

Heterogeneity in graduate earnings by socio-economic background

IFS Working Paper W14/30

Claire Crawford
Anna Vignoles

The Institute for Fiscal Studies (IFS) is an independent research institute whose remit is to carry out rigorous economic research into public policy and to disseminate the findings of this research. IFS receives generous support from the Economic and Social Research Council, in particular via the ESRC Centre for the Microeconomic Analysis of Public Policy (CPP). The content of our working papers is the work of their authors and does not necessarily represent the views of IFS research staff or affiliates.

HETEROGENEITY IN GRADUATE EARNINGS BY SOCIOECONOMIC BACKGROUND¹

CLAIRE CRAWFORD² AND ANNA VIGNOLES³

OCTOBER 2014

Education is often regarded as a route to social mobility. For this to be the case, however, the link between family background and adult outcomes must be broken (or at least reduced) once we take account of an individual's education history. This paper focuses on individuals who have completed university and provides new evidence on differences in graduates' earnings by socio-economic background, with a particular focus on whether they attended a private school. We use data on the population of individuals graduating from UK universities in 2006-07 and find that those who attended private schools earn around 7% more per year, on average, than state school students some 3.5 years after graduation, even when comparing otherwise similar graduates and allowing for differences in degree subject, university attended and degree classification. This work complements Macmillan et al. (2013), who found that graduates from private schools were more likely to enter "high status" occupations. However, our results show that earnings differences persist even within occupations, with graduates who attended private schools earning 6% more than their state school compatriots working in the same occupations. This is equivalent to around £1,500 extra per year in our data. Together, these results suggest that there is a pressing need to understand why private schooling confers such an advantage in the labour market, even amongst similarly achieving graduates, and why higher education does not appear to be the leveller it was hoped to be.

Key words: higher education, earnings, social mobility, private schools

JEL codes: I23, I24, I26

¹ The authors gratefully acknowledge funding from the Nuffield Foundation, who have provided generous support for our research via the project "Higher education funding and access: exploring common beliefs". The Nuffield Foundation is an endowed charitable trust that aims to improve social well-being in the widest sense. It funds research and innovation in education and social policy and also works to build capacity in education, science and social science research. The Nuffield Foundation has funded this project, but the views expressed are those of the authors and not necessarily those of the Foundation. More information is available at <http://www.nuffieldfoundation.org>.

They would like to extend particular thanks to Haroon Chowdry and Wenchao Jin for their substantial contributions to the analysis, and to Lorraine Dearden, Sonia Ilie and John Micklewright for helpful comments and discussion.

Support from the Economic and Social Research Council (ESRC) through the Centre for the Microeconomic Analysis of Public Policy (CPP) at IFS is also gratefully acknowledged.

² University of Warwick and Institute for Fiscal Studies.

³ University of Cambridge and Institute for Fiscal Studies. Corresponding author: av404@cam.ac.uk.

Introduction

Increasing social mobility has emerged as a key goal of government policy in the UK and US in recent years, largely in response to research that has found substantial social immobility in both countries (Bukodi and Goldthorpe, 2011; Corak, 2013; Ermisch et al. 2012). Previous research has highlighted the important role that education can play in “levelling the playing field” (e.g. Blanden et al. 2007), hence the extent to which young people from disadvantaged backgrounds can access and perform well in different levels of education is of keen policy interest (e.g. Cabinet Office, 2011).

Yet the role that education can potentially play in driving social mobility may be weakened if there remains a link between family background and adult outcomes, even once we account for attainment at school and university. There has been relatively little research on this topic to date in the UK, however, particularly amongst recent cohorts. This paper seeks to fill this gap. Our aim is to add to the limited previous literature on the relationship between graduates’ socio-economic background and earnings, and in particular on the relationship between type of school attended and subsequent earnings. We do so by focusing on a recent cohort of graduates, examining the extent to which differences in earnings arise as a result of the routes that are taken up to and throughout young people’s university careers (Blanden et al. 2007; Devine and Li, 2013), and the extent to which they arise from different occupational choices made following graduation (Macmillan et al., 2013).

Using data on graduates’ earnings measured 6 months and 3.5 years after graduation, we find that those who attended private schools just prior to entering university earn around 7% more, on average, than those who attended state schools, even when comparing otherwise similar graduates and allowing for differences in degree subject, university attended and degree classification. Moreover, these differences persist within occupations, with private school graduates earning 6% more than their state school compatriots in the same occupations.

These findings complement those of Macmillan et al. (2013), who found that graduates from private schools were more likely to enter “high status” occupations. Together, these results suggest that there remains a challenge for policymakers interested in the role of higher education as a route to social mobility. While these data only provide an early indication of the extent to which graduates’ earnings differ by family background, they may be indicative of a longer-term relationship between socio-economic background and graduates’ labour market success. Future research could usefully explore whether this is the case.

The models that we estimate do not necessarily produce causal estimates of the ‘private school premium’, as we may not be fully capturing the selection of individuals from different backgrounds into different types of schools. Nonetheless, estimates of earnings dispersion by socio-economic background are nonetheless informative for policy, since they provide insight into the extent to which socio-economic factors continue to be associated with labour market choices and outcomes, even amongst a group of otherwise similar graduates.

This paper now proceeds as follows: Section 2 briefly discusses previous literature in this area; Sections 3 and 4 describe our methods and data respectively. Section 5 presents our main results, and Section 6 concludes.

Previous Literature

There is a vast literature on the link between socio-economic circumstances during childhood and adulthood – whether measured in terms of income, earnings or social class (e.g. Blanden et al. 2007; Bukodi and Goldthorpe, 2011; Corak, 2013; Ermisch et al. 2012). But there is less evidence on the extent to which these relationships remain once we account for different educational choices (e.g. Blanden et al., 2007). Indeed, although there is considerable evidence of heterogeneity in returns by degree subject, institution and class (e.g. Bratti and Manchini, 2003; Chevalier, 2011, 2014; Chevalier and Conlon, 2003; Feng and Graetz, 2013; Hussain et al., 2009; Walker and Zhu, 2011), there is far less evidence on how graduates' earnings vary by socio-economic background.

This paper contributes to the limited empirical evidence from the UK on the extent to which graduates' labour market outcomes vary by socio-economic background (e.g. Bratti et al., 2008; Macmillan et al., 2013) or school type (e.g. Wright, 1999; Dolton and Vignoles, 2000; Naylor et al., 2002). Our goal is to understand whether, if we were to compare two individuals who went to the same university, studied the same subject and achieved the same degree classification – but who came from different socio-economic backgrounds or attended different schools – would there be any difference in their earnings?

Using data from the 1970 British Cohort Study, Bratti et al. (2008) found very little evidence that the return to a degree varied substantially by socio-economic background, as measured by parental social class. However, studies focusing on differences in graduate earnings on the basis of type of school attended have typically found a significant 'private school premium'. For example, Dolton and Vignoles (2000) evaluated the impact of attending private school some 6 years after graduation amongst those leaving higher education in 1980. They found a private school premium of around 7% for men but an insignificant effect for women. This result held even after controlling for degree subject, institution and degree class. Similarly, Naylor et al. (2002), using data on 1993 graduates and focusing on average occupational earnings (as their data lacked individual wage information) found a 3% wage premium for graduates who had attended a private school, with considerable variation amongst private schools. Indeed their study found that the size of the private school wage premium increased with the level of school fees charged by the school, though not with the average academic performance of the school. These studies focus on graduates leaving education at least 20 years ago, however, so there is a clear need to see whether such differences persist amongst more recent cohorts of graduates.

The most comprehensive study of the role of private education in conferring economic advantage in the labour market in the UK has been conducted by Green et al. (2012). They consider how the private sector wage premium has changed over time, by comparing differences in earnings for a cohort born in 1958 (using the National Child Development Study) to those for a cohort born in 1970 (using the British Cohort Study). Their work found a substantial increase in the private school wage premium from 4% for the earlier cohort to 10% for the later one, even after controlling for education level achieved. The authors conclude that private schooling is playing a significant role in perpetuating social immobility. However, their study does not focus on graduates specifically, nor were they able to control for the type of university education acquired (i.e. degree subject and institution).

Our study is also related to the broader literature on the impact of private schooling in the labour market. For example, Wright (1999) uses data from the British Household Panel Survey to examine differences in the return to a year of schooling, comparing the return to state and private schooling. Wright found significantly larger returns to a year of private schooling, assuming that private schooling is exogenous. When using social class as an instrument for school type he found no significant differences between the return to a year of private or social schooling.

Our work is perhaps most closely related to earlier work by Macmillan et al. (2013) using similar data, who found that, amongst the cohort of graduates leaving university in 2006-07, socio-economic background had an additional influence on occupational status, over and above the impact of degree subject and institution. Specifically, they found that privately educated graduates were around 2.5 percentage points more likely to work in a high status occupation than state educated graduates some 3.5 years after graduation, even if they came from similarly affluent families, had similar education achievement and attended the same university. Here we build on this work by considering the relationship between socio-economic status – including whether or not an individual attended a private school – and earnings, and examine the extent to which differences in earnings are mediated by different occupational choices.

Methods

As outlined above, we are interesting in identifying differences in earnings by socio-economic background amongst graduates. We are unfortunately unable to use an experimental or quasi-experimental approach, so we instead rely on richly specified regression models including higher education institution of study and subject fixed effects, to estimate how graduates' earnings vary amongst similarly qualified individuals. While we have access to information about students' A-level grades, as well as their degree class, we are mindful that our estimates may reflect unmeasured student ability. We follow the lead of Dickson and Harmon (2001) and view our estimates as providing a broader understanding of how the labour market value of different types of education varies, an important policy issue in the UK (Harmon et al., 2003).

We estimate an ordinary least squares regression model of the relationship between graduates' characteristics and their subsequent earnings. Annual earnings (Y) of individual i are hypothesised to be a function of the individual's human capital (H) and social capital (S).

$$\ln Y_{it} = B_1 S_{it} + B_2 H_{it} + \mu_{it}$$

The individual's stock of human capital is measured by their achievement on entry into university, their degree subject, degree classification and the institution they attended, as well as age (as a proxy for previous work experience) and – when using measures of earnings 3.5 years after graduation – an indication of any additional qualifications they achieved following graduation from their first degree. The individual's social capital (S) is proxied by parental occupation, ethnicity, whether they attended a private school and whether they lived (on entry to university) in a neighbourhood with a low level of higher education participation. We additionally account for region and the individual's main activity at the time of the survey (e.g. some individuals are studying at the same time as working).

Our primary interest is in understanding whether there are differences in graduates' earnings by socio-economic background, and if so, how these gaps are attenuated once we allow for other

factors that influence their earnings. Our main focus is on differences in earnings by school type. We therefore start by presenting the results from a model that only controls for the type of school that graduates attended prior to entering university (state vs. private). This is simply an indication of the raw correlation between school type and earnings. We then progressively include the other human and social capital variables discussed above. In our final specification, we additionally include a measure of the graduate's occupation at the time of the survey. We do so in order to investigate the extent to which any differences in earnings that we observe arise as a result of the selection of graduates from different socio-economic backgrounds into different occupations, or whether there remain differences in earnings even conditional on the types of jobs that graduates are doing.

Our main results are estimated on both males and females, but given the literature on gender differences in the graduate labour market (e.g. Machin and Puhani, 2006), the appendix additionally shows the results when we estimate each model separately for males and females.

Each model is estimated at time point $t=1$, 6 months after graduation, and $t=2$, 3.5 years after graduation. There are a number of problems with focusing on earnings 6 months after graduation. Firstly some graduates will be taking a post university gap year, doing casual work or travelling and hence their earnings may not be indicative of their longer run prospects. Secondly, graduates may take an extended period of time to transition into their first 'proper job', particularly in times when the labour market is tight, again suggesting that initial earnings may be misleading. Thirdly, graduates who are higher achieving may go on to do postgraduate studies full-time and hence will be missing from the sample 6 months after graduation from their first degree: indeed we observe that 16% of the sample was in further study at this point. For all these reasons, we particularly emphasise the results from models that use a measure of earnings 3.5 years after graduation.

Data

We use data on a cohort of graduates who completed their first degree at undergraduate level in a UK institution in 2006-07.⁴ The entire cohort was surveyed to capture information about graduates' activity status and gross annual earnings some 6 months after graduation as part of the Destination of Leavers from Higher Education (DLHE) exercise. Approximately 75% of graduates who were invited to take part responded, which is relatively high for this kind of survey. However, fewer graduates provided information on earnings and employment status. In addition, we restrict the sample to those who were UK domiciled when they applied to enter higher education, and who studied full-time for a first degree. Hence the usable sample is more restricted: around 75,000 out of a total of around 210,000 full-time first degree UK-domiciled graduates who responded to the survey provided usable salary information. (Note earnings information was not collected from individuals who reported being self-employed.)

A subset of respondents at 6 months was followed up 3.5 years later (known as the Longitudinal DLHE sample). The response rate amongst those who were invited to take part at 3.5 years was only 44%, hence non-random attrition is potentially a problem. Amongst UK domiciled graduates who studied full-time for a first degree, we have an initial sample of around 35,000 graduates who we observe 3.5 years later, although again the sample for analysis is smaller due

⁴ Note that UK domiciled students who graduate from overseas institutions are not included in the data.

to the lack of usable salary information for some individuals: we observe gross annual earnings for around 24,000 graduates 3.5 years after leaving university.

Individuals who were working part-time at the time of the survey were asked to provide the full time equivalent of their salary, though only 2% of graduates were in part-time employment 3.5 years after graduation. We trim salary data by dropping outliers (the top and bottom 0.05% of the distribution) and use the log of gross annual earnings as the dependent variable in our models.

If we are to understand the extent to which the role of socio-economic background changes over time – as graduates start to settle into their careers – then the representativeness of the Longitudinal DLHE (and hence the comparability of the groups for which earnings information is available at 6 months and 3.5 years) is an important issue. Chevalier (2011) undertook some work to understand the representativeness of the Longitudinal DLHE, comparing the DLHE and Longitudinal DLHE samples. He found both data sets to be relatively consistent for the same cohort, although he highlighted some changes in the way that degree subjects allied to medicine and education were recorded, so some caution is needed when comparing degree subject wage premia across the 6 month and 3.5 year surveys. (This is less relevant for our study, however, since we focus on the role of socio-economic status rather than particular degree subjects.) Further details are also available from Tipping and Taylor (2007).

Table 1 shows the average gross annual earnings of graduates 6 months after leaving university for those in the 2006-07 cohort, split according to whether they were included in the Longitudinal DLHE or not, and whether they responded to the 3.5 year survey. There is a modest difference in earnings between the groups, with those in the Longitudinal DLHE being slightly higher paid. Similarly, comparing the average earnings of those observed in the Longitudinal DLHE at 6 months after graduation vs. 6 months and 3.5 years after graduation suggests a small difference. From this we conclude that the sample of individuals who are both in the Longitudinal DLHE and in employment at 6 months after graduation is a somewhat select and higher achieving sample. Therefore when we draw inferences from our analyses we need to consider that we are analysing a slightly higher earning sample than average.

As outlined above, a key focus of this paper is the extent to which earnings vary according to the socio-economic background of the student. Of particular interest is whether they attended a private school. With this in mind, our main covariate of interest is a dummy variable indicating whether or not the individual attended a private school at age 18, just before they entered higher education. In the Longitudinal DLHE sample, for those with non-missing school type information, around 12% of students graduating from first degrees in 2006-07 attended private schools at age 18. This is consistent with the 13% originating from private schools reported by HESA for England in 2006-07.⁵

In addition to whether the student attended a private school, we also have a measure of the social class of each student's highest earning parent. Unfortunately, we are missing data on both school type and social class for a relatively high proportion of individuals in our sample – around 18% for school type and 27% for social class – hence in addition to accounting for this missing data in our models, we also include a set of dummy variables indicating the quintiles of

⁵ Source: Higher Education Statistics Agency student records.

historical HE participation in the individual's local area. The results (shown in Tables 3 and 4) are striking in that students with missing data on these socio-economic variables have higher earnings than average, indicating that those with missing information are likely to come from more advantaged backgrounds. In future work we will investigate using multiple imputation techniques to 'fill in' this missing data given the limitations of controlling for missing data by including missing data indicators.

In addition to the individual's socio-economic background, we also include controls for region of institution⁶, age of respondent (which we control for linearly) and ethnicity, plus a series of indicators for the human capital of the graduate. Specifically, we control for an overall measure of cognitive achievement on entry to higher education – known as the “tariff” score, created to summarise the student's achievement in post-compulsory education⁷; whether or not the individual entered HE with A levels (the traditional “academic” qualification taken by most university entrants in England) or some other kind of qualification; and their degree classification.⁸ In the models focusing on earnings 3.5 years after graduation, we additionally account for whether or not the individual achieved additional qualifications (and their level) after graduation.

In addition, we know that degree returns vary by subject and to a lesser extent institution (e.g. Chevalier and Conlon, 2003; Chevalier 2011; 2014). We therefore include institution and subject fixed effects, in order to compare individuals studying at the same university for the same subject.⁹

Finally, we include measures of the individual's occupational status at the time of the survey, to investigate the extent to which any differences in earnings that we observe arise because graduates from different types of schools move into different occupations, or whether there remain differences in earnings by school type even conditional on occupation. To do so we include a series of dummy variables indicating the type of work that the graduate is doing, differentiating between managers and senior officials; professional occupations; associate professional and technical occupations; administrative and secretarial occupations; skilled trades occupations; personal service occupations; sales and customer service occupations; process, plant and machine operatives; and elementary occupations.

Results

In this section we show how salary levels 6 months and 3.5 years after graduation vary by socio-economic background, and explore what explains these differences. We focus on how gross

⁶ Salary differentials across regions are large so some control for this would be advisable. However, current region of work may be endogenous to student ability and academic achievement given that graduates are relatively mobile. We therefore control for region of higher education institution as being a more exogenous measure of location. (We do not observe location prior to HE participation.)

⁷ Full details are at: <http://www.ucas.com/how-it-all-works/explore-your-options/entry-requirements/ucas-tariff>.

⁸ UK universities are responsible for awarding their own degrees, with classifications split into five categories: first class (the highest level awarded); 2.1, 2.2, third class and unclassified.

⁹ We use the standard 19 subject area classification provided in the Joint Academic Coding System version 2.0. A full list is available at: http://www.hesa.ac.uk/dox/jacs/IACS_sg.pdf.

annual earnings vary by school type (state vs. private), but additionally comment on differences by parental social class and neighbourhood participation where relevant and of interest.

Figures 1 and 2 present the distribution of gross annual earnings for state and private school students 6 months and 3.5 years after graduation. Table 2a provides some key descriptive statistics based on these distributions. It shows that, 6 months after graduation, those who attended private schools are earning around £22,000 per year, on average, around £3,000 more than the average earned amongst those who attended state schools. These differences are slightly larger for men than for women. These average differences increase over the following three years, such that those who attended private schools (who report earnings 3.5 years after graduation) earn around £4,500 more per year, on average, than those who attended state schools. Again, these differences are larger for men than women, and the gender gap has increased somewhat over time.

It is clear, however, that there is considerable variation around these averages: many state school graduates earn more than their private school counterparts. Indeed, we estimate that around a third of state school students earn more than the median amongst private school students both 6 months and 3.5 years after graduation. It is also interesting to note that the variation in earnings is larger amongst graduates who attended private schools than amongst those amongst those who attended state schools. Moreover, this variation increases over time. This suggests that the premium that appears to arise from attending private school is not automatic: there is more variability in how well graduates from private schools go on to do in the labour market.

As discussed above, the composition of the groups who report earnings at 6 months and 3.5 years are likely to be different. To check whether the pattern of a rising private school premium (and greater variability in earnings) remains if we focus on a group of individuals for whom we observe earnings at both 6 months and 3.5 years, Table 2b reports the overall differences in earnings between those who attended state and private schools for a common sample. As we might expect, earnings are, on average, higher in both periods than they were in Table 2a; however, the pattern of rising inequality remains. This suggests that the increase in the “return” to attending a private school over time is not driven by the changing composition of the groups for which we observe wages and does indeed increase over time. (Of course, this group is not representative of the graduate population as a whole.)

Clearly these results have potential implications for social mobility if socio-economic status is influencing the point at which graduates enter the labour market and the progression they subsequently make. However, these descriptive statistics do not account for academic achievement at school, degree subject, institution and class, and these factors clearly interact to influence earnings. We therefore now go on to explore what proportion of the gap in wages between private and state school students can be explained by other ways in which their human and social capital differs.

Table 3 presents the differences in earnings 6 months after graduation. Column 1 is similar to the raw differences discussed above, showing that, amongst the sample of graduates who are in work 6 months after graduation and report salary information, those who attended private schools earn 12.8% more, on average, than those who attended state schools. Column 2 adds controls for other social capital (background) factors which might differ between those

attending state and private schools and may be correlated with earnings, namely gender, age, ethnicity, region and two other indicators of socio-economic status: parental social class and neighbourhood HE participation rates.

It is clear that these factors explain some, but by no means all, of the difference in earnings between graduates from state and private schools: the average difference falls from 12.8% to 11.7% and remains statistically significant. At the same time, it is interesting to note that all of the other indicators of socio-economic background that we have added to the model are also statistically significant, with graduates from lower social class backgrounds and low participation neighbourhoods earning less, on average, than those from higher socio-economic backgrounds and high participation neighbourhoods. For instance, a graduate from a routine socio-economic background is likely to earn around 5% less, on average, than a graduate from a higher professional background. Similarly, a graduate who comes from one of the 20% lowest participation neighbourhoods earns around 5% less, on average, than a graduate who comes from one of the 20% highest participation neighbourhoods. Interestingly, these differences are much smaller than the gap between private and state school students noted above.

Of course, these stark differences in earnings may be at least partially attributable to the fact that individuals from private schools attended different higher education institutions and studied different degree subjects than their state school counterparts. In Column 3 we add controls for human capital - specifically A-level attainment, degree class and institution and subject fixed effects - in order to assess the extent to which differences in earnings by socio-economic status can be explained by the fact that students from different backgrounds have different attainment and take different routes through university.

It is clear that educational choices and attainment are a key part of the story. Controlling for a student's human capital, the difference in average earnings between graduates who attended state vs. private schools immediately prior to entry falls by around 5 percentage points, but remains reasonably large and significant. This suggests that, even amongst those who graduated from the same universities in the same subjects and who achieved similarly, those who attended private schools still earn around 6.7% more, on average, than those who attended state schools. The same is true for most other indicators of socio-economic background: the differences generally fall, but often remain significantly different from zero, suggesting a continuing link between indicators of socio-economic background at the individual, school and neighbourhood level and subsequent earnings.

Moreover, these relationships do not change if we additionally account for the individual's main activity at the time of the survey (in Column 4). (Some individuals may be working part-time whilst studying, the full-time equivalent salary of which might be lower than if they were in a full-time graduate job. The fact that this makes no difference to our results suggests that the propensity to work whilst studying does not differ between state and private school students, or at least that it does not affect their earnings.)

These results suggest that, 6 months after graduation, once we control for a rich set of factors that might be expected to influence earnings, the relationship between individual and neighbourhood measures of socio-economic status is relatively weak but the relationship between earnings and school type remains strong. The top panel of Appendix Table 1 additionally reports the link between school type and earnings separately for males and females

and suggests that this link is stronger for males than for females, with male private school students earning 8% more, on average, than equivalent male state school students, while the difference for females is 5.5%.

As we have said, however, we might prefer to focus on students' earnings a few years into their career. Table 4 shows the results from a model of earnings 3.5 years after graduation. This sample is smaller since it comes from the Longitudinal DLHE. The advantage, however, is that it will include the earnings of graduates who at 6 months were undertaking postgraduate study and who might have had zero or very low earnings at that point. Column 1 shows the raw differences by school type. As we might have expected from the descriptive statistics, the gap is larger than it was at 6 months, with graduates who attended a private school earning 17.2% more, on average, than graduates who attended a state school some 3.5 years after graduation.

The analysis then proceeds as before, with Column 2 adding other measures of social capital, Column 3 adding measures of human capital and Column 4 accounting for what the individual was doing at the time of the survey. The results follow a similar pattern to those described above, with a reduction in the link between school type and earnings once we account for other ways in which these individuals differ from each other, and a larger reduction once we account for their routes into and through university. Interestingly, however, although the raw difference in earnings between graduates who attended state vs. private schools was larger 3.5 years after graduation than it was at 6 months, the difference after accounting for other differences in human and social capital is similar, with those who attended private schools earnings 6.8% more, on average, 3.5 years after graduation than those who attended state school (compared to 6.7% 6 months after graduation). This suggests that the "return" to private schooling is relatively constant over time (or that the unobserved factors that are correlated with the decision to attend a private school exhibit a relatively constant relationship with earnings).

Some individuals may have undertaken further study since graduating from university, so Column 5 of our 3.5 year analysis additionally accounts for any additional qualifications that the individual obtained since graduation, including postgraduate and professional qualifications. As we might expect, we find that those who studied for postgraduate qualifications earn less than those who did not – most likely because the effect of additional work experience outweighs the additional benefit from attaining a higher qualification at this early stage of graduate careers. Accounting for these additional qualifications makes relatively little difference to our estimates of the 'private school premium', however, suggesting that the likelihood of undertaking further study does not differ significantly between graduates from state and private school backgrounds (or at least not in a way which significantly affects their earnings).

Even once we account for a rich set of ways in which graduates from state and private school backgrounds differ from each other, however, we still find evidence of significant differences in earnings by school type – of around 7% on average – both 6 months and 3.5 years after graduation. Moreover, these differences are larger for men than for women, with the gender gap having widened over time. For example, as we saw above, 6 months after graduation, male graduates who attended private schools earned around 8% more than male graduates who attended state schools prior to entry, while the equivalent difference for female graduates was 5.5%. By the time of the 3.5 year survey, these differences were 9.2% for males and 4.6% for females, suggesting a divergence in the predictive power of an individual's socio-economic background for men and women during the early parts of their careers.

The differences in earnings 3.5 years after graduation are particularly important given that our previous analysis of average salaries indicated that those in this more restricted Longitudinal DLHE sample are likely to be higher earners and hence on average less socio-economically disadvantaged. It is perhaps particularly surprising that a 'private school premium' exists even amongst this relatively advantaged sample.

Previous research (e.g. Macmillan et al., 2013) has suggested that private school students are more likely to enter "high status" occupations than their state school counterparts. To explore whether the differences in earnings that we observe arise because of differential selection of individuals from different backgrounds into different occupations (which are higher or lower paid), or whether there are differences in earnings even within occupation, we include – in Column 5 of Table 3 for earnings at 6 months and Column 6 of Table 4 for earnings at 3.5 years – controls for individual's occupation at the time of the survey.

In both cases, this reduces the 'private school premium' by around 1 percentage point, suggesting that the selection of individuals from different types of schools into different occupations plays a marginal role in explaining why they go on to have different earnings. But this is clearly not the whole story: the difference in earnings between those educated in state as compared to private schools within occupations remains large and significant. This suggests that the channelling of private school students into high status professions is not the main reason why they earn more than their state school counterparts on average. Instead, similarly qualified state and private school graduates who enter the same occupations seem to earn different salaries. Our results suggest that those who attended private schools earn around 6% more per year, on average, than those who attended state schools. This is equivalent to around £1,500 per year in our data.

There are many reasons why we might expect graduates who were privately educated to earn more, including access to particular social networks or having better non-cognitive skills (confidence, self-esteem, etc). Macmillan et al. (2013) did not find supporting evidence for social networks being a major reason why privately educated workers were more likely to enter high status occupations, though they acknowledge that measuring individuals' use of networks is particularly challenging. It is possible, however, that they may play a larger role in explaining wages within occupations. Whilst there is much speculation about whether private schools do inculcate better non-cognitive skills in children there is, to our knowledge, no robust evidence on whether this is the case. This is clearly a candidate for future research.

An alternative explanation is that private schools improve the *cognitive* skills of their students in ways that are not captured by measures such as A level grades or degree class and that it is these stronger cognitive skills that are driving our findings. There may also be unobservable differences in the characteristics of households that matter for subsequent earnings. For example, wealthier families that also place greater emphasis on education are more likely to enrol their children in private school and may also invest more in their children in other ways that boost their cognitive and non-cognitive skills. It could therefore be family investments, not measured in our model, that explain our result. Again future research might usefully focus on distinguishing between these alternative explanations.

Conclusions

This paper has examined the link between socio-economic background – particularly whether or not the individual attended a private school prior to university – and earnings 6 months and 3.5 years after graduation. Taken together, our results imply that university does not entirely level the playing field across students from different socio-economic backgrounds. Some (small) earnings differences persist across students from different occupational classes and areas with different levels of higher education participation, even after controlling for a range of factors designed to capture differences in human and social capital, including degree subject, institution and degree class. However, there remain large and significant differences in early career earnings amongst graduates on the basis of whether the student attended a private school prior to entering university.

The raw differences are large: we find that, 3.5 years after leaving university, graduates who attended private schools earn 17% more per year, on average, than those who attended state schools. Some of the ‘private school premium’ appears to arise from the fact that these students have higher achievement prior to entering university and are more likely to attend institutions and study subjects which elicit high wage returns, as the differences in earnings fall once we account for these factors. However, attending a private school continues to be associated with economic advantage, even when comparing students with very similar academic backgrounds. Moreover, this pattern holds even when comparing private and state school educated graduates within the same occupation, suggesting that the selection of private school graduates into higher status occupations plays only a marginal role in explaining why they earn more 6 months and 3.5 years after graduation.

Even once we account for differences in a range of human and social capital measures – and occupation – there remains a significant ‘private school premium’ of around 6%: this is approximately equal to some estimates of the value of a year of schooling (e.g. Blundell et al., 2005). This is clearly of great policy relevance: the existence of a private school earnings premium for graduates has clear implications for social mobility. Private schooling not only appears to provide better access to elite universities by ensuring that pupils have higher academic attainment but also provides an economic advantage after graduation. Hence even a university education fails to level the playing field.

So what is the explanation for this apparent private school effect? One possible explanation is that the variable indicating whether the student attended a private school is a proxy for some unobserved characteristic of the student that is correlated with earnings. Such unobserved characteristics may include ability, social skills, determination or indeed a range of other skills not properly measured in our model. We also note that whilst our model controls for overall summary measures of prior achievement, we cannot control for differences in achievement in particular subjects and grades. Hence it may be that private school students are more likely to take (or score well in) subjects that continue to give them a labour market advantage after graduation. Of course an alternative explanation is that private schooling provides access to social and cultural capital (e.g. networks) which are helpful to individuals in securing well paid jobs; although Macmillan et al. (2013) suggest that this is not a major factor in the selection of privately educated individuals into higher status occupations. This issue therefore merits further research on the role of private schooling in the education system and indeed the labour market.

Naturally our work comes with some caveats. We do have missing data on some of our variables measuring socio-economic status. An additional issue is that our measure of prior attainment may not be sufficient to capture all the ability and other differences across students who take different subjects and qualifications. If this is the case, we may not be modelling the 'value added' by universities in an adequate way. Our measure of prior attainment is, we would argue, reasonably high quality but the analysis could be made more robust by using more detailed prior qualification data. Administrative data containing detailed information on prior achievement – including on different subjects, grades and qualifications – has just been linked to the DLHE data that we use, and we would recommend that future work makes use of this linked data to explore this issue further.

References

- Blanden J., P. Gregg and L. Macmillan (2007), Accounting for Intergenerational Income Persistence: Noncognitive Skills, Ability and Education, *Economic Journal*, Vol. 117 pp. C43-C60.
- Blundell, R., L. Dearden and B. Sianesi (2005), Evaluating the effect of education on earnings: models, methods and results from the National Child Development Survey, *Journal of the Royal Statistical Society: Series A*, Vol. 168, pp. 473-512.
- Bratti, M. and L. Manichini (2003), *Differences in early occupational earnings of UK male graduates by degree subject: Evidence from the 1980–1993 USR*, IZA Discussion Paper 890.
- Bratti, M., R. Naylor and J. Smith (2008), *Heterogeneities in the returns to degrees: evidence from the British Cohort Study 1970*, Departmental Working Papers 2008-40, Department of Economics, Management and Quantitative Methods at Università degli Studi di Milano.
- Bukodi, E. and J. H. Goldthorpe (2011), Class Origins, Education and Occupational Attainment in Britain, *European Societies*, Vol. 13, pp. 347–375.
- Cabinet Office (2011), *Opening Doors, Breaking Barriers: A Strategy for Social Mobility*, London: Information Policy Team.
- Chevalier, A (2011), Subject Choice and Earnings of UK Graduates, *Economics of Education Review*, Vol. 30, pp. 1187-1201.
- Chevalier, A. (2014), *Does higher education quality matter in the UK?*, IZA Discussion Paper 8363.
- Chevalier, A. and G. Conlon (2003), *Does it Pay to Attend a Prestigious University?*, Centre for Economic Performance Working Paper, London School of Economics.
- Corak, M. (2013), Income equality, equality of opportunity, and intergenerational mobility, *Journal of Economic Perspectives*, Vol. 27, pp. 79 – 102.
- Devine, F. and Y. Li (2013), The changing relationship between origins, education and destinations in the 1990s and 2000s, *British Journal of Sociology of Education*, Vol. 34, pp. 766-791.
- Dickson, M. and C. Harmon (2011), Economic returns to education: what we know, what we don't know and where we are going – some brief pointers, *Economics of Education Review*, Vol. 30, pp.1118-1122.
- Dolton, P. and A. Vignoles (2000), The incidence and effects of overeducation in the UK graduate labour market, *Economics of Education Review*, Vol. 19, pp. 179–198.
- Ermisch, J., M. Jantti and T. Smeeding (2012), *The Intergenerational Transmissions of Advantage*, New York: Russell Sage Foundation.
- Feng, A. and G. Graetz (2013), *A question of degree: the effects of degree class on labour market outcomes*, CEP Discussion Paper No. 1221, London School of Economics.
- Green, F., S. Machin, R. Murphy and Y. Zhu (2012), The changing economic advantage from private schools, *Economica*, Vol. 79, pp. 658-679.

- Harmon, C. P., V. Hogan and I. Walker (2003a), Dispersion in the economic return to schooling, *Labour Economics*, Vol. 10, pp. 205–214.
- Harmon, C. P., H. Oosterbeek and I. Walker (2003b), The returns to education: Microeconomics, *Journal of Economic Surveys*, Vol. 17, pp. 115–155.
- Hussain, I., S. McNally and S. Telhaj (2009), *University quality and graduate wages in the UK*, CEP Discussion Paper, No. 99, London School of Economics.
- Machin, S. and P. Puhani (2006), *The contribution of degree subject to the gender wage gap for graduates: A comparison of Britain, France and Germany*, Report to the Anglo-German Foundation.
- Macmillan, M., C. Tyler and A. Vignoles (2013), *Who gets the Top Jobs? The role of family background and networks in recent graduates' access to high status professions*, Institute of Education, Department of Quantitative Social Science Working Paper No. 13-15.
- Naylor, R., J. Smith and A. McKnight (2002), Why is there a graduate earnings premium for students from independent schools?, *Bulletin of Economic Research*, Vol. 54, pp. 315-339.
- Tipping, S. and R. Taylor (2007), *Destination of Leavers from Higher Education Longitudinal Survey 2002/3 Cohort: assessment of robustness and fitness for purpose*, Higher Education Statistics Agency.
- Walker, I. and Y. Zhu (2011), Differences by degree: Evidence of the net financial rates of return to undergraduate studies for England and Wales, *Economics of Education Review*, Vol. 30, pp. 1177–1186.
- Wright, R. (1999), *The rate of return to private schooling*, IZA Discussion Paper 92.

TABLES AND FIGURES

Table 1: Gross annual earnings 6 months after graduation

| | Salary (£) | Std dev | Sample |
|--|------------|---------|--------|
| Not in Longitudinal DLHE (LDLHE) | £19,796 | £6,622 | 62,318 |
| In LDLHE at 6 months after graduation | £20,257 | £6,652 | 11,880 |
| In LDLHE at 6 mths <i>and</i> 3.5 years after graduation | £20,381 | £6,578 | 9,228 |

Source: Longitudinal DLHE 2006/7 and DLHE 2006/7

Table 2a: Gross annual earnings at 6 months and 3.5 years, by school type

| | | Salary at 6 months | | Salary at 3.5 years | |
|---------|---------------|-----------------------|---------------------|-----------------------|---------------------|
| | | <i>Private school</i> | <i>State school</i> | <i>Private school</i> | <i>State school</i> |
| Overall | <i>mean</i> | £21,643 | £18,919 | £28,592 | £24,044 |
| | <i>median</i> | £20,000 | £18,000 | £26,665 | £23,295 |
| | <i>sd</i> | £6,976 | £5,849 | £11,673 | £9,647 |
| | <i>N</i> | 6,800 | 53,299 | 2,254 | 17,467 |
| Females | <i>mean</i> | £20,436 | £18,259 | £26,316 | £22,861 |
| | <i>median</i> | £20,000 | £18,000 | £25,000 | £22,350 |
| | <i>sd</i> | £6,226 | £5,306 | £10,130 | £8,523 |
| | <i>N</i> | 3,592 | 31,889 | 1,177 | 10,329 |
| Males | <i>mean</i> | £22,996 | £19,903 | £31,078 | £25,755 |
| | <i>median</i> | £22,000 | £19,000 | £29,000 | £25,000 |
| | <i>sd</i> | £7,503 | £6,452 | £12,700 | £10,849 |
| | <i>N</i> | 3,208 | 21,410 | 1,077 | 7,138 |

Source: Longitudinal DLHE 2006-07.

Table 2b: Gross annual earnings at 6 months and 3.5 years for those for whom we observe earnings at both time points, by school type

| | | Salary at 6 months | | Salary at 3.5 years | |
|---------|---------------|-----------------------|---------------------|-----------------------|---------------------|
| | | <i>Private school</i> | <i>State school</i> | <i>Private school</i> | <i>State school</i> |
| Overall | <i>mean</i> | £22,281 | £19,459 | £31,423 | £26,175 |
| | <i>median</i> | £22,000 | £19,000 | £29,000 | £25,000 |
| | <i>sd</i> | £6,787 | £5,866 | £12,698 | £9,661 |
| | <i>N</i> | 865 | 6,752 | 865 | 6,752 |

Table 3: Determinants of gross annual earnings at 6 months

| | Private school dummy only | Plus background controls | Plus prior attainment | Plus activity at time of survey | Plus occupation |
|---|---------------------------|--------------------------|-----------------------|---------------------------------|----------------------|
| Attended private school | 0.128*** [0.010] | 0.117*** [0.007] | 0.067*** [0.006] | 0.067*** [0.006] | 0.058*** [0.006] |
| School type missing | 0.035 [0.029] | -0.080*** [0.012] | -0.021** [0.009] | -0.021** [0.009] | -0.019** [0.008] |
| Lower managerial and professional | | -0.018*** [0.004] | -0.001 [0.003] | -0.001 [0.003] | -0.000 [0.003] |
| Intermediate | | -0.024*** [0.005] | -0.004 [0.004] | -0.004 [0.004] | 0.001 [0.004] |
| Small employers | | -0.034*** [0.007] | -0.012** [0.006] | -0.013** [0.006] | -0.010* [0.005] |
| Lower supervisory and technical | | -0.031*** [0.008] | -0.005 [0.007] | -0.005 [0.007] | 0.004 [0.006] |
| Semi-routine | | -0.056*** [0.007] | -0.029*** [0.005] | -0.029*** [0.005] | -0.026*** [0.005] |
| Routine | | -0.052*** [0.008] | -0.021*** [0.006] | -0.021*** [0.006] | -0.016** [0.006] |
| Unemployed | | -0.041 [0.036] | 0.001 [0.030] | 0.002 [0.030] | 0.022 [0.026] |
| Missing social class | | 0.022** [0.009] | 0.024*** [0.006] | 0.024*** [0.006] | 0.024*** [0.005] |
| Bottom 20% participation neighbourhood | | -0.051*** [0.007] | -0.028*** [0.005] | -0.028*** [0.005] | -0.023*** [0.005] |
| 2 nd quintile participation neighbourhood | | -0.040*** [0.005] | -0.019*** [0.004] | -0.019*** [0.004] | -0.017*** [0.004] |
| 3 rd quintile participation neighbourhood | | -0.032*** [0.005] | -0.014*** [0.004] | -0.014*** [0.004] | -0.012*** [0.003] |
| 4 th quintile participation neighbourhood | | -0.022*** [0.004] | -0.010*** [0.003] | -0.010*** [0.003] | -0.009*** [0.003] |
| Low participation data missing | | 0.078*** [0.027] | 0.057*** [0.015] | 0.056*** [0.015] | 0.052*** [0.013] |
| Controls | | | | | |
| Parents' social class; neighbourhood participation rate; gender; age; ethnicity; region | | √ | √ | √ | √ |
| institution fixed effects; degree subject; degree class; A-level attainment | | | √ | √ | √ |
| Studying for a postgraduate or professional qualification at time of survey | | | | √ | √ |
| Individual social class at time of survey | | | | | √ |
| Sample size | 74,198 | 74,188 | 74,188 | 74,188 | 74,188 |
| Adjusted R squared | 0.047 | 0.163 | 0.298 | 0.299 | 0.426 |

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the higher education institution level and are shown in square brackets.

Table 4: Determinants of gross annual earnings at 3.5 years

| | Private school dummy only | Plus background controls | Plus prior attainment | Plus activity at time of survey | Plus attainment since first degree | Plus occupation |
|--|---------------------------|--------------------------|-----------------------|---------------------------------|------------------------------------|----------------------|
| Attended private school | 0.172*** [0.017] | 0.127*** [0.014] | 0.068*** [0.013] | 0.068*** [0.012] | 0.071*** [0.012] | 0.060*** [0.011] |
| School type missing | -0.116*** [0.022] | -0.101*** [0.019] | -0.033* [0.017] | -0.030* [0.017] | -0.032* [0.017] | -0.027* [0.015] |
| Lower managerial and professional | | -0.020* [0.010] | -0.003 [0.010] | -0.002 [0.009] | -0.003 [0.010] | -0.004 [0.008] |
| Intermediate | | -0.011 [0.011] | 0.015 [0.010] | 0.018* [0.010] | 0.016 [0.010] | 0.014 [0.010] |
| Small employers | | -0.049*** [0.013] | -0.016 [0.011] | -0.015 [0.011] | -0.015 [0.011] | -0.009 [0.011] |
| Lower supervisory and technical | | -0.040** [0.017] | -0.007 [0.017] | -0.008 [0.017] | -0.011 [0.016] | -0.004 [0.015] |
| Semi-routine | | -0.059*** [0.012] | -0.026** [0.011] | -0.025** [0.011] | -0.026** [0.011] | -0.017 [0.011] |
| Routine | | -0.086*** [0.016] | -0.031** [0.014] | -0.031** [0.014] | -0.033** [0.014] | -0.021 [0.013] |
| Unemployed | | -0.218*** [0.082] | -0.119 [0.075] | -0.120 [0.075] | -0.123 [0.074] | -0.052 [0.061] |
| Missing social class | | -0.017 [0.013] | -0.001 [0.012] | -0.001 [0.012] | -0.003 [0.012] | 0.002 [0.011] |
| Bottom 20% participation neighbourhood | | -0.064*** [0.013] | -0.029** [0.012] | -0.029** [0.012] | -0.030** [0.012] | -0.024** [0.011] |
| 2 nd quintile participation neighbourhood | | -0.067*** [0.010] | -0.035*** [0.009] | -0.035*** [0.009] | -0.036*** [0.008] | -0.026*** [0.008] |
| 3 rd quintile participation neighbourhood | | -0.040*** [0.009] | -0.022** [0.009] | -0.023*** [0.008] | -0.024*** [0.008] | -0.020** [0.008] |
| 4 th quintile participation neighbourhood | | -0.032*** [0.008] | -0.020*** [0.007] | -0.020*** [0.007] | -0.021*** [0.007] | -0.017*** [0.006] |
| Low participation data missing | | 0.150*** [0.056] | 0.075* [0.038] | 0.071* [0.039] | 0.068* [0.039] | 0.073** [0.037] |
| Controls | | | | | | |
| Parents' social class; neighbourhood participation; gender; age; ethnicity; region | | √ | √ | √ | √ | √ |
| institution fixed effects; degree subject; degree class; A-level attainment | | | √ | √ | √ | √ |
| Studying for a postgrad. or professional qual. at time of survey | | | | √ | √ | √ |
| Qualifications attained since graduation | | | | | √ | √ |
| Individual social class at time of survey | | | | | | √ |
| Sample size | 23,582 | 23,574 | 23,574 | 23,574 | 23,574 | 23,574 |
| Adjusted R squared | 0.016 | 0.062 | 0.190 | 0.205 | 0.210 | 0.303 |

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the higher education institution level and are shown in square brackets.

Figure 1: gross annual earnings 6 months after graduation, by school type

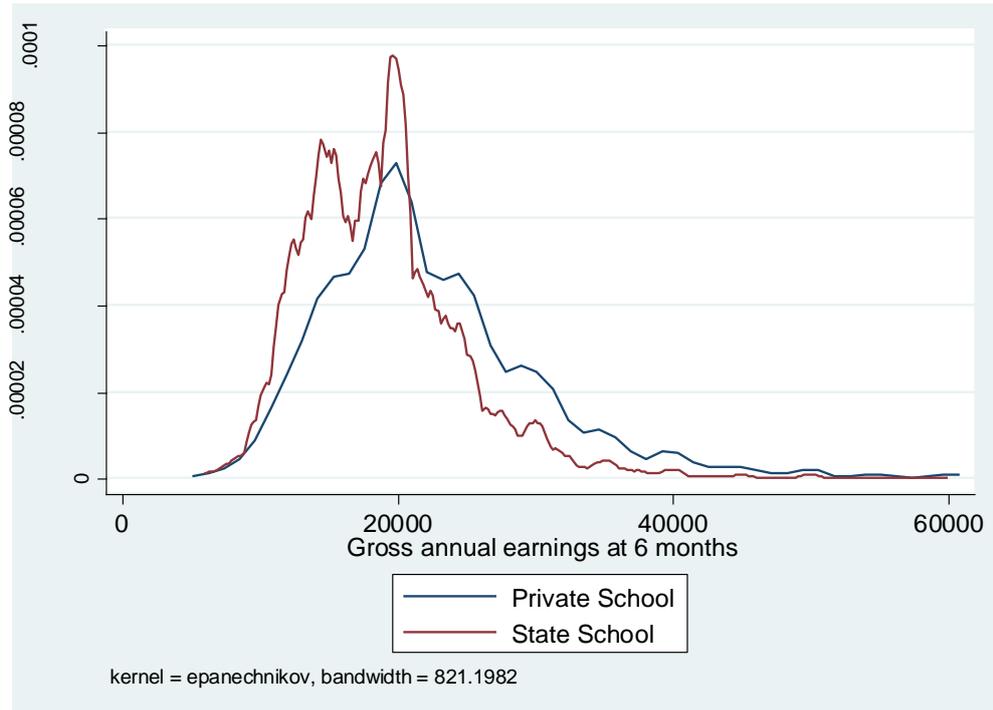
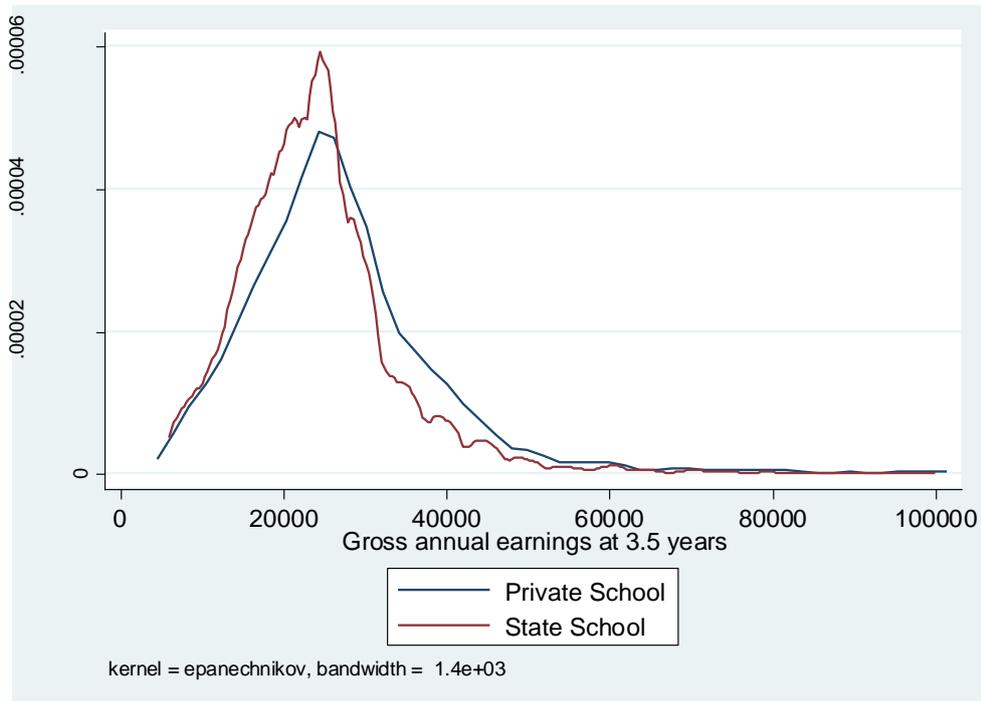


Figure 2: gross annual earnings 3.5 years after graduation, by school type



Appendix

Appendix Table 1: Regression results: salary at 6 months and 3.5 years, by gender

| | Private school dummy only | Plus background controls | Plus prior attainment | Plus activity at time of survey | Plus attainment since first degree | Plus occupation |
|--|---------------------------|--------------------------|-----------------------|---------------------------------|------------------------------------|---------------------|
| Salary at 6 months | | | | | | |
| Males | | | | | | |
| Attended private school | 0.140*** [0.011] | 0.134*** [0.009] | 0.080*** [0.007] | 0.080*** [0.007] | N/A | 0.067*** [0.007] |
| School type missing | 0.039 [0.041] | -0.090*** [0.016] | -0.028** [0.011] | -0.028** [0.011] | N/A | -0.024** [0.010] |
| Sample size | 30,255 | 30,248 | 30,248 | 30,248 | | 30,248 |
| Adjusted R squared | 0.052 | 0.144 | 0.304 | 0.306 | | 0.419 |
| Females | | | | | | |
| Attended private school | 0.107*** [0.011] | 0.103*** [0.008] | 0.055*** [0.009] | 0.055*** [0.009] | N/A | 0.049*** [0.009] |
| School type missing | 0.046** [0.021] | -0.072*** [0.012] | -0.014 [0.011] | -0.014 [0.011] | N/A | -0.014 [0.010] |
| Sample size | 43,943 | 43,940 | 43,940 | 43,940 | | 43,940 |
| Adjusted R squared | 0.044 | 0.153 | 0.282 | 0.283 | | 0.424 |
| Salary at 3.5 years | | | | | | |
| Males | | | | | | |
| Attended private school | 0.192*** [0.024] | 0.148*** [0.021] | 0.091*** [0.020] | 0.092*** [0.020] | 0.091*** [0.019] | 0.080*** [0.018] |
| School type missing | -0.116*** [0.043] | -0.117*** [0.030] | -0.050* [0.027] | -0.047* [0.026] | -0.046* [0.026] | -0.043* [0.024] |
| Sample size | 9,667 | 9,663 | 9,663 | 9,663 | 9,663 | 9,663 |
| Adjusted R squared | 0.021 | 0.062 | 0.221 | 0.233 | 0.238 | 0.325 |
| Females | | | | | | |
| Attended private school | 0.141*** [0.016] | 0.108*** [0.014] | 0.046*** [0.012] | 0.046*** [0.012] | 0.051*** [0.011] | 0.041*** [0.011] |
| School type missing | -0.090*** [0.019] | -0.087*** [0.020] | -0.012 [0.017] | -0.010 [0.017] | -0.014 [0.016] | -0.009 [0.015] |
| Sample size | 13,915 | 13,911 | 13,911 | 13,911 | 13,911 | 13,911 |
| Adjusted R squared | 0.011 | 0.034 | 0.153 | 0.170 | 0.177 | 0.277 |
| Controls | | | | | | |
| Parents' social class; neighbourhood participation; gender; age; ethnicity; region | | √ | √ | √ | √ | √ |
| institution fixed effects; degree subject; degree class; A-level attainment | | | √ | √ | √ | √ |
| Studying for a postgrad. or professional qual. at time of survey | | | | √ | √ | √ |
| Qualifications attained since graduation | | | | | √ | √ |
| Individual social class at time of survey | | | | | | √ |

Notes: *** indicates significance at the 1% level; ** at the 5% level; * at the 10% level. Standard errors are clustered at the higher education institution level and are shown in square brackets.