Was there ever a Ruling Class? Rare Surnames and Long Run Social Mobility in England, 1858-2011

Gregory Clark, University of California, Davis

Neil Cummins, Queens College, CUNY[1]

Using rare English surnames we follow the socio-economic status of a group of rich and poor families in 1858-87 over 5 generations. We measure social status both through wealth at death, and through average age at death. Our method allows an unbiased estimate of the mobility rate. Paradoxically we find two things. The mobility rate is lower than conventionally estimated. There is considerable persistence of status. But because the process continues uninterrupted generation after generation, 8-12 generations will wipe out all trace of earlier advantage and disadvantage. The upper class will dissolve into the mass of society, and the underclass rise to a comfortable mediocrity. The only difference is that there will be substantially more descendants of the lower class in all future generations than of the upper class.

Introduction

What is the fundamental nature of human society? Is it stratified into enduring layers of privilege and want, with some mobility between the layers, but permanent social classes? Or is there, over generations, complete mobility between all ranks in the social hierarchy, and complete long run equal opportunity? This paper examines this question for 5-6 generations of the English from 1858 to 2011.

Existing studies of social mobility generally look at the income, education, or occupational status of children compared to their parents examined just over a generation. Such studies typically use data from modern social science panels such as the PSID in the USA, or from income tax records, and so concern just the last 40-60 years. These studies typically try and estimate b, the rate of persistence of income, from the expression

$$y_1 = a + by_0 + e \qquad (1)$$

where y_1 is the log income of sons or daughters and y_0 the corresponding log income of parents. The range of values for b, the persistence of income, is 0.1-0.6 depending on the country, the period

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over which income is averaged, and controls for age.[2] There will be measurement error in y, however, even when income is averaged over many years. Another source of measurement error is that income will always be an imperfect measure of the true social status of people (since people trade off income for other work conditions). So these studies will tend to underestimate the true persistence of social status.

Economists such as Gary Becker have argued that whatever the exact value of b such studies show that in the long run – meaning 2-3 generations – we live in a world of complete social mobility. For if all that predicts the income or status of children is that of their parents, then by iteration over n generations

$$y_n = a + b^n y_0 + u_n \tag{2}$$

even if b = 0.5, then $b^2 = 0.25$, $b^3 = 0.125$, $b^4 = 0.06$, $b^5 = 0.03$. Thus within a few generations most of the advantages and disadvantages of earlier generations get wiped out. All that matters for income in generation n is the cumulative random component u_n. Indeed if the income distribution is stable then the amount of the variance in y that is explained by inheritance will be b^2. Thus Becker and Tomes conclude:

> *Almost all earnings advantages and disadvantages of ancestors are wiped out in three generations. Poverty would not seem to be a "culture" that persists for several generations* (Becker and Tomes, 1986, S32).

However there are reasons to suspect this reasoning on both theoretical and empirical grounds. The theoretical doubt is that the Becker argument assumes that the *only* information relevant for the prediction of the economics success of the current generation is the success of the previous generation. If there are important genetic elements determining economic and social success then this assumption will not hold. The economic and social position of grandparents, and even earlier ancestors will all be predictive of current outcomes.[3] The assumption also will not hold if membership of a social group or caste is an important determinant of outcomes.

The empirical reason to doubt Becker's reasoning is that in the USA where we can distinguish families by race or ethnicity, we find that children in these groups are in fact regressing to means that are different from the population mean. This shows if we instead estimate the expression

$$y_1 = a_i + by_0 + u_0 \tag{3}$$

[2] Solon (1999, 2002), Muzumdar (2005), Harbury and Hitchens (1979), Nimubona and Vencatachellum (2007). For a recent literature survey see Black and Devereux 2010.
[3] That is why breeders of thoroughbred racing horses maintain elaborate pedigrees for the animals.

where a_i is estimated separately for different sub-groups of the population. If all subgroups in the population are regressing to a common mean, a_i will be the same for all groups.

Thomas Hertz carried out exactly such an exercise in a recent study of the link between parental and child income in the USA where he grouped people by race – white, black and Latino – and by religion. Table 1 reports his estimated regression coefficients, with and without dummies for race, for a sample of 3,568 parental incomes in 1967-71, and the income of adult children in 1994-2000. Simply knowing the race of someone in the USA has a powerful effect on the ability to predict their income, even controlling for the family income of the parents. It also significantly increases regression to the mean, though this time to the group mean. This holds true even controlling for all other measured attributes of parents in 1967-71 such as education, occupation, and household cleanliness.[4] These results suggest that indeed the modern USA is a society divided by class, where there is no sign of the ultimate regression to the mean and social mobility that Becker expected.

Hertz's study looked just at the identifiable correlates of class: race and ethnicity. There may be within these populations further hidden divisions of class – but divisions that are not marked by such outward signs such as race or religion. All societies might thus have groups persistently at the top, and those persistently at the bottom, that the simple analysis of regression to the mean cannot capture. If such families are otherwise indistinguishable from the general population, then only by observing them over many generations would we know whether there was for such groups complete long run social mobility.

A simple example of society with hidden classes would be the following, where income depends on parental income, but also an unobserved fixed class or group membership effect, a_i , so that

$$y_1 = a_i + by_0 + e_1 .$$

In this case if we estimate the connection between y_1 and y_0, using the misspecified expression, $y_1 = a + by_0 + u_0$, we will observe classic regression to the mean. But the estimated coefficient $\hat{b}$ will relate to the true b through the expression

$$\hat{b} = 1 - (1 - b)\frac{\sigma_u^2}{\sigma_a^2 + \sigma_u^2}$$

where

$$\sigma_u^2 = \sigma_e^2 \left[\frac{1}{1-b^2}\right]$$

4 Hertz, 2005.

Table 1: Regression to the mean controlling for race, USA

Independent Variable	No controls	Only Race	All Observable Parental Characteristics
Ln Family Income Parents	0.52**	0.43**	0.20**
Black	-	-0.33**	-0.28**
Latino	-	-0.27**	-0.15
Jewish	-	-	0.33**

Notes: ** = significant at the 1 percent level. Only 3 percent of the sample was Latino.

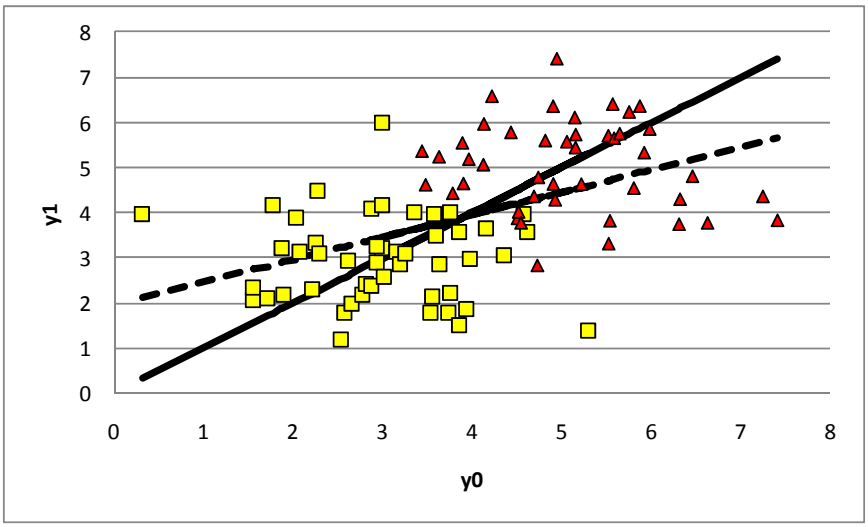
Source: Hertz, 2005, table 6.

Now over many generations the estimated coefficient between current and earlier income will not converge on 0, but instead on $(1 - \frac{\sigma_u^2}{\sigma_a^2+\sigma_u^2})$.[5]

Figure 1 shows a simple simulation of a society of hidden classes, where there are two social classes, with the first (shown by the squares) having an underlying inherited component of income 3, and the second (the triangles) an inherited component of 5, and where the true b is 0. In this case there are social classes that persist – because of access to education, or exclusion of a different religion, or a caste system. But if we just pool the raw data and estimate the coefficient b, then the estimated value is 0.5. The dashed line shows the estimated connection with the incorrect specification.

5 The regression coefficient for descendants n generations distant will be $\hat{b}_n = 1 - (1 - b^n)\frac{\sigma_u^2}{\sigma_a^2+\sigma_u^2}$.

Figure 1: Regression to the mean with different social classes



In this example, the estimated b linking grandparents and grandchildren, and even more distant generations will always be close to 0.5. After one generation there will be no further regression to the mean. As can be seen in figure 1 the two groups can never merge in income with this specification, because the groups are regressing to different mean incomes. In the example, once we included separate intercepts for each class, the estimated b becomes close to the true 0 (-0.04 for this simulation). There are persistent classes.

If, however, we do not know a priori what the social strata are – because, for example, they are distinguished by race or religion - then there will be no way of disentangling the various social classes. Presented with the raw data we would incorrectly observe just the general regression to the mean of the world of complete long run mobility. So to observe whether there are persistent social classes in any society we must look at families across multiple generations. By tracking specific groups over many generations we can correct for the potential mis-measurement of intergenerational correlations, and test whether families/groups are in fact regressing to different means.

Surnames

The idea of this paper is not to look at specific family linkages across generations, but instead to exploit naming conventions as a way to track families across generations. We can track economic and social mobility using surnames in a society like England because, from medieval times onward, children inherited the surname of their father. Surnames thus trace the patrilineal descendants of men of earlier generations.[6] Adoption in England before the nineteenth century was rare, so surnames also trace the path of the Y chromosome, and their later frequency can also measure reproductive success.[7]

In looking at mobility from surnames in England we can use two types of analysis. The first concerns common surnames – those held by many people – such as *Smith*, *Clark* and *Jones*. These surnames attached to the population in the Middle Ages, starting with the upper classes, and moving down to the general population.[8] By 1381 surnames were near universal.[9]

At the time of establishment many surname types were a marker of economic and social status. Many people were named after their occupation. By 1881 9.9 percent of surnames derived from an occupation: *Smith*, *Wright*, *Shepherd*, *Butcher*, and so on. But there were also a class of individually rarer surnames that indicated high status individuals. Thus we can use the social and economic distribution of surnames in later periods as a measure of the mobility of people between social classes, stretching back to the heart of the medieval era in England.

In particular, for the achievement of complete mobility every common surname must be equally likely to be found at all levels of the social hierarchy – criminals, workmen, traders, clergy, members of Parliament, the wealthy. Using various data sources that give the names of the elite and the underclass – members of Oxford and Cambridge Universities, rich testators, the county court indicted – for the years 1200-2010 we can test whether pre-industrial England achieved complete social mobility, and also how long the process took.

By 1650 common surnames lost most information on economic and social status, as a result of the extraordinarily complete social mobility of the English in the years 1300-1650.

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[6]Illegitimate children in England bore the mother's surname. Thus there is still a linkage through the surname to ancestors, just a different ancestor in this case. But illegitimacy was uncommon for most of English history.

[7] Adoption did not become legally sanctioned until 1926 (McCauliff, 2006).

[8] The Domesday book of 1086, records surnames, including combinations of Saxon forenames with Norman family names.

[9] Surnames developed because of the limited variety in forenames. Four or five common male and female first names covered the majority of people before 1800. Surnames became essential to identification in England because it was commercial and mobile by the thirteenth century.

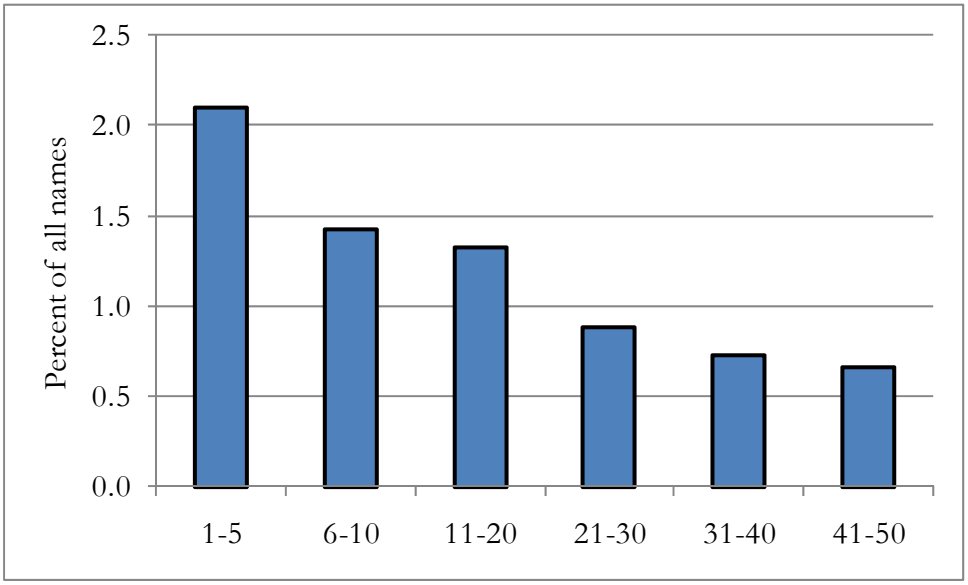
To trace mobility through surnames after this we turn to rare surnames.[10] In England there always has been a significant fraction of the population holding rare surnames. We have good measures of what surnames were rare in England after 1540 from various sources: 1538-1840 Boyd's marriage index (together with various supplements) which lists 7 million surnames of people married in England, and the manuscript censuses of 1841-1911. Figure 2, for example, shows the share of the population holding surnames held by 50 people or less, for each frequency grouping, for the 1881 census of England. The vagaries of spelling and transcribing handwriting mean that, particularly for many of the surnames in the 1-5 frequency range, this is just a recording or transcription error. But for names in the frequency ranges 6-50 most will be genuine rare surnames. Thus in England in 1881 5 percent of the population, 1.3 million people, held 92,000 such rare surnames. Such rare surnames arose in various ways: immigration of foreigners to England, such as the Huguenots after 1685 (example, "Bazalgette"), spelling mutations from more common surnames (example, "Bisshopp"), or just names that were always held by very few people, such as "Binford" or "Blacksmith."

Through two forces – the fact that many of those with rare names were related, and the operation of chance – the average wealth levels of those with rare surnames will vary greatly at any time. We can thus divide people post 1600 into constructed social and economic classes by focusing on those with rare surnames.

We can follow the economic and social success of those with rare surnames 1858-2011 using a number of sources. First probate records which give an indication of the wealth at death of everyone in England and Wales by name.[11] We can also measure social status using the death register which allows us to calculate the age at death of most people with rare surnames dying in England 1841-66, and of all people 1866-2008.[12] Average age at death in all periods is a good index of socio-economic status. The third source we use are the public records of address and occupation, such as the electoral register, which become available for 1998 and later. The last source is the records of those admitted to elite institutions such as Oxford and Cambridge, available 1200-1998.

[10] See the interesting study of Güell, Rodríguez Mora, Telmer (2007) which also measures social mobility through rare surnames, but using cross-section data.
[11] Those not probated typically have wealth at death close to 0.
[12] For people dying 1841-1866 with rare names we can infer age at death for most of them from the censuses of 1841, 1851 and 1861, and the birth register 1837-1866.

Figure 2: Relative Frequency of Rare Surnames, 1881 Census, England



Rich and Poor in 1858-1887

Taking a generation length as 30 years, we construct first samples of rich and poor rare surnames in 1858-1887. For the rich sample we take surnames with 40 of fewer holders in the 1881 census where the average wealth of those dying (measured as personalty) was £1,260 or higher, taking those with no probate aged above 21 as having a wealth of £5, since the requirement then for probate was a wealth of £10 or above. This minimum corresponds to 22 times the average annual wage earnings in England in these years.

To identify a poor sample we started with similarly rare surnames from three sources. First there was the 1861 list of paupers who had been in workhouses across England and Wales for at least 5 years. Then there were people convicted of crimes in Essex courts 1860-1862. Finally there were those convicted of crimes in the Old Bailey in London in these same years. These surnames were included in the sample of poor surnames only if the average probate value 1858-1887 was less than £400, again counting missing probates at £5.

The surname database then consisted of everyone dying with these surnames in the interval 1858-2008, 4 generations of 30 years, plus a last of 31 years, as well as their ages at death and probate values where they were probated. Table 1 gives a summary of the data.

Table 1: Summary of the Sample

Period	Rich Surnames	Rich Probates	Rich Deaths	Rich Deaths 21+	Poor Surnames	Poor Probates	Poor Deaths	Poor Deaths 21+
1858-87	64	412	800	636*	294	77	3,291	1,720*
1888-1917	59	331	661	541	279	231	3,048	1,789
1918-1947	57	456	720	675	269	461	2,636	2,152
1948-77	47	428	625	615	283	921	3,177	2,966
1978-2008	51	289	523	518	273	1,116	3,503	3,431

Note: * Estimated from 1866-87 ratio of deaths 21+ to all deaths for 1858-65.

Figure 3 shows the probate rates of the rich and poor surnames by decade, for those dying 21 and older. Also shown as a measure of the general indigenous English population are the probate rates for the surname "Brown." The extreme difference in probate rates narrows over time. But even by 2000-2008 probate rates for the rich surname group are above average by at least 10%.

Figure 4 shows the average of the log value of the probates of those probated among rich and poor by decade, as well as for the control group, the "Brown" surname, until 1930-9. Probate values here in £ are normalized by dividing them by the average annual wage in England in the year of probate. Thus the normalized values are bequests expressed in multiples of the average annual wage.

The average values for those probated among the rich approach those of the poor surname group over time, but are still higher in 2000-7. Finally figure 5 combines the information in figures 3 and 4 to produce an estimate of the average wealth at death of the rich and poor surname groups by decade, all normalized by annual wages in pounds. The fact that generally only a minority of those dying aged 21 and above are probated means that we have to infer wealth at death for those not probated to get average wealth levels. The measure we use for these inferred probates is half the estate value at which probate was required. These minimum values for required probate were

Figure 3: Probate Rates of Rich, Poor and "Brown" samples, by decade

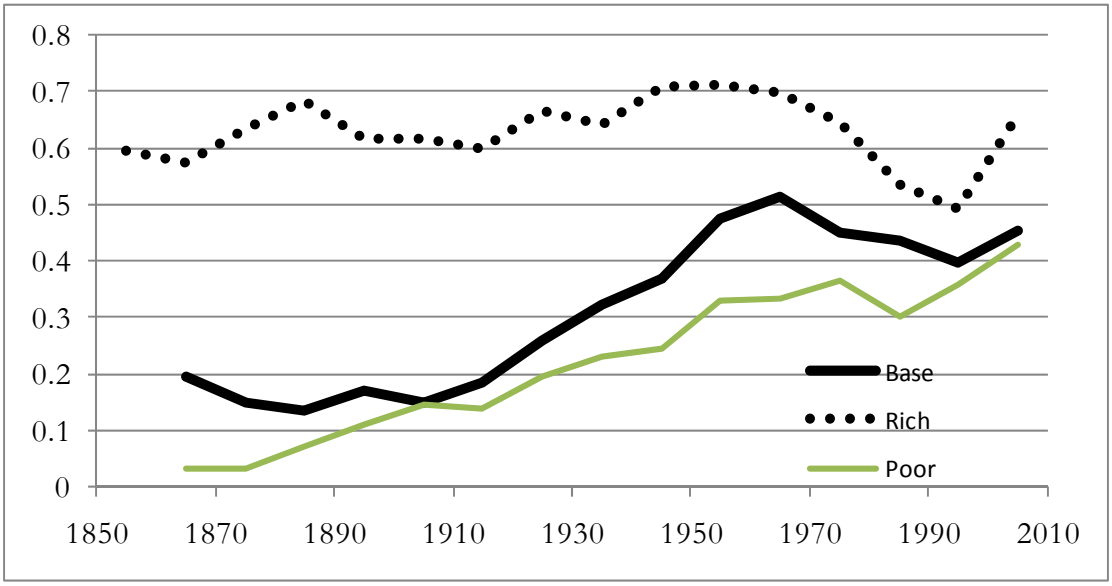


Figure 4: Ave Log Value of Probates, those probated, by decade

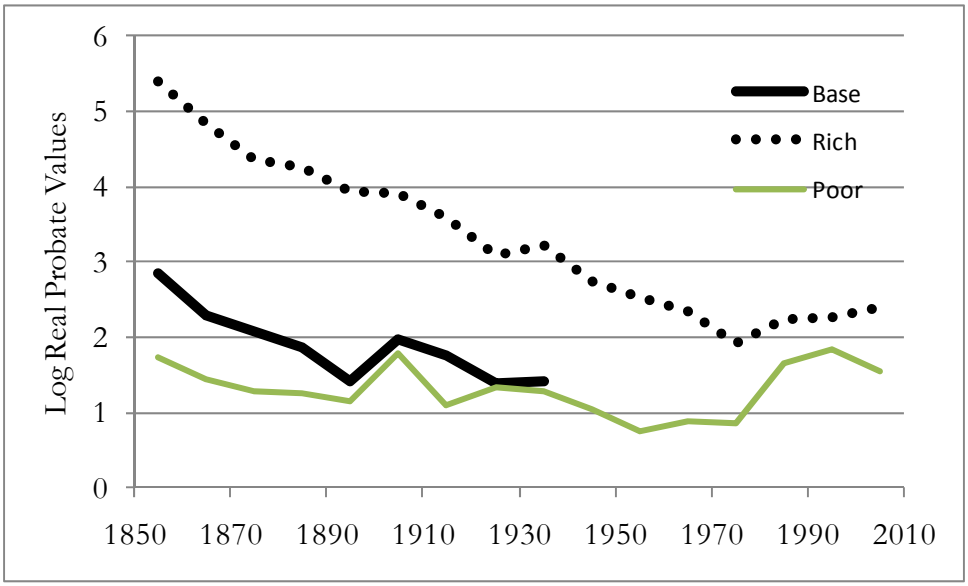


Figure 5: Average Log Probate value, including those not probated, by decade

£10 (1858-1900), £50 (1901-1930), £50-500 (1931-1974), £1,500 (1975-1983), and £5,000 (1984-2011) (Turner, 628). Figure 5 shows that there is clearly a process of long run convergence in wealth of the two surname groups, and that process continues generation by generation, so that eventually there will be complete convergence in wealth of the two groups. For the indigenous population in England there are no permanent social classes, and all groups are regressing to the social mean. But this process of convergence turns out to be much slower than recent estimates of bs for income, earnings and education would suggest. Average wealth at death in 2000-8 was still significantly higher for the group identified as rich in 1858-1887. Indeed the average wealth of the "rich" surname group from 1858-1887 was still 4.2 times that of the "poor" surname group in 2000-8.

It is also evident in figure 5 that the estimated rate of convergence will be influenced by the need to infer the value of the missing probates. The jump upwards in the relative average log wealth of the poor in 1900-9 is purely an artifact of the raising of the probate cutoff value to £50 in this period, which led missing values under our procedure to be inferred as £25, compared to £5 before. We hope to find better ways of inferring these missing values in future work.

Another way we can observe this convergence is though average age at death. Life expectancy in England, for example, has since at least the nineteenth century been dependent on socio-economic status. In 2002-2005 life expectancy for professionals in England and Wales was 82.5 years. For unskilled manual workers it was only 75.4. Thus another way to observe whether the rich and poor of 1858 converge, and how quickly, is using the death register for England and Wales, which for 1866-2005 shows the age of death of everyone in England by name.

If we take just the overall average age of death by group then the differences in 1857-1887 are dramatic: 50.7 for the rich, 31.7 for the poor. As figure 6 shows these average ages at death converged steadily over time, but had not completely converged by 1978-2008. Average age at death for the rich surnames was still 78.0 for the rich surnames, compared to 74.1 for the poor, a difference of 3.9 years. The reason for the extreme difference in life expectancy in the first generation is actually a combination of lower death rates for the rich at each age, but also differences in fertility which expose more of the poor population in the early years to high child mortality risks.

Since we do not know the age structure of the population, measuring fertility accurately is not possible. However, given the average age at death of those 21+ we can estimate for each group in each decade the stock of the population in the 25-45 age group if we assume (counterfactually) a uniform age distribution. Then we can calculate a rough measure of the numbers of children born per woman. This is shown in figure 7.

As can be seen there are substantial differences in the estimated fertility of rich and poor surname groups which while narrowing over time are still present in 2000-8. In the nineteenth century the higher fertility of the poor was partially counterbalanced by substantially higher infant and child mortality. Thus child mortality in the poor group before 1900 was 138 per 1000 more than for the rich. But the relative population of the poor surname group has increased substantially over time relative to that of the rich group. To measure the population of those aged 21+ in each group we used the formula

$$stock = \frac{deaths\ per\ year}{(average\ age\ at\ death - 21)}$$

where the average age of death is that of those dying 21+. Figure 8 shows the relative size of the stock of "poor" surname people, and the stock of "brown" surname people, compared to the stock of the "rich" surname group. The poor stock rose 150 percent between 1858-87 and 1978-2008. But the brown stock increased even more, by nearly 300 percent.

Figure 6: Average Age at Death, by Generation

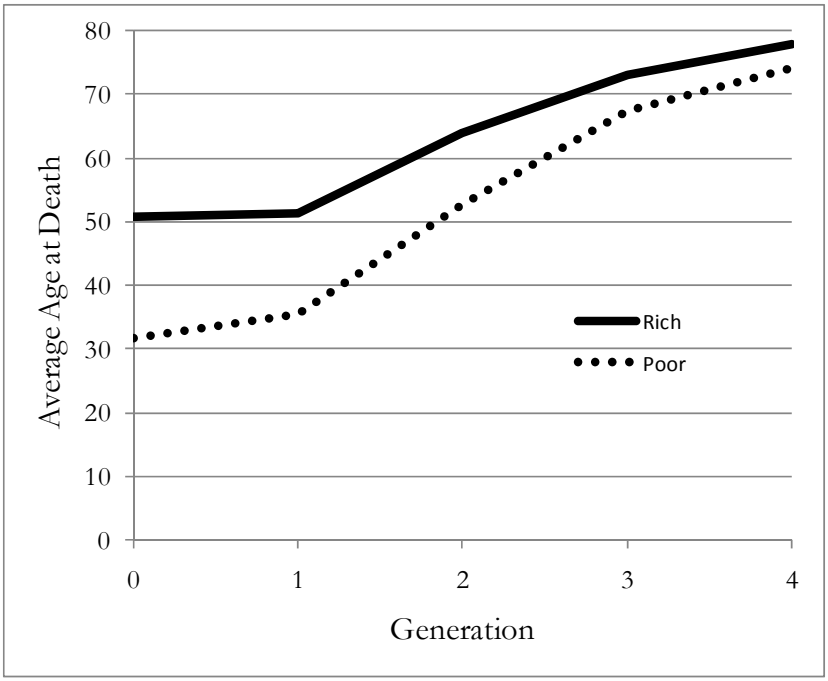
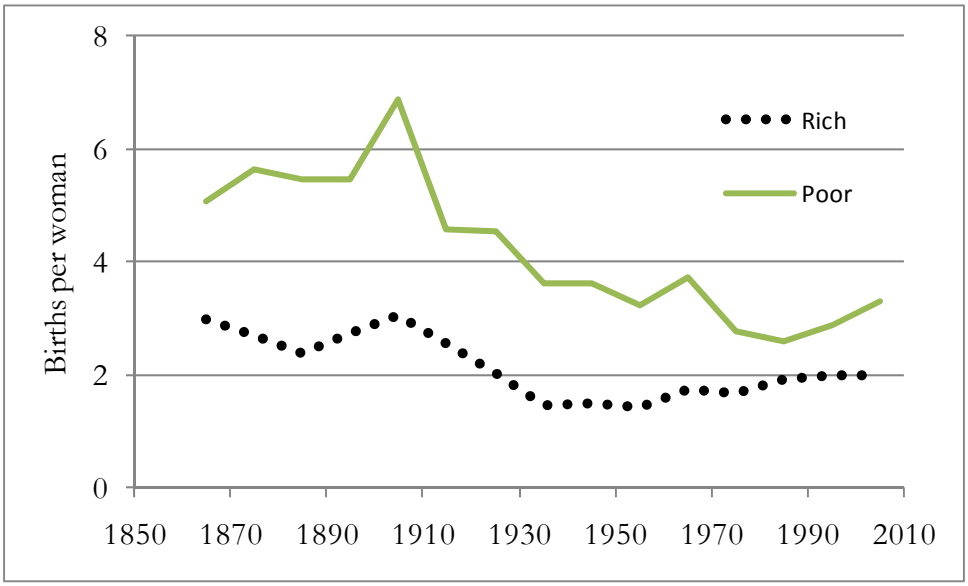
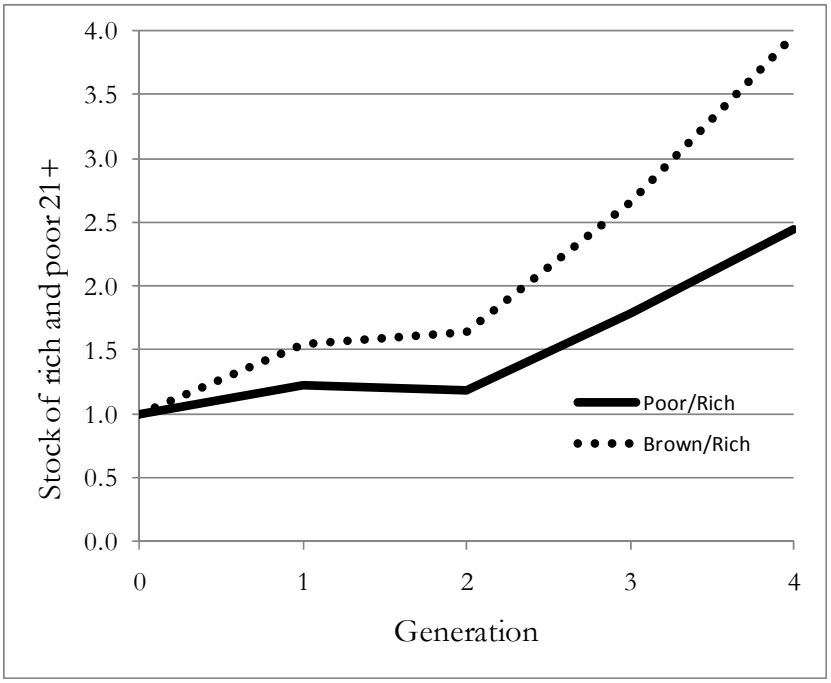


Figure 7: Estimated births per woman by decade, rich and poor surnames



Note: By construction this will overestimate fertility in a stable population since the 25-45 cohort will be larger than is estimated here.

Figure 8: Numbers of Poor 21+ Relative to the Rich



Thus in this period, instead of survival of the richest, and the growing share of the rich descendants in population, we see the decline of the rich class even as it regresses towards the social mean. It must be emphasized that these stock estimates are subject to much error, but they are underlain by a basic fact that the numbers of those dying with rare rich surnames declined substantially relative to those with rare poor surnames, and even more substantially relative to a common name like *Brown*.

Estimating bs

We can estimate the bs, the measure of persistence in wealth, in several different ways. If we define y_{Ri} and y_{Pi} as the average of ln wealth for generation i for the rich and poor surname groups, then the *b* linking this generation with the nth future generation can be measured simply as

$$y_{Ri+n} - y_{Pi+n} = b(y_{Ri} - y_{Pi})$$

This estimation has an advantage that after the first generation, when rich and poor samples were chosen partly based on wealth, there is no tendency for the b estimate to be attenuated by

measurement error in wealth, since the average measurement error for both rich and poor groups will be zero. Also as long as wealth is linked to true underlying social status, even imperfectly, this measure will show how rapidly the two groups are moving towards each other. However, there is a disadvantage that there is no associated standard error with the estimated b. Figure 9 shows the mean log wealth of each group by generation, and table 3 the implied bs.

Another advantage of this estimate is that by construction,

$$b_{04} = b_{01}.b_{12}.b_{23}.b_{34}$$

so the individual period b estimates are consistent with the observed long run mobility.

It is striking how high the b estimates are in table 3. It is also striking that over 4 generations the b is still 0.26, though as figure 9 shows there will be eventual convergence in wealth. The fact that the b between generations 3 and 4 was only 0.53 might give some hope of faster regression to the mean in future. But if you look at figure 5, you will see that for those dying in 2000-8 there is no sign of any faster convergence, though this may just be random error. Wealth at death now may be much more subject decade to decade to the vagaries of the housing market and stock market.

Suppose we count complete regression to the mean as the two groups of descendants having average wealth within 10 percent. If we assume the b from now on is the one between the last two generations of 0.53, it will take 8 generations (the generation of 2098-2127) to achieve this. But if the future b is the average of the between generations bs for 1858-2008, then complete convergence will require 12 generations (2218-2247).

The more conventional way to estimate b is by taking the average wealth of each surname in each generation as the unit of observation, and then estimate by OLS the b values (weighting by the average number of observations in each surname group).

The regressions run are

$$y_{i+n} = a + b^n y_i + u_{i+n} \tag{4}$$

where here y_{n+i} is the average log wealth by surname in period i+n. As noted this measure is always subject to attenuation bias because of the errors in measuring wealth, and the imperfect link between wealth and true underlying social status. The first set of regression coefficients are reported in table 4, along with standard errors. We included controls for the fraction of testators in each surname group who were female in each generation.

Figure 9: Average Log Probate value, by generation

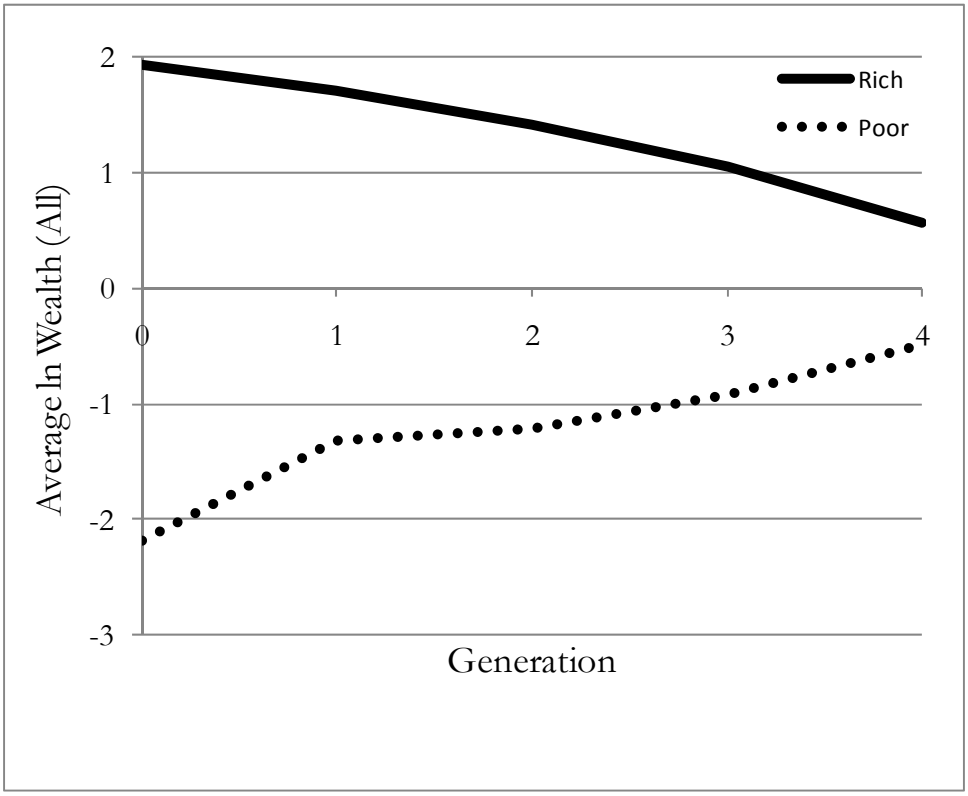


Table 3: b values between generations

	Generation 1	Generation 2	Generation 3	Generation 4
Generation 0	0.74	0.64	0.48	0.26
Generation 1		0.87	0.65	0.35
Generation 2			0.75	0.40
Generation 3				0.53

Table 4: Estimated b values between generations, conventional estimates

	Generation 1	Generation 2	Generation 3	Generation 4
Generation 0	0.662 (.030)	0.604 (.027)	0.469 (.028)	0.308 (.032)
Generation 1		0.748 (.034)	0.567 (.035)	0.379 (.041)
Generation 2			0.684 (.034)	0.441 (.041)
Generation 3				0.501 (0.044)

Note: Standard errors in parentheses.

As predicted the one-period b estimates here are always lower than with the estimates in table 3, though not dramatically so. However, we do see evidence in table 4 that the b's either are being estimated as too low, or the rich and poor groups are regressing to different means. For if the process was the Markov one that most studies of social mobility assume, then

$$b_{04} = b_{01}.b_{12}.b_{23}.b_{34}$$

In fact we see in table 4 that

$$\hat{b}_{04} = 0.31 > \hat{b}_{01}.\hat{b}_{12}.\hat{b}_{23}.\hat{b}_{34} = 0.67\times.75\times.68\times.50 = 0.17$$

The long run regression to the mean is slower than the one period bs would predict. One possibility is that measurement error in wealth is leading to b estimates that are too low. If there is the same measurement error in estimating the bs, an attenuation factor θ, between any two generations, then

$$E(\hat{b}_{04}) = b_{04}\theta > E(\hat{b}_{01}.\hat{b}_{12}.\hat{b}_{23}.\hat{b}_{34}) = b_{01}\theta.b_{12}\theta.b_{23}\theta.b_{34}\theta = b_{04}\theta^4$$

In this case we can get better estimates of the true bs between periods by taking the ratios of the estimated bs. Thus

$$\frac{E(\hat{b}_{02})}{E(\hat{b}_{12})} = \frac{b_{02}\theta}{b_{12}\theta} = \frac{b_{01}b_{12}}{b_{12}} = b_{01}$$

This method suggests the following "true" values of b across each generation of

$b_{01} = 0.89$, $b_{12} = 0.83$, $b_{23} = 0.88$, $b_{34} = 0.66$.

Another possibility, however, is that the rich and poor surname groups are regressing to different means, so that they will never converge. To test for this possibility we estimate (4), but with a separate intercept term for the rich surnames. Table 5 shows the results of this estimation. Now the b estimates fall very substantially, and at the same time the rich are estimated across all generations to be regressing to a higher mean than that of the poor (DRICH, the indicator for the rich surnames, is positive). If we were just to estimate wealth mobility across two generations with this method we would conclude that rich and poor would never converge.

However, while DRICH is always positive and significant, it is clear from figure 9, and from the associated evidence on measures such as average years lived, that the rich and poor surnames groups will eventually converge. And in table 5 we see that the separate intercept term for the rich surname group is always declining in size as we go across more generations. This suggests that Hertz's finding that Jews and Blacks in the US were regressing to means different from the general population in the long run may be just an artifact of the estimation method, and that instead there is a much slower general regression to the same social mean (Hertz, 2005).

All this suggests that there is no substitute for observing the long run outcomes in trying to observe the process of social mobility. Regressions run on the characteristics of just two adjacent generations will not be able to statistically predict the nature and the rate of the long run mobility regime. Our conclusion here is that while the bs were high, very high, there is no sign that the upper class will persist in advantage for ever, or the lower class persist in disadvantage.

Table 5: Intergenerational b, Distinct Intercepts for Rich and Poor

	Generation 1	**Generation 2**	**Generation 3**	**Generation 4**
Generation 0	0.360 (.072)	0.450 (.065)	0.246 (.068)	0.147 (.075)
Generation 1		0.429 (.057)	0.331 (.057)	0.195 (.064)
Generation 3			0.472 (.055)	0.320 (.065)
Generation 4				0.398 (.058)
DRICH 0	1.663 (.329)	0.861 (.303)	1.074 (.317)	0.680 (.342)
DRICH 1		1.184 (.213)	0.963 (.215)	0.783 (.239)
DRICH 2			0.809 (.182)	0.514 (.216)
DRICH 3				0.467 (.172)

Conclusions

What the rare surname dataset implies is somewhat paradoxical. On the one hand the Beckerian vision of ultimate regression to the social mean seems to apply to modern England as well as late medieval England. In the long run no social class is able to stop from regressing to the mean. The poor similarly regress upwards. There are no permanent upper classes and under classes, but instead long run equality.

However, the estimated persistence of wealth is higher than in most modern studies, and much higher than Becker and Thomes (1989) assumed. The true *b* for wealth in England in these years averages at least 0.74, and might be as high as 0.8. A *b* of 0.75 or greater would imply much more persistence of wealth between children and parents than is generally assumed. It would imply, for example, that 56 percent of the variance of wealth in any generation is explained by inheritance of characteristics by children from their parents.

It is still the case that 120 years after the first generation, 4 generations on, the descendants of a group of the rich still are significantly richer than the descendants of a group of the poor, and live nearly 4 years longer. From the regressions reported in table 4, for example, still 27 percent of the log wealth variance across rare surnames in 1978-2008 is explained by the average log wealth of people with these surnames in 1858-87. Complete regression to the mean will take many generations. However, here we have focused on a rich group in particular that started off with an average wealth 62 times that of the poor group. So from another perspective there has been an impressive narrowing of this wealth gap over the course of four generations.

Since the wealthy and average age measures look at people at the end of their lives, the final generation here had an average birth year of 1918. Even the group dying in 2000-8 had an average birth year of 1927. However, there are other measures we will pursue that give insight into the status of much later cohorts. First there is the current residence of members of each group as revealed by the 1998 Electoral Roll. It is possible to match post codes to average residential house values in England and Wales. Thus residence gives a proxy for the wealth of not just those dying, but also of those on average much younger. Second there is another source where we can follow the shares of different rare surname groups attending elite universities (Oxford and Cambridge) which runs all the way to 1998, and which looks at 18 year olds. Exploitation of this source, since we are dealing with rare surnames, will however reply on much larger sample sizes.

What should we think of this result? Does it imply a society of enduring privilege, with limited opportunities for the lower class? One caveat is that we still have a relatively modest rich surname sample, and there is in 1978-2008 a lot of heterogeneity across these names in average wealth. Some

have regressed to the mean completely, some are still very wealthy. The surnames *Colvile, Coryton* and *Cazalet* were all associated with substantial numbers of people leaving bequests many multiples of the average person. But surnames such as *Brandram,* once wealthy, had substantial numbers of people dying with very modest assets. We are in the process of substantially increasing the sample of wealthy names.

Assuming the b estimates here survive greater amounts of data, the problem is that we have no clear idea of what b would be in a society of complete opportunity and access. Indeed Richard Herrnstein and Charles Murray in *The Bell Curve* argue that recent creation of a meritocracy, combined with assortative mating, will lead to an ever more stratified society, but stratified by intellectual abilities that are strongly inherited (Herrnstein and Murray, 1996).

It is also likely that most of the strong correlation of wealth across generations does not come from direct transfers of assets from parents to children. In other work Clark has shown that only about a third of the correlation of wealth between fathers and sons in England 1550-1850 is explained by bequests from fathers (Clark, 2007). Rich fathers have rich sons mainly because the sons are inheriting other characteristics of the fathers, such as their genetics, which are transmitted independently of how many surviving children father's have at death.

The fact that by 2000-8 there was still a difference in average age at death between the rich and poor surname groups does suggest that other types of transmission of characteristics that create socio-economic advantage, social and genetic, are important. Years lived is not going to be directly a function of wealth, but much more a function of lifestyle, aptitudes, and attitudes. There is no expectation that in England, with its open access National Health Service, wealth would create much direct benefit in terms of years lived. Wealth must thus just be correlated with other attributes that promote longer lives. So the plausible cause of the intergenerational correlation of wealth is not inheritance of wealth, but of these other attributes.

It matters to people's sense of the fairness of society whether the high correlation of wealth across generations is largely the product of home environment, or of genetics. The *b*s we find here for wealth are equivalent in magnitude to those for the most strongly inherited genetically controlled human traits. The b for human height for example between parents and children in modern high income societies is 0.8-0.9, with most of this from genetics and not environment (height differences by social class are now modest). But we see nothing problematic in this high height b, since it is mainly genetic. So what matters in our attitude to the bs found here is whether they turn out to be largely explained by genetics. Twin studies reveal that both earnings and education are strongly influenced by genetics, but there is no equivalent study for wealth.

We also have to do more in looking at the startling divergence in the numbers of those with the rich rare surnames compared to those with poor rare surnames and the indigenous population (represented by the name *Brown*). Our data suggests that starting with the generation born around 1860, the poor and the general population had much greater reproductive success than our rich group, resulting in much larger numbers of poor deaths in the generations 3 and 4. Indeed at a time when English population tripled, the rich surname group barely increased its numbers. This might, however, in part arise from greater migration of the rich from England to the USA, to the British Empire, and to Europe in the late nineteenth century. And indeed there is evidence in the probates that a significant number of the rich were dying abroad. If the wealthy are in general more cosmopolitan and polyglot, so that they end up spread around the globe, then this would explain their surprisingly small numbers in later years.

But the crude estimates of fertility shown in Figure 7 control for out migration, in that it looks at deaths in England compared to births in England. And these suggest consistently low fertility rates by the rich surname group, though again with a tendency to converge on the poor. This, however, does mean that while all wealth is ultimately transitory, and there is no enduring ruling class, the ruling group of any moment in the modern world is likely to see a permanent reduction in their share of the population. Wealth does have persistent effects, but only through demography.

Since some of the rich surnames were distinctive and aristocratic in their sound, could it be that as people in this group moved down they changed surname? The names in our rich sample include Willoughby de Broke, Bazalgette, Du Cane, and Champion de Crespigny. With a larger sample of rich surnames we will be able to check if the relative frequency of such aristocratic surnames declined over time, as a possible indicator of name changing. However, these four names were 6.6 percent of rich surname deaths in 1858-87, and 6.1 percent of deaths in 1978-2008. So there is no indication so far that elite names are being abandoned as people become less elite.

One interesting issue that this raises, however, is with the quality-quantity tradeoff theory that dominates modern discussions of fertility. The rich had fewer children, yet in the end they were condemned to regress to the social mean. The poor had many children yet moved up to the social mean. So interestingly there was no strategy of investing more in fewer children that could keep the elite in the same social position permanently. The forces of regression are stronger than any family strategies could overcome. In that sense though regression to the mean is slow here, its inexorable power on elites and under classes is surprising in light of the ability of elites to trade off quantity for quality in children, and to endow their children with considerable wealth.

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