



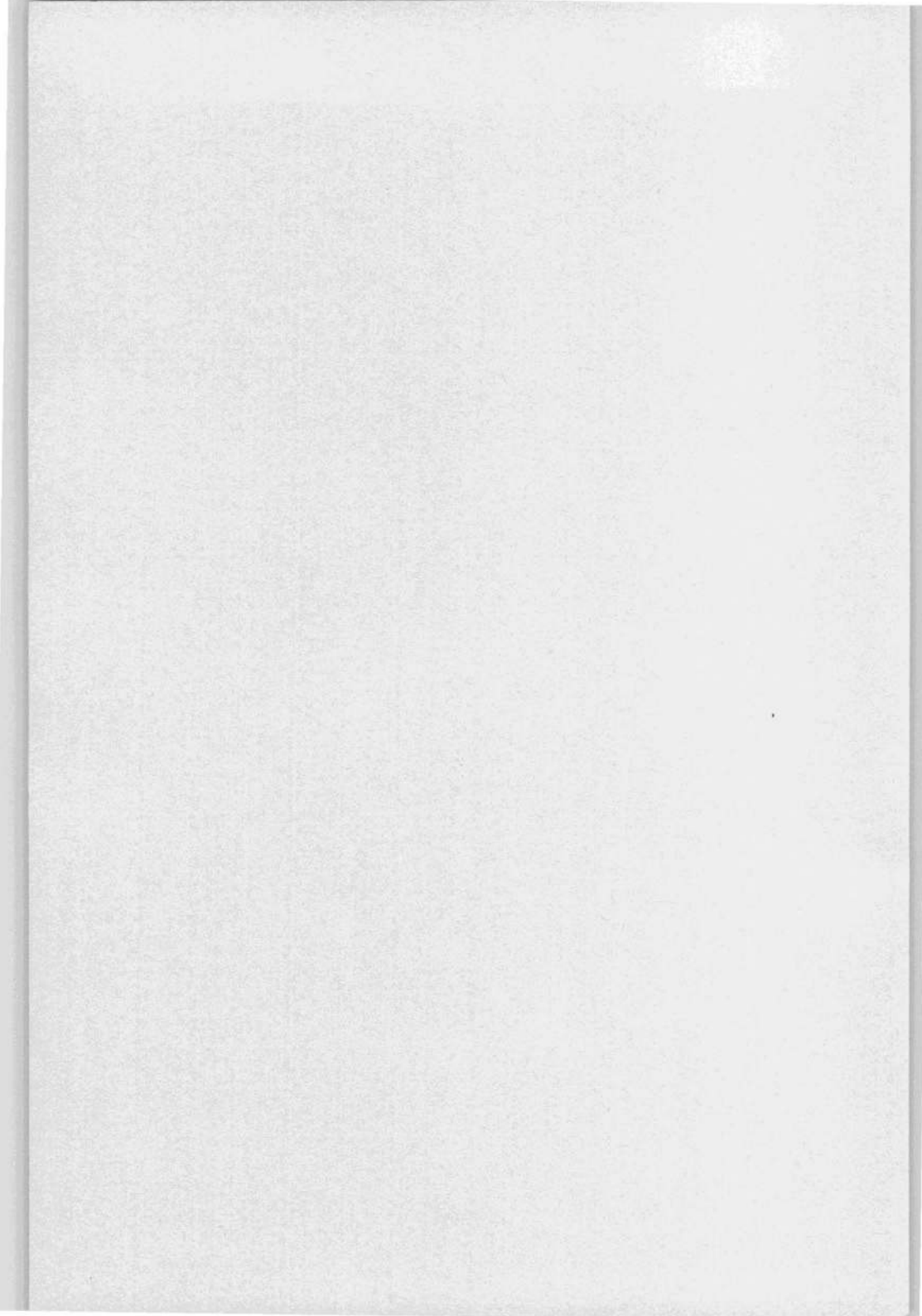
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**CLOGS TO CLOGS IN THREE GENERATIONS?
EXPLAINING ENTREPRENEURIAL PERFORMANCE
IN BRITAIN SINCE 1850**

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Britain since 1850**

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ABSTRACT

Using a data set collected from dictionaries of business biography and probate records, this article analyses entrepreneurial performance in Britain since the middle of the nineteenth century. Lifetime wealth accumulation is specified as a measure of entrepreneurial performance and applied empirically to analyse the link between aspects of culture and entrepreneurship. The analysis identifies a negative performance effect for firm inheritors and for those receiving a high social status education. New firm founders, managers, and those with a lower social status education are shown to have been comparatively successful. Industry, region and religious dissent are ruled out as explanations for the performance patterns established. The method and findings pose important implications for the debate concerning culture and entrepreneurship in Britain.

**CLOGS TO CLOGS IN THREE GENERATIONS?
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Entrepreneurial ability is not always inherited according to Alfred Marshall in his *Principles of Economics*.

When a man has got together a great business his descendants often fail in spite of their great advantages to develop the high abilities and special turn of mind and temperament required for carrying it on with equal success... When a full generation has passed, when the old traditions are no longer a safe guide and when the bonds that held together the old staff have been dissolved, then the business almost invariably falls to pieces.¹

Most references to inheritance and entrepreneurship in the economic history literature cite Landes' influential account of European industrialisation, which describes late nineteenth century Britain as plagued by family firms, tradition and inflexibility.² Inherited business ownership is said to have created complacency and conservatism while the pursuit of social and political distinction encouraged entrepreneurial lethargy.³ The persistence of family capitalism supposedly delayed the adoption of efficient administrative and organisational structures, so that British firms fell behind their competitors in terms of both capacity and efficiency.⁴ A

¹ Marshall, *Principles*, pp. 299-300.

² See for example, Berghoff and Möller, 'Tired Pioneers', p. 262.

³ There are various references for this view. See further, Aldcroft, 'The Entrepreneur'; Coleman, 'Gentlemen and Players'; Kindleberger, *Economic Growth*; Landes, *Unbound*; Payne, *British Entrepreneurship*. Using case study evidence Rose, 'Beyond Buddenbrooks', argues that poor provision for succession into the business leadership of family firms contributed to failure.

⁴ Chandler, *Scale and Scope*.

lacklustre enterprise culture, it has been argued, was a primary obstacle to economic growth.⁵

But what is the evidence for this failure? Judgements of performance invariably rest on individual case studies that are sufficient neither to refute nor confirm more general hypotheses of weak British entrepreneurship. The Kenrick family in hardware manufacture, the Du Cross's in rubber and the Crawshay's in iron and steel provide salutary tales of dynastic downfall. But instances of success are equally plentiful. Before 1914 the three largest firms in Britain, J&P Coats, Imperial Tobacco and Watney Combe Reid were built up around the family rather than new management structures. Cadbury Brothers, the epitome of good management, is an example of a family firm that thrives today.

Explanations of culturally induced economic decline have proved difficult to substantiate or defend using qualitative, archival or institutional research methods. In the historical debate about culture's influence on economic performance, education has typically occupied a prominent role. The public school with its emphasis on anti-individualism is singled out for condemnation. The slow pace of technical advance, especially in the old staple industries, has been attributed to the practical exclusion from the public school curriculum of science and technology studies.⁶ Yet the evidence is far from conclusive. As Berghoff points out, "so far no one has really proved that a classical education always has a negative effect on non-classical careers".⁷

⁵ There are various manifestations of the cultural thesis. The most well known (certainly the most derided) is Wiener, *English Culture*. For a summary of this debate see Collins and Robbins, *British Culture* and Rubinstein, *Capitalism*.

⁶ Ward, 'Public Schools'; Warwick, 'Did Britain Change'.

⁷ Berghoff, 'Public Schools', p. 161.

Several writers have followed Weber's theory of 'ascetic Protestantism' arguing that non-conformism is the handmaiden of economic growth in a capitalist society. To a large degree the evidence is impressionistic. For Ashton, the fact that non-conformists were better educated than the rest of the middle class in eighteenth and nineteenth century Britain accounts for their prominence in business life.⁸ Non-conformist teaching that idleness was a source of sin and immorality is said to have encouraged profit-seeking entrepreneurship, while mutual systems of support provided access to information, credit and trading patterns.⁹ A number of studies use empirical data to test the hypothesis that non-conformists were over-represented in the ranks of Britain's entrepreneurs.¹⁰ But these studies do not adequately distinguish between entry into entrepreneurship and eventual success.¹¹ So far, there has been no direct test of the hypothesis that religious affiliation is a determinant of business performance.¹²

This article systematically analyses the link between aspects of culture and entrepreneurship. A measure of entrepreneurial performance is developed using information on lifetime wealth accumulation. Entrepreneurs are profiled using categories such as firm type, education, religion, and industry and region. Key

⁸ Ashton, *Industrial Revolution*, p. 19.

⁹ Kindleberger, *Economic Growth*.

¹⁰ Berghoff, 'British Businessmen'; Hagen, *Social Change*; Howe, *Cotton Masters*; Rubinstein, *Men of Property*.

¹¹ This argument has been made by Berghoff, 'British Businessmen'. If society creates an outgroup, in this case non-conformists, one would expect to find an over-representation of non-conformists in the business community. The cause, rather than inherent entrepreneurial ability, might be restricted access to alternative career paths such as the professions.

¹² For further information on this issue see Kirby, 'Quakerism', p.105.

issues relating to the debate on culture and entrepreneurship in Britain are explored.

A PERFORMANCE MEASURE

In the economic history literature, the use of economic theory to assess entrepreneurial performance is confined almost exclusively to the application of the neo-classical paradigm.¹³ Business historians have made performance judgements using individual case studies, but debate has centred largely on the issue of whether entrepreneurs active in British industry were economically rational in their choices of technology. Advances in endogenous growth theory pose important implications for this research. Taking into consideration different market environments, resource flows and technology spillovers in the investment decisions of entrepreneurs, "endogenous growth theory may offer additional lines of defence for those wishing to absolve British business of any failure".¹⁴

However, performance tests based on growth theory are unlikely to sway the critics who favour cultural explanations of Britain's relative retardation. Wiener, a key exponent of the so-called 'cultural critique', argues that the reasons which explain British economic decline remain beyond the sole domain of the economist.¹⁵ A central objective of this article is to combine both economic theory and the empirical study of culture in order to re-examine the hypothesis of culturally induced entrepreneurial decline in Britain. A performance test is

¹³ McCloskey, 'Victorian Britain' and McCloskey and Sandberg, 'From Damnation to Redemption', are perhaps the most well known examples.

¹⁴ Crafts, 'Forging Ahead', p. 206.

¹⁵ See Wiener, *English Culture* and the chapter entitled 'British Retardation - The Limits of Economic Explanation'.

undertaken on the basis of a link between profit as the reward for exploiting business opportunities and the lifetime wealth outcomes of entrepreneurs.

In accordance with Knight and Schumpeter, and more recent theorists, it is assumed that the pursuit of profit is the prime motivation for entrepreneurial activity, even though there can be non-pecuniary influences on the entrepreneurial labour supply such as a preference for work independence, power, or status.¹⁶ Profit arises through entrepreneurship in a variety of forms. In a Schumpeterian sense entrepreneurship is a productive activity which benefits society and the economy. Profit is generated through the introduction of new goods, new methods of production, the opening of a new market, or the creation of a new type of industrial organisation. Additionally, as emphasised by Baumol, profit return can derive from activities that damage the industrial system. Entrepreneurs can create long-standing monopolies or expose gaps in the legal system as a consequence of the prevailing reward structure. Entrepreneurship can be a rent-seeking activity with a zero marginal product yield to the economy.¹⁷

If the neo-classical assumption of free entry and free exit of the entrepreneurial labour supply is assumed, profits will tend towards zero in competitive equilibrium. With favourable business cycle conditions profits will be higher, may vary across firms, and be exploited through the creation of a monopoly. In the long run, however, profits converge to their competitive equilibrium level because of the perfect competition assumption. In competitive equilibrium there is a return for entrepreneurship, but this is simply a reward for the entrepreneur's labour supply.¹⁸

¹⁶ Knight, *Risk*; Schumpeter, *Economic Development*. See also, Baumol, *Entrepreneurship*; Casson, *The Entrepreneur*.

¹⁷ Baumol, *Entrepreneurship*.

¹⁸ See Mueller, *Profits*, especially pp. 1-33.

If profits do tend towards their competitive equilibrium rate why choose entrepreneurship over regular wage work? According to Blanchflower and Oswald *ex ante* profits can be assumed to be indeterminate, which provides a spur to entrepreneurial activity. Then if the equilibrium condition does not hold *ex post*, for example through imperfect capital markets that constrain the supply of entrepreneurship, the entrepreneur can achieve supernormal returns. The utility gap between entrepreneurs and wage-workers is wider in the presence of imperfect capital markets. Those who gain access to investment funds can receive supernormal returns for their business effort.¹⁹

In the absence of a competitive process to eliminate supernormal profits those who overcome credit constraints can maximise their rate of accumulation. The greater the profit in disequilibria the more intense is the inducement towards entrepreneurship. If the pursuit of profit is the prime motivation for entrepreneurship, more able entrepreneurs will be distinguishable *ceteris paribus* by their higher rate of profit accumulation. In a purely economic maximisation scenario, one way to identify success from relative failure would be to measure differences in profits.

Although profit data are not generally available a proxy measure of entrepreneurial performance can be introduced using information on lifetime wealth accumulation.²⁰ Suppose profit p_t is equivalent to the entrepreneur's

¹⁹ Blanchflower and Oswald, 'Supernormal Returns'.

²⁰ In order to obtain profit data entrepreneurs must be considered as the embodiment of their firms – there are no such data at the individual level. Even with this assumption the availability of information is severely restricted for studies with an historical perspective. Very few firms took advantage of early limited liability legislation. Moreover, it was not until the 1948 Companies Act that firms

income y_t . In long run competitive equilibrium an entrepreneur will receive profit income payments generated by the process,

$$p_t = y_t = \varepsilon_t \quad (1)$$

where ε_t is a non-negative random variable distributed as $N(0, \sigma_\varepsilon^2)$ such that realisations of ε_t are serially uncorrelated. If the competitive equilibrium condition does not hold, the entrepreneur can receive supernormal returns such that,

$$p_t, y_t > 0 \quad (2)$$

Making the link with lifetime wealth accumulation, consider an entrepreneur active over n years beginning in business time t with initial wealth W . Profit income generated through entrepreneurship can either be consumed c_t or saved. The entrepreneur's wealth evolves as,

$$W_{t+n} = [W_t + y_t - c_t](1+r)^n \quad (3)$$

where the terminal wealth outcome is measured by profit income due to enterprise and labour, a return on initial wealth and adjusted downwards for consumption expenditure.²¹

were forced to detail information about their true assets and profits in consolidated annual balance sheets.

²¹ For a detailed theoretical appraisal of wealth accumulation see, Hall, 'Stochastic Implications'.

If equation 3 is rearranged the 'rate of return' r can be calculated in order to distinguish between large values of W_{t+n} caused by inherited wealth and large values, relative to W_t , caused by entrepreneurship.

$$r = \left[\sqrt[n]{\left(\frac{W_{t+n}}{W_t + y_t - c_t} \right)} \right] - 1 \quad (4)$$

Differences in r will depend on the entrepreneur's ability to exploit profit-making opportunities and generate a rate of return on initial wealth. Since initial wealth is commonly inherited the formula is useful for analysing the performance of family firms. Firm inheritors can make excessive demands on the wealth built up by parents and grandparents. Using this performance measure the proverbial hypothesis of "clogs to clogs in three generations" can be subjected to an empirical test.

THE DATA SET

Data collection has been carried out using information in the *Dictionary of Business Biography* (DBB) the *Dictionary of Twentieth Century British Business Leaders* and probate archival holdings.²² All deceased individuals on whom information was available were gathered into a data set. Birth dates range from 1789 to 1937 and death dates from 1868 to 1993. These individuals were active in British business during the nineteenth and twentieth centuries. A total of 1149 observations were obtained, of which 1079 include terminal wealth entries. An

²² Probate records were consulted at the Probate Registry, Somerset House, London.

empirical counterpart of equation 4 is estimated for 283 individuals in the data set on whom terminal and inherited wealth entries were gathered.

Since the publication of the biographical sources it has been possible to consider omissions and erroneous inclusions and to challenge the view of the editors that the result is a balanced coverage of entrepreneurial leadership in Britain over the last century and a half. In some instances names in the sources seem to have been included for their non-business interests. John Maynard Keynes (1883-1946) was principally renowned as an economist and investment policy analyst, though he held several directorships of London based corporations. Others were perhaps included because their work was technologically significant. Sir Henry Bessemer (1813-1898) was an inventor first, an engineer and steel master second. His Bessemer Converter made the last Bessemer steel in England in 1874, but his business interests remained comparatively minor.²³

How representative are the data of British entrepreneurship? Certainly the many who entered into the entrepreneurial labour market but failed will not be included in the data set, aside from a few well-documented cases of failure and the colourful careers of rogue figures. But whether included as success stories or as spectacular example of failure the catchment area of the biographical sources is wide. Hannah and Jeremy claim that the DBB is a collection of the “nations entrepreneurs” and in doing so accord with the view that,

any attempt at a rigid definition of the term entrepreneur... [should be avoided] ...because whatever attributes are selected they are sure to prove excessively restrictive, ruling out some feature, activity or accomplishment of this inherently subtle and elusive character”.²⁴

²³ See the entries for Keynes and Bessemer in the DBB.

²⁴ Baumol, *Entrepreneurship*, p. 7.

Firm founders, inventors, and managers are included in the sources because all may be said to have contributed to business leadership in Britain. Although firm foundation is commonly taken as the defining element of entrepreneurship typifying the distinction between profit seeking entrepreneurs and wage earning workers, other functions may be considered as 'entrepreneurial'. Inventors can attempt to appropriate a profit return from their inventions using patents and licenses. Managers can be credited with transforming inventions into useable products. The manager's wage is, in part, a reflection of the firm's profitability but it can also be complemented with equity holding. Rubinstein's analysis of the very wealthy in Britain shows that even non-asset holding businessmen could amass fortunes by investing their salaries.²⁵

A specific source of bias in the DBB and DTBB is the overrepresentation of individuals active in manufacturing and mineral extraction industries. This bias can be identified with a simple, if also imperfect, test. Individuals active in manufacturing and mineral extraction industries account for 66 per cent of those in the full sample (1149 individuals) which can be compared with a benchmark calculation using Broadberry's sectoral shares of employment. Broadberry's figures, adjusted, show that if there was no bias in the sample manufacturing and mineral extraction industries would account for around 46 per cent of those included.²⁶ This sectoral bias does not invalidate hypothesis tests, but it does place the findings in a qualified context. It is only possible to explore the characteristics

²⁵ Rubinstein, *Men of Property*, pp. 176-192.

²⁶ Broadberry, 'Productivity Levels', p.385. This is the equivalent comparable share of the workforce active in such industries on average between 1871 and 1990 as calculated from Broadberry's data. My re-adjustment calculation excludes agriculture and government sectors from Broadberry's figures because such sectors are also excluded from the biographical sources. The sectoral share of employment

of the observed sample and make inferences that relate to a specified population. The representation in the DBB and DTBB, albeit broad, is heavily weighted towards manufacturing and mineral extraction industries. The data cover mostly successful entrepreneurs and minimise failures. The general composition of the data set must be reflected in the analytical results.

An additional bias might be introduced into the analysis if the smaller sample, for whom terminal and initial wealth entries were available, over-represents or under-represents characteristics present in the larger sample. Figure 1 compares the density of probate terminal wealth (probate records are discussed in the following section) for the 1079 individuals and the smaller sample of 283 individuals on whom such data were available. The kernel density of terminal wealth is generated to determine whether the different sample sizes narrow or widen the wealth distribution.²⁷ Using terminal wealth as a criterion for comparison in Figure 1 it is clear that the distribution is preserved across the sample sizes with no apparent loss of generality.²⁸

for manufacturing and mineral extraction is then an average share of employment taken over the five benchmark years, 1871, 1911, 1930, 1950 and 1990.

²⁷ The kernel function is specified as being Gaussian. The wealth data are corrected for price changes using a GDP deflator and indexed in 1938 prices. The deflator is obtained by dividing the Feinstein's series of GDP at factor cost in current prices, by the series in constant prices given in Mitchell *Historical Statistics*, pp. pp.831-832, 837-838.

²⁸ Similarly under a t-test there is no significant difference between the sample means ($t = -1.2173$ with probability 0.8881). The descriptive statistics are (in 1938 £'s):

	Mean	St. Dev	Median
1079 individuals	489,309	1,706,650	115,080
283 individuals	627,977	1,678,743	162,026

Data Coding

Most of the information in the biographical sources is qualitative but it can be collected in a quantitative form using binary coding. In order to test hypotheses relating to cultural explanations of Britain's relative economic decline, the following profile categories outlined below are utilised.

First, a firm type category separates firm inheritors from non-inheritors. Firm inheritors, are classified further as either third or second generation entrepreneurs, depending on the relationship between the entrant and the founder.²⁹ Non-inheritors are also classified additionally as either career managers or firm founders. Second, an education category distinguishes those educated at all public schools, a leading public school,³⁰ or an Oxbridge College. Collected together two variables identify those receiving a high status education (a public school and/or Oxbridge College) and a lower status education (basic elementary or secondary

²⁹ Where a firm was older than three generations the individual is included under the third generation profile variable. There are a few cases in which an individual took over a family firm owned by a brother or cousin of the same generation. These cases are coded as firm inheritors but are neither third nor second generation inheritors. To avoid confusion they do not appear again under a separate category.

³⁰ In Britain a 'public school' is fee-charging and under private management, equivalent to a 'private school' in America. A leading public school (equivalent to a highly prestigious private school such as Exeter or Andover in America) is defined as a Clarendon School comprising of the nine leading schools as determined by the Clarendon Commission of 1864. These are Eton, Harrow, Winchester, Westminster, Rugby, St. Paul's, Merchant Taylors, Charterhouse and Shrewsbury.

education, grammar school and non-Oxbridge university).³¹ A variable to distinguish those with a technical/scientific education is also included. Third, a religion category separates non-conformists from other religious groups. The biographical data has been used to assess the strength and period of allegiance because in some instances individuals did switch from one religion to another.³² Finally a region/industry category is used to separate individuals active in staple industries (coal, iron and steel, shipbuilding, textiles), new technology manufacturing industries (chemicals, engineering, electricity, car and aircraft manufacturing), other manufacturing, and the regions of the north-east and north-west and London.

The data series are described in Table 1 both for the full data set (1149 observations) and for the number of individuals on whom terminal and inherited wealth entries were available (283 observations). Comparing the two series it can be seen that the degree of comparability is high, although the smaller sample does contain a larger share of individuals active in staple industries, in the north-east and north-west and in family firms of older generations. Again the presence of this bias does not invalidate hypothesis tests as long as the analytical results are placed in the context of the sample. The objective of this article, to link profile characteristics with entrepreneurial performance, can be achieved with the data set coverage.

³¹ An elementary education is up to the age of eleven years and a secondary education up to the age of sixteen years. A grammar school is a better level school which may be maintained by state funds or be a fee-paying 'independent' school.

PROBATE RECORDS AND ESTIMATION TECHNIQUE

This section describes how probate records are used to measure the lifetime wealth accumulation of the individuals in the data set. In doing so it draws heavily on Rubinstein's detailed account of probate records as an archival statistical source.³³ It is not necessary to replicate Rubinstein's general analysis of probate records in terms of their salient features and information contained therein. But it is necessary to discuss issues that relate to the specification of lifetime wealth accumulation as a measure of entrepreneurial success.

First, wealth recorded by probate may not be an accurate reflection of an individual's total worth. Probate records cover just the assets that an executor must dispose of and take no account, beyond a certain period prior to death, of gifts bestowed upon others. Over time with more severe death duties levied there is likely to be, *ceteris paribus*, a reduction in the value of bequests. Gifts *inter vivos*, investments not aggregated with the estate, or a reduction in the duty value of assets provide examples of the ways in which the payment of death duties can be dodged.³⁴

In order to adjust for reduced bequests through the evasion and avoidance of death duties I use a period 'control' to separate individuals liable to different taxation regimes. Figure 2 tracks the real rate of duty charged on a variety of sized estates between 1894 and 1990. The progressive taxation of wealth transfers over time can be seen in the data series. Before the First World War death duty payments were relatively minor. After 1919 death duty charges increased

³² Jeremy discusses the transfer of businessmen's allegiance in, *Business and Religion*, p. 15-16.

³³ See Rubinstein, *Men of Property*, pp. 9-27.

³⁴ See Horsman, 'The Avoidance' and Whalley, 'Estate Duty'.

substantially in addition to tighter restrictions on *inter vivos* giving. Finance Acts following the Second World War were associated with higher real rates of death duty. The introduction of Capital Gains/Transfer and Inheritance Tax reduced the tax burden in real terms which is borne out in the data. However, additional sanctions on lifetime gifts closed loopholes alleviating exposure to a tax liability on death.³⁵

In accordance with the legislative developments highlighted in Figure 2, and a detailed consideration of death duty administration procedures, the individuals in the data set can be separated according to deaths before 1919, between 1919 and 1945 and after 1945. The probate terminal and initial wealth entries collected will then be subject to similar taxation regimes and broadly proportionate pre-death transfers. This procedure is likely to be a noisy estimator of death duty evasion and avoidance because of the long time periods involved and because of individual heterogeneity. If the errors are normally distributed, however, and a large enough set of observations is considered, the deviations will not represent a major distortion to the reported results.

A second issue is that probate provides a snapshot of wealth at a moment in time, namely death, which may conceal fluctuations in assets over the life cycle. In the context of a standard neo-classical utility maximising problem, the entrepreneur at the beginning of the life cycle plans consumption and leisure supply for the present and the future. The consumption profile will be influenced by the rate of time preference. If individuals save over working periods and dissave during retirement there will be some running down of assets with old age. If there is a bequests motive, households with children may leave more wealth than childless households. Or *inter vivos* gifts can be bestowed upon children reducing

³⁵ For a detailed description of death duty legislation see Lawday and Mann *Death Duties* and Miller, *Succession*.

the terminal wealth of parents. Altruistic entrepreneurs can turn to philanthropy.³⁶

In order to test for such effects I specified the following wealth equation across the individuals in the data set. Let W be the natural logarithm of probate terminal wealth.³⁷ The variables C and A refer to the entrepreneur's number of children and age. P is a dummy variable coded one for individuals active in philanthropy and zero otherwise.

$$\ln W = \alpha_0 + \alpha_1 C + \alpha_2 A + \alpha_3 A^2 + \alpha_4 P + \varepsilon \quad (5)$$

The empirical results are reported in Table 2. The period 'control' procedure is applied to filter out the effects of death duty evasion and avoidance. The standard errors are corrected for possible heteroskedasticity bias. Equation 5 is run for both sample sizes (1079 = full sample, 283 = sub-sample) to test for changes in the sub-sample results. The larger sample provides a better 'fit' to the data, but the coefficients which are significant at the customary levels in both samples, are similar in size and share the same sign.

According to the low R-squared of the regressions, life cycle factors will not present a major distortion to the performance measure results. The life cycle variables specified account for, at best, 10 per cent of the variation in the logarithm of terminal wealth. The parameters on the 'children' variable are not significantly different from zero, which means that family size is not a good predictor of the terminal wealth outcome. Using the parameters on age, on the other hand, it is difficult to prove or disprove that life cycle factors will affect our performance measure of entrepreneurship. In contrast to the positive effect of increasing age on

³⁶ For a discussion of the life cycle model see Modigliani, 'Intergenerational Transfers', and Kotlikoff, 'Savings'.

terminal wealth in the first cohort, the effect is not significant at the customary level in the second cohort, and negative in the case of the third cohort. The life cycle theory predicts a polynomial in age, but the squared age term is dropped from the regressions on an F-test. There are a range of possible explanations for the age variable results none of which can be confirmed, or denied, with these data.³⁸

Most of the explained variation in the dependent variable comes from the introduction of the philanthropy dummy. This variable is positive and significant at better than the 5 per cent level. Cross tabulations reveal that 42, 31 and 28 per cent of the individuals in the respective cohorts could be identified as making donations to charity. Following Halvorsen and Palmquist the parameters across the three cohorts show that the estate of a philanthropist was between 100 and 264 per cent greater than that of a non-philanthropist.³⁹ According to these cross section results, and assuming identical initial endowments, a philanthropist would score a higher performance rating than a non-philanthropist in spite of the philanthropist's lifetime reduction in wealth.

There are complicated issues involved in testing the life cycle hypothesis. At the micro level evidence can be amassed both in favour and against life cycle

³⁷ The wealth data are indexed in 1938 prices using a GDP deflator.

³⁸ For example, the longer lived may have more time to accumulate wealth and leave more at death in periods before the onset of heavy death duty regimes (cohort 1 results). Higher death duty charges, thereafter may encourage *inter vivos* giving, thus reducing the precautionary demand for wealth at death for older individuals (cohort 3 results). A squared age term would be more likely to feature in a dynamic measure of wealth over the life cycle rather than a static measure of wealth at death.

³⁹ Find the antilog of the parameter estimate and subtract 1. See Halvorsen and Palmquist, 'Dummy Variables'.

patterns of wealth accumulation and decumulation.⁴⁰ The results from equation 5 are tentative and serve only as a method of testing the extent to which life cycle factors will influence the results of the performance analysis. It appears that neither family size nor a propensity for philanthropy will pose a significant distortion. Increasing age depending on cohort is both positively and negatively correlated with the terminal wealth outcome. Overall, however, only a small percentage of the variation is explained.

A third issue is the measurement of an initial wealth endowment. Recall from equation 4 that lifetime wealth accumulation as an index of entrepreneurial performance requires known values of terminal and initial wealth. I use the father's bequest in the denominator of the expression because fathers represent the sole group for whom wealth information could be traced. Ideally, however, indirect inheritances would be considered as the sources of inheritance are much wider than from father to progeny. In spite of data limits there are good reasons for believing that a father's wealth is a useful proxy for an entrepreneur's initial endowment. Entrepreneurs can borrow on the expectation of an inheritance or use a father's collateral as a means of securing a loan.⁴¹ The distribution of wealth in the present is closely linked with that of the preceding generation, the major source of wealth inequality arising from direct as opposed to indirect inheritances.⁴²

Collecting the biographical and archival information together, and considering the data obtainable, it is possible to calculate what may be described as an approximation of r ,

⁴⁰ Hall and Mishkin, 'Sensitivity'; Runkle, 'Liquidity Constraints'; Zelder, 'Consumption'.

⁴¹ Blanchflower and Oswald, 'What Makes an Entrepreneur'.

⁴² Atkinson, *Inequality*; Harbury and Hitchens, *Inheritance*; Harbury and McMahan, 'Top Wealth Leavers'.

$$r^* = \left[\sqrt[n]{\left(\frac{W_{t+n}}{W_t} \right)} \right] - 1 \quad (6)$$

where r^* is the approximation of the rate of return on initial wealth expressed in equation 4 and W_{t+n} and W_t are probate terminal and inherited wealth respectively. The period of business activity in n years is taken as the date of death minus the date of entry into entrepreneurship.⁴³ Notwithstanding the fact that income and consumption data are missing from the estimated expression, equation 6 is a close empirical counterpart to equation 4. It can be assumed that heterogeneity in consumption will be smoothed out in estimates of r^* across a data set of individuals. It is a reasonable *a priori* assumption that wealth will be an increasing function of the entrepreneur's profit income.

RESULTS AND ANALYSIS

The estimation results are given in Table 3. In columns 2-4 the mean rate of return is given along with its standard error and the number of observations (*ob*) in each cell.⁴⁴ The subscript n refers to the average number of years of business activity.

⁴³ Though most will relinquish their entrepreneurial roles before they die, the biographical information is not sufficiently detailed to make the necessary adjustment. A lot of detail, however, is provided on the career patterns of the individuals included. This makes it possible to establish the date when a business career commenced, especially for firm founders, because the date of business start-up is given.

⁴⁴ In 21 cases a father's wealth was equal to zero. A value of £1 was imputed in order to estimate the rate of return. I conducted a series of experiments using

The cohorts are specified using the period 'control' procedure. To correct for inflation, the wealth data are indexed respectively in 1900, 1938 and 1980 prices using a GDP deflator.⁴⁵ As with all the estimates in Table 3, comparisons can only be made within cohorts as opposed to between cohorts because of the particular distortion to recorded wealth created by death duty evasion and avoidance.

The structure of the results in Table 3 reflects economic and societal changes in Britain since the middle of the nineteenth century in addition to data availability. In the second cohort a separate category for managers can be specified in line with the development of the corporate economy. The post-1945 period covered by the third cohort is characterised by the growing ranks of career managers in public corporations. Far fewer new firm founders made it into the ranks of Britain's business leaders during this high point of 'organisation society'.⁴⁶ The old staple industries are represented in the first two cohorts but not in the third where a separate category is specified to account for the rise of the new technology industries. Religious categories are included only for the first two cohorts reflecting the decline of non-conformist denominations and more general trends in twentieth century secularisation.

Before discussing the disaggregated results fully it is useful to consider how well, as a group, the entrepreneurs in the data set performed. The first row of Table 3 reports the unweighted rate of return pooled across the individuals in the sample. The parameter estimates can be multiplied by 100 to give the percentage rate of return per annum. It can be seen that the average rate of return for each

higher and lower imputed values (ranging from £0.1 to £10), and the substantive results remained unchanged.

⁴⁵ 1900, 1938 and 1980 are among the standard index years used by Feinstein. These years correspond approximately with the average date of death for the individuals in the respective cohorts.

⁴⁶ Roper, *Masculinity* pp. 47-73.

cohort is 9.32, 4.06 and 1.74 per cent per annum respectively. To get some idea of the size of these percentages, two sets of benchmark figures were estimated.

First, I calculated the average yield on consols from data assembled by Mitchell.⁴⁷ Consols represent an ultra low performance asset virtually without risk of default and may be taken as the minimum expected return from a wealth portfolio. At 9.32 per cent the entrepreneur's rate of lifetime wealth accumulation in the first cohort is over three times greater than the average yield on consols of 3.0 per cent per annum between 1870 and 1918. In the second and third cohorts there is an illusionary downward effect on the rate of lifetime wealth accumulation arising from the negative influence on recorded wealth of heavier death duty regimes. Clearly the average yield on consols is not subject to this distortion which prevents further comparisons.

Therefore, I calculated equation 6 for a sample of non-businessmen landowners taken from Perkin's data set covering elites in British society since 1880.⁴⁸ These landowners are likely to hold a stock of wealth over a number of generations rather than generate new wealth through entrepreneurship so their rate of return, much like the yield on consols, may be regarded as a threshold level below which a successful entrepreneurs would not be expected to fall. The mean rates of return for these landowners are given in Table 4. It can be seen that the gap between the respective rates of return comparing entrepreneurs and landowners is large. The entrepreneurs in the sample displayed favourable rates of lifetime wealth accumulation over the three cohorts.

Finding a high rate of return for the individuals included is not altogether

⁴⁷ Mitchell, *Historical Statistics*, p. 678.

⁴⁸ Perkin, *Elites* [computer file]. These constitute individuals coded as landowners under Perkin's category scheme. All individuals for whom Perkin gives probate wealth and land value information are included in the calculation.

surprising given that the sample is biased towards the inclusion of success stories. The entrepreneurs were active mostly in successful firms and the performance judgement is limited by the scope of the data set coverage. The more telling result of the exercise comes from disaggregating the sample in order to test the hypothesis that particular cultural traits influence entrepreneurial performance.

The specified industry and region categories can be used to determine the likelihood that success was a function of being in an expanding rather than a declining region and industry. A useful by-product of the death duty period control procedure is that individuals are simultaneously separated according to their period of business activity, filtering out, to some extent, long run variations in profit earning opportunities. The first, second and third cohorts capture individuals active in the middle to late nineteenth century, the interwar period and the post-1945 period respectively. However, in addition to changes over the long run there can be industry and region effects that influence the profit and wealth outcomes of individuals within the specified cohorts.

The clear result to emerge from Table 3 is that neither region nor industry was a determinate of the rate of lifetime wealth accumulation across the three cohorts. At the 95 per cent confidence interval all of the mean rates of return overlap for the region and industry variables. The confidence interval serves as a prescription for determining the size of the point estimate error and as a method for assessing statistical significance of the difference between mean interval estimates.

It is interesting to note that there is no positive performance effect for individuals who were active in London. Contrary to previous assertions, it appears that London was not the centre of wealth making in the nineteenth and early twentieth centuries around which the wealth of the rest of the country tended to

revolve.⁴⁹ The rate of lifetime wealth accumulation of entrepreneurs in London did not deviate significantly from that of entrepreneurs active in the northern half of the country. There is no positive performance effect for individuals active in staple industries or new technology industries in their epochs of ascendancy. Likewise there is no significant negative performance effect for individuals active in staple industries during the period of interwar decline. Successful entrepreneurs were adept at exploiting wealth making opportunities irrespective of a regional or industrial growth rate. These variables do not explain, for our sample of largely successful individuals, variations in entrepreneurial performance.

Recourse to religious affiliation does not improve our ability to explain the performance measure results. The rate of return for non-conformists is higher than for other religious groups in the first two cohorts, but there is no significant difference between the estimated means at the 95 per cent confidence interval. This test is somewhat imperfect because the biographical sources provide no systematic indication of the degree to which religion affected business decision making.⁵⁰ However, if the fostering of information and credit networks proved conducive to the growth of firms among non-conformists, as is often claimed in the literature, there should be a positive entrepreneurial performance effect. Even if nonconformists were over-represented among Britain's class of entrepreneurs, compared to their proportions in the population as a whole, our comparative performance analysis suggests there was no inclination toward entrepreneurial success.

⁴⁹ Rubinstein, *Men of Property*, p. 102; Rubinstein, 'Wealth Occupation and Geography'.

⁵⁰ These problems are noted by Jeremy, *Business and Religion*, and *Capitalists and Christians*.

The most important determinants of entrepreneurial performance according to the results in Table 3 were firm type and education. Figures 3-5 provide a visual representation of the mean rates of return calculated at the 95 per cent confidence interval. Two striking patterns emerge from the data. First, there is a comparatively low rate of lifetime wealth accumulation for firm inheritors. The older the generation, the lower the rate of return; third generation entrepreneurs did 'fail' relative to the performance of either firm founders or managers, or both. Second, a negative performance effect can be identified for individuals receiving a high rather than a lower status education. In the first two cohorts there is a large gap in the rate of lifetime wealth accumulation between these two groups. Notwithstanding the fact that this gap is bridged in the third cohort an education in the upper echelons of the British system - at a Clarendon school or Oxbridge College - was associated with negative rates of return.

Clearly, association does not imply causality and the results must be heavily qualified. It is not clear that the type of education *per se* will influence business performance. Recent research has emphasised that differences in the nature of science and technology studies in the British as compared with the continental education systems do not explain differences in industrial leadership.⁵¹ Figures 3-5 show that a technical and scientific education was indeterminate of business performance for our sample of entrepreneurs. Cross tabulations also reveal that 31, 38 and 32 per cent of those in receipt of a high social status education in the three cohorts had pursued a technical and scientific course of study. A high social status education was associated with low rates of lifetime wealth accumulation, but it seems unlikely that a paucity of science and technology in its curriculum was the cause.

⁵¹ Berghoff and Möller, 'Tired Pioneers'; Cassis, *Big Business*.

Family firm owners by virtue of their wealth could secure for their offspring a high social status education in which case firm type or education might be instruments for an unobserved family background variable. It is a commonly argued in the literature that tradition and elitism in education were important status preoccupations for business families that had built up wealth through generations. In the first cohort there is evidence of such a connection. A simple bivariate probability estimate shows that a firm inheritor as opposed to a non-inheritor was 28 per cent more likely to have received a high social status education.⁵² There are complicated links between these aspects of culture and entrepreneurship and it is impossible to definitively say that one factor was a more important influence than another.⁵³

One explanation of the results in Figures 3-5 would be that there are diminishing marginal returns to an inheritance, whereby larger inheritances *ceteris paribus* are associated with lower rates of return. Further analysis of the data in Table 5 shows that there may be some merit in this argument. Inheriting a family firm and possessing a high social status education were positively associated with initial and terminal wealth, whereas non-inheritors (firm founders and managers) and those receiving a lower status education, on average, inherited less and bequeathed less over a life cycle of business activity. On the other hand, there are equally plausible alternative explanations. If entrepreneurial ability is not passed on as Marshall contended, there will be a tendency for those who inherit firms to run down assets built up over generations. Firm inheritors gain privileged access to the

⁵² I estimated a simple probit model and calculated the marginal effect of a unit change in the value of the regressor. The slope coefficient is 0.2758 with a standard error 0.1049.

⁵³ Similarly, although there is no significant marginal probability response under the same test in the second and third cohorts, it is impossible to pin-point the size of the firm type and education effect.

entrepreneurial labour market and may not possess the requisite skills needed for success. A comparison of the confidence intervals in Figures 3-5 and in Table 4 is particularly revealing. Recall that the rate of return for landowners identifies a threshold level below which the rate of return for successful entrepreneurs would not be expected to fall. Firm inheritors and individuals receiving a high social status education over the three cohorts did not yield significantly higher rates of return at the 95 per cent confidence interval than did these landowners. For our sample of individuals there is *prima facie* evidence that these profile characteristics were associated with weak entrepreneurship.

CONCLUSION

This article advocates a performance measure which links profit income, received as the reward for exploiting business opportunities, with the entrepreneur's lifetime wealth accumulation. A data set of individuals notable for their business achievements in Britain since the middle of the nineteenth century has been utilised. The data set is biased towards the inclusion of success stories and in favour of those active in manufacturing and mineral extraction industries. Nonetheless, these data provide a comprehensive source of information. Successful entrepreneurs make the largest contribution to economic growth, while the industries covered are those which frame the debate on culture and entrepreneurial performance in Britain.

The cultural critique of British entrepreneurship provides a classic example of an historical supposition that has been supported without systematic evidence. The purpose of this article has been to establish a corrective formula using a different research method and data source. The central findings are that region of activity, industry of occupation, and religious affiliation were indeterminate of entrepreneurial performance, that firm inheritors performed less

well than firm founders and managers, and that a high social status education was associated with a negative performance effect. These findings are broadly based due to the complex interactions between culture and entrepreneurship. Much further work needs to be done in this area in order to establish the precise patterns of causation.

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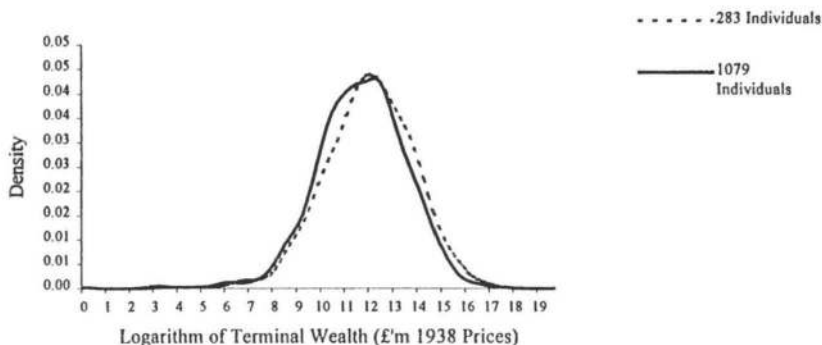
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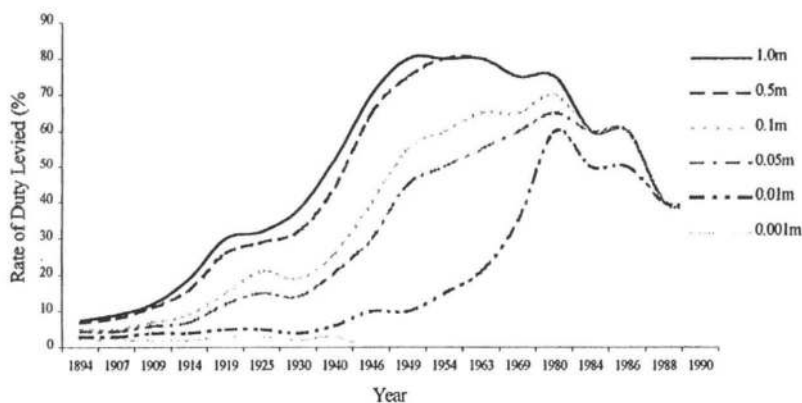
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Figure 1
Kernel Density Estimates of Probate Terminal Wealth



Source : see text

Figure 2
The Real Rate of Death Duty Charged on a Variety of Sized-Estates in 1938 Prices



Sources : Lawday and Mann, *Death Duties*, pp. 1201-1216, HMSO, *The Taxes Acts*

Table 1 - Profile Categories for the Individuals in the Data set

	1149 Individuals %	283 Individuals %
<i>Firm Type Category</i>		
Firm Inheritors	31	59
Non-Inheritors	69	41
Third Generation	8	22
Second Generation	21	36
Firm Founder	37	20
Manager	32	21
<i>Religion Category</i>		
Non-Conformists	21	22
<i>Education Category</i>		
High Status	72	69
Lower Status	28	31
Public School	70	62
Clarendon School	20	23
Oxbridge	19	19
Technical/Scientific	45	34
<i>Industry/Region Category</i>		
Staple	15	29
New Technology	22	21
Other Manufacturing	29	29
London	36	30
North East/West	13	35

Note : percentages refer to individuals on whom information was available
Source: see text

Table 2 - Wealth Equations

VARIABLE	Cohort 1 Entrepreneurs (Deaths Before 1919)		Cohort 2 Entrepreneurs (Deaths 1919-1945)		Cohort 3 Entrepreneurs (Deaths After 1945)	
	Full Sample	Sub-Sample	Full Sample	Sub-Sample	Full Sample	Sub-Sample
Constant	-3.582* (0.626)	-3.311* (1.237)	-2.274* (0.625)	-2.630* (0.626)	0.727 (0.757)	1.701 (1.245)
Children	0.035 (0.026)	0.072 (0.055)	0.048 (0.032)	0.043 (0.054)	-0.074 (0.070)	-0.038 (0.132)
Age	0.015** (0.009)	0.013 (0.016)	-0.001 (0.008)	0.008 (0.008)	-0.016** (0.009)	-0.029* (0.014)
Philanthropy	0.781* (0.182)	0.694* (0.335)	1.293* (0.209)	0.880* (0.372)	0.810* (0.209)	1.003* (0.390)
F	8.22*	1.96	12.74*	1.97	5.33*	2.97*
R-sq(adj)	0.065	0.049	0.105	0.033	0.045	0.052
Observations	273	65	266	86	333	74

Notes: * significant at 5 per cent level ** significant at 10 per cent level
 A squared age variable was included in the regressions but dropped on an F-test.
 Regressions run for the number of individuals on whom information was available.

Table 3 - Rate of Return Estimates

CATEGORY	Cohort 1 Entrepreneurs (Deaths Before 1919)				Cohort 2 Entrepreneurs (Deaths 1919-1945)				Cohort 3 Entrepreneurs (Deaths After 1945)			
	mean	s.e.	ob	n	mean	s.e.	ob	n	mean	s.e.	ob	n
Pooled (Unweighted)	0.0932	0.0165	84	44	0.0406	0.0107	105	46	0.0174	0.0085	94	49
<i>Firm Type Category</i>												
Firm Inheritors	0.0454	0.0195	47	41	0.0079	0.0072	62	48	-0.0072	0.0070	58	52
Non-Inheritors	0.1513	0.0249	37	46	0.0920	0.0231	43	44	0.0570	0.0172	36	45
Third Generation	0.0282	0.0111	17	41	-0.0058	0.0115	20	42	-0.0057	0.0078	25	48
Second Generation	0.0557	0.0296	29	41	0.0160	0.0099	39	51	-0.0058	0.0110	33	55
Firm Founder	0.1591	0.0297	29	47	0.1419	0.0420	19	48	-	-	-	-
Manager	-	-	-	-	0.0542	0.0236	24	41	0.0545	0.0203	28	41
<i>Education Category</i>												
High Status	0.0295	0.0205	42	44	0.0178	0.0095	79	46	0.0081	0.0083	77	49
Lower Status	0.1569	0.0219	42	44	0.1163	0.0296	26	48	0.0596	0.0261	17	50
Public School	0.0180	0.0224	36	44	0.0175	0.0102	72	46	0.0103	0.0090	71	48
Not Public School	0.1491	0.0200	48	43	0.0917	0.0239	33	47	0.0395	0.0205	23	53
Clarendon School	-	-	-	-	-0.0009	0.0105	24	44	-0.0204	0.0099	26	45
Oxbridge	-	-	-	-	-	-	-	-	-0.0181	0.0101	22	45
Technical/Scientific	0.0581	0.0163	25	44	0.0453	0.0167	42	47	0.0462	0.0161	31	46
No Technical/Scientific	0.1086	0.0224	57	43	0.0374	0.0140	63	46	0.0032	0.0095	63	50
<i>Religion Category</i>												
Non-Conformists	0.1262	0.0272	25	41	0.0475	0.0290	19	46	-	-	-	-
Other	0.0795	0.0203	59	44	0.0391	0.0115	86	46	-	-	-	-
<i>Region/Industry Category</i>												
London	0.0928	0.0240	24	47	0.0280	0.0152	31	46	0.0077	0.0163	29	49
Not London	0.0933	0.0211	60	42	0.0450	0.0133	66	48	0.0211	0.0120	45	50
North East/West	0.1052	0.0209	39	44	0.0318	0.0134	35	51	0.0221	0.0174	24	50
Not North East/West	0.0828	0.0250	45	43	0.0451	0.0147	68	44	0.0128	0.0116	50	49
Staple	0.0609	0.0326	27	43	0.0366	0.0226	28	48	-	-	-	-
Non-Staple	0.1082	0.0187	57	44	0.0420	0.0122	77	46	-	-	-	-
New Technology	-	-	-	-	-	-	-	-	0.0446	0.0214	20	45
Non-New Technology	-	-	-	-	-	-	-	-	0.0101	0.0090	74	50
Other Manufacturing	0.0969	0.0254	26	42	0.0354	0.0219	27	44	0.0037	0.0099	29	55

Notes: (-) reflects missing data, or an insufficient number of observations
n is number of years of business activity used to estimate the rate of return
ob is the number of observations

Table 4 - Rate of Return Estimates for a Sample of Landowners

	mean	s.e.	95% Confidence Interval		ob
Cohort 1 Landowners (Deaths Before 1919)	0.008	0.012	0.0315	-0.0155	56
Cohort 2 Landowners (Deaths 1919-1945)	0.001	0.014	0.0284	-0.0264	35
Cohort 3 Landowners (Deaths After 1945)	-0.051	0.026	0.0000	-0.1020	38

Figure 3 - Rates of Return at the 95 per cent Confidence Interval
Cohort 1 Entrepreneurs (Deaths Before 1919)

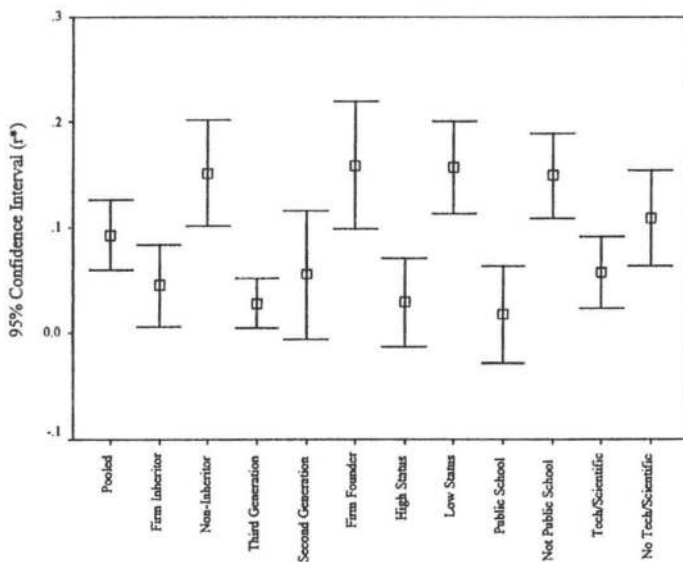


Figure 4 - Rates of Return at the 95 per cent Confidence Interval
Cohort 2 Entrepreneurs (Deaths 1919-1945)

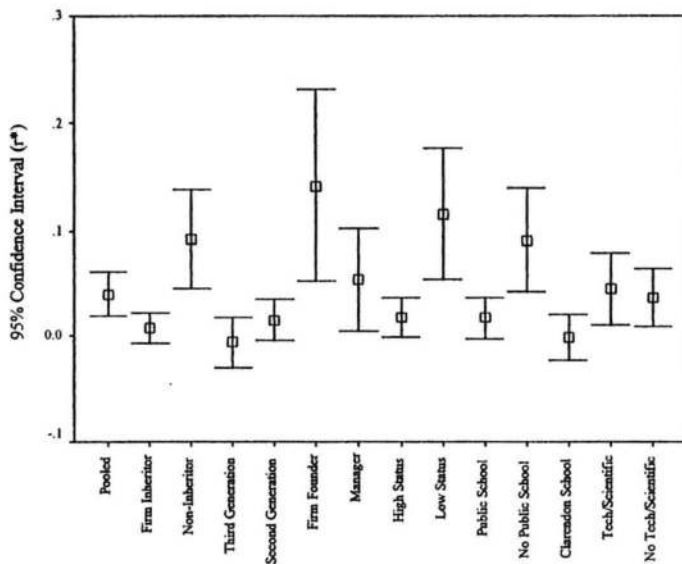


Figure 5 - Rates of Return at the 95 per cent Confidence Interval
Cohort 3 Entrepreneurs (Deaths After 1945)

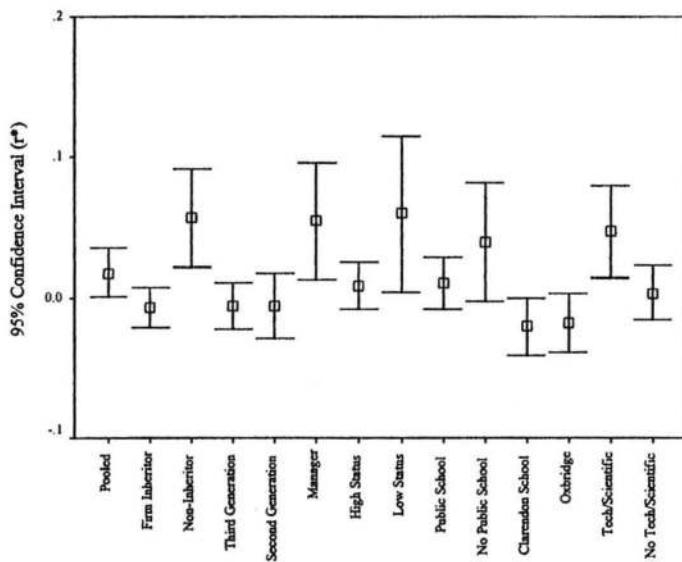


Table 5 - The Level of Wealth by Firm Type and Education

CATEGORY		Cohort 1 Entrepreneurs (Deaths Before 1919)		Cohort 2 Entrepreneurs (Deaths 1919-1945)		Cohort 3 Entrepreneurs (Deaths After 1945)	
		Terminal Wealth £'s 1900 Prices	Initial Wealth £'s 1900 Prices	Terminal Wealth £'s 1938 Prices	Initial Wealth £'s 1938 Prices	Terminal Wealth £'s 1980 Prices	Initial Wealth £'s 1980 Prices
Firm Inheritors	mean	869,669	287,861	792,507	642,461	2,944,847	5,410,171
	st. dev.	1,729,404	726,512	1,881,981	1,300,390	5,412,767	11,487,840
	median	297,299	48,065	223,451	292,293	924,961	1,823,480
Non-Inheritors	mean	253,824	60,088	471,745	121,364	1,947,318	3,741,113
	st. dev.	283,771	159,924	874,945	382,678	3,881,642	18,999,210
	median	137,124	27,254	182,519	15,184	535,659	145,261
High Status Education	mean	877,284	350,636	731,336	551,976	2,500,536	5,266,282
	st. dev.	1,778,339	755,520	1,723,458	1,119,042	4,864,502	16,160,940
	median	453,827	82,070	202,956	182,684	827,573	1,259,537
Lower Status Education	mean	306,290	18,009	487,483	76,312	2,844,902	2,449,377
	st. dev.	474,696	30,761	973,161	215,070	5,119,655	5,023,373
	median	159,639	2,644	221,707	7,907	625,474	352,790

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