THE SOCIOECONOMIC RETURN TO PRIMARY SCHOOLING IN VICTORIAN ENGLAND

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In this paper I provide a micro-level analysis of primary schooling in Victorian England. Using a new dataset of school-age males linked between the 1851 and 1881 population censuses, I examine the determinants of childhood school attendance and the impact of attendance on adult labor market outcomes. I find that schooling had a positive effect on adult occupational class and that the associated wage gains were likely to have outweighed the cost of schooling. However, this effect was small relative to father's class, and the effect of education on earnings appears to have been small relative to modern results.

Education and human capital investment are topics of longstanding interest in the economic history of Victorian and Edwardian England. The literature is particularly rich in macro-level analyses of the English educational system, with an emphasis on primary schooling and advanced technical education. Landes (1969), Mathias (1983), and Crouzet (1982), for example, all assess the quantity and quality of educational provision in nineteenth-century England and conclude that underinvestment was a key ingredient in Britain's growth slowdown relative to the more dynamic economies of the U.S. and Germany. More recently, the low relative levels of both primary and secondary schooling in England before the Education Act of 1870 have been called "the greatest anomaly in global nineteenth century educational history" (Lindert, 2000). Not all take a negative view. Pollard (1989), for example, while acknowledging low enrollment levels, downplays the supposed inferiority of English education to the German system. Historians such as Hurt (1971), Sutherland (1971), and West (1970; 1975) are far more optimistic in their appraisal of English elementary education than were earlier scholars like Birchenough (1938) and Curtis (1967). West (1975, p. 42), for example, points to rising literacy rates before 1870: marriage registries indicate that the percentage of grooms signing their name at marriage increased from 67.3 percent in 1841 to 80.6 percent in 1871.

Given the important role that education is widely regarded to have played in the growth experiences of the nineteenth and twentieth centuries' leading economies, it is perhaps surprising how little has been done to analyze schooling at the micro-level of the individual student or household before the twentieth century. This omission is particularly striking considering the central place that education studies have come to hold in the modern labor economics literature.[1] Clearly, education plays an important role in the economics of growth and in the functioning of labor markets, currently and historically. Data limitations

[1] For a survey of this vast literature, see Card (1999).

must largely account for this gap. The sort of survey or panel data which modern labor and development economists use to estimate the return to education simply does not exist for most times and places before the twentieth century. For nineteenth-century England, the most relevant work on this topic has been done by Mitch (1984; 1992), who uses marriage registries to measure the effect of literacy on occupational mobility. He finds a positive association between signature ability and upward occupational mobility, indicating a positive occupational premium to literacy. Subsequent work provides some evidence that the effect may have been stronger in rural than in urban areas (Mitch, 2005). These are valuable results on the socioeconomic effect of literacy that are certainly indicative of the return to education, but of course literacy and schooling, even primary schooling, are not synonymous. It was entirely possible to attend some school yet not acquire literacy or to acquire literacy outside of school from a literate parent or other adult. Furthermore, schooling was thought to impart socializing attributes such as willingness to accept discipline and structured workdays that themselves may have conveyed advantages in the labor market.

In this paper, I use new nationally representative panel data from England in the second half of the nineteenth century to assess the determinants of childhood primary school attendance and to estimate the effect of primary schooling on adult labor market outcomes. I do not directly address the contentious issue of England's potential underinvestment in human capital; rather, I aim to assess the quality of English primary education and its role in the labor market by analyzing the return to education at an individual level. I find that family background exerted a large influence on the probability of attendance. For example, sons of fathers with high-class occupations were more likely to attend school, and to attend at a later age, as were sons of working mothers. The opportunity cost of foregone labor, especially within the home, was also an important consideration. As for the effect of school attendance, the results indicate that it conveyed real, substantive economic benefits to adult participants in the labor market that outweighed the total costs of childhood attendance. At the same time, the magnitude of the effect, while non-trivial, appears to have been small in two important dimensions. First, the effect of education was markedly smaller than the effect of several other important variables; father's socioeconomic status, in particular, had a significantly greater influence on adult socioeconomic status than did primary school attendance. Second, though the comparability of the results is tenuous, the measured return to primary education appears to be smaller than typical estimates of the returns to education in the modern labor and development economics literature.

PRIMARY SCHOOLING IN NINETEENTH-CENTURY ENGLAND

Long before the role of mass primary education in England's economic growth became an important topic for twentieth-century economic historians, it was a matter of great concern for contemporary thinkers and policy makers. At issue was the education gap opening up between England on the one hand and the U.S. and Germany on the other. England was decades behind the United States in the establishment of a national system of primary education, and even further behind in achieving high rates of school attendance and literacy. The gap relative to Germany was greater. Prussia established compulsory education in 1763, more than a century before England. By 1860, 97.5 percent of all German children between the ages of 6 and 14 attended school; in England, only half of 6-14 year olds were in school in 1851.[2] Not until the Education Act of 1870 did England create its own national system of universal elementary education. Prior to that, school attendance in England was strictly voluntary; a combination of private enterprise, limited public funding, religious organizations, and miscellaneous philanthropy provided elementary schooling to those who wanted it. Nationalized education was delayed by a strong tendency in policy-making circles toward the market provision of goods and services, by the debate over the advisability of educating the lower-class masses, and especially by rancorous disagreement over the religious content of elementary education.[3]

Even in the national educational systems of today, quality varies across schools; in Victorian England's informal system, the variation was tremendous. Public schools, which received a portion of their income from a source other than student fees and were subject to oversight from funding bodies, varied less than did private schools. Because of their endowments, public schools cost less to attend and spent on average 48 percent more per student than private schools (Mitch, 1992, p. 144). Table I shows the number of schools and students by source of funding, and Table II gives an indication of the variation in curricula between schools. Reading, writing, and arithmetic were dominant, but other subjects were also taught – more than a third of English elementary schools taught English grammar and geography, for instance. Comparing subject coverage indicates that the average public school elementary education was probably superior to the average private education. Nearly all public schools taught writing, compared with just over half of private schools. The gaps in arithmetic, grammar, and geography were also large.

[2] The German figure is from Crouzet (1982, p. 415). The British figure is calculated from a publicly available two percent sample of the 1851 Census. The lag persisted into the twentieth century (Easterlin, 1981, p. 18).

[3] For a concise summary of this complex issue, see Sutherland (1971).

Attending school was not necessarily easy or cheap. Availability varied greatly, particularly between rural and urban areas; a school was more likely to be nearby in populous Lancashire (2.5 schools per 1000 acres) than in rural Northumberland (0.5 per 1000 acres), for example. In a time before motor vehicles, a distance of several miles could have precluded school attendance. At the same time, urban areas tended to have fewer schools relative to population size, so a spot in a reasonable sized class was not guaranteed even if a school was nearby. Cost was another barrier to school attendance.[4] Fees themselves, which ranged from about one to eight pence per week, were not prohibitive. Even low wage agricultural laborers earned between 9 and 15 shillings per week, and skilled laborers typically earned 20-30 shillings. The more substantial cost was foregone wages. According to the Newcastle Commission Report on Popular Education in 1861, child wages in England in the 1850s ranged from two to four shillings per week, much greater than school fees. Children also contributed to the home economy by doing chores and caring for siblings. After the 1870s, compulsory schooling laws dramatically changed the cost benefit analysis; before then, many households decided that the costs were too great and opted not to send their children to school.

At precisely which ages and for how long children went to school is not known exactly. The censuses reveal which children were in school, but they give no information on enrollment prior to enumeration. Figure I shows the age/attendance profile at mid-century according to the 1851 census. Probability of attendance peaks at age 8 and declines steeply after age 11. Taking the area under the attendance probability curve indicates that the average child would be in school for approximately five years, though of course these might not be complete years. The Newcastle Commission also found that the majority of students were enrolled from the ages of six to ten, though a substantial minority began at five and many remained until twelve (West, 1975, pp. 82, 97). What the students typically studied at each age was by no means standardized. However, the general goal for a well-educated primary student was to reach the "first class." Different school evaluators defined the first class differently. For one typical school inspector, the first class student would be able "to read a page of natural history – about an elephant, a cotton tree, or a crocodile – with tolerable fluency…would name the counties of an unlettered map of England, and…would work a sum in compound addition – two thirds of them without mistake" (Newcastle Report, pp. 234-5). Many students did not reach this level; in Cheshire, Salop, and Stafford, only between 20 and 30 percent did (Newcastle Report, p. 245). It was generally accepted that fairly extended schooling, until at

[4] The following wage and school fee information are from Mitch (1992, ch. 7 and pp. 202-204).

least age 10 and preferably to 11 or 12, was required to reach this level (Newcastle Report, p. 238).

Analyzing Schooling with Linked Census Data

In order to estimate the return to education, it is necessary to observe both the schooling decisions and the labor market outcomes of individuals. A new data set of 28,000 males linked from the 1851 to the 1881 Census of the Population of England and Wales provides the longitudinal information to observe the schooling outcomes of children and their subsequent adult labor market outcomes. Individuals are nominally linked between the two censuses by first and last name and parish and year of birth—responses which should be constant across censuses. These data have been used elsewhere to examine patterns of geographic mobility within Britain (Long, 2005; Long and Ferrie, 2004). They are equally well suited to examining patterns of socioeconomic mobility. The present study uses only the 5,337 school-aged males – those between the ages of 6 and 13 in 1851.[5] The two central pieces of information from the data are schooling in 1851 and labor market outcome in 1881. Both are reported in the occupation field of the censuses. Parents were to record their children as "scholars" if they were receiving formal education. Of all the Victorian censuses, the 1851 enumerators' instructions were the clearest and most specific, and as a result, the information on school attendance from that census is more useful than from any other nineteenth-century census. In 1851, parents were to report their children as scholars if they were older than five and were "daily attending school, or receiving regular tuition under a master or governess at home." Unlike later definitions, this one excluded children taught by a parent and, critically, those whose only education came from Sunday schools, allowing attention to be restricted to children receiving a regular elementary education. The instructions were not followed faultlessly, and the pool of scholars even from the 1851 census represents an imperfect record (Higgs, 1986). Still, it is the best national record of individual school attendance available for England in the nineteenth century.[6]

[5] For a complete description of the dataset of matched males, including details on the matching technique and the representativeness of the data with respect to the population, see Long (2005). The important point for the present study is that the matched data is well representative of the young male population of England and Wales in 1851. The young are over-represented simply because individuals had to survive for thirty years in order to be included in the sample, and this was more likely for the young in 1851 than for the old. The age cutoffs that define "school-aged" here are somewhat arbitrary.

[6] Altogether, the population census shows 2,046,848 scholars present in England and Wales in 1851. Independent confirmation of the census record's reliability is provided by the separate Education Census of 1851, which involved delivering questionnaires to

The 1851 record offers another advantage. As compulsory primary schooling did not become law until 1870, the incentive falsely to report children as scholars would have been far smaller before 1870 than after. In fact, the voluntary nature of elementary education in Great Britain before 1870 is central to the question at hand. Educating their children was a choice that parents faced; sending them to work, or having them work in the home, was a viable alternative. This study provides an analysis of the impact of that choice on the child's socioeconomic status 30 years later, as an adult. Therefore, the analysis is limited to boys of the prime school ages of 6 to 13. School attendance patterns in mid-century England were irregular by modern standards and are not well understood by historians. As Figure I indicates, there were four ages – six through nine – of exceptionally high attendance probability, with more than two thirds of boys attending school. As the lower bound of this cluster, age six is used as the minimum age for inclusion in the analysis. As for the maximum age, several factors suggest that children older than 13 years be excluded. First, the enrollment rate of 17 percent for 14 year olds represents a steep decline from the 29 percent enrollment rate of 13 year olds—the steepest decline over the entire range of years. Second, age 14 was the typical starting point of apprenticeship, which often would have represented an important educational transition for an individual. Finally, there is the opinion of many contemporary authorities that attendance through age 13 represented an optimal period for primary schooling. The Education Act of 1870 eventually mandated school attendance through age 13.[7]

The main limitation of the schooling information available from the 1851 census is that it tells us little about the duration of schooling for an individual. Only the fact of attendance at the point of enumeration in 1851 is known; nothing is known about attendance before or after that date. The only available clue as to the duration of schooling is age in 1851. It is reasonable to assume that older boys, say those 10 years old or older, who were in school in 1851 likely received an amount of schooling which could be considered large or above average relative to those out of school in 1851. They would have been far more likely to have reached the first class, progressing beyond simple reading to more complex reading, writing, simple math, and basic geography. As discussed above, reaching the first class was generally assumed to

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approximately 70,000 heads of schools. This source gives a very similar result: 2,144,378 scholars in day schools (1851 Census, Education, pp. xxviii, xiv).

[7] Given the somewhat arbitrary nature of these age cutoffs, it is important to note that the empirical results are not sensitive to their alteration. Changing the minimum age to 5 or the maximum age to 12 or 14 does not appreciably change the nature of the results.

occur sometime after age 10. The inability to observe schooling duration in the data has important implications for measuring the treatment effect of education and is discussed in greater detail below.

It is not possible to estimate the effect of education on earnings directly, as modern studies do, because the census does not include any quantitative information on earnings. It does include detailed occupational information, which is used to construct two labor market outcome measures. The first and more important is a ranked index of occupational class or socioeconomic status: I – Professional, II – Intermediate, III – Skilled, IV – Semiskilled, and V – Unskilled.[8] This variable is the primary measure of adult labor market outcome in 1881. Its principal advantage is that it comes more or less directly from the observable information – occupation. Nearly all occupations can be classified with this scheme, which is widely regarded as the standard method for classifying nineteenth-century occupations in Britain. It is a coarse enough measure to handle the frequent ambiguity of ranking nineteenth-century occupations, whose positions relative to each other are difficult to determine in the absence of any supporting information on wage or earnings. On the other hand, this coarseness is also a drawback; by collapsing a vast array of occupations into only five classes, a great deal of information is lost. Furthermore, it is a qualitative, non-monetary measure, which makes it difficult to quantify the economic effect of schooling in pecuniary terms.

To augment the results derived from the socioeconomic status measure, a second labor market outcome variable is constructed: annual nominal earnings, imputed by occupation. This measure has the advantages of being quantitative and less coarse than the occupational class measure; however, it is subject to its own substantial limitations and so should be seen as a secondary measure used to support the primary results derived using occupational class. Williamson (1980; 1982) provides average yearly earnings for 21 common groups of occupations in both 1851 and 1881, reproduced here in Appendix 1.[9] 77.4 percent of the

[8] This scheme was developed and has been described in detail by Armstrong (1972) and has become standard for classifying nineteenth-century British occupations. Some typical occupations are Class I – solicitor, accountant; Class II – farmer, carpenter (employer); Class III – carpenter (not employer), butcher (not employer), skilled in manufacturing; Class IV – agricultural laborer, wool comber; Class V – general laborer, porter.

[9] Williamson discusses his sources in detail in the articles. To summarize, he uses Bowley and Wood's articles in the *Journal of the Royal Statistical Society* and unpublished Board of Trade data to compile wage series for agriculture, industry, mining, and construction. For the service sector, he uses records of government pay from the "Annual Estimates" reported in the House of Commons *Parliamentary Papers* and various sources from the private sector such as clergy lists and records of teachers' pay. These earnings figures are largely consistent with Armstrong's classification scheme. The only exception is the "Messengers and Porters"

occupations in the data can be assigned an earnings level directly from this table. However, Williamson relies on wage data to construct his earnings measures and so necessarily excludes the self-employed. Several important occupational groups, therefore, lack a directly imputable wage, notably farmers and the various sellers, dealers, and merchants of the commercial trades. The latter is particularly important; they are the most numerous of the omitted occupations, and membership in this group is positively associated with childhood schooling.[10] In order to include the self-employed, these individuals are assigned an earnings value equal to the average for their occupational class.[11] It is therefore important to interpret the imputed earnings measure as representing an approximate monetary value of the various occupations rather than as an actual observed wage for each individual.

A final feature of the data is worth noting. Because of the nature of the census enumeration, every person in each linked individual's household in 1851 and in 1881 is observed. This provides a great deal of useful information, particularly from 1851. Father's occupational class; mother's labor market status; number, gender, and age of siblings; and the presence of servants should all be correlated with the probability of school attendance. The single most useful piece of information is father's occupation in 1851. The nineteenth-century English labor market was marked by substantial intergenerational occupational continuity. In the sample of matched males, 40 percent of all men between the ages of 30 and 50 in 1881 were in the same occupational class as their fathers had been in 1851. The most important control variable in the analysis of the return to elementary education is father's occupational class. Class and school attendance are highly correlated; if father's class were not controlled for, some of the estimated influence of schooling on adult occupational class would be spurious, driven by the unobserved intergenerational transmission of occupation. Controlling for father's class, it is possible to measure the extent to which school attendance allowed sons to overcome poor initial prospects and realize upward intergenerational occupational mobility. Furthermore, the longitudinal nature of the linked data allows the father's and son's occupations to be observed at roughly the same age – sons are between 35 and 43 years old in 1881, while the fathers in the data are on average 42.8 years old in 1851. In the marriage registry data that has typically been used in

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category, which is Class V under Armstrong's scheme but highly paid according to Williamson's data. However, there are few messengers or porters in the data, and eliminating them does not change any of the results.

[10] Attending school in 1851 increases the probability of holding a "commercial occupation" from 7.2 percent to 8.5 percent (s.e. = 0.007), controlling for other relevant factors. School attendance is not associated with becoming a farmer.

[11] Results are also reported leaving out the self-employed, using only occupations covered by Williamson's wage table.

literacy and mobility studies of nineteenth-century Britain, father's and son's occupations are observed at the time of the son's marriage, when the father is considerably older.

CORRELATES OF SCHOOL ENROLLMENT

Table III summarizes the data. It shows results comparing those attending school in 1851 and those either at home or working. There are more students in the sample (3,130) than there are non-students (2,207). The group of scholars clearly differs from the group of non-scholars. In order to observe the partial effect of each potential correlate, a probit equation of school attendance probability is estimated, with results reported in Table IV. The estimation is carried out for all the boys in the sample and separately for the boys aged 6-9 and the boys aged 10-13 in 1851. Boys aged 10-13 and in school are likely to have received a more advanced elementary education, with more years of schooling and a higher likelihood of achieving the qualifications of the first class described above. As expected, sons of higher-class fathers were more likely to attend school than were sons from lower socioeconomic backgrounds.[12] Furthermore, the effect of class on attendance was stronger for older children, indicating that while higher class fathers were in general more likely to send their sons to school than were lower class fathers, they were especially likely to provide their sons with a longer, more advanced course of primary schooling.[13] Class I fathers, for example, were 30 percent (18 percentage points) more likely to send their sons to school than were class V fathers, and they were 60 percent (29 percentage points) more likely to send their older sons to school. Father's industry was also a strong predictor of school enrollment. Fathers in agriculture, mining, and manufacturing (especially textiles) were less likely to send their children to school than were other fathers.[14] Workers in the distributive trades (shopkeepers, dealers in one thing or another) were more likely to school their children – particularly at higher ages – reflecting the greater usefulness of literacy, writing ability and perhaps arithmetic. Age heaping (the extent to which a population over-reports rounded ages like 20 and 30) in the county of residence is negatively correlated with attendance, reflecting county level differences in aggregate

[12] The only exception to this pattern is that sons of class III and class IV fathers had no statistically significant difference in their attendance probabilities.

[13] The χ^2 statistic testing differential effect of class by age is significant at the one percent level.

[14] These industry variables are highly correlated with the region dummies; for example, there were virtually no agricultural jobs in London, and the jobs in textiles were concentrated in Lancashire, Cheshire, and Yorkshire. Still, all of the industry effects are robust to the exclusion of the regional dummies, and the region effects are robust to the exclusion of the industry dummies.

education and human capital. School enrollment was particularly prevalent in three regions. High enrollment in London, Lancashire, and Cheshire can be attributed to their high levels of economic development and population density. High schooling rates in the northern counties of England could well be related to their proximity to Scotland, which had a more extensive primary school system than did England and Wales.[15]

Several variables were included to incorporate the opportunity cost of sending a child to school. School availability is proxied for by including the number of schools per thousand residents in the county, the number of schools per thousand acres (intended to capture distance), and a variable indicating whether the family lived in a town of 2,500 or more residents. The two school density variables did not have a statistically significant effect, perhaps because they ignore important intra-county variation in school density. On the other hand, living in an urban area increased the probability of enrollment by four percentage points, reflecting the greater availability of schools in more populated areas. Household demographics also played a role in the schooling decision. Households in which the mother worked at a wage-earning job were more likely to send their sons to school than were households in which the mother stayed at home or was deceased. Quite likely, working mother families could better afford the opportunity cost of foregone child wages, while families headed by a widower could least afford to do without the son's wages or home production. If child-minding were the primary motivation for schooling, then widower-headed households would have been more likely to send their sons to school; instead, they were the least likely. The presence of at least one servant in the household increased the likelihood that a son would be schooled, as did the son having an older sister in the household. The presence of younger siblings was negatively correlated with school enrollment. All three factors point to the value of sons' household labor and its importance in the schooling decision. Younger siblings could require looking after, potentially keeping a son out of school; on the other hand, a servant or older sister might be called upon instead to perform this or other household chores, freeing up sons to attend school.

RETURN TO SCHOOLING

Time spent in elementary school as a child should have conferred at least two distinct advantages to an adult participating in the Victorian labor market. First was the acquisition of general human capital. Literacy was perhaps the most important skill learned in elementary school. According to Mitch (1992, Table 2.1), less

[15] In this Scotland is an interesting case, and with the newly available manuscript level information from the 1881 Census of the Population of Scotland it will be the subject of future work.

than half of the male English labor force in 1851 worked in jobs for which literacy was "unlikely to be useful." Though many factory jobs did not require literacy, still the problem solving and reasoning skills that might be acquired from basic education could increase a worker's productivity and potential for advancement. While children could and certainly did acquire literacy in the nineteenth century without day schooling, it was much less likely that a child would learn arithmetic, geography, and grammar without formal schooling. There was no guarantee that a child would learn these subjects in school, either, but as Table II indicates, many schools did teach them. Apart from the benefits of specific skills and knowledge, primary schooling conveyed a sense of discipline and willingness to accept supervision that could have been advantageous in the labor market. Adults who received formal schooling as children may have been more successful in the ordered environment of the factory, even when their ability to read and write was not put to use. Perhaps at least as important as any actual benefit, employers may have preferred educated workers based on the perception that they were more manageable. Indeed, employers often stated as much in nineteenth-century parliamentary inquiries into labor disputes (Mitch, 1992, p. 13).

One would expect to find, then, a positive relationship between school attendance and occupational class or annual earnings. However, parents did not simply face a one-time choice of sending a child to school or not; they would have made the decision year by year, or even month by month. The ideal variable for measuring the educational outcome of each individual would be duration of schooling. Unfortunately, as discussed above, this information cannot directly be observed from the census. There are several potential strategies for incorporating the available age and attendance information into a rough estimate of school duration. The simplest approach, and the one emphasized here, is to treat schooling as a dichotomous variable, which is how it appears in the data. The school variable can be made to account for likely differences in school duration across individuals in a crude manner by splitting the sample into younger and older boys. The dichotomous school variable is then interpreted differently for the two age groups. For the older group (here, ages 10-13) those observed to be in school in 1851 are assumed to have received an advanced elementary education – attaining or nearly attaining the qualifications of a first-level student – while those observed to be out of school are assumed not to have. For the younger group (ages 6-9), those in school are assumed to have received at least some elementary schooling, while those not in school in these prime ages are more likely to have received little or no schooling. This method will inevitably result in some misspecification. Some individuals out of school in 1851 may still have received an average or above

average course of schooling at some point in their childhood, and some in school in 1851 may have attended for only a year or even less. To make some effort to account for this, a second schooling measure is developed that uses father's class and the school attendance of siblings (two observable variables that are highly predictive of attendance) to estimate total schooling duration for each individual. The derivation of this estimate is described in Appendix 2. Essentially, it attributes some years of schooling to individuals not in school in 1851 who were nevertheless likely to have received some unobserved schooling, where likelihood of unobserved schooling is determined by father's class and the presence in the household of siblings in school. However, because of the very strong assumptions needed to construct these estimates, they should be seen as secondary, supporting results. Splitting the sample by age lessens the misspecification of the dichotomous variable approach to an extent, and in the end, this approach is in line with the sparse information available in the data.

Effect of Schooling on Occupational Class

The primary labor market outcome variable used here is occupational class in 1881. Occupational class is a discrete, qualitative variable with five ranked categories, which suggests ordered probit analysis. Table V shows the results of estimating the following equation by ordered probit maximum likelihood:

$$\text{(1)} \qquad \mathrm{P}\left(y_{i,1881} = c\right) = \mathrm{f}\left(\beta_1 s_{i,1851} + \boldsymbol{fathersclass}_{i,1851}\boldsymbol{\beta}_2 + \mathbf{x}_{i,1851}\boldsymbol{\beta}_3\right)$$

where y_i is the individual's occupational class in 1881, $c \in [1,2,3,4,5]$, $s_i = 1$ if the individual was in school in 1851 and 0 otherwise, $\boldsymbol{fathersclass}_i$ is a set of dummy variables capturing father's occupational class in 1851, $\mathbf{x}_{i,1851}$ is a vector of additional controls, and β_1 measures the treatment effect of schooling. The equation is estimated for the whole sample and separately for boys aged 6-9 in 1851 and 10-13 in 1851.[16]

Interpreting ordered probit coefficients is not straightforward; Table V reveals the sign and statistical significance of the effect of each variable, and it can be used to compare the relative magnitude of different coefficients, but it does not provide a meaningful interpretation of the marginal effect of each variable. For this, it is necessary to use the results from estimating (1) to calculate the marginal effect of

[16] This specification assumes a constant effect of school attendance across different class backgrounds. To examine the possibility of variable school effects by class, (1) was reestimated with a full set of dummy variables interacting school and father's class. The four school-class dummies were jointly statistically insignificant for each of the three age groups: 6-13, 6-9, and 10-13. The χ^2 test statistics were, respectively, 1.72, 2.27, and 6.77.

each variable on the probability of attaining the various occupational classes; these marginal effects are displayed in Table VI, along with the baseline probabilities of attaining each occupational class. Table V shows that, even subject to the misspecification error in the schooling variable discussed above, the treatment effect of schooling is positive and statistically significant for all three estimation samples. As expected, the effect is greater, in fact almost twice as great, on the sample of older boys than on the sample of younger boys.[17] This result supports the idea that older boys were receiving more advanced elementary schooling and indicates that their additional human capital accumulation was economically valuable. To interpret the magnitude of the schooling effect it is necessary to consult the marginal effects of Table VI. Attending elementary school in 1851 increased the probability of attaining a class I occupation in 1881 by 0.7 percentage points (or 38.9 percent, relative to a baseline probability of 1.8 percent). Odds of a class II or III occupation increased by, respectively, 2.8 percentage points (23.4 percent) and 2.0 percentage points (3.5 percent). School attendance decreased the probability of class IV and V occupations by 2.7 percentage points (14.2 percent) and 2.9 percentage points (29.0 percent), respectively.

Childhood schooling, therefore, had a statistically and economically significant positive effect on adult occupational class. Still, even for the older boys, there is an important sense in which the real magnitude of that effect was small. This is most evident in comparing the magnitude of the effect of schooling with the magnitude of the effect of father's class. The effect of having a class III father versus a class V father is more than two and a half times greater than the effect of going to school in 1851 versus not going to school (0.432 versus 0.162), the effect of a class II father (0.534) is more than three times greater, and the effect of a class I father (1.432) is almost nine times greater.[18] In a practical sense, this meant that, for example, having a class II father increased the likelihood of having a class II occupation in 1881 by 10.7 percentage points, while being in school in 1851 increased the likelihood by 2.8 percentage points. Several caveats bear mentioning here. First, father's class is the most influential variable included in the analysis. As mentioned above, the English labor market had a relatively low level of intergenerational mobility, so father's class is expected to exert substantial influence on the son's class as an adult.[19] Comparing schooling to father's class is bound to minimize the apparent effect of schooling. Still, in evaluating schooling as a path

[17] The χ^2 statistic testing differential effect of school by age is significant at the 10 percent level.

[18] Each of these differences in coefficients is statistically significant at the one percent level.

[19] For a detailed analysis of the low level of intergenerational mobility in England relative to the U.S., see Long and Ferrie (2005).

to socioeconomic mobility, it is the appropriate comparison to make. Second, the gap between schooling and father's class is smaller when considering advanced elementary schooling for children aged 10-13. The schooling effect is 30 percent greater for 10-13 year olds than for the whole sample, while the effect of father's class does not differ between the two groups. Still, the basic result holds that having a class I, II, or III father has a substantially greater impact than being in school.[20] Finally, it must be remembered that the dichotomous schooling variable understates the effect of schooling by misspecifying certain individuals. To provide something of a check on this result, (1) is reestimated with estimated years of schooling substituted for the dichotomous variable s_i. The last two columns of Table V display the results, which are largely consistent with the previous results. β_1 now captures the effect of each year of primary schooling; multiplying β_1 by five (an estimate of an average course of elementary schooling) yields a total effect of 0.135, only slightly less than the value of 0.162 obtained from using the dichotomous school variable.

Another comparison also demonstrates the small relative magnitude of the schooling effect: the effect of numeracy was significantly greater than the effect of schooling. Numeracy, in other words basic quantitative ability, is not directly observable, but the structure of the linked census data provides a proxy: age discrepancy, defined as $\left|\text{Reported Age}_{1881} - \left(\text{Reported Age}_{1851} + 30\right)\right|$.[21] Table V indicates that reporting age consistently between the two censuses had a 78 percent greater impact on adult occupational class than did school attendance for the whole sample and a 29 percent greater impact for the 10-13 year olds.[22] This result is not driven by high correlation between school attendance and age discrepancy: reestimating (1) without the age discrepancy dummies does not change β_1. In fact, school attendance is related to age discrepancy: 50 percent of the boys observed to be in school in 1851 consistently reported their age between the censuses, versus 44 percent of those not in school. Interestingly, this result reinforces the result for adult wage – schooling had a noticeable, but fairly small, effect, both on wage and numeracy.

[20] As before, the differences in coefficients are significant at the one percent level for class I and II; however, for class III the difference is no longer statistically significant.

[21] In most cases for this sample, the parents would have reported the age in 1851. It could be possible, therefore, for an individual to report his correct age and still have a non-zero value of age discrepancy, if his parents had incorrectly reported his age in 1851. This seems unlikely, though, as most people would have learned their age from their parents.

[22] Only the difference for the whole sample is statistically significant (at the five percent level).

Robustness Check: Effect of Schooling on Earnings

To check the robustness of the preceding results, a new equation is estimated to measure the effect of childhood school attendance on adult annual earnings:

$$\log\left(wage_{i,1881}\right) = \beta_0 + \beta_1 s_{i,1851} + \beta_2 \log\left(\ fatherswage_{i,1851}\right) + \mathbf{x}_{i,1851}\boldsymbol{\beta} + \varepsilon_i \quad (2)$$

β_1 still captures the treatment effect of education, now expressed as the percent effect of school attendance on adult earnings. Table VII shows the results of estimating (2) by ordinary least squares. Attending school in 1851 increased adult earnings by 7.7 percent for the whole sample and by 10.7 percent for the 10-13 year olds receiving advanced elementary education. As before, these are statistically and economically significant effects.[23] In fact, these results indicate that the pecuniary benefit of childhood school attendance would have outweighed the costs for most workers under most assumptions of time preference. In a detailed analysis of the costs of primary school attendance, Mitch (1992) shows that the average direct cost from school fees was small – roughly £0.34 per year – while the opportunity cost of foregone wages was greater – about £2.5 per year on average. This implies a present discounted value of £12.3 for five years of schooling using a continuous discount rate of 0.05, £10.6 with a discount rate of 0.1, or £8.11 using a discount rate of 0.2. The average imputed 1851 wage value in the data is £81.5; using the lower β_1 estimate of 0.077 indicates that schooling would, on average, raise earnings by £6.28 per year. Even with a discount rate of 0.2, it would take only 11 years of work to compensate for the cost of schooling.[24]

The nature of the data used here is very different from the data typically used to measure the return to education in the modern labor and development economics literature, so a direct comparison of results is impossible. There are at least two sources of downward bias in the estimates presented above: the misspecification inherent in the dichotomous schooling variable and the use of earnings imputed by occupation. Using imputed rather than observed earnings means that only between-occupation wage

[23] Reestimating (2) on only those individuals who can be assigned a wage directly from Williamson's wage table (in other words dropping the self-employed) yields slightly smaller estimates: $\beta_1 = 0.0675$ (s.e. = 0.0153) for the whole sample, and $\beta_1 = 0.0956$ (s.e. = 0.023) for the 10-13 year olds.

[24] This result would not hold for all workers. The average 1851 wage for class IV and V workers was only £35.7 per year. The resulting schooling premium of £2.75 per year would not be enough to compensate for the cost of schooling with a high discount rate of 0.20. The cost-benefit analysis for low class workers hinges on the assumed discount rate; with a discount rate as high as 0.13, twenty work years is enough to compensate a low class worker for the cost of schooling.

variation is measured. Any effect of education on earnings within occupations is unobserved. Still, the modern estimates give some sense of context for the current results. Typical empirical studies in the U.S. and U.K. have found that *each year* of secondary education increases annual earnings by somewhere between 5 and 15 percent (e.g. Card, 1999; Harmon and Walker, 1995). Estimates for the U.S. in the first half of the twentieth century show a return of 11 percent (Goldin and Katz, 2000). Studies of developing economies without universal primary education are more useful in gauging the return to primary education. A recent survey of results from Africa finds an average return to primary education of roughly 7 percent per year of schooling (Schultz, 2003). To place the findings on Victorian England in this context, consider the results for the 10-13 year olds, for whom receiving an advanced level of elementary education increased earnings by 10.7 percent. If this more advanced education involved, say, three additional years of schooling, this would translate to a return of 3.6 percent per year – roughly half the magnitude of the results for modern Africa and a third of the effect of secondary schooling in the early twentieth-century U.S. However, to the extent that English primary schooling yielded unobserved wage gains within occupation, the difference would be less. Goldin and Katz (2000) attribute approximately half of the earnings return to effects within occupation. If roughly this same split held in Victorian England, that could bring the true return in line with the results from Africa, though it would still be less than Goldin and Katz's results for the U.S.[25]

CONCLUDING REMARKS

This paper adds a micro-level analysis of school attendance and the return to education to a large literature on the history of primary schooling in Victorian England. In a regime of voluntary elementary education that was at most partly subsidized, households responded predictably in their schooling decisions. Sons of fathers with high-class occupations were much more likely to be in school in 1851, and to be in school at later ages, than were sons of lower-class fathers. Not surprisingly, opportunity costs mattered. In urban areas, where schools were more readily available, probability of attendance was greater. In households where sons' domestic labor was likely to be more valuable due to the presence of younger siblings or the absence of an elder sister, probability of attendance was lower. The outcomes of these schooling decisions had long-lasting effects. Childhood school attendance was positively associated with the attainment of higher class, higher

[25] The difficulty in comparing the results for England to other studies is exacerbated by not knowing how many additional years of schooling the 10-13 year old students received on average. If they typically received more than three years of additional education, this would imply a lower per-year rate of return and would increase the difference in results.

paying adult occupations. This was especially true for boys in school over the age of 10, who likely received more advanced elementary education. For example, schooling increased the odds for this group of attaining a relatively high-paying class II occupation from 14 to 17 percent, and it decreased the odds of a low-paying class IV or V job from 29 to 22 percent. For most workers, under reasonable assumptions of time preference, the corresponding wage gains would have more than offset the cost of schooling.

However, although childhood schooling did then pay off, there is still an important sense in which the return to schooling looks small. First and most importantly, father's occupational class exerted a much greater influence on own adult class than did school attendance. This result holds even for the older children receiving more advanced schooling. Second, the impact of school attendance on adult earnings appears to be small relative to other estimates of the return to education for developed and developing countries today and for the U.S. early in the twentieth century. This result is highly tentative; the data and methods used here are too different from those used elsewhere to make any direct comparisons. Still, these results taken together do provide some very preliminary evidence for a low return to primary schooling in Victorian England. This could be interpreted as evidence that England's schools were, on average, low quality, or at least that the human capital they provided was not of great economic value. Alternately, it could be interpreted as a statement about England's labor market, that a high level of intergenerational occupational stasis minimized

APPENDIX 1: OCCUPATION CLASSIFICATION AND ADULT EARNINGS

Occupation	**Nominal Annual Earnings, 1851**	**Nominal Annual Earnings, 1881**
Solicitors and Barristers	£1837.50	£1280.00
Engineers and Surveyors	479.00	312.97
Clergymen and Ministers	267.09	315.37
Clerks	235.81	286.65
Govt high wage	234.87	275.29
Surgeons and Doctors	200.92	520.29
Messengers and Porters	88.88	97.05
Skilled in engineering	84.05	96.68
Teachers	81.11	120.80
Skilled in printing trades	74.72	86.42
Govt low wage	66.45	74.65
Skilled in building trades	66.35	87.18
Skilled in shipbuilding	64.12	81.38
Skilled in textiles	58.64	85.77
Miners	55.44	59.58
Police and Guards	53.62	76.73
Manual workers in commodity production	46.59	64.58
General non-ag laborer	44.83	55.88
Railways	41.13	58.85
Male domestics	38.63	55.00
Farm laborer	29.04	41.52

Sources: Williamson (1980, 1982)

APPENDIX 2: ESTIMATING SCHOOLING DURATION

Given information on age, family characteristics, and school attendance at one point in time for each individual, the goal is to find $E(d_i \mid s_i, a_i, \mathbf{z}_i)$, where d_i is total duration of schooling, s_i is a dummy variable indicating whether an individual is observed to be in school in 1851, a_i is age, and $\mathbf{z}_i$ is a vector of relevant family demographic variables. Strong assumptions on attendance patterns are necessary. First, I assume that all individuals who receive any elementary schooling began their schooling at age six and that none remain in elementary school past the age of 13. This reflects general attendance patterns according to sources such as the Newcastle Commission and is in keeping with the very low attendance rates past the age of 13. Still, given the often haphazard nature of nineteenth-century primary school attendance, these are strong assumptions. Fortunately, the estimates are robust to changing the assumed starting and ending ages. The final assumption is that primary school enrollment was continuous: students who left school did not return. Again, under the informal English school system, this certainly would not have held in all cases. Even so, it is a necessary and reasonable simplifying assumption.

Given these assumptions, it is possible to recover the hazard rate of school exit for each age and to use these hazard rates to calculate the conditional expected school duration for each individual. First, let p_6 be the probability of attending school at age six, observable in the data as the proportion of six-year olds in school in 1851. Next, note that the probability of attending school at age $a > 6$ is $p_a = p_6 \prod_{j=7}^{a} (1 - h_{j-1})$ where h_a is the hazard rate of school exit at age a, that is, the probability of leaving school after age a conditional on having attended through age a. From this it follows that $\frac{p_{a+1}}{p_a} = 1 - h_a$. Since p_a is observable for each age as the proportion of individuals of that age in school, each of the hazard rates $h_6, h_7, \ldots, h_{14}$ can be recovered. In addition, different hazard rates can be calculated for individuals with different background characteristics. To construct the hazard rates for this analysis, I incorporated two variables that are highly correlated with school attendance: father's socioeconomic status and the school attendance of siblings. With the hazard rates in hand, the conditional expectation of total school duration d for an individual of age a and background characteristics $\mathbf{z}$ observed to be in school in 1851 is

$$(3) \qquad E(d \mid s = 1, a, \mathbf{Z}) = a - 5 + (1 - h_{az}) h_{az+1} + 2(1 - h_{az})(1 - h_{az+1}) h_{a+2} + \cdots + (13 - a) \prod_{j=a}^{12} (1 - h_{jz}) h_{13}$$

where h_{13} is assumed to be 1. (a – 5) is the known completed school duration and the summation that follows is the conditional expected duration of additional schooling continuing past age a. For individuals of age a observed to be out of school, the conditional expectation of total school duration is

$$(4)\ \mathrm{E}(d \mid s=0, a, \mathbf{Z}) = p_6 h_{6z} + 2p_6(1-h_{6z})h_{7z} + 3p_6(1-h_{6z})(1-h_{7z})h_{8z} + \cdots + (a-6)\,p_6\prod_{j=6}^{a-2}(1-h_{jz})(h_{a-1,z})$$

and $h_{a\text{-}1} = 1$ since $s = 0$.

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FIGURE I

School Attendance by Age, 1851

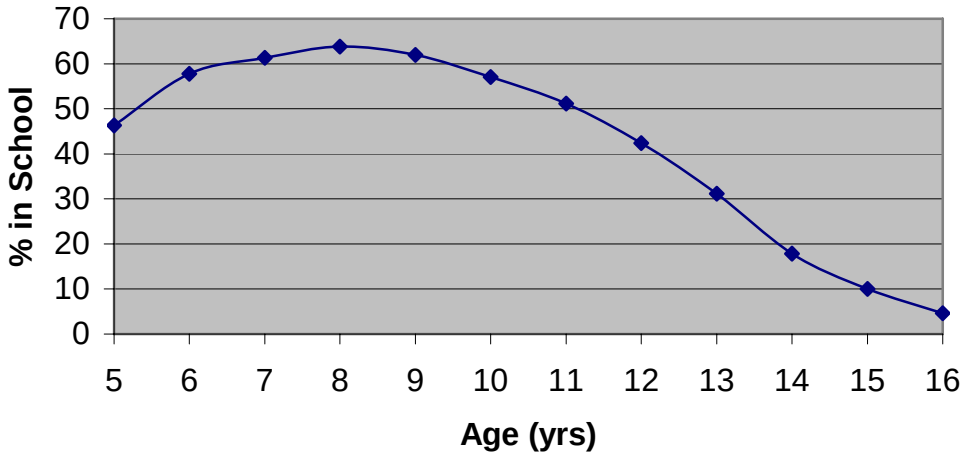

TABLE I

PUBLIC AND PRIVATE SCHOOLS IN ENGLAND AND WALES, 1851

School Type	Schools	Students
Public	15,411	1,413,170
Supported by Taxation	610	48,826
Supported by Endowment	3,125	206,279
Supported by Religious Body	10,595	1,048,851
Other Public	1,081	109,214
Private	30,524	721,396

Source: Census of Great Britain, 1851, Education, pp. 26, 58 (IUP).

TABLE II

SUBJECTS OF PRIMARY INSTRUCTION, 1851

	Schools Offering Subject (%)		
Subject	Public	Private	Total
Reading	98.4%	97.8%	98.0%
Writing	90.8	55.2	68.5
Arithmetic	84.5	48.1	61.8
English Grammar	61.7	34.8	44.9
Geography	55.3	30.5	39.8
Modern Languages	4.2	9.8	7.7
Ancient Languages	6.3	9.6	8.2
Mathematics	13.7	9.4	11.0
Drawing	11.6	8.4	9.6
Music	17.5	5.5	10.0
Industrial Occupations	4.9	1.2	2.5
Number of Schools	12,741	21,252	38,993

Note: Boys schools only.
Source: Census of Great Britain, 1851, Education, p. 44.

TABLE III

SUMMARY STATISTICS, CHILDREN 6-13 YEARS OLD IN 1851

	Percent, 1851			Percent, 1881		
	All	*School*=1	*School*=0	All	*School*=1	*School*=0
In school	58.65	100	0			
Working	14.33	0	34.66			
Not in school or working	27.02	0	65.34			
Wage (mean)	£81.50	£88.87	£71.04	£107.87	£115.74	£96.71
Socioeconomic status						
I. Professional	2.17	2.84	1.22	3.15	3.99	1.95
II. Intermediate	15.59	17.86	12.37	13.32	14.86	11.15
III. Skilled	43.86	46.10	40.69	52.24	55.21	48.03
IV. Partly Skilled	28.39	24.15	34.39	18.85	15.05	24.24
V. Unskilled	9.99	9.04	11.33	12.44	10.89	14.64
Industry						
Agriculture	29.36	25.34	35.07	17.76	14.44	22.47
Building	5.81	6.55	4.76	8.30	9.30	6.89
Distributive	6.67	8.21	4.49	9.97	11.02	8.47
Mining	2.68	2.24	3.31	3.32	2.72	4.17
Iron & Steel	2.79	2.75	2.85	4.37	4.41	4.30
Textiles	6.95	6.33	7.84	4.65	4.22	5.26
Other manuf.	24.26	26.52	21.07	21.38	22.84	19.30
Other	21.47	22.08	20.62	30.26	31.05	29.13
Age discrepancy (1851,1881)						
0 years	47.59	49.78	44.49			
1	27.75	26.65	29.32			
2-5	24.66	23.57	26.19			
Age (mean, years)	9.28	8.83	9.91			
Eldest son (still in hh in 1851)	46.79	46.31	47.48			
Inheritance	11.95	13.39	9.92			
Not residing in town of birth	27.39	26.36	28.86			
Living in town	64.29	66.93	60.53	74.39	77.80	69.55
Region						
East	8.09	6.36	10.56	6.91	5.43	9.02
Lanc-Cheshire	13.34	14.41	11.83	14.58	15.97	12.60
London	4.82	4.41	5.39	8.51	8.98	7.84
London Environs	15.06	13.71	16.99	14.61	12.91	17.04
Midlands	21.34	22.40	19.85	19.75	20.32	18.94
North	5.45	6.87	3.44	5.60	7.00	3.62
South	20.87	20.51	21.39	18.59	17.67	19.89
Yorkshire	11.02	11.34	10.56	11.45	11.73	11.06
N	5,337	3,130	2,207	5,337	3,130	2,207

Notes: For *Wage*, *SES*, and *Industry*, 1851 values correspond to father's occupation, 1881 values correspond to son's occupation. *Age Discrepency* = $|\text{Age}_{1881} - (\text{Age}_{1851}+30)|$. Other variables defined in text.

Source: Dataset of linked males.

TABLE IV

PROBIT RESULTS: CORRELATES OF SCHOOL ATTENDANCE

Dependent Variable: Dummy = 1 if in school in 1851

	Ages 6-13 in 1851		Ages 6-9 in 1851		Ages 10-13 in 1851	
	$\partial P/\partial z$	se	$\partial P/\partial z$	se	$\partial P/\partial z$	se
Father's SES						
I. Professional	0.180	0.046	0.089	0.062	0.286	0.071
II. Intermediate	0.166	0.037	0.128	0.045	0.208	0.061
III. Skilled	0.096	0.030	0.096	0.038	0.093	0.044
IV. Semiskilled	0.102	0.031	0.123	0.039	0.072	0.048
Father's industry						
Agriculture	-0.166	0.029	-0.175	0.039	-0.167	0.040
Building	0.019	0.037	-0.023	0.048	0.060	0.055
Distributive	0.056	0.034	-0.020	0.045	0.142	0.052
Mining	-0.229	0.048	-0.238	0.065	-0.232	0.065
Iron & Steel	-0.091	0.048	-0.190	0.068	0.007	0.069
Textiles	-0.160	0.036	-0.121	0.051	-0.190	0.046
Other manufacturing	-0.006	0.025	-0.035	0.033	0.023	0.037
Mother home	-0.046	0.023	-0.076	0.027	0.006	0.035
Mother deceased	-0.095	0.032	-0.047	0.045	-0.111	0.043
Age	0.214	0.030	0.174	0.133	0.309	0.246
Age ^{2} */ 10*	-0.141	0.016	-0.114	0.089	-0.181	0.107
Eldest son in HH in 1851	0.009	0.015	0.031	0.019	-0.011	0.023
Inheritance	0.057	0.045	0.054	0.054	0.085	0.071
Eldest $\times$ *Inheritance*	-0.028	0.045	-0.049	0.060	-0.033	0.065
Servant in household	0.064	0.026	0.017	0.033	0.120	0.039
Older sister in household	0.034	0.015	0.049	0.018	0.012	0.022
Number of younger siblings	-0.011	0.005	0.005	0.008	-0.022	0.007
Not in town of birth	-0.031	0.017	-0.045	0.022	-0.013	0.025
Schools per 1,000 acres in county	-0.014	0.015	-0.034	0.019	0.011	0.023
Schools per 1,000 residents in county	0.029	0.023	0.038	0.030	0.027	0.033
Living in town	0.039	0.017	0.023	0.022	0.060	0.026
Age heaping	-0.005	0.002	-0.005	0.002	-0.003	0.002
Region						
Lancashire-Cheshire	0.224	0.035	0.248	0.033	0.161	0.063
London	0.280	0.162	0.341	0.037	-0.108	0.389
London Environs	0.036	0.034	0.057	0.039	0.012	0.053
Midlands	0.108	0.030	0.119	0.035	0.096	0.048
North	0.267	0.028	0.251	0.026	0.269	0.055
South	0.075	0.028	0.067	0.034	0.085	0.045
Yorkshire	0.065	0.036	0.068	0.043	0.050	0.057
N	5282		2838		2444	
Pseudo R^2	0.096		0.045		0.113	
Log likelihood	-3236.104		-1692.350		-1499.607	
LR $\chi^2(35)$	686.309		157.926		383.570	
P[s =1 | **Z**=E(**Z**)]	0.595		0.692		0.474	

Omitted dummies are *Father's SES* : Unskilled, *Father's Industry* : Others, *Mother working* , *Region* : East. LR χ^2 statistic represents a test of all parameters of the model being equal to 0. Marginal effects are evaluated at the mean of the z variables, except for discrete variables, where the effect is $P(s = 1| z = 1) - P(s = 1|z = 0)$.

TABLE V

ORDERED PROBIT RESULTS: CORRELATES OF SES IN 1881

Dependent Variable: SES/Occupational Class in 1881

	(1) Ages 6-13		(2) Ages 6-9		(3) Ages 10-13		(4) Ages 6-13	
	β	se	β	se	β	se	β	se
In school in 1851	0.162	0.032	0.130	0.045	0.210	0.046		
Years of schooling (est)							0.027	0.005
Father's SES								
I. Professional	1.432	0.122	1.425	0.167	1.441	0.179	1.438	0.122
II. Intermediate	0.536	0.090	0.514	0.124	0.584	0.132	0.529	0.090
III. Skilled	0.432	0.065	0.517	0.091	0.339	0.093	0.431	0.065
IV. Semiskilled	0.010	0.070	0.033	0.099	-0.015	0.100	0.010	0.070
Father's industry								
Agriculture	-0.212	0.060	-0.257	0.083	-0.154	0.087	-0.216	0.060
Building	0.041	0.077	-0.010	0.108	0.107	0.112	0.021	0.078
Distributive	-0.021	0.073	-0.147	0.099	0.124	0.109	-0.034	0.074
Mining	-0.034	0.104	-0.032	0.136	-0.030	0.163	-0.054	0.104
Iron & Steel	-0.132	0.102	-0.300	0.142	0.080	0.147	-0.120	0.103
Textiles	-0.139	0.076	-0.198	0.107	-0.059	0.108	-0.147	0.076
Other manufacturing	-0.014	0.053	-0.079	0.074	0.061	0.078	-0.025	0.054
Mother home	0.043	0.049	0.080	0.067	-0.005	0.072	0.052	0.049
Mother deceased	0.061	0.066	0.071	0.096	0.039	0.093	0.048	0.067
Servant in household	0.375	0.055	0.480	0.075	0.247	0.081	0.377	0.055
Age	-0.011	0.121	0.018	0.308	-0.172	0.327	-0.001	0.121
Age^2 */ 10*	0.002	0.015	-0.003	0.041	0.021	0.039	0.000	0.015
Eldest son in HH in 1851	0.068	0.032	0.025	0.044	0.105	0.047	0.069	0.032
Inheritance	0.411	0.095	0.399	0.130	0.404	0.141	0.400	0.096
Eldest $\times$ *Inheritance*	-0.071	0.092	0.036	0.128	-0.173	0.132	-0.062	0.092
Age discrepency=0	0.288	0.042	0.321	0.066	0.271	0.070	0.287	0.042
Age discrepency=1	0.131	0.045	0.128	0.068	0.150	0.073	0.132	0.045
Not in town of birth	0.035	0.035	0.092	0.049	-0.026	0.052	0.038	0.036
Living in town	0.072	0.036	0.095	0.050	0.044	0.053	0.072	0.036
Age heaping	-0.001	0.003	-0.007	0.005	0.004	0.004	-0.001	0.003
Region								
Lancashire-Cheshire	0.057	0.075	0.110	0.106	0.010	0.107	0.066	0.075
London	-0.017	0.107	0.053	0.146	-0.058	0.159	-0.004	0.107
London Environs	-0.061	0.068	-0.100	0.094	-0.024	0.099	-0.052	0.069
Midlands	0.067	0.064	0.060	0.089	0.064	0.092	0.066	0.064
North	0.025	0.086	-0.039	0.118	0.115	0.126	0.024	0.086
South	0.064	0.062	0.080	0.086	0.030	0.089	0.075	0.062
Yorkshire	0.111	0.079	0.066	0.110	0.154	0.115	0.117	0.079
N	5330		2857		2473		5282	
Pseudo R^2	0.072		0.079		0.067		0.072	
Log likelihood	-6386.178		-3356.517		-3013.598		-6323.452	
LR $\chi^2(32)$	985.315		579.326		434.334		974.251	

Notes: Omitted dummies are *Father's SES*: Unskilled, *Father's Industry*: Others, *Mother working*, *Region*: East.

TABLE VI

ORDERED PROBIT RESULTS: DETERMINANTS OF SES IN 1881

Marginal effects of key explanatory variables on SES in 1881

	Ages 6-13 in 1851 (N=5,330)					
	∂[P(y=I)]/∂x	∂[P(y=II)]/∂x	∂[P(y=III)]/∂x	∂[P(y=IV)]/∂x	∂[P(y=V)]/∂x	E(x)
In school in 1851	0.007	0.028	0.020	-0.027	-0.029	0.587
Father's SES						
I. Professional	0.227	0.266	-0.218	-0.173	-0.102	0.022
II. Intermediate	0.035	0.107	0.019	-0.088	-0.074	0.156
III. Skilled	0.021	0.078	0.046	-0.071	-0.074	0.439
IV. Semiskilled	0.000	0.002	0.001	-0.002	-0.002	0.284
Mother home	0.002	0.008	0.005	-0.007	-0.008	0.784
Mother deceased	0.003	0.011	0.007	-0.010	-0.010	0.099
Servant in household	0.023	0.074	0.021	-0.062	-0.055	0.123
Age discrepency=0	0.013	0.051	0.033	-0.048	-0.050	0.476
Age discrepency=1	0.006	0.024	0.014	-0.022	-0.022	0.277
Living in town	0.003	0.013	0.009	-0.012	-0.013	0.642
P[*y* | **X** = E(**X**)]	0.018	0.122	0.572	0.189	0.100	
	Ages 6-9 in 1851 (N=2,857)					
	∂[P(y=I)]/∂x	∂[P(y=II)]/∂x	∂[P(y=III)]/∂x	∂[P(y=IV)]/∂x	∂[P(y=V)]/∂x	E(x)
In school in 1851	0.005	0.022	0.018	-0.022	-0.023	0.684
Father's SES						
I. Professional	0.213	0.269	-0.210	-0.174	-0.097	0.022
II. Intermediate	0.031	0.099	0.024	-0.086	-0.069	0.154
III. Skilled	0.023	0.090	0.058	-0.086	-0.085	0.441
IV. Semiskilled	0.001	0.006	0.004	-0.006	-0.006	0.288
Mother home	0.003	0.013	0.011	-0.014	-0.014	0.802
Mother deceased	0.003	0.012	0.008	-0.012	-0.012	0.079
Servant in household	0.029	0.093	0.022	-0.080	-0.064	0.126
Age discrepency=0	0.013	0.055	0.040	-0.054	-0.054	0.478
Age discrepency=1	0.006	0.022	0.015	-0.022	-0.021	0.272
Living in town	0.004	0.016	0.013	-0.016	-0.016	0.639
P[*y* | **X** = E(**X**)]	0.016	0.113	0.586	0.190	0.095	
	Ages 10-13 in 1851 (N=2,473)					
	∂[P(y=I)]/∂x	∂[P(y=II)]/∂x	∂[P(y=III)]/∂x	∂[P(y=IV)]/∂x	∂[P(y=V)]/∂x	E(x)
In school in 1851	0.010	0.039	0.023	-0.034	-0.038	0.475
Father's SES						
I. Professional	0.238	0.264	-0.226	-0.171	-0.105	0.021
II. Intermediate	0.042	0.121	0.012	-0.093	-0.081	0.158
III. Skilled	0.017	0.064	0.034	-0.055	-0.060	0.437
IV. Semiskilled	-0.001	-0.003	-0.002	0.002	0.003	0.279
Mother home	-0.000	-0.001	-0.001	0.001	0.001	0.764
Mother deceased	0.002	0.007	0.004	-0.006	-0.007	0.122
Servant in household	0.014	0.049	0.017	-0.041	-0.039	0.119
Age discrepency=0	0.013	0.050	0.029	-0.044	-0.049	0.474
Age discrepency=1	0.008	0.028	0.014	-0.025	-0.026	0.283
Living in town	0.002	0.008	0.005	-0.007	-0.008	0.646
P[*y* | **X** = E(**X**)]	0.019	0.130	0.559	0.188	0.104	

Notes: Marginal effect is P(y=c|x=1) - P(y=c|x=0), c=1,…,5. Baseline probabilities calculated at mean of all variables.

TABLE VII

OLS RESULTS: CORRELATES OF LOG WAGE IN 1881

Dependent Variable: Log Wage in 1881

	Ages 6-13 in 1851		Ages 6-9 in 1851		Ages 10-13 in 1851	
	β	se	β	se	β	se
In school in 1851	0.077	0.015	0.056	0.021	0.107	0.023
Log father's wage	0.262	0.017	0.283	0.024	0.240	0.025
Father's industry						
Agriculture	-0.065	0.024	-0.074	0.033	-0.043	0.036
Building	0.000	0.034	-0.003	0.046	0.007	0.050
Distributive	0.016	0.032	-0.012	0.043	0.051	0.049
Mining	-0.092	0.047	-0.098	0.060	-0.073	0.077
Iron & Steel	-0.042	0.046	-0.148	0.062	0.083	0.068
Textiles	-0.003	0.033	0.002	0.045	0.003	0.048
Other manufacturing	0.004	0.021	-0.025	0.029	0.041	0.032
Mother home	0.024	0.023	0.041	0.031	-0.005	0.035
Mother deceased	0.029	0.031	0.033	0.045	0.021	0.045
Servant in household	0.272	0.026	0.288	0.035	0.248	0.040
Age	0.034	0.058	-0.062	0.144	-0.075	0.159
Age^2 */ 10*	-0.004	0.007	0.009	0.019	0.009	0.019
Eldest son in HH in 1851	0.034	0.015	0.025	0.021	0.043	0.023
Inheritance	0.030	0.038	-0.017	0.050	0.080	0.058
Eldest $\times$ *Inheritance*	-0.003	0.044	0.052	0.061	-0.059	0.065
Age discrepency=0	0.104	0.020	0.164	0.031	0.064	0.034
Age discrepency=1	0.026	0.021	0.061	0.032	0.015	0.035
Not in town of birth	0.019	0.017	0.027	0.023	0.004	0.025
Living in town	0.096	0.017	0.114	0.023	0.074	0.026
Age heaping	0.000	0.002	-0.001	0.002	0.000	0.002
Region						
Lancashire-Cheshire	0.073	0.036	0.085	0.049	0.067	0.052
London	0.046	0.051	0.115	0.068	-0.030	0.077
London Environs	-0.027	0.033	0.009	0.044	-0.059	0.049
Midlands	0.049	0.031	0.080	0.042	0.015	0.045
North	0.015	0.041	0.019	0.055	0.027	0.062
South	0.025	0.030	0.065	0.041	-0.020	0.044
Yorkshire	0.052	0.038	0.086	0.052	0.018	0.057
Constant	2.414	1.123	4.131	2.665	4.827	3.291
N	5330		2857		2473	
R^2	0.215		0.240		0.197	
F (29,5300)	49.971		30.808		20.701	

Notes: Omitted dummies are *Father's Industry*: Others, *Mother working* , *Region*: East.