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**The Relationship between Private Schooling and Earnings:
A Review of the Evidence for the US and the UK**

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Abstract[2]- Despite the strategic importance of the private school sector to education policy reform, and a general belief in the superiority of private schools, there is very little evidence on the relative effects of such schooling over public schools. This paper reviews the current evidence in the US and the UK on the relationship between private school attendance and earnings. The effects of private schooling on future earnings are important for the equity and efficiency of education systems, arguably more so than any effects on test scores. Yet, the review uncovers only four studies of this relationship for the US, and eleven studies for the UK. These show a reasonably robust correlation between higher earnings and private schooling, but a summary of the private schooling earnings premium cannot be easily identified. The available evidence varies across estimation techniques, and probably fails to include the full set of direct and indirect effects of private schooling on earnings. However, from simulations of the earnings premium, we calculate the rate of return to investment in private schooling over public schooling. This rate of return – including the direct and indirect effects of private schooling – is modest, at around 3% for the US and 5% for the UK.

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1.   Introduction

Private school enrolments in the US are around 10%, and this proportion has been reasonably stable over the past four decades (Kenny and Schmidt, 1994). For the UK, private school enrollment are also approximately 10%, and also unchanging over time (Belfield, 2000). In both these countries, even though the vast majority of K–12 students are in public schools, the private sector has a strategic influence on education reform debates.[3]

This influence arises in four ways. First, private schools are regarded as 'elitist' in delivering high quality education to a select few, endowing them with social advantages, and (perhaps) undermining social cohesion (see Gorard, 2001). Second, private schools are regarded as more effective and more efficient than public schools, so much so that parents are willing to forego free public schooling and pay tuition fees. Hence, a number of large-scale education reforms have been proposed where public schools should be encouraged to mimic the technologies and syndromes of these private schools (Friedman, 1993; Chubb and Moe, 1988). Third, the supposition is that, were parents allowed greater freedom of choice, it would be private schools that would respond to meet parents' new choices, and parents would be glad to send their children to private schools (Moe, 2001). As a final factor, private schools satisfy the needs of families with particular, different educational preferences (typically for religious schooling, James, 1987). Fundamentally, the first three of these arguments rest on the belief – implicitly held both by the detractors and supporters – that private schools offer a superior education. This paper investigates what evidence there is to support or reject this belief.

At the outset, three cautions may be noted regarding public–private school comparisons. The first relates to inferences from comparisons of resource levels across the school sectors. Private schools may use fewer resources than public schools (although the evidence on this is weak), but

they may be able to educate to an equivalent standard because student inputs and or parental inputs are higher. Yet, even where private schools do spend more, there is no guarantee that extra resources translate into higher outcomes (Hanushek, 1998). How private schools are able to deploy an equivalent set of resources may be an important source of relative effectiveness. The second caution reflects the particular nature of education services. If the quality of education services is unobservable or non-verifiable (Winston, 1999), then parents may not necessarily choose private schools that are superior to public schools. A third caution relates to the 'technology' of education provision. Specifically, there is little conclusive evidence on precisely what particular technology private schools employ that differs from, and is more efficient than, that of public schools (Levin, 2001a; although on the additional homework in Catholic schools, see Sander, 2000).

Looking at the direct evidence, a recent review by McEwan (2000) compares the educational effectiveness of private (Catholic) schools with public schools in the US. When the outcome is educational achievement, there appear to be modest effects in mathematics for low-income, minority students (but only in grades 2-5) from attendance at Catholic schools; but no consistent effects for reading (non-experimental data yield no consistent effects). Second, with regard to attainment, Catholic schools increase the probability of high school completion and of college attendance (particularly for minorities in urban areas). These findings do not suggest overwhelming educational (cognitive) benefits from attending private school. In their analysis of NELS, Figlio and Stone (1999) find private schooling increases the probability of (selective) college enrollment, but has no general effect on test scores when sector choice is instrumented. Rhetorically, they ask why – given this evidence on educational outcomes– parents would send their children to private school.

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[3] Although the term 'public school' in the UK conventionally refers to a select group of private schools, the American term is adopted here: public schools are state/government schools; all other schools are private schools. Although private schools may be a heterogeneous group, no finer distinction is made in the literature reviewed here.

One answer to this question is proposed here. Generally, private schools (and indeed all schools) may be optimizing a vector of outcomes that extends beyond test scores, to include personality traits, socialization skills, self-confidence, or future earnings. As none of these outcomes correlates particularly closely with test scores (Levin, 2001b), then it is still an open question whether and by how much private schools are superior to public schools. Indeed, economists have argued that earnings may be a better optimand for schools than test scores (e.g. Burtless, 1996). As well as correlating with well-being, earnings may embody many other personality traits which are rewarded in the workplace and which schooling might foster (Bowles and Gintis, 1999). Also, earnings premia can be used to calculate rates of return to private schooling and so offer an assessment of whether private schooling enrollment is optimal (Wright, 1999).

Therefore, this review looks at the empirical evidence on the correlation between earnings and private schooling in the US and in the UK. It is structured as follows. Section 2 formalizes the research question, in terms of the relationship between private schooling and earnings. Section 3 details the review protocol and tabulates the available evidence, along with a description of important features such as the sample group of students and the estimation method. Section 4 reports the earnings premium for private schooling across each of the studies, and offers a summary estimate of the overall effect. Section 5 explores issues of external validity and publication bias. Section 6 includes a calculation of the rate of return to private schooling for the individual. Section 7 concludes, referring back to the relevance of private schools within a comprehensive system of public schools.

2. The Research Question

Benefits of attending private school

Schools are hypothesized to optimize a vector of outcomes for their students. These

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are: (1) achievement (*ACH*); (2) attainment (*ATT*); (3) social outcomes (*SOC*); and (4) earnings (*Y*). Private schools and public schools may weight these outcomes differently, and private schools may be superior (or inferior) to differing degrees across these components.

We are interested in the relationship between private schooling and earnings, but this relationship will be mediated through the other three components of the vector. So, if private schools generate higher achievement levels for students – as measured by test scores – then this will lead to higher earnings. This is an indirect effect of private schooling. Further, if private schooling encourages students to attain more years of education, then this too will raise earnings. As well, if private schooling encourages a different set of social behaviors, then an individual's earnings capacity may be affected; examples of this effect might be the aspiration to be a lawyer, or to be married. These three components are all indirect effects of private schooling, and reflect the fact that private schools may have different optimands to public schools.

However, earnings may also be increased directly from private schooling, relatively to public schooling. Examples here are: the work ethic (of diligence and conscientiousness etc.) instilled at school (see Bowles and Gintis, 1999); and differences in the reputations of school types, which are then reflected in differences in labor market signals (Weiss, 1985). This direct effect is the 'independent treatment' effect of attending a private school. By assumption, this direct effect is reflected *neither* in test scores, *nor* in years of attainment, *nor* in social behavioral changes. The indirect effects may be larger than the direct, but it is important to distinguish the two.

Only through distinction between direct and indirect effects is it possible to interpret the empirical evidence on how private schooling influences earnings. Specifically, the indirect and direct effects on earnings can be interpreted from the coefficient on a dummy variable indicating private school attendance. At issue is which of the direct and indirect effects of private schooling are captured by this coefficient (here called *PRVS*). Clearly, interpretation of the coefficient will depend

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on which earnings specification is used. Eight specifications are possible, to capture the direct and indirect effects of private schooling ($PRVS$) on earnings (Y), controlling for a set of other characteristics (vector $\mathbf{Z}$):

$\{1\}$ $Y = a_1 + b_{1Z}\mathbf{Z} + c_1 PRVS + d_1 ACH$

$\{2\}$ $Y = a_2 + b_{2Z}\mathbf{Z} + c_2 PRVS + e_1 ATT$

$\{3\}$ $Y = a_3 + b_{3Z}\mathbf{Z} + c_3 PRVS + f_1 SOC$

$\{4\}$ $Y = a_4 + b_{4Z}\mathbf{Z} + c_4 PRVS + d_2 ACH + e_2 ATT$

$\{5\}$ $Y = a_5 + b_{5Z}\mathbf{Z} + c_5 PRVS + d_3 ACH + f_2 SOC$

$\{6\}$ $Y = a_6 + b_{6Z}\mathbf{Z} + c_6 PRVS + e_3 ATT + f_3 SOC$

$\{7\}$ $Y = a_7 + b_{7Z}\mathbf{Z} + c_7 PRVS + d_4 ACH + e_4 ATT + f_4 SOC$

$\{8\}$ $Y = a_8 + b_{8Z}\mathbf{Z} + c_8 PRVS$

So, equation $\{1\}$ estimates the effects of private schooling ($PRVS$), but includes a 'control' for achievement (ACH).[4] With this specification, the effect of private schooling on earnings will be the sum of the coefficient c_1 (the direct effect) and some proportion of the coefficient d_1 (the indirect effect arising if private schooling raises achievement levels). The specifications identified in equations $\{2\}$ and $\{3\}$, where attainment (ATT) and social outcomes (SOC) are included, can be similarly interpreted. However, when the indirect effects are interacted (as in equations $\{4\}$ to $\{7\}$), the interpretation of a private schooling effect becomes more difficult. The inter-relationships between the variables may be interpreted recursively: achievement is likely to influence attainment, for example. In these cases, the influence of private schooling on earnings will be the sum of the coefficient on private schooling and some proportions of the coefficients for the three indirect

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[4] We assume that this 'control' for achievement also captures the effect of ability. Higher ability students may enroll at private school: any earnings premium to private schooling may therefore be a result of higher ability, and not a private school 'treatment effect'. However, this argument can be applied to the other indirect effects as well. So private schools may enroll students who have exhibit certain social behaviors; interpreting differences in social behavior as a "treatment" effect would be equally erroneous.

effects (that is, $c_i + \alpha d_i + \beta e_i + \gamma f_i$). To identify these three proportions (α, β, γ), the following relationships need to be estimated:

$\{9\}$ $ACH = h_{ACH}(PRVS| ATT, SOC)$

$\{10\}$ $ATT = h_{ATT}(PRVS| ACH, SOC)$

$\{11\}$ $SOC = h_{SOC}(PRVS| ACH, ATT)$

Equations $\{9\}$ to $\{11\}$ are ways to capture each of the indirect effects of private schooling on achievement, attainment, and social behaviors (adjusting for the other two indirect effects). So, as we noted above, the $\boldsymbol{h_{ACH}}$ parameter – the influence of private schooling on achievement – appears to be small (McEwan, 2000; Figlio and Stone, 1999). However, the $\boldsymbol{h_{ATT}}$ parameter – the influence of private schooling on attainment – is probably non-trivial. Plus, the $\boldsymbol{h_{SOC}}$ parameter should also not be neglected; recent evidence draws attention to the wide range of social outcomes that may be differently inculcated through private schooling (Sander, 2000; Figlio and Ludwig, 2000). The difficulty with this last parameter is that the identification and attribution of the social outcomes may be problematic. The social effects of education are numerous and subtle (Behrman and Stacey, 1997); an example here would be marital status, which correlates strongly with both education and earnings. At issue here, to repeat, is what marginal effect private schooling has over public schooling in these respects. Absent any achievement advantages, private schooling enrollment might in fact be motivated by a desire for different social behaviors.

To repeat, this exposition through equations $\{1\}$ to $\{11\}$ is necessary because of how the evidence on the link between private schooling and earnings is presented. A specification such as equation $\{8\}$, for example, might capture the aggregate set of direct and indirect effects of private schooling; but it would be very difficult to draw any causal inference. With such an equation, a positive correlation would fail to indicate whether private schooling raises earnings because it raises achievement levels, because it encourages longer duration of schooling, because it fosters social

skills, or because it has a strong signaling effect. Such a specification would also fail to account for differences in selection into the private schooling sector. However, in a specification such as equation {5}, the effect of private schooling is also mis-attributed. In this specification, the direct effect of private schooling (and the indirect effect on attainment) is captured by the dummy variable indicating private schooling, but the indirect effects of private schooling on achievement and social behaviors are controlled for. The coefficients on these two variables also need to be included.

Private school type

Any link between private schooling and earnings will only be identifiable if private schooling (*PRVS*) connotes a discrete and meaningful organizational form. Private schools are not all alike, and are of course not universally superior to public schools. The private schooling sector may be differentiated according to its input mix, the technologies being used, and the outcomes being optimized. This differentiation would allow for identification of (i) private schools that are high quality but nonetheless substitutes for public schools, from (ii) private schools that offer an alternative type of provision. Figlio and Stone (1999) distinguish between religious and non-religious schools, for example, and find differential selection effects across these forms of provision.

However, of necessity a much simpler classification is used here. Reflecting most of the literature, 'private schooling' is classed either as a single group, implying a homogeneous effect. This classification applies to all the UK studies, although the US studies do allow for refinements between private schools that are 'Catholic', or are 'religious/non-religious'.

3   The Review Evidence

Search strategy

To identify relevant research, the search strategy drew on the key social science bibliographic databases (ERIC, BIDS, EconLit and Web of Science), JSTOR journals, and the Internet. No date restriction was applied and no restrictions were made on the estimation method

employed, or the type of private school. Only research on earnings in the US and the UK was included. The search keywords were, initially, 'private school' and 'earnings'. Later searches aimed to identify papers where a school-type dummy was included in an earnings equation. One journal (*Economics of Education Review*) was hand searched. The references of all selected papers were checked and citations were identified using the Web of Science database. All studies reporting some measure of the effect of private schools on earnings were included.

Evidence base

From this search strategy the total evidence base is four US studies and eleven UK studies. Tables 1S and 1K summarize the characteristics of each study. All of these studies use individual-level data on earnings and most simply use a dummy variable for individuals who were privately schooled. The specifications used vary across {1} to {8}, although achievement or ability is included in most estimations. Thus, interpreting the effect of private schooling on earnings based on its coefficient addresses only the direct effects. But, this form of interpretation is the only one available here. Because none of the research directly models selection into the private sector, or allows for estimation of h_{ACH}, h_{ATT} or h_{SOC}, then the indirect effects cannot be calculated. Moreover, because the sample of available studies is so small, general inferences must be drawn with caution.

The four US studies draw on three datasets: High School and Beyond; the National Longitudinal Survey of Youth; and an NBER dataset. Studies based on the second of these datasets offer evidence on the returns to private schooling from the early 1990s; the other two studies relate to even earlier (more remote) periods. Only the NBER data is used for longitudinal analysis. All of these US papers use evidence on young workers, and only one includes female workers [Crawford et al., 1997].

The US studies vary in how they represent the private schooling 'treatment' variable. Private schooling is either split into religious/non-religious, or designated as Catholic (or split into

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elementary/secondary). Only one paper reports on when or for how long the students were in

private school [Crawford et al., 1997]. Finally, one of the studies does not control for ability or

attainment [Neal, 1997].

Table 1S: Study Characteristics (US Data)

Source	Dataset	Cohort (X) or Longitudinal (L)	Sample	Type of Private School	Age attended private school	Mean and s.d. of independent variable	Achievement, attainment and social outcome controls included
Crawford et al. (1997)	HSB (1985)	X	Direct entrants to labour force	Religious Non-religious	HS Sophomores / Seniors	Y, Y	High School GPA; Post-secondary degree; Some social outcomes
Neal (1997)	NLSY (1991)	X	White males Minority males age 27-34	Catholic	NA	Y, NA	None
Sandy and Duncan (1996)	NLSY (1991)	X	Black and White males	Any	NA	Y, Y	AFQT 1980; Highest grade completed; Some social outcomes
Taubman (1977)	NBER-TH (1955/69)	L	Male army recruits	Any elementary Any high school	NA	Y, NA	Ability quintile; Highest qualification; Some social outcomes

Notes: HSB–High School and Beyond; NLSY–National Longitudinal Survey of Youth; NBER-TH–National Bureau of Economic Research Thorndike and Hagen data. NA – Not available

Table 1K: Study Characteristics (UK Data)

Source	Dataset	Cohort (X) or Longitudi nal (L)	Sample	Type of Private School	Age attended private school	Mean and s.d. of independent variable	Achievement, attainment and social outcome controls included
Dearden (1999a)	NCDS (1991)	X	Males	Any	At age 16	Y, Y	Maths/reading ability at age 7 Some social outcomes
Dearden (1999b)	NCDS (1991)	X	Males Females	Any	At age 16	Y, Y	Maths/reading ability at age 7 School/post school qualifications Years of education Some social outcomes
Dearden et al. (2000)	NCDS (1981/91)	L	Males Females	Any	At age 16	Y, Y	Maths/reading ability at age 7 and 11 Highest qualification Some social outcomes
McNabb and Psacharopoulos (1981)	GHS (1972)	X	White males Non-white males	Any	NA	Y, NA	Highest qualification
Naylor et al. (2000)	USR, FDS, NES (1993)	X	Graduates	Any	NA	Y, Y	A-Level score and degree class Only graduates Some social outcomes
Dolton and Vignoles (2000)	NSGD (1981, 1986)	X	Graduates	Any	NA	NA, NA	A-level grade; years of (over) education Only graduates Some social outcomes
Dolton and Makepeace (1986)	NSGD (1981)	X	Graduates	Any	NA	Y, Y	A-level grade Only graduates, qualifications Some social outcomes
Belfield and Fielding (2001)	HEFCE (1996)	X	Graduates	Any	At age 14	NA, NA	A-level score and degree class Length of degree, Only graduates Some social outcomes
Wright (1999)	BHPS (1991-5)	X	Males	Any	NA	Y, NA	None Some social outcomes
Kuh and Wadsworth (1991)	MRC NSHD (1982)	X	Males	Any	At age 15	Y, NA	None
Kuh et al. (1997)	MRC NSHD (1989)	X	Females	Any	At age 15	Y, NA	None

Notes: NCDS–National Child Development Survey; MRC NSHD–Medical Research Council National Survey of Health and Development; GHS–General Household Survey; USR–Universities Statistical Record; FDS–First Destinations Survey; NES–New Earnings Survey; BHPS–British Household Panel Survey; HEFCE–Higher Education Funding Council for England Survey; NSGD –National Survey of Graduates and Diplomates.

Across the eleven UK studies, three are very similar in using the National Child Development Survey from either 1981 or 1991 [Dearden, 1999ab; Dearden et al., 2000]. Two other studies use a Medical Research Council database, for male and then female workers [Kuh and Wadsworth, 1991; Kuh et al., 1997]. Of the remaining five UK studies, four focus only on graduates, with one being a collation of two discrete datasets without individual linking [Naylor et al., 2000]. In general, the UK datasets are more recent than those used in the US, and, although only

one paper uses longitudinal data in a purposive way, results for both male and female workers are available.

However, the UK data are less satisfactory in other respects. They all implicitly assume that private schools are an operationally distinct but uniform group; and enrolment in private schooling is measured relatively late in the school career. Similar to the US evidence, most of the samples are based on young workers. Finally, three of the UK studies do not use ability or attainment controls.

4.   Results

Point estimates of earnings premia for private schooling in the US

Table 2S presents the results of the earnings equations across the four US studies. Most of the studies undertook multiple estimations (mostly OLS) across various sub-samples.

The results do not show a clear direct earnings premium for attending private school in the US, based on the *PRVS* coefficient. One study shows a statistically significant difference at the 5% confidence level [Sandy and Duncan, 1996], another shows a premium only for minority males [Neal, 1997], and a third shows no premium, either for religious or non-religious private schooling [Crawford et al., 1997]. The final study also shows mixed results, with no earnings premium for students who attended private elementary school, but an identifiable one for private secondary school students [Taubman, 1977].

Where statistically significant, the estimates vary sizably in their substantive significance. Using annual wages, the substantive direct effect of private school attendance appears trivial; when the natural log of hourly wages is used, however, the direct effect is to increase wages by between 10.2% and 23.4%.

Table 2S: The effect of private schooling on earnings (US data)

Source	Sample for Estimation	Sample size	Dependent variable ($ mean, s.d.)	Independent variable mean (s.d.)		Estimation Method	Private schooling Coefficient (SE) PRVS	
Crawford et al. (1997)	Non-religious private school students	1142	Annual wages (8790, 6717)	0.010	(0.11)	OLS Tobit	574 475	(1851)[ns] (9500)[ns]
	Religious private school students	1142	Annual wages (8790, 6717)	0.110	(0.32)	OLS Tobit	-1331 -1165	(817)[ns] (798)[ns]
Neal (1997)	White males	1030	Ln(hourly wage) (na)	0.095	(na)	OLS	0.017	(0.055)[ns]
	Minority males	939	Ln(hourly wage) (na)	0.050	(na)	OLS	0.234	(0.084)**
Sandy and Duncan (1996)	Black and White males	2520	Ln(hourly wage) (2.29, 0.58)	0.051	(0.004)	OLS	0.102	(0.047)**
Taubman (1977)	Elementary private school pupils, 1955 wages	5100	Annual wages (7300, 3800)	0.004	(na)	OLS	0.230	(0.767)[ns]
	Elementary private school pupils, 1969 wages	5100	Annual wages (14600, 4826)^	0.004	(na)	OLS	2.98	(1.863)[ns]
	High School private school pupils, 1955 wages	5100	Annual wages (7300, 3800)	0.019	(na)	OLS	1.49	(0.382)**
	High School private school pupils, 1969 wages	5100	Annual wages (14600, 4826)^	0.019	(na)	OLS	2.80	(0.485)**

Notes: OLS –Ordinary Least Squares; na – data not available; ^ - data are estimates; ns – not significant; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 2K: The effect of private schooling on earnings (UK data)

Source	Sample for Estimation	Sample size	Dependent variable (£ mean, s.d.)	Independent variable Mean (s.d.)		Estimation Method	Private schooling Coefficient (SE) PRVS	
Dearden (1999a)	Males	2597	Ln(hourly wage) (2.05, 0.43)	0.052	(0.223)	OLS IV OLS (HET)	0.079 0.070 0.077	(0.039)*** (0.039)*** (0.039)***
Dearden (1999b)	Males	2597	Ln(hourly wage) (2.04, 0.42)	na	(na)	OLS	0.078	(0.038)***
	Females	2363	Ln(hourly wage) (1.68, 0.49)	na	(na)	OLS	0.022	(0.040)[ns]
Dearden et al. (2000)	Males 1981	2232	Ln(hourly wage) (1.58, 0.02)	0.054	(0.226)	OLS	-0.006	(0.043)[ns]
	Males 1991	2232	Ln(hourly wage) (2.06, 0.42)	0.056	(0.231)	OLS	0.195	(0.052)***
	Females 1981	2412	Ln(hourly wage) (1.44, 0.34)	0.054	(0.226)	OLS	-0.012	(0.040)[ns]
	Females 1991	2412	Ln(hourly wage) (1.69, 0.49)	0.056	(0.231)	OLS	-0.026	(0.060)[ns]
McNabb and Psacharopoulos (1981)	White males	670	Annual wages (1519, na)	0.035	(na)	OLS	0.167	(na)***
	Non-White males	172	Annual wages (1294, na)	0.006	(na)	OLS	0.247	(na)[ns]
Naylor et al. (2000)	Males	22351	Ln(weekly wages, US$) (6.14, 4.83)	0.29	(0.45)	OLS–ML	0.029	(na)***
	Females	22495	Ln(weekly wages, US$) (5.85, 4.57)	0.25	(0.43)	OLS–ML	0.023	(na)***
Dolton and Vignoles (2000)	Males 1981	2982	Ln(earnings)	na	(na)	OLS	0.0141	(0.0163) [ns]
	Male 1986	2819					0.0651	(0.0174)***
	Females 1981	2035	Ln(earnings)	na	(na)	OLS	-0.0627	(0.0204)***
	Females 1986	1658					-0.0173	(0.0244) [ns]
Dolton and Makepeace (1986)	Males 1977	3217	Ln(earnings) (7.59, 0.34)	0.289	(0.545)	OLS	0.0506	(0.0127)**
	Females 1977	1213	Ln(earnings) (7.33, 0.46)	0.246	(0.431)	OLS 2SLS ML 2SLS	0.0034 0.0127 0.0068	(0.0276) [ns] (0.0276) [ns] (0.0303) [ns]
Belfield and Fielding (2001)	Males 1996	2712	Ln(hourly earnings) (2.38, 0.53)	0.16	(na)	VCM	0.1649	(0.0451)***
	Female 1996	3011	Ln(hourly earnings) (2.28, 0.55)	0.16	(na)	VCM	-0.0292	(0.0422)[ns]
Wright (1999)	Males	5370	Ln(hourly wages) (2.17, 1.63)	0.057	(na)	OLS IV HT HT & IV	11.7% 16.2% 10.0% -6.0%	T(4.9)** T(1.3)[ns] T(2.3)** T(0.6)
Kuh and Wadsworth (1991)	Males	1424	Income distribution	0.077	(na)	Descriptive statistics only	52% of private pupils in top 1/3 of income distribution	(na)
Kuh et al. (1997)	Females	1155	Average wages	0.084	(na)	Descriptive statistics only	Private £182 Public £145	(na)

Notes: OLS – Ordinary Least Squares; IV –Instrumental Variables; HT – Hausman-Taylor fixed effects model; OLS–ML
–OLS with Multinomial Logit for selection into employment; VCM –Variance Components Model; T – t-statistic
reported; ns – not significant; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Point estimates of earnings premia for private schooling in the UK

Table 2K reports on the estimates of the earnings premium for the UK. The evidence for

the UK draws on a wider range of estimation methods and it appears that these alternatives do alter

(albeit not straightforwardly) the coefficient estimates.

The effect of private schooling is statistically significant in a majority of cases. Two studies show some cross-sectional evidence of higher earnings for private school students, but do not test for the significance of this effect [Kuh and Wadsworth, 1991; Kuh et al., 1997]. The remainder use regression estimation and testing. From these, the effect of private schooling on hourly/annual wages for males varies between -1.2% and +19.5%, with many of the estimates clustered at 7-10% [Dearden, 1999ab; Dearden et al., 2000; McNabb and Pscharopoulos, 1981; Wright, 1999]. The effect for females is however much weaker, with only one of seven estimations (from six studies) reporting a statistically significant effect [Naylor et al., 2000]. Four of the studies are of graduates only. Of these, three are based on similar surveys (over a 15 year period), and include a substantial array of controls. They generate very similar results with strong positive effects on earnings for male private school students, but no effect or even negative effects for females [Dolton and Makepeace, 1986; Belfield and Fielding, 2001; Dolton and Vignoles, 2000]. The fourth study, using a different data collection scheme based on occupational group averages, finds somewhat lower effects, at 2.3% (2.9%) for males (females) [Naylor et al., 2000]. A final concern, revealed more clearly in the UK evidence, is that the private schooling coefficient does appear to vary according to the estimation method [Wright, 1999].[5]

5. Discussion

External validity

The above results are suggestive but far from conclusive about the earnings advantages of private schooling. As noted above, they only refer to the direct effects, and 'control for' the indirect effects. Moreover, a further set of caveats should be applied regarding the method, some of the assumptions, and the validity of these findings.

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[5] One cross-comparison is noteworthy. From the coefficients from the two longitudinal studies [Dearden et al., 2000; Taubman, 1977], the private school effect for males actually increases with age. The size of the coefficient on *PRVS*

First, the estimation methods used here are typically cross-sectional correlations. There is no natural or quasi-experimental (or indeed experimental) evidence; and the use of instrumental variables or selection correction mechanisms does cause the results to vary. Yet, it seems intuitive that private schooling is a distinct preference, and that such a preference requires modelling.

Second, a number of implicit assumptions have been made to derive this evidence. For example, the inferences assume that an individual went to private school for a reasonable duration, and did not switch between public and private school at any point. This assumption may not be legitimate. As well, it is not possible to estimate precisely values for h_b the indirect effect of private schooling on attainment, achievement and social outcomes. The grossest assumption here, though, is that all private schools represent a discrete group, with an identifiable 'treatment' effect: the distinction between religious and non-religious private schools is one example of the heterogeneity of the private sector.

Third, if we assume that private schools do have a reasonably positive influence on earnings, this evidence may not be generalized to other students who might attend private schools. First, any 'effective demand' for private schooling requires access to borrowed funds (typically through intergenerational transfers), and those currently attending private school probably have access to relatively low-cost financing. For others, the cost of private schooling may be prohibitive. Second, individual preferences may limit the attractiveness of private schools; many parents might be unwilling to send their children to religious private schools, for example. Third, if private schooling is beneficial through its signaling effects in the labor market, then any expansion of the private sector is likely to dilute these signaling effects. Finally, the elasticity of supply of private schooling is not well-known (Downes and Greenstein, 1996): new entrants into the private market may display different syndromes to current private schools.
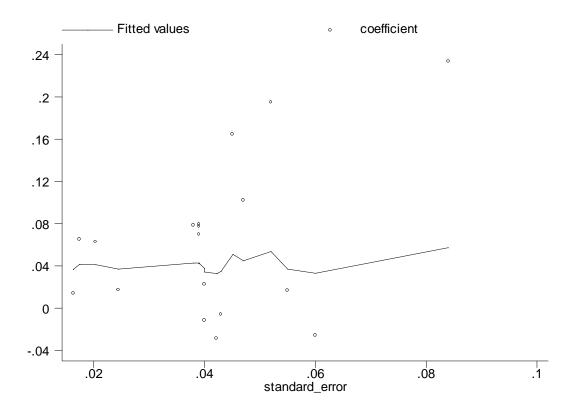
increases over time, suggesting that the private school effects are reasonably durable.

Publication bias

To test for validity, publication bias is considered by plotting each coefficient estimate against its standard error. In such a plot, the absence of publication bias is indicated by a horizontal line of best fit plotted against the individual data points (Ashenfelter et al., 1999).

Figure 1: Scatterplot of *PRVS* coefficients and fitted values against standard errors (US and UK)

This plot is shown in Figure 1, using OLS estimates for evidence where standard errors are available and pooling the US and UK samples. Pooling the sample (n=18), Figure 1 shows no compelling evidence of publication bias. The datapoints are scattered, and the hypothesis that the line of best fit has a slope of zero cannot be rejected. (As few of the papers were directly testing for a private schooling effect, publication bias might not be anticipated).

6.   Rate of Return to Private Schooling

From the direct earnings premia, it is possible to calculate an internal rate of return from investment in private schooling. The rate presented here is that which equalizes the net present value of the costs against the benefits (Belfield, 2000). The earnings premium from the coefficient for private schooling (*PRVS*) cannot be considered as a rate of return because private and public schooling do not cost the same amount.

The costs of private schooling are estimated as the average annual tuition fee for each year of private schooling (grades K through 12). The benefits are the salary premia, concatenated from the results in Table 2 but also taking into account attainment effects.

The annual fees for private schooling in the US (UK) are approximated at \$3550 (£2000) (National Center for Education Statistics, 2000; ISIS, 2001). The total costs of private school will depend on the duration of attendance, but there may be other costs of private schooling (such as uniforms or learning materials). Private schooling itself costs more than public schooling, but it may also raise expenditures on future education, both in school and in college. Figlio and Stone (1999) clearly identify this attainment effect. The costs of college are estimated for each student at \$4000 (£500) per annum.

The direct returns to private schooling (d_i) are the earnings premia over the full working life (up to age 60). These earnings premia may arise from the 'treatment' effect of private schooling, and the evidence in Tables 2S and 2K show that to be generally positive. However, where private school raises attainment then each additional year of education will also raise earnings ($e_i>0$). Each extra year is conservatively estimated to add 7% to earnings per year (Cohn and Addison, 1998; Ashenfelter and Rouse, 1999). For any years not in education, the individual is assumed to be earning income. Earnings are likely to grow with general improvements in productivity; we assume this growth is only between 1-2% per annum. Finally, the earnings advantage of private schooling will be lower if it pushes the individual into a higher tax bracket.

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These costs and benefits are simulated into a set of models. The base model for the US and the UK is reported in the initial rows of Table 3. For the costs, this base model assumes the individual attends private school for 13 years, at a cost of $3550, and that this induces 1 additional year of schooling and 1 additional year of college, relative to public school students. For the benefits, this base model uses earnings declared in Table 2 [Sandy and Duncan, 1996; Dearden, 1999a] to represent salaries at age 26. These earnings are then trended up and down at 2% per year. No increase in the marginal tax rate is assumed in this base model. The critical variable is of course the premium on private schooling, yet the evidence does not allow us to identify this precisely. In the base model, this direct premium is assumed to be 5% over earnings of public school students.

The rates of return to private schooling are reported in Table 3. The base model for the US shows the rate of return to be 3.83%. For the UK, the base model yields a rate of return of 5.03%. These rates are not especially high, and do not corroborate claims that private schools convey substantial advantages, when the fees from private schooling are accounted for. The returns are however positive, and, to emphasize, these are the returns over public schooling, not the returns to education.

To test for robustness, three other simulations are reported in Table 3.[6] The costs are varied in three ways. First, we reduce the numbers of years in private school to secondary school. Second, we increase private schooling costs by 50%; this increase might reflect: (i) higher expenses, e.g. uniforms; (ii) additional borrowing costs for low-income parents; or (iii) the divergence of fees from costs. Third, we assume no effect of private schooling on attainment ($h_{ATT}=0$). As well, the benefits are varied in four ways. These variations are: changes in the salary levels; a lower rate of economic growth; a higher marginal tax rate on extra earnings; and, finally, different values for the coefficient for private schooling. For the US, the rate of return to private schooling is bounded between 3.83%

and 6.13%. For the UK, rates are slightly higher, between 5.03% and 8.51%. To recap, these rates include the direct effects of 'treatment' at a private school, and the indirect effects on attainment. (The indirect effects on achievement and social behaviors are assumed to cost zero). However, these rates do not take into account the relative psychic and consumption benefits of public versus private schooling (although these might be reflected in additional attainment). Regardless of the simulation, however, investment in private schooling appears positive, yet close to the margin as a worthwhile investment.

Table 3: The internal rate of return to private schooling (US and UK)

Country	Education costs				Earnings premium for private schooling				Internal rate of return to private schooling (%)
	PRVS years	*Fees*	*Extra school years*[a]	*Extra college years*[a]	*Salary at age 26*[b]	*Earnings growth pa*	*Marginal tax rate*	*PRVS coefficient*	
US *Base model:*	*13*	*$3550 pa*	*1*	*1*	*$19750*	*2%*	*0*	*0.05*	*3.8341*
Model 2:	6	$3550 pa	1	1	$16000	1%	0	0.10	5.7086
Model 3:	13	$5325 pa	1	1	$19750	2%	10%	0.15	4.0700
Model 4:	13	$3550 pa	0	0	$19750	2%	10%	0.20	6.1252
UK *Base model:*	*13*	*£2000 pa*	*1*	*1*	*£15700*	*2%*	*0*	*0.05*	*5.0317*
Model 2:	6	£2000 pa	1	1	£15700	1%	0	0.10	8.5140
Model 3:	13	£3000 pa	1	1	£15700	2%	10%	0.15	5.2550
Model 4:	13	£2000 pa	0	0	£15700	2%	10%	0.20	7.7776

[a] Extra school/college years refers to years of schooling/college beyond those undertaken by public school students.
[b] Salary applied to public school graduates.

7.   Conclusion

This paper has reviewed the extant evidence to ascertain the earnings premium for private schooling in the US and UK. The majority of estimations, controlling for achievement, attainment and some social consequences of schooling, show a positive coefficient on a dummy variable for

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[6] No distinction is made between males and females in these estimations; although single-sex female private schools

private schooling. Yet, this coefficient varies according to specification and so cannot be precisely or robustly identified. More importantly, the estimations confound a direct 'treatment' effect of private schooling with three other indirect effects: those on achievement, attainment, and social outcomes. Looking at rates of return to private schooling, the evidence suggests that the internal rate of return to private schooling is positive in both the UK and the US. Yet, on strict financial criteria, the rate of return to private schooling is probably not that far from a threshold critical level.

This evidence has relevance to the debate over private schools. Claims that private schools are 'elitist' may be legitimate; private schools may convey both economic and social benefits to enrollees. This claim would be supported by looking just at the correlation between private schooling and earnings. However, this method is probably inaccurate, because of confounding and sector selection. Rather, our evidence suggests that the rate of return to private schooling – when fees are taken into account – is no more than modest.

Yet, there are two strong reasons for arguing that private schooling should be evaluated via its effects on incomes. One reason, referred to above, is that income effects may in fact reflect the social advantages of private schooling (in a way that test scores do not), and so are more informative of private school elitism. The other reason arises because earnings premia can be rendered as rates of return to education. Such rates are the key criteria for making optimal investment decisions: for the individual, it may be efficient to borrow to attend private school; for society, it may be efficient to enroll students in private schools because the fiscal returns (through additional tax contributions) are sufficiently high. Strictly, however, society's optimal investment decisions depend on the anticipated costs and benefits for the marginal enrollee. Therefore, expansion of private schooling depends on whether the benefits to the currently enrolled students apply to extra enrolees. From

charge lower fees, the earnings premia appear to be lower.

the limited evidence base identified here, however, the benefits to those self-selected into private

schooling are no more than modest.

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