholic School			0.023	0.028
			(0.037)	(0.033)
10-15 years*Indep. School			0.003	0.020
			(0.043)	(0.041)
15-20 years*Catholic School			0.115**	0.101**
			(0.045)	(0.045)
15-20 years*Indep. School			0.032	0.066
			(0.057)	(0.059)
20-25 years*Catholic School			0.086*	0.133**
			(0.045)	(0.054)
20-25 years*Indep. School			-0.024	0.117*
			(0.057)	(0.068)
25-30 years*Catholic School			0.050	0.080
			(0.045)	(0.063)
25-30 years*Indep. School			-0.005	0.104
			(0.063)	(0.074)
30+ years*Catholic School			0.070	0.060
			(0.051)	(0.073)
30+ years*Indep. School			-0.120*	0.080
			(0.069)	(0.087)
Constant	2.637***	2.607***	2.613***	2.570***
	(0.076)	(0.083)	(0.083)	(0.193)
State Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Individual Fixed Effects	No	No	No	Yes
Observations	19,498	19,129	19,129	19,129
R-squared	0.263	0.265	0.267	0.768

All models include other covariates summarized in Table 1; except Model D, which excludes time-invariant factors.

[†]: 0-5 is excluded and 5-10 years is the reference case.

[‡]: Government School is base category.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.10

Table 5: **Key Results from the Log Wage Rate Model, Males 26-53 years, Alternative Employment Experience Categories**

	Standard Categories (Std)		Alternative Categories (Alt)	
	Model D	Model D.1[†]	Model D.2	Model D.3[‡]
Labor Market Experience				
Category 1 (Std:5-10, Alt:3-8)		0.005		0.002
		(0.039)		(0.023)
Category 2 (Std:10-15, Alt:8-13)	0.024	0.030	-0.021	-0.025
	(0.019)	(0.018)	(0.016)	(0.016)
Category 3 (Std:15-20, Alt:13-18)	-0.010	-0.002	-0.032	-0.037
	(0.027)	(0.027)	(0.023)	(0.023)
Category 4 (Std:20-25, Alt:18-23)	-0.016	-0.008	-0.021	-0.026
	(0.033)	(0.033)	(0.028)	(0.028)
Category 5 (Std:25-30, Alt:23-28)	-0.012	-0.005	-0.007	-0.014
	(0.037)	(0.037)	(0.032)	(0.032)
Category 6 (Std:30+, Alt:28+)	-0.012	-0.006	0.010	0.004
	(0.042)	(0.042)	(0.037)	(0.037)
School Effects by Labor Market Experience				
Category 1*Catholic School		-0.080		-0.063
		(0.078)		(0.050)
Category 1*Indep. School		-0.067		-0.114**
		(0.068)		(0.051)
Category 2*Catholic School	0.028	0.026	0.077**	0.078**
	(0.033)	(0.033)	(0.032)	(0.032)
Category 2*Indep. School	0.020	0.021	0.032	0.039
	(0.041)	(0.042)	(0.048)	(0.048)
Category 3*Catholic School	0.101**	0.099**	0.093**	0.095**
	(0.045)	(0.045)	(0.047)	(0.047)
Category 3*Indep. School	0.066	0.068	0.082	0.089
	(0.059)	(0.060)	(0.062)	(0.062)
Category 4*Catholic School	0.133**	0.130**	0.096*	0.097*
	(0.054)	(0.054)	(0.054)	(0.054)
Category 4*Indep. School	0.117*	0.119*	0.105	0.111
	(0.068)	(0.068)	(0.070)	(0.070)
Category 5*Catholic School	0.080	0.077	0.061	0.063
	(0.063)	(0.063)	(0.063)	(0.062)
Category 5*Indep. School	0.104	0.106	0.088	0.097
	(0.074)	(0.075)	(0.078)	(0.078)
Category 6*Catholic School	0.060	0.058	0.098	0.099
	(0.073)	(0.073)	(0.076)	(0.075)
Category 6*Indep. School	0.080	0.082	0.119	0.121
	(0.087)	(0.088)	(0.100)	(0.101)
Constant	2.570***	2.804***	2.481***	2.805***
	(0.193)	(0.171)	(0.237)	(0.170)
State Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Individual Fixed Effects	Yes	Yes	Yes	Yes
Observations	19,129	19,498	18,243	19,498
R-squared	0.768	0.766	0.771	0.766

All models include other covariates summarized in Table 1.

Standard errors clustered on individuals are in parentheses.

*** p<0.01, ** p<0.05, * p<0.10.

Government School is always the base category.

[†]The reference case is 0-5 years.

[‡]The reference case is 0-3 years.

Table 6: **Key Results from the Log Wage Rate Model, Males 26-53 years, with Extra Controls for Time Trends**

	Model D	Model D.i	Model D.ii	Model D.iii	Model D.iv
	School Effects by Labor Market Experience‡				
10-15 years*Catholic School	0.028	0.006	0.017	-0.031	0.025
	(0.033)	(0.051)	(0.033)	(0.070)	(0.053)
10-15 years*Indep. School	0.020	0.087	0.013	0.018	-0.028
	(0.041)	(0.083)	(0.040)	(0.081)	(0.073)
15-20 years*Catholic School	0.101**	0.111*	0.083*	0.073	0.122
	(0.045)	(0.066)	(0.045)	(0.104)	(0.081)
15-20 years*Indep. School	0.066	0.103	0.052	0.055	-0.018
	(0.059)	(0.097)	(0.058)	(0.091)	(0.167)
20-25 years*Catholic School	0.133**	0.156**	0.105*	0.031	0.225*
	(0.054)	(0.077)	(0.054)	(0.114)	(0.118)
20-25 years*Indep. School	0.117*	0.042	0.099	0.094	0.164
	(0.068)	(0.111)	(0.067)	(0.107)	(0.193)
25-30 years*Catholic School	0.080	0.080	0.044	-0.027	0.068
	(0.063)	(0.082)	(0.063)	(0.123)	(0.126)
25-30 years*Indep. School	0.104	-0.166	0.073	0.054	0.188
	(0.074)	(0.142)	(0.073)	(0.120)	(0.215)
30+ years*Catholic School	0.060	-0.012	0.020	-0.001	-0.146
	(0.073)	(0.096)	(0.073)	(0.130)	(0.186)
30+ years*Indep. School	0.080	-0.070	0.050	0.104	0.057
	(0.087)	(0.162)	(0.086)	(0.156)	(0.241)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	Yes	Yes	Yes	Yes	Yes
Education*Time FE	No	No	Yes	No	No
Observations	19,129	4,313	19,129	5,546	3,191
R-squared	0.768	0.772	0.769	0.729	0.764

Model D.i: Catholic Students Only.

Model D.ii: Education*Time fixed effects included.

Model D.iii: People with no post-school qualifications.

Model D.iv: Bachelor degree holders.

All models include other covariates summarized in Table 1.

†: 5-10 years is the reference case.

‡: Government School is base category.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.10