

# **Ruling Classes and Under Classes: 1,000 Years of Social Mobility**

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DISCLAIMER – this is a sketch of a book in progress.

Some chapters report on joint work with others – Neil Cummins (chapter 4), and Zach Landes (chapter 8).

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## The Social Mobility Debate

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?

Will the unemployed youths of the French banlieues, the English council estates, and the American projects, be the founding fathers of unending lineages of want? Are the children of the Upper West Side of Manhattan, or at Eton, Harrow and Rugby, representatives of a timeless elite?

And even if there is complete mobility in the long run, is the rate of that mobility fast enough? Does the dead hand of the past control still the fates of today's children, irrespective of individual merit? Are modern societies even now failing to ensure that talent is rewarded, and that there is opportunity for all?

To ordinary opinion it is near axiomatic that privilege perpetuates privilege, and want breeds want. The wealthy orbit social circles distinct from those of the poor. They marry their peers. They invest enormous time and money in the care and raising of their children. These children, in consequence, inherit not just wealth, but education, socialization, and connections. Richard Herrnstein and Charles Murray indeed argued in *The Bell Curve* that these forces of persistence would soon create a dystopia, with an entrenched meritocratic elite and a permanent underclass.<sup>1</sup>

Take, for example, the history of the Earls of Derby in England. Figure 1 shows the current holder of the earldom, Edward Richard William Stanley, 19th Earl of Derby, pictured below in festive mood with Lady Derby. Also shown in figure 1.2 is the Stanley family home, Knowsley Hall, which sits 15 minutes from the council estates of Liverpool in 2,500 acres of parkland.

The current Earl of Derby can trace his ancestry as a Stanley to the early twelfth century, and by the time of John Stanley (1350-1414) they were knights.<sup>2</sup> The modern ascent of the family was secured by Thomas Stanley, who playing an important role in the Tudor victory at the Battle of

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<sup>1</sup> Herrnstein and Murray, 1994.

<sup>2</sup> Allegedly an earlier progenitor was Ligulf of Aldithley, an English landowner in the Domesday Book of 1086.

Figure 1.1: Earl and Lady Derby in Festive Mood



Figure 1.2: Knowsley Hall, Home of the Stanleys



Bosworth Field, was created first Earl of Derby in 1485. Since then important members of the family included Edward Smith-Stanley, 14th Earl, and Prime Minister of the United Kingdom three times, in 1852, 1858-9, and 1866-8. The town of Stanley, capital of the Falkland Isles was named in Smith-Stanley's honor.

The assumption of persistent class privilege also underlies the public provision of education, demands for inheritance taxes, and affirmative action programs in hiring and education.

Economists, in contrast, in so far as they have considered this issue, have often been sanguine about rates of social mobility, and have indeed argued that in developed societies advantages of income, wealth or position will typically be eliminated within three or four generations.<sup>3</sup>

The reason for economists' cheer is that mobility studies consistently find Galton's phenomenon of "regression to the mean." The children of the rich are poorer than their parents, the children of the poor are richer than their parents. Regression to the mean applies to all characteristics that can be measured for parents and children: income, wealth, education, height.

If we can give a scale to aspects of social rank – as in the case of income, wealth, average years lived, and even occupational rank – then the rate of regression to the mean can be measured by one simple number (1-b), where

$$y_{t+1} = by_t + u$$

$y_{t+1}$  is the measured status of the children, and  $y_t$  that of their parents, and  $u$  is a random perturbation.<sup>4</sup> Expressed in this way the coefficient  $b$  has a simple interpretation and interesting properties.  $b$  measures the extent of *persistence* of socio-economic status, and  $b^2$  measures the share of the variation in socio-economic status that is attributable to inheritance.

If  $b$  is 1, then children have wealth or income of education exactly like that of their parents. Persistence is complete. If  $b$  is 0, then each generation inherits none of its characteristics from the parents. Thus if  $b$  is 1 all the variation in current characteristics is caused by inheritance. If  $b$  is 0, inheritance explains none of the current variation in income.

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<sup>3</sup> Notably, most of this consideration of long run social mobility has come from the "Chicago School" – Gary Becker, Casey Mulligan, Nancy Stokey.

<sup>4</sup> Here status is measured relative to a mean social status which has a value 0.

**Table 1.1: Recent Estimates of Regression to the Mean**

Country	Earnings	Years of Schooling	Wealth
USA	0.55	0.46	0.37-0.69
UK	0.30	0.71	0.35-0.61
Scandinavia	<0.30	0.49	-

Source: Earnings - Black and Devereaux, 2010, p. 16. Schooling - Hertz et al., 2007, table 2. Wealth - Menchik, 1979 (parents, 1930-47, children 1947-1976), Charles and Hurst, 2003, Mulligan, 1997, Horbury and Hitchen, 1979, 120.

The lower is persistence,  $b$ , the more rapidly the children of exceptional parents return to the mean. In practice, as table 1.1 shows, modern estimates of  $b$  for income, wealth and years of education center around 0.5. This implies substantial social mobility. In particular only a quarter of variation in income, wealth, and educational attainment in any generation is explained through inheritance. If  $b$  is as low as the 0.19 reported for Scandinavian incomes, then astonishingly, only 4% of the current variance of Scandinavian income is explained by inheritance.

Observing the intergenerational regression of income, wealth and status to the mean, some free market advocates such as Gary Becker have argued that with enough time we are in a society of complete social mobility. The argument is by iteration. If the persistence between parents and children is 0.5, then that between parents and grandchildren will be only 0.25, between parents and great grandchildren 0.12, between parents and great great grandchildren 0.06 and so on. This means that within 4-5 generations the predicted income or wealth of the descendants of most of the current rich and poor will be within 10% of the social mean.<sup>5</sup>

*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).

<sup>5</sup> This result is derived in the Mathematical Appendix.

**Figure 1.3: The Rapidity of Convergence to the Mean**

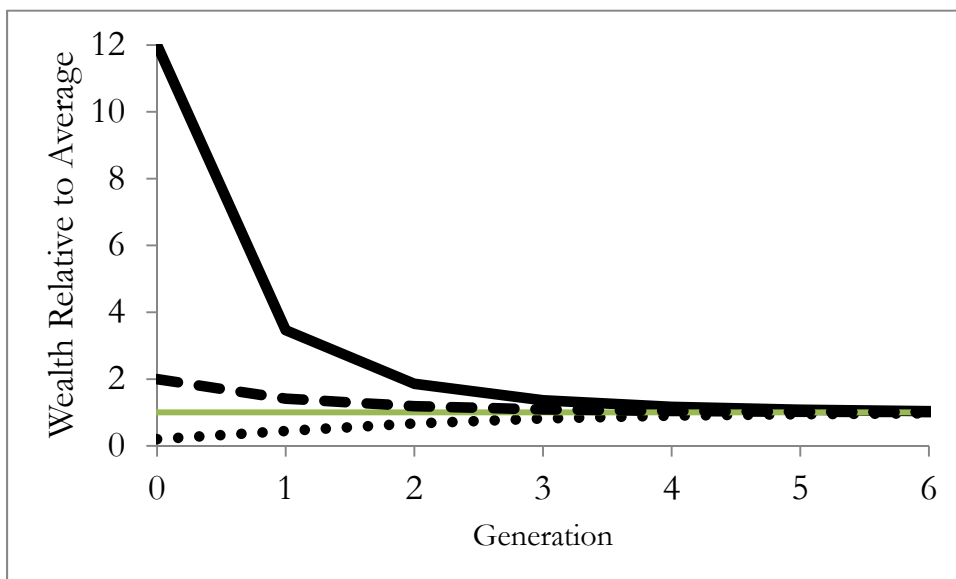


Figure 1.3 shows the expected wealth of families over generations which start at 12 times the average income, twice the average income, and one fifth the average income, if  $b$  is 0.5. The expected income of the families starting at double the average wealth is within 10 percent of the average by the third successor generation, the great grandchildren. That of the families starting at one fifth average wealth comes within 10 percent of the average by the fourth successor generation. And that of families at 12 times average income is within 10 percent by the fifth successor generation.

This does not mean that income and wealth differentials are collapsing over time, since at the same time there are shocks and accidents that cause income or wealth to diverge. But it does imply that the current high status of some families, and low status of other families, is in the end just the product of a collection of these random shocks through time.

Thus, to economists studying modern market economies, the popular belief in permanent social classes seems an illusion, at least within ethnic groups. While there may be persistent difference for some minority groups, social mobility for the bulk of the population is substantial, pervasive and ultimately complete.

The fact that the modern cross country estimates of  $b$  for a group of equivalently high income countries are not only low, but also vary substantially, suggests two further things.

The first is that genetics must be unimportant in the determination of income through intrinsic talent. Nurture is much more importance than nature. For if genetic inheritance mattered, and we assume mating is similarly assortative across societies, then there would be a lower bound to  $b$  that would be observed in well-functioning market economies. The importance of inheritance in determining socio-economic success must be purely a feature of the social institutions of societies.

The second is that much of the inequality in modern society must be driven by inequality in access to capital, training and social networks. The good society would have a very low rate of inheritance of social status, and a correspondingly low variance of income and wealth.

This book examines this tension between popular conception and economic measurement by systematically exploits a new method of tracing social mobility over many generations, surnames, to measure the persistence of classes over as much as 950 years, 32 generations. It looks at societies where most surnames are inherited, unchanged, by children from fathers. In such cases they thus serve as a tracer of the distant social origins of the modern population (and interestingly also as a tracer of the Y chromosome).

In this role surnames are a surprisingly powerful instrument for measuring long run social mobility. The results they reveal are clear, powerful, and a very different picture of social physics than either popular conceptions or economists measurements.

- The popular conception is right. Social mobility rates are much lower than those typically estimated by economists. The true value of  $b$  for wealth and educational mobility throughout English history is 0.70-0.85, much higher than conventionally estimated. Even egalitarian Sweden has social mobility rates much lower than suggested by economists' estimates once we look at surnames. Social status is inherited as strongly as any biological trait, such as height, from parents.

- However, even though these rates of intergenerational mobility are low, they are enough to ensure that there were never any permanent ruling and lower classes for the indigenous population: not in medieval England, and not now. It may take 10 generations or more. But with enough time social mobility will erase most echoes of initial advantage or want. For the English permanent classes are, and always were, an illusion. Histories such as those of the Stanley family turn out to be exceptions, not the rule.
  
- The rate of social mobility in medieval England was as high as it is now in England. The arrival of the whole apparatus of free public education in the late nineteenth century, and the elimination of nepotism in government and private firms, has not improved the slow rate of social mobility.
  
- The complete long run mobility of England is likely typical of other western European societies until recently, and is confirmed in similar surnames study of Sweden, 1600-2011, and the USA, 1700-2011. Surprisingly mobility in England, Sweden and the USA does not seem to be much higher, if at all, than in caste bound India in the past 150 years. Nor is downward mobility any more rapid in Japan, a country where in 1946 the existing elite lost much of its political and economic power in the wake of the disastrous defeat in the war.

Social mobility varies much less across societies than explanations which stress the role of social institutions would predict.

- In England we can find groups that seem to defy the general rule of slow regression to the mean. At the bottom end are the Gypsies or Travellers, a social group at the bottom of the economic scale for more than 400 years, which now encompasses as many as 300,000 people. At the top is the Jewish community. Those with Jewish surnames, for example, in England 1858-2011 have been moving away from the mean. These case, I will argue, are only apparent violations of the rule of regression to the mean, explained by selective in and out migration from such groups.
  
- There is tentative, but disquieting, evidence that after 950 years of complete

long run social mobility, modern England, and other parts of Europe also, are becoming class societies, with persistent groups of privilege and want. Recent immigrants from Africa, the Caribbean, and south Asia are not exhibiting the same generalized social mobility of the indigenous population.

- Though parents at the top of the economic ladder in any generation in pre-industrial England did not derive any lasting advantage for their progeny, there was one odd effect. Surname frequencies show that there was a permanent increase in the share of the DNA in England from rich parents before 1850. After 1850 a frequency effect operated, but in reverse. Surname frequencies show the DNA share of families in England who were rich in 1850 declined substantially relative to that of poor families of the same generation by 2010. These effects are likely common in western Europe.
- The different demographic correlates of social status before and after 1800 mean that in the modern world social mobility tends to be predominantly upward, while in the pre-industrial world it was mainly downward.

What is the meaning and explanation of these empirical results? This is a much more contentious and difficult area. Studies of social mobility tend to be plagued by a reflexive assumption that more social mobility must be good. In this section of the book I consider what the likely sources of mobility are, and whether improving the rate of intergenerational mobility would indeed produce a better society.

The first important argument here is that genetic processes must play a large role in creating social mobility. Why can't the ruling class in a place like England defend itself forever against downwards mobility? If the main determinants of economic and social success were wealth, education and connections then there would be no explanation of the consistent tendency of the rich to regress to the society mean (even at a slow rate). We see, for example, in the years 1850-1950 that the rich in England consistently had fewer children than the poor, investing more time and resources in their children, and dividing their wealth between fewer descendants. With this behavior, why do they not persist forever at the top of society, or even move away from the mean?

Only if genetics is the main element in determining economic success, if nature

trumps nurture, is there a built-in mechanism that ensures the observed regression. That mechanism is the intermarriage of the rich with those from the lower classes. Even though there is strong assortative mating, since this is based on the phenotype created in part by chance and luck, those of higher than average innate talent tend to systematically mate with those of lesser ability and regress to the mean.

This in turn has a number of implications. First the world is a much fairer place than we intuit. Innate talent is the main source of economic success, not inherited privilege. Second the upper classes have tended to vastly over-invest in the care and raising of their children, to no avail in preventing long run downwards mobility. The wealthy Manhattan attorneys who hire coaches for their toddlers to ensure placement in elite kindergartens cannot prevent the eventual regression of their descendants to the mean. Third government interventions to improve social mobility are unlikely to have much impact, unless they impact the rate of intermarriage between the levels of the social hierarchy. Also racial, ethnic and religious differences allow long persisting social stratification through the barriers they create to this intermarriage. Thus for a society to achieve complete long run social status of all groups in it must achieve cultural homogeneity. Multiculturalism is the enemy of long run equality.

Finally the existence in England of complete social mobility before the Industrial Revolution further shows that institutional barriers do not explain the long delay in the timing of the Industrial Revolution. Even medieval England was not a society where most of the talent was trapped under the yoke of serfdom, but a place where abilities and skills slowly but surely rose to the top.

## Chapter 2: Surnames as a Measure of Social Mobility

Surnames give us a new window into social mobility for two reasons. First, even for modern data, they allow for the compilation of much larger sets of data on social mobility than is possible when we have to use individual family linkages. But secondly, surnames make feasible the study of mobility across multiple generations. In the case of England, for example, we can study social mobility all the way back to the Norman Conquest of 1066. We can pose questions that would have seemed inconceivable to answer even a few years ago such as “How does the rate of social mobility in England in medieval England compare to the rate now?”

The idea of this study is not to look at specific family linkages across generations. These are exceedingly difficult and time consuming to trace, given available sources. Instead here I exploit naming conventions as a way to track families across generations, just by tracking the average status of surnames. The crucial naming convention is that sons and unmarried daughters inherit their surnames from their fathers (fortunately this is a common convention). This means that everyone in generation  $n$  with a given surname will be descended from someone with that surname in the previous generation.<sup>6</sup>

Thus even though we do not know the specific link between sons, daughters and fathers, we can estimate the b linking the socioeconomic status of generations just from the average socio-economic status of these surname cohorts. Using this method I can examine, for example, in England the social status of some families over as many as 32 generations between 1066 and 2011.

If we look only at men then surnames will proxy for a genetic link between generations. If we include also women, then included in this measure will be daughters in law, who acquire the surname by marriage. But given assortative mating and the pooling of resources in marriages their status at death this should be a good proxy for the status of the direct genetic descendants of the previous surname

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<sup>6</sup>Two things add error to this linkage, adoption and illegitimacy. Adoption was rare in England before 1900. Illegitimate children in England bore the mother's surname. Thus for the illegitimate there is still a linkage through the surname to ancestors of the same name class, just a different ancestor in this case. But illegitimacy was also uncommon in most of English history.

cohort. We shall see that this is indeed the case.

Will the  $b$  estimated in this way be precisely the same as the  $b$  estimated from individual parent child links? As the mathematical appendix shows this  $b$  will have an expected value the same as that estimated between identified parents and children. Aggregating across surname groupings does itself potentially introduce measurement errors, these being detailed in the appendix. These will cause some downward bias in the  $b$  estimates when sample sizes are small. For large sample sizes, however, these measurement errors disappear and the two measures will be in principle identical, as long as fertility is not correlated with social status.

## Why Surnames Allow Better Mobility Measures

Surnames, by allowing us to track mobility across multiple generations, allow us also to get better measures of true social mobility rates.

The model of social mobility we will employ here is simple mathematically. What is the value of the coefficient  $b$  connecting the socio-economic status of any two generations of families where

$$y_{t+1} = by_t + u \quad ?$$

The standard way to measure social mobility is to compare the income, education, or occupational status of children and their parents. Such studies, as noted, tend to find high rates of social mobility in modern societies. But there are reasons to suspect that these estimates may substantially overestimate true social mobility rates.

The problem is errors in the measurement of status. Social status is a combination of many correlated elements: education, income, wealth, and occupation being the most important. Thus the partial measures that social mobility studies use, such as income, are imperfect measures of the full social status of individuals.<sup>7</sup> Income itself also can fluctuate substantially from year to year. For this reason some investigators prefer to use occupation as a measure of income, and

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<sup>7</sup> Solon, 1999.

attribute an average income to each occupation. But again occupation is a broad category. “College professor,” for example, ranges from high profile Harvard faculty, to community college instructors. People trade off income for other aspects of jobs – prestige, location, intrinsic interest. Education is generally measured by the years of full time schooling attained, but again the social meaning of that will vary with the institution attended, and the major pursued.

These measurement errors do not imply measures such as income, education and wealth being good proxies for the wider occupational status of different social groups. They are excellent proxies at the group level.

But when we attribute status at the individual level and try and measure how it is changing over generations within families such imperfect measures lead to a predictable bias towards finding more mobility than there actually is. Thus if we measure status by income, then those with the highest incomes in the first generation will tend to disproportionately include people whose income overestimates their true social status. Similarly those with the lowest incomes will disproportionately represent those whose income underestimates their social status.

When we move to the next generation, however, income on average will be an accurate representation of social status for both the children of the current rich and poor. That means that even without any regression to the mean the children of the rich will be measured as on average poorer in the next generation, and the children of the poor will be measured as on average richer. Thus just from the measurement error status will appear to be regressing to the mean more strongly than in reality.

By extending the study of social mobility from two generations to many we can escape this problem of measurement error and its inherent bias towards finding more social mobility than truly exists.

By using multiple generations of people identified in the initial period by their surnames as being rich or poor, the measurement error problem disappears once we move to the looking at regression to the mean of the second or later generations. Measurement error is a problem because in the base generation those identified as rich tend to have positive measurement errors, and those identified as poor negative errors. However once we move to comparing the second generation of those with rich surnames to the third generation, the second generation will have an average

measurement error of 0 across rich and poor surnames. They were identified by what happened in the previous generation. Thus after the first generation, the later intergeneration estimates will be unbiased from measurement error.

Even if we employ more conventional estimates of  $b$ , grouping people into surname “families,” we can get better estimates of the true underlying  $b$  by combining information across multiple generations to remove the measurement error from the individual estimates (again how this works is detailed in the appendix).

Existing studies rarely, if ever, estimate  $b$  across multiple generations.<sup>8</sup> Much of the data used only emerged in the past 50 years, and these panels are generally not designed to include multiple generations of families. Other sources on income such as tax records may cover the whole population, linking specific families across even three generations is extremely time consuming and impossible for most of the population.

A second factor that operates in exactly the same way as measurement error is that there will be a substantial component of chance or luck in the attained social status of any specific individual. Individuals will happen to be employed by successful businesses, as opposed to those which go bankrupt. Some will just pass the test for university admission, others will just fail. This correctly measures an aspect of social mobility. It is not measurement error, and should be included in the estimates of the  $b$  between generations and their successors. But if we use the  $b$  estimated from such observations of parents and children, and try to then project the long run movement of incomes as  $b^2$ ,  $b^3$ , .... we will fail. Specifically we will overestimate the rapidity of convergence in the long run, because in the first generation richer people will have had good luck on average, poorer people bad luck. But again over later generations the descendants of rich and poor will have average luck. So the tendency to regress to the mean will decline after the first generation.

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<sup>8</sup> Biblarz, Bengtson, and Bucur, 1996, look explicitly at three generations, but consider only the nature of parent-child linkages across different generations.

## Societies with Useful Surname Information

England is, par excellence, a society where we can use surnames to measure social mobility over the very long run. In England hereditary surnames were frequently used for the propertied classes by 1086 (as evidenced in the Domesday Book), and then progressively spread to all orders of society by 1300-1350.<sup>9</sup> Given the rarity of adoption in England through most of its history, the first act to legally allow adoption coming only in 1926, we can thus in England from 1350 on trace the path of the Y chromosome. Changes in the frequency of surnames can also measure reproductive success.

The high income levels and sophistication of pre-industrial English society meant that many records were created of status by surname from the earliest years. The political stability that characterized England for most of its history, and the absence of foreign invasions in the prosperous south of the country through most of the period 1066-2011, meant that there has been excellent survival of these records. The fascination by the English with tracing their ancestors has led to the creation of unparalleled source of data on people by name all the way back to 1066.

In this study I will use the incredibly rich sources in England to do the most detailed and longest range estimates there. But the same methods will also be applied in Sweden (which conferred hereditary surnames on nobles in the seventeenth century, and particular surnames on the educated class), the USA, Bengal (where the elite had surnames by the time of the British conquest in 1757), Japan, 1868-2011, and China as comparisons.

In looking at mobility in England through surnames we need to be able to partition the population into rich and poor groups on the basis of surnames. For England 1086-1300 we can do this because at the time of their establishment many surname types were good markers of economic and social status. Many people, for example, were named after their occupation. By 1881 in England 10 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

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<sup>9</sup> 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.

individuals. The invading Normans of 1066 were named after the villages they derived from in France. The later indigenous properties were named after the towns and villages where their principle residence lay. 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. By counting the share of their bearers in the population we can also measure reproductive success.

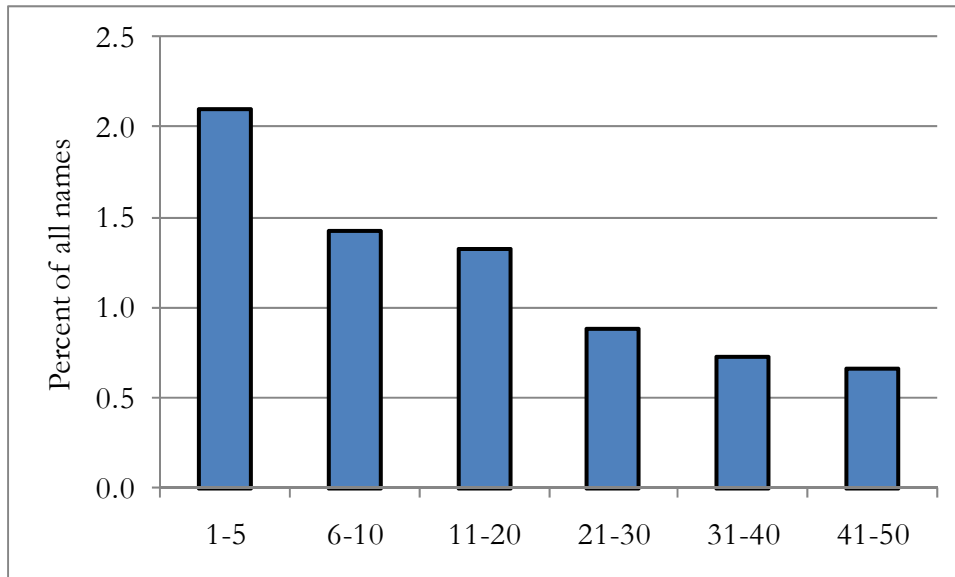
In particular, for the achievement of complete mobility every common surname must be equally likely to be found at all levels of the social hierarchy – criminals, workmen, traders, clergy, members of Parliament, the wealthy. Using various data sources that give the names of the elite and the underclass – members of Oxford, Cambridge and other Universities, rich testators, the county court indicted – for the years 1066-2011 we can test whether pre-industrial England achieved complete social mobility, how long the process took, and what the implied  $b$  is that would account for the observed speed of convergence.

We shall see that after 1650 most common surnames lost any information on economic and social status, as a result of the substantially complete social mobility of the English in the years 1300-1600. The indigenous common surnames all became near equivalent in status. However, we will also see that the rate of upwards diffusion of artisans, and downwards diffusion of aristocrats was slow enough that the implied  $b$ , at around 0.7, is higher than conventionally estimated for the modern world.

After 1600, however, we can still trace social mobility rates through surnames, but now using rare surnames. In England, for example, there always has been a significant fraction of the population holding rare surnames. We have a good measure of what surnames were rare in England after 1540 from a variety of sources: from 1538-1840 Boyd's marriage index (together with various supplements) which lists 7 million surnames of people married in England, the birth and death registers 1837-2011, the national censuses of 1841-1911, and the recent electoral rolls.

Figure 2.1, 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

**Figure 2.1: Relative Frequency of Rare Surnames, 1881 Census, England**



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, name mutations from more common surnames, or just names that were always held by very few people.

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 strata by focusing on those with rare surnames.

We can follow the economic and social success of those with rare surnames all the way from 1600 to 2010 using a variety of sources. The first are probate records which after 1858 give an indication of the wealth at death of everyone by surname.<sup>10</sup> The second is 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 1867-2011.<sup>11</sup>

<sup>10</sup> Those not probated typically have wealth at death close to 0.

<sup>11</sup> For people dying 1841-1866 with rare names we can infer age at death for most of them from the censuses and the birth register.

Average age at death in all periods is a good index of socio-economic status. The third are public records of addresses and occupations, such as the electoral register, which become available for later years. From the 1999 Electoral Roll, for example, we can calculate average house values for people in 1999 by surname.

We can also follow people with rare surnames from 1600 to 1858 and later, picking out those of high and low status in the earlier period by using records of wills and of criminal convictions.

## Deriving $b$

Where we have information on wealth or occupations by surname, the procedures for estimating  $b$  are analogous to those in conventional mobility studies.

However, for a number of cases we observe such as medieval England or Bengal evidence on social status by surname takes a very different form. What we observe in high status surnames is that they are found at a higher frequency among elite groups, and then we can observe this frequency decline over time. Similarly for initially low status names we observe their frequency rise over time in high status occupations.

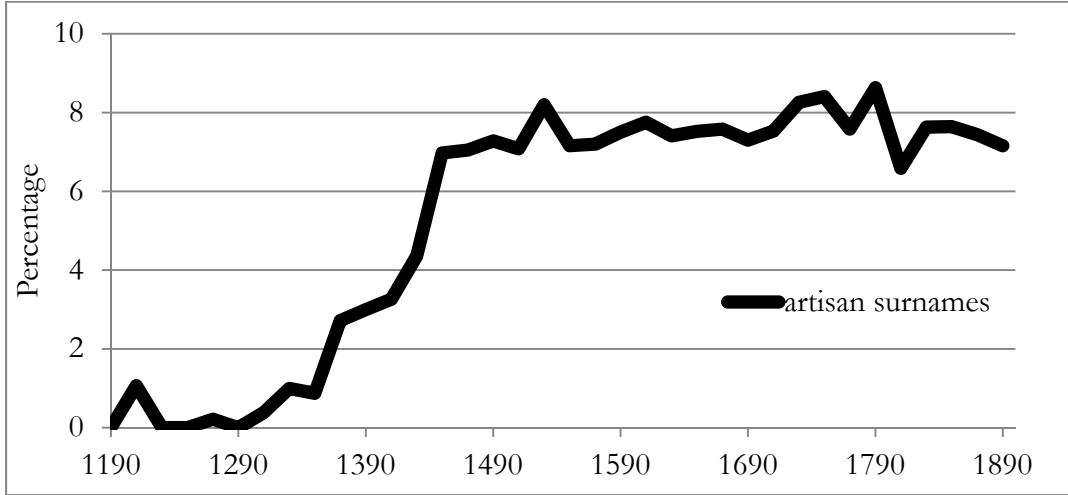
Figure 2.2 shows, for example, the percentage of the members of Oxford and Cambridge who had artisan surnames by 20 year periods from 1180-1900. We can see a clear rise in this percentage from 0 percent before 1300 to an equilibrium of about 7% by 1460. What can we infer about the rate of status persistence, the  $b$ , of medieval Europe?

If we assume that socio-economic status was normally distributed, and that artisans started at one point on this distribution, then the derivation of  $b$  from this data is surprisingly simple. All we need to know is how elite a share of the English population attended Oxford or Cambridge in these years? The number of men born per year in England 1480-99, and surviving to age 15, would be about 20,600.<sup>12</sup> 179 men per year are recorded first at Oxford and Cambridge in 1480-99 (this number depends on record survival, so will be a lower bound). Thus entrants to the university represented 0.9% of the male cohort in these years. Entry to the

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<sup>12</sup> Assuming a total population of 2.4 million, a crude birth rate of 35, and that 60% of males survived to age 15.

**Figure 2.2: Artisan Names at Oxford and Cambridge, 1180-1900**



university was a prelude in these years to service at the university, in the church, in law, or in government. The students of Oxford and Cambridge thus constituted an elite of between the top 2% and 5% of the population (not all the social elite attended the universities).

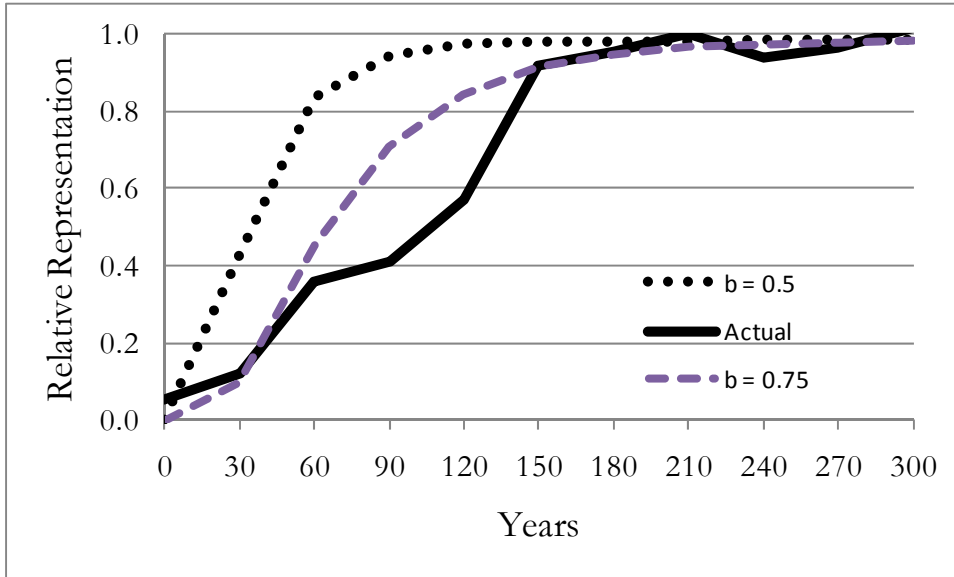
Complete diffusion of the artisans into this elite will be accomplished when the mean of the artisan status distribution is that of the population, and its variance is similarly that of the population. If we assume the artisans started with a socio-economic status of  $\bar{y}_A$  and a variance of status of 0 (while the general population has mean 0, and variance  $\sigma^2$ ) then after  $t$  generations the mean and variance of this population will be

$$\bar{y}_{At} = \bar{y}_A b^t \rightarrow 0$$

$$var(y_{At}) = \sigma^2 (1 - b^{2t}) \rightarrow \sigma^2.$$

So all we have to calculate is the  $b$  that would cause those with artisan surnames to converge on the population distribution of socio-economic status in 6 generations (assuming a generation is 30 years), as measured by them having the same share in Oxbridge as in the general population. The  $b$  that best fits this rate of spread towards the population distribution is 0.75, a high number by modern standards.

**Figure 2.3: Simulated Convergence of Artisan Names to the Oxbridge Elite**



One measure of how close a group is to the population distribution of socio-economic status is its *relative representation* at different points in the wealth distribution. This is just defined as

$$\text{relative representation} = RR = \frac{\text{surname share of group } x}{\text{surname share of population}}$$

Only when its relative representation is everywhere 1 will a group have the same distribution of socio-economic status as the population.

Figure 2.3 shows the actual path of the relative representation of artisan surnames at Oxbridge, as well as the path implied (assuming artisans started at median socio-economic status, and Oxbridge is the top 2% of the distribution) for a  $b$  of 0.5 and 0.75. Clearly  $b$  has to be close to 0.75 to fit the path. Different assumptions about how elite a share Oxbridge was, or where in the distribution the artisan surnames started would change this estimate by only modest amounts. If instead we assumed that Oxbridge was less elite, and represented a draw from a full 5% of the top wealth and incomes in English society, then the  $b$  will be somewhat lower, though the difference is not great. Now the best fitting  $b$  would be close to 0.8.

We can follow a similar procedure to look at the rate of regression to the mean by elite groups. Here if we assume a 0 variance of status within the elite group we will typically get a lower bound estimate of  $b$ , while if we assume the elite group had a variance of status equal to that of the population as a whole we get typically an upper bound estimate of  $b$ .<sup>13</sup> Thus I can construct estimates of the rate of social mobility that extend back to England in the 13<sup>th</sup> century, as well as to countries such as India 1770-2011.

### The Power of a Single Equation

What we will see in the following chapters is that one simple equation

$$y_{t+1} = by_t + u$$

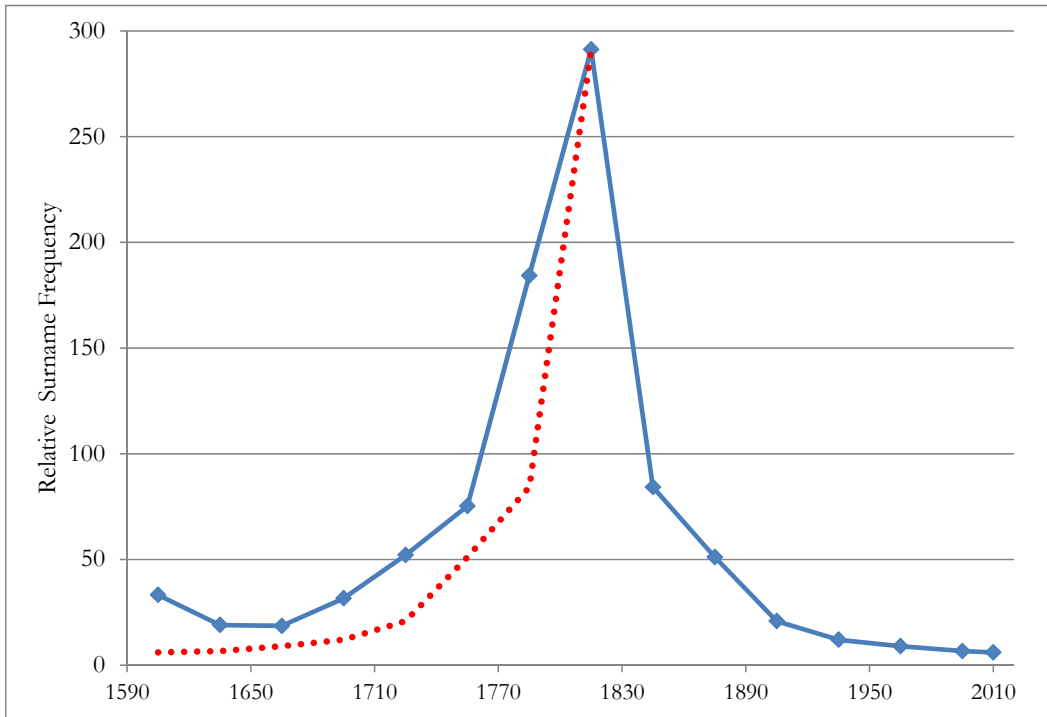
with a relatively modest variation in the values of  $b$  describes intergenerational mobility across a wide variety of times and societies. There seems to be a simple physics of social mobility. One implication of this equation is that social mobility should be the same forwards and backwards. The move of those at the extremes of the distribution – extremes of wealth or poverty, education and ignorance – towards the center should be symmetrical with their earlier move from the center to the extremes. Any group at the extreme should not only regress to the mean in future generations, it should also seem to regress to the mean in the same fashion if we go back through earlier generations.

Using the database of Oxford and Cambridge students we can test this proposition for England. I start with the period 1800-29, and look at all students at Oxford and Cambridge whose surname began with an  $a$  or  $b$ , but where 40 or fewer persons were recorded with that name in the 1881 census. People with these rare

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<sup>13</sup> This result holds as long as a minority of the elite group whose mobility is being measured lies above the observed percentile on the status distribution. If a majority of the elite group lies initially above this percentile, then the bias reverses. Assuming the same variance will produce a lower bound estimate of  $b$ , while assuming no variance will now produce an upper bound estimate of  $b$ .

**Figure 2.4: Relative Representation of an Elite in 1800-29 over 15 Generations**

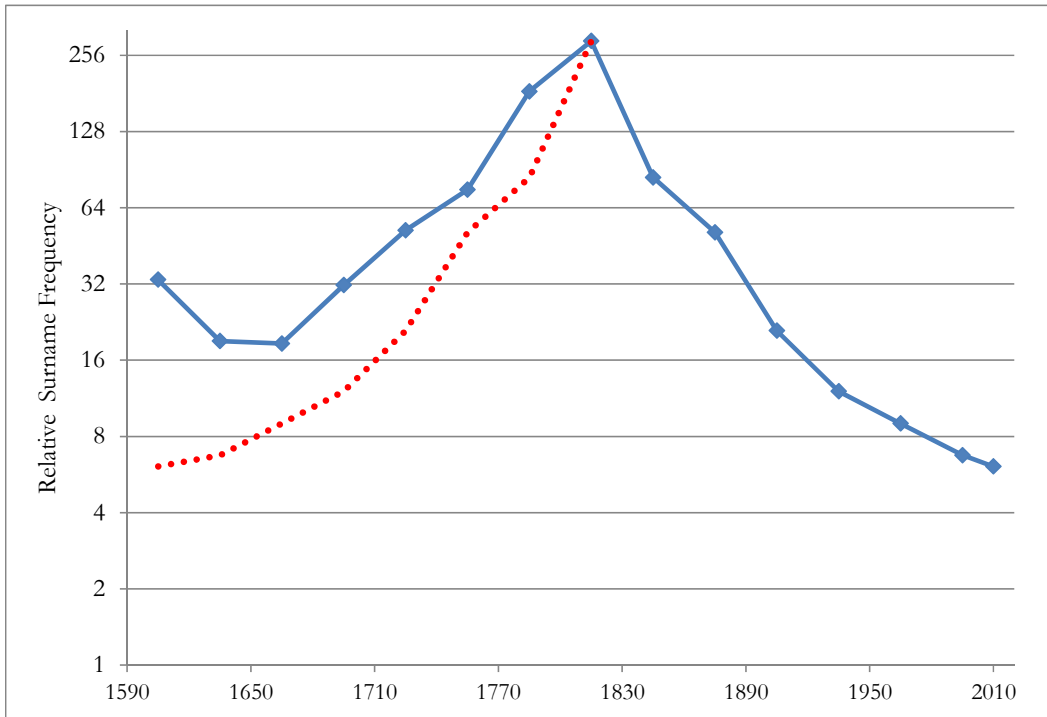


surnames thus represent on average an educational elite when observed in 1800-39.

Figure 2.4 shows their relative representation at Oxford and Cambridge for each 30 year generation 1830-59, ..., 1980-2009, and also 2010-14. There is the predicted period by period decline in relative representation for the 7 generations following. But interesting these names show an near symmetrical rise in the 7 generations before 1800. Complete symmetry is indicated by the dotted line. So clearly the path does not achieve this. But the figure is nonetheless powerful testament to the simple equation used in this study being close to the true. Elites arise step by step from mediocrity, have their generation in the sun, and then fade back to mediocrity. Though as figure 2.4 shows this is at least a 10 generation long process in either direction.

Figure 2.5 shows the same path, but in logs, to show that even in 2010 the 1800-29 elite was still 4 times overrepresented at Oxbridge, so that their eventual demise to mediocrity will actually take potentially many more generations (in chapter 4 the specific  $b$  for this process is estimated).

Figure 2.5: Relative Representation of an Elite in 1800-29 (logs)



## Chapter 3 England, 1066-1780: Pre-Industrial Mobility

Surnames allow me to follow the socio-economic status of elites and under classes in England all the way from 1066 to 2011.

Paradoxically two results emerge. The first is that England does not have, and never had, a persistent ruling elite. Social mobility *in the long run* for the indigenous English, and for western European migrants, has been complete. All elites gradually slip back to mediocrity. Even in the medieval period they could not defend their social position.

The second result, however, is that this process takes a very long time: as much as 300-500 years for some elites to return completely to mean status. Mobility rates are very low, both in medieval England and in recent years. There is little sign of increase in mobility rates in the Industrial Revolution, after the introduction of universal education in 1870, or after the creation of universal suffrage in 1928. The rates of mobility shown here are much lower than economists have estimated in recent years, with a  $b$  in the range of 0.70-0.85, as opposed to the 0.45-0.50 estimated for England in the 1990s.

There is one big change, however, between the years before and after 1850. Before then elites had higher fertility than the poor. Groups that spent time as elites permanently increased their share of the population. However, since 1900 elite groups display lower fertility than poor groups, so that the permanent effect of a period spent at the social summit is a reduction in number of descendants, even when the group eventually returns to average status. Elites in the modern world have a tendency to die out, as do the rare surnames of elites.

### The Medieval Rise of the Artisans

A substantial fraction of the English population, more than 10 percent, have surnames that indicate the occupation of their first forbear to hold the name, typically some time before 1300. These occupations run across a wide range of status.

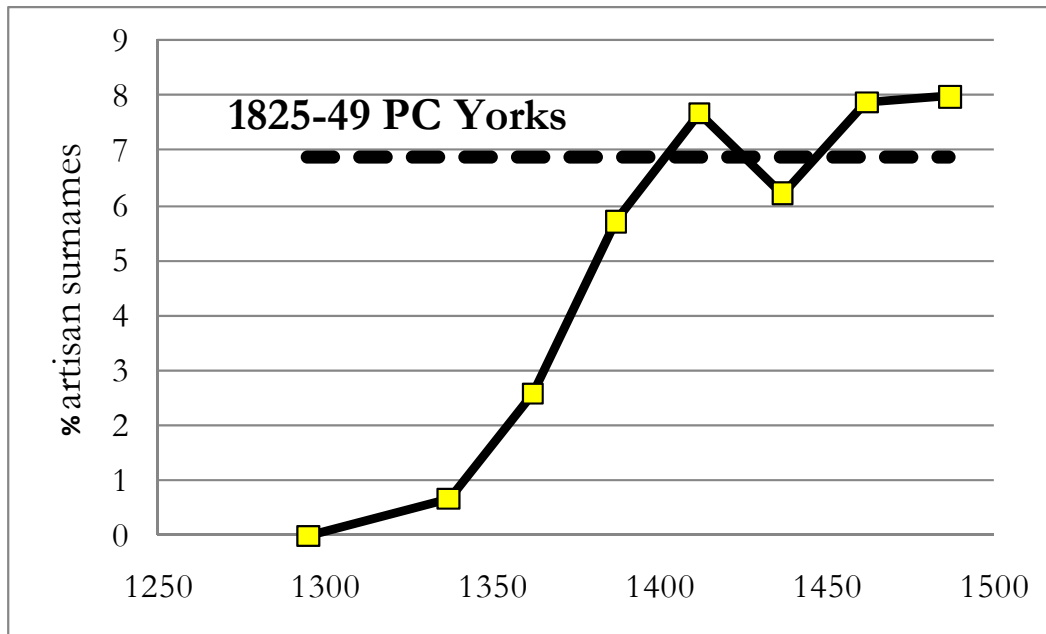
At the upper level there are such names as chamberlain, steward, spencer and butler which describe high level officials in rich households. Also of higher status are such names as clark, which described attorneys and lower level clerics in the church, batchelor, a young knight, and higher level mercantile occupations such as clothier, draper, mercer, and marchant. Then there is a substantial category of names that belonged to artisans: baker, carpenter, cook, smith, taylor, wright. Finally there are also surnames that indicate quite low, though by no means the lowest, status: Shepherd, Calvert (calf herd), Coward (cow-herd), Coulthard (colt herd).

Here I look at the group of people whose ancestors started as artisans or lower, and ask how long it took them to be fully represented within the upper reaches of society. We already saw in chapter 2, that they had achieved full representation in the universities by 1500, within 6 generations of the origins of the surnames.

Another early source for the diffusion of artisan names into the upper classes, is the records of the Exchequer and Prerogative courts of the archdiocese of York in the north of England from 1267 to 1501. Until 1858 wills in England were proved in church courts. There was a hierarchy of such courts, beginning with archdeaconry courts, then bishop's courts, then the archbishop's courts of York and Canterbury. The appropriate court for filing for probate of a will was theoretically determined by where the real property of the deceased lay. If it was in more than one bishopric then it should be filed in the Archbishopric Courts. So the archbishopric courts dealt with the elite amongst property owners. The Exchequer court dealt with people lower down in the social scale – such as clergy without benefices (endowed positions).

Figure 3.1 shows the percentage of testators in these courts with artisan names. To establish a baseline, the percentage in the Prerogative Court of York with such names is shown for 1825-49. Interestingly by 1400-24 the share of testators in these courts with artisan surnames had already risen to that of the general population. So

**Figure 3.1: Artisan Names in the York Courts Wills**



Source: Index of the Exchequer and Prerogative Courts of York, Borthwick Institute, York.

**Table 3.1: Distribution of Prerogative Court of Canterbury Wills**

Century	PCC wills	Population (millions)	Wills/year/death
1384-99	87	2.5	.0002
1400-99	5,915	2.3	.002
1500-99	45,555	3.3	.010
1600-99	218,624	5.2	.029
1700-99	361,827	6.7	.040
1800-58	384,119	14.6	.036

Source: *Index to the Prerogatory Court of Canterbury Wills.*

the absorption of the artisan class into the propertied portion of society was even faster here than with the absorption into the Oxbridge elite. Again, however, while social mobility seems rapid in the late middle ages, taking only 3.5 generations, the implied  $b$  may still be quite high, since those probated may represent only the top 10-20% of the wealth distribution.

Another source of the elite is the index of surviving wills filed in the Prerogative Court of Canterbury (PCC) 1384-1858. Canterbury was the most important of the ecclesiastical courts that probated wills, dealing with relatively wealthy individuals living mainly in the south of England, and in Wales.

More than 1 million of these wills survive, with table 3.1 showing the frequency in terms of distribution by century. Normalizing by the number of adult deaths per year gives an impression, in the last column, of the share of the population they covered. By the eighteenth century 4 percent of those dying in England and Wales would leave wills probated in the Canterbury court. Allowing for those dying intestate, and the fact that will makers were more likely male, represented perhaps the top 10 percent of wealth distribution. In earlier years PCC wills represented a much smaller fraction of deaths, so they may represent a smaller share at the top of the wealth distribution.

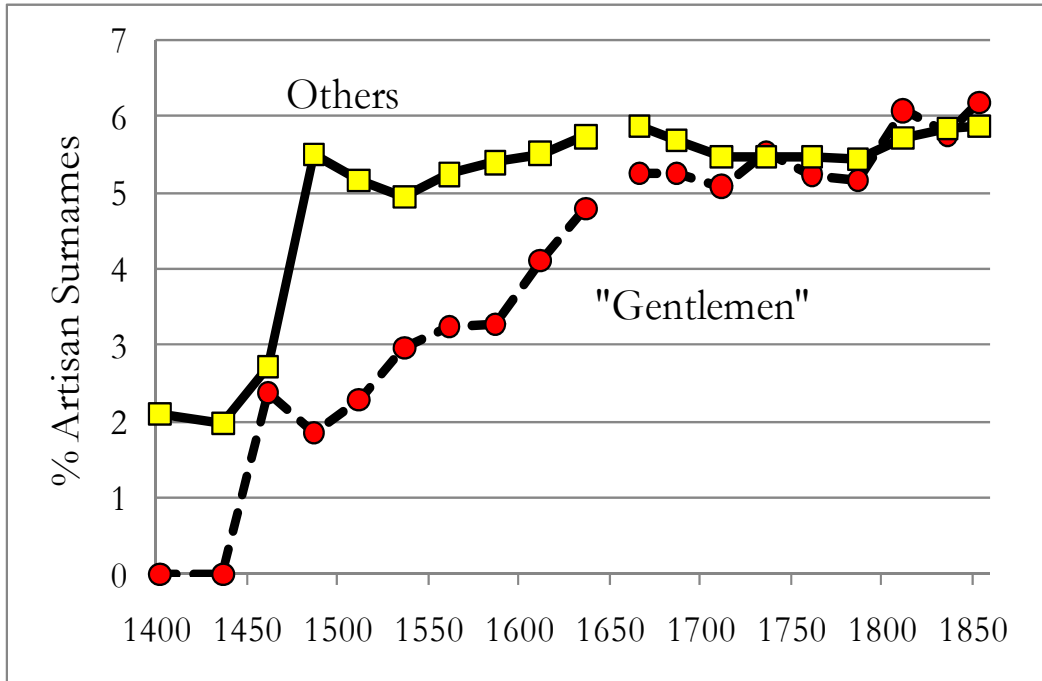
Over time, particularly over the years 1400-1500, the distribution of names in the Prerogative Court of Canterbury wills also changed markedly in favor of artisan surnames. Such names were not found in any PCC wills before 1400, but by 1500 they had risen to what was likely close to the shares of these names in the general population (based here on just a subset of artisan names), as figure 3.2 shows. Since the PCC measures wealth at death, averaging age 55, and the Oxbridge membership measures status at age 15-20, these two data sets are very consistent. They both imply the large scale movement of the artisan class into the top 2-5% of the wealth/status distribution by 1460-79.

We can get an even finer slice of the rich from the PCC wills by focusing on those labeled with “gentleman,” “sir,” “lord” and other such honorifics. This came to stabilize at about 16 percent of all those leaving PCC wills by 1550 and later.<sup>14</sup>

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<sup>14</sup> Earlier most wills have no indication of the occupation or status of the testator.

Figure 3.2: Artisan Names in Prerogative Court of Canterbury Wills



Source: *Index to the Prerogative Court of Canterbury Wills*.

Notes: This graph is drawn for a subset of all artisan surnames.

These individuals represented the richest of the PCC testators, and thus typically the top 0.5%-1% or less of the wealth distribution of England. Figure 3.2 also shows the fraction of all “gentleman” testators with lower artisan surnames. Again there is convergence of a stable share of such surnames, though the convergence takes much longer and is not complete until after the 1660s. This implies that in the course of 360 years, 12 generations, the artisan class of the middle ages moves from the lower end of the income distribution to being fully represented among the richest in the society. There is complete long run mobility in medieval and early modern England.

## The Medieval Fall of the Artisans

The artisan class not only rose in social status, they also fell to be fully represented in the lowest ranks of society. Witness to this comes also when we look at the lowest level of society, those indicted for petty crimes – and in particular those whose occupation was “laborer” who were so indicted.

Table 3.2 thus shows 1558-1625, and for the 1850s, the share of a sample of artisan surnames among PCC wills, compared to the share among criminals. Here, however, we have to deal separately with the surname *Smith*. This, the most common name in England, seems to have been adopted as a criminal alias, in that it always shows a higher relative representation among criminals than in the general population. However, if we look at a sample of other artisan surnames and compare the frequency in the general population, among the Canterbury Court Wills, and in criminals, by 1600 these frequencies are the same. The descendants of artisans had also moved down to be fully represented in the criminal underclass by 1558.

For artisans, thus, the simple model of mobility described in chapter 2 is born out in pre-industrial England. For status there is constant regression to the mean, accompanied by random shocks that eventually result in those of artisan origin being distributed across status levels in just the same way as the average member of the society.

While we see here the complete mobility to all ranks of society by the original artisan class, as discussed in chapter 2 the rate of mobility is low by the standards of conventional measures. Assuming that hereditary surnames for the artisan class appeared first in 1270-1300 I derived there an estimated  $b$  of 0.75. If hereditary surnames for artisans actually appeared earlier then the implied rate of social mobility would be lower. Judging, however, whether surnames were inherited, or were merely temporary by-names, is difficult from the existing tax and court lists of the medieval period. In the records of the 1381 Poll Tax, where names and occupations were recorded, occupational surnames still correlated with actual occupations. Vastly more than a chance number of people worked in the occupation that would be implied by their surname. Of a sample of 35 carpenters, for example, 7 bore the name “wright.” If surnames by then had become completely hereditary, then either they were formed within a very few generations of 1381, or there was strong intergenerational persistence of occupations.

**Table 3.2: A sample of Artisan Surnames across Rich and Criminal**

<b>Group</b>	<b>Number</b>	<b>Percent “Smith”</b>	<b>Percent Other Artisan Names</b>
England, all, 1853	-	1.4	3.8
PCC wills, 1850-8	66,807	1.3	4.0
London, indicted, 1850-9	15,705	3.0 <sup>a</sup>	4.1
PCC wills, 1600-24	31,690	1.2	3.9
Indicted Laborers, 1558-99	1,262	1.7 <sup>a</sup>	4.1
Indicted Laborers, 1600-25	891	2.2 <sup>a</sup>	4.4

Notes: <sup>a</sup>See the discussion of Smiths in the text. This table is drawn using a smaller set of artisan surnames than in figures 4 and 6.

Sources: Annual Report of the Registrar General, 1856; *Index to the Prerogatory Court of Canterbury Wills*; *The Proceedings of the Old Bailey*; Cockburn, 1978, 1982.

## The Decline of the Medieval Ruling Class

The artisan surnames show the ascent of the lower classes. What about the decline of the ruling class?

There are various sources that give the names of the English elite in the middle ages. The Domesday Book gives surnames for many of the conquering Norman elite in 1086. The Norman surnames identified people by their village of origin in Normandy (and also Brittany and Flanders, since some of the conquering army was drawn also from these regions). These names include such well known English names as Balliol, Baskerville, Bruce, Darcy, Glanville, Lacy, Mandeville, Percy, Sinclair, and Venables. Thus Baskerville is from the village of Bacqueville in Normandy, Venables from Venables, Ivry from Ivry-la-Bataille.<sup>15</sup> As the ruling class imposed by force in 1066, did this group remain a distinct upper class in medieval England thereafter?

For the Norman elite a group of 236 names of this form, appearing in the Domesday book, was compiled. The frequency of these names in the later medieval population was estimated at 0.4% in 1538-1599 from Boyd's marriage register, though by 1881 it had risen to 0.521%.

A second source of elite names is the *Inquisitiones Post Mortem*, which record the names of tenants in chief of the King at their death. The inquisitions were conducted to establish whether there was an heir of an age to inherit the property. If the heir was a minor then the property would revert to the King until they came of age.

Here I use these *Inquisitiones* for 1236-1299 to establish who was in the propertied elite of the thirteenth century. Many of these surnames are Norman, but by this date many new wealth holders had emerged, with surnames that refer to the location of their principle place of residence in England: Berkeley, Abingdon, Pakenham, Merton.

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<sup>15</sup> Katherine Keats-Rohan's *Domesday People: A Prosopography of Persons Occurring in English Documents 1066-1166* is the invaluable reference source used to extract these names.

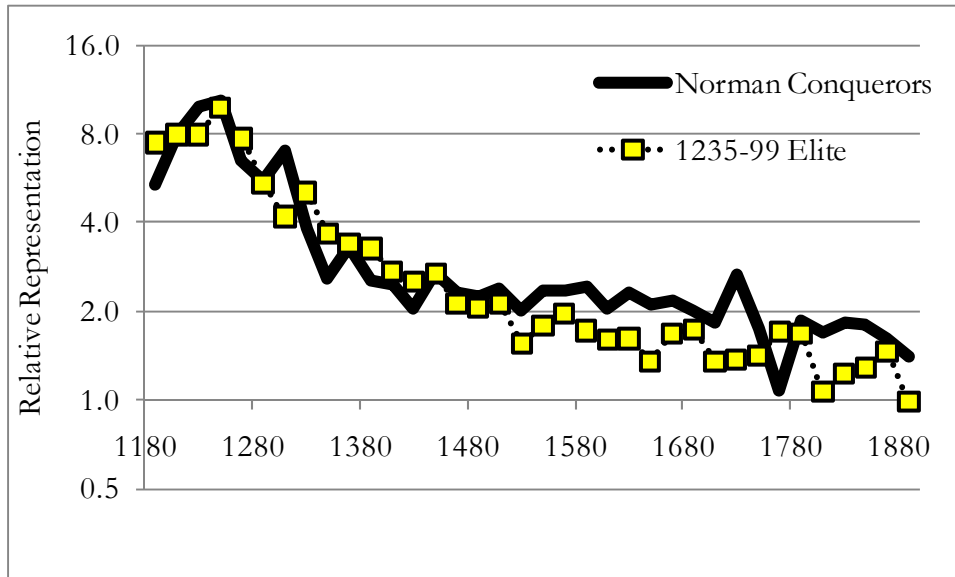
A third source for the elite, but one that we can follow from 1180 until 2011, are the records of those who attended and taught at universities. In England up until 1836 this was just Oxford and Cambridge. Alfred Emden, for example, published a complete listing of all known members of Oxford and Cambridge Universities for the years 1180-1500 (Emden, 1957, 1974). From 1180 to 1499 this records 14,654 faculty and students at Oxford. The overwhelming majority of these university members, even from the earliest years, had surnames. A series of other volumes allowed the construction of a database of all those who attended Cambridge 1200-2011, and Oxford 1160-2011. The Oxbridge elite constituted a cohort of no more than the top 2% of society throughout these years.

Figure 3.3 shows the relative representation at Oxbridge of two groups of medieval elite from 1180 to 1900: those with the surnames of the Norman conquerors and those with the surnames of the 1236-99 IPM elite.

What was the relative representation of the Norman elite at Oxford and Cambridge universities by the thirteenth century and later, assuming their name share in the general population was 0.4 percent? Figure 3.3 shows this by 20 year periods from 1180. In the thirteenth century these surnames were on average eight times as frequent at the university as in the general population. However, their representation fell rapidly in the fourteenth century, so that by the early fifteenth century these names were only a bit more than twice as common at the university than in the general population.

However, curiously the decline in the relative representation of the names of the Norman elite largely ceased after this. Having lost most of their social position by 1400, for some reason these names did not continue to decline in relative representation over the following 500 years. By 1900 the surnames of the Norman elite were still overrepresented at Oxford and Cambridge.

**Figure 3.3: Relative Representation of Medieval Elites at Oxbridge, 1180-1900**



Also shown figure 3.3 are the percentage of students and faculty at Oxbridge with surnames the same as a 10 percent sample of the medieval elite identified through the *Inquisitions post Mortem* of 1236-99. *Inquisitions post mortem* were inquiries at the death of feudal *tenant in chief* (direct tenants of the crown), to establish what lands were held, and who should succeed to them. The holders of these properties were typically members of the upper classes of medieval England. With rarer names typical of this group there is a problem of their mutation over time. Since they are not anchored to a well known form, like “smith”, they can and will mutate, especially for names of foreign origin if their original meaning and significance is lost. Thus in forming a 10 percent sample of the upper class names of 1236-1299 from the *Inquisitiones Post Mortem* I deliberately favored those names that correspond to places in England since this will tend to anchor the form of the name over time, or two names so distinct that even if they mutated their mutations would be discernable. Names in this sample included Baskerville, Berkeley, Beaumont, Essex, Hilton, Lancaster, Maundeville (Mandeville), Neville, Normanville, Percy, Somerville, Wake. This sample thus includes many from the original Norman elite, but also a variety of new rich emerging between 1086 and 1235.

In the thirteenth century this 10% sample of elite names constituted 5.2 percent of university members, implying that the whole of the elite identified in the Inquisitions Post Mortem could have been as much as 52 percent of the members of Oxford then. But as we see their relative representation declined in a similar manner to that of the Norman elite (this sample surname group was 0.67% of the population in 1538-99).

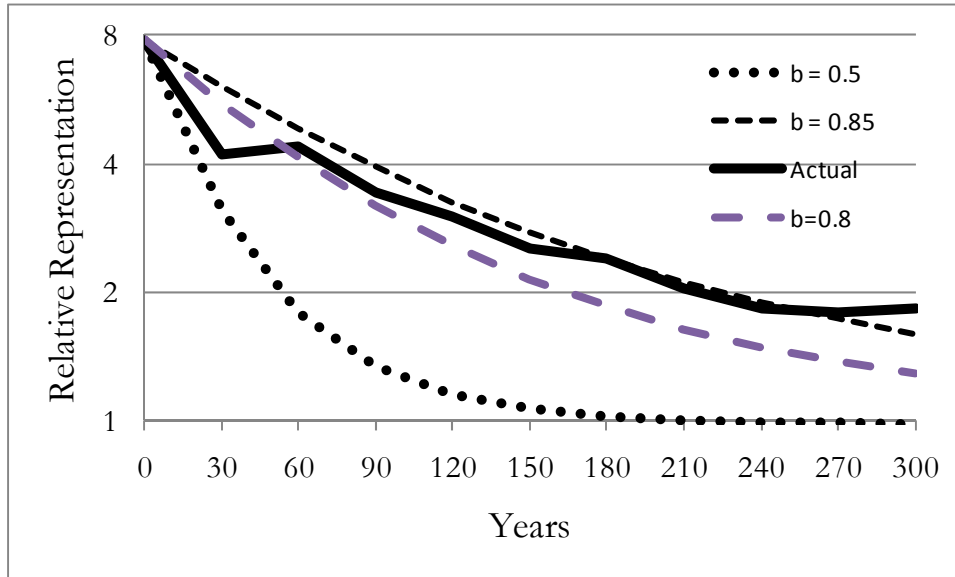
Assuming Oxbridge was the top 2% of the population, what was the  $b$  implied by the subsequent decline of the relative representation of this group? Figure 3.4 shows the relative representation of this 1235-99 elite at Oxbridge over 10 generations, where generation 0 is 1236-1299. Also shown is the implied representation, given the starting point in generation 0, for a  $b$  of 0.5 and 0.85, and the assumption that Oxbridge was the top 2% of the population. The assumption here is that the elite had the same variance of status as the general population, but a higher mean status in the original generation.<sup>16</sup> At a  $b$  of 0.5, with these assumptions the advantage of the elite would be gone in 5 generations. In order to fit the data we need instead to assume a  $b$  of 0.85, which is even higher than the 0.75 we estimated for artisan surnames. Though here what shows is that the initial convergence towards the mean seems higher than that observed as the group becomes less distinct. Thus over the first 3 generations the implied  $b$  is 0.8, close to the artisan persistence measure.

However, when we look at the end of the data on Oxbridge, in 1880-1900 we do see an extraordinary residuum of the medieval past. It is still the case for this generation that Norman origin surnames are 51% more frequent than they are in the general population, though those of the 1236-99 elite are just 22% more frequent. This is a relatively inconsequential overrepresentation. If 2% of the population were then at Oxford or Cambridge, then among the Norman elite surnames the share would be 3%, hardly a noticeable difference. This old elite has status only modestly above average - testament to the slow but inevitable forces of regression to the mean. But if correct it would imply that the true  $b$  for this upper group was even higher than 0.85, and indeed was close to the value of 1 after 1500 which would indicate a forever persistent upper class.

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<sup>16</sup> This assumption is a bit more problematic than that for craftsmen, and the conclusions here will be tested by assuming a less dispersed socioeconomic status among this group.

Figure 3.4: Simulated  $b$  for the 1236-99 Elite at Oxbridge



The extraordinary persistence of a residual higher status for Norman surnames shows when we turn to death records in England and Wales for 2003-5. Life expectancy in England, for example, has since at least the nineteenth century been dependent on socio-economic status. Thus in 2002-5 life expectancy for professionals in England and Wales was 82.5 years. For unskilled manual workers it was only 75.4 years.<sup>17</sup> Table 3.2 shows the average age at death of four groups of people in 1866-87 and 2003-5. The first are those with the surname *Brown* to represent the average person of the indigenous population. The second group are those with the rare surnames of people who were on average poor in 1858-1887. The third group those with the same rare surnames as those who were on average rich in 1858-87. As can be seen the rich of 1858-87 are regressing to the mean, but still live 3 years longer than the average person.

However, those bearing Norman surnames still in 2003-5, 938 years after the conquest, die on average 2 years older than the average person of the indigenous population. Though this is a slight advantage that does not place them in average in the professional classes, it is a remarkable apparent survival of earlier privilege.

<sup>17</sup> Office of National Statistics, "Variations persist in life expectancy by social class", <http://www.statistics.gov.uk/pdfdir/le1007.pdf>.

**Table 3.3: Average Ages at Death by Surname Group, 1866-87, 2003-5**

<b>Group</b>	<b>Average Age at Death 1866-87</b>	<b>Average Age at Death 2003-5</b>
Poor 1858	31.7	77.0
<i>Brown</i>	29.8	76.7
<b>Norman Surnames</b>	<b>31.3</b>	<b>78.9</b>
Elite 1858	50.7	79.8

Confirmation of the seeming slow erosion of privilege comes when we look at the relative representation of a sample of the IPM elite of 1236-1299 in later centuries. Table 3.4 shows the relative representation of these surnames in the PCC from 1380 to 1858. The population frequency of surnames is estimated in 1381 from the Poll Tax. In 1500-1858 it is estimated from Boyd's marriage index 1538-1840. The surnames of the medieval elite are initially heavily overrepresented in the PCC wills, but their relative representation declines steadily over time. Interestingly, however, nearly six hundred years after the identification of this group of names with the rich it is still the case that the bearers, 16 generations later, were better represented among the rich than among those accused of crimes. By 1800-58 it is still there, but is only 4%. Figure 3.5 shows these converging name frequency trends for this elite in the tops and bottom of the socio-economic distribution over time.

Thus the tale of the Stanley's discussed in the introduction turns out to be an exception. The medieval elites are not able to maintain their position among the rich over time. Regression to the mean takes its toll. But the time it takes for this erosion, and its lack of completeness even now, suggests an extraordinary high degree of persistence of status. However, we shall see below in the chapter on surname changing, that the Norman descendants most likely have regressed completely to the mean, and that the vestigial status of their surnames has been

**Table 3.4: Relative Representation of the IPM elite among rich and criminals**

Period	Wealthy (PCC wills)	Poor (London Indictments)
1236-99	23.23	-
1380-1499	3.73	-
1500-99	1.64	-
1600-99	1.21	0.75
1700-99	1.15	0.93
1800-58	1.04	0.86

Note: Set of wealthy defined 1236-99 as those with an Inquisition Post Mortem, and 1380-1858 as those with a PCC will.

**Figure 3.5: Relative Representation of Medieval Elite Surnames, among Rich and Criminals, 1236-1858**



Note: The upper line shows the status of medieval elite surnames among the wealthy. The lower line is their relative representation among the accused of the Old Bailey. Sources: *Index to the Prerogatory Court of Canterbury Wills*. *The Proceedings of the Old Bailey*. Fenwick (2001). Public Record Office (1904, 1906).

created by selective changing of upper class people towards such surnames. Because of their distinguished history, relative rareness, and foreignness, such names have retained a patina of prestige that has been sought by social climbers.

Common English surnames thus largely lost most association with social status by 1650. Below we thus turn to rare surnames after 1600 as a way of measuring mobility. However, the nineteenth century saw substantial migration into England, principally by the Irish, bringing a distinct set of surnames. By 1841 there were 289,000 people of Irish birth living in England. Many Irish surnames, particularly those of Gaelic origin, are quite distinct from those of England. Table 3.5 also shows the share of defendants and victims in the Old Bailey in London in 1830-1859 with such Irish surnames. For comparison the same percentages are shown for the distinctive surnames of Scottish immigrants. Also shown is the share of PCC wills made by people with these artisan or Irish surnames resident in London or Middlesex in 1850-8. The later date for the wills was adopted because the Irish population would have been relatively young and growing over time.<sup>18</sup>

The bearers of Irish surnames are heavily concentrated at the bottom of the social ladder. They are three times as likely to be the defendant in a criminal trial, than the victim of a crime. They are also between 5 and 6 times as likely to be a criminal defendant, than to make a will proved in the high status Canterbury Court. Thus we can potentially use such immigrant groups to measure, using common names, the rate of upward mobility in the years 1800 and later. In the 150 years between 1850 and 2009 have the Irish achieved complete upward mobility within English society?<sup>19</sup> We can also do the same for distinctively Jewish surnames such as Cohen.

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<sup>18</sup> The percent of victims and defendants with names of distinctively Scottish origin is included as another control. If the low ratio of victims to accused for the Irish was a consequence of their immigrant population having a skewed age structure then we would expect that other recent immigrant groups such as the Scots would show a similar pattern.

<sup>19</sup> This test is complicated by continuing Irish immigration into England between 1850 and 2009, but a large share of the modern stock of people with distinctively Irish surnames in England in 2009 would have ancestors who arrived before 1914.

**Table 3.5: Immigrant Group Surnames in London, 1830-59**

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<b>Surname Group</b>	<b>PCC wills (%)</b>	<b>Old Bailey Victims (%)</b>	<b>Old Bailey Accused (%)</b>
Irish	0.67 <sup>a</sup>	1.18	3.69
Scottish	-	2.04	2.01

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Note: <sup>a</sup>The PCC will shares here are for London and Middlesex in the years 1850-8, to partially control for the youth of the Irish immigrant population compared to the general population, and its concentration in urban locations.

Source: *Index to the Prerogatory Court of Canterbury Wills. The Proceedings of the Old Bailey*

## Chapter 4: England, 1600-2011 – Modern Mobility

By 1600, as we saw in the previous chapter, social mobility in medieval and early modern England, while slow, had been ubiquitous. It had thus eliminated for common surnames all but very vestigial status differences. *Bakers* and *Chamberlains*, *Smiths* and *Clarks*, were all now of equivalent status despite the very different places in the social rank their ancestors had held 300 years earlier.

But I can still use surnames to trace the nature of social mobility in England and Wales up to the present day by switching from the study of common surnames to looking at rare surnames.<sup>20</sup> In England there always has been a significant fraction of the population holding rare surnames. Figure 4.1, 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.

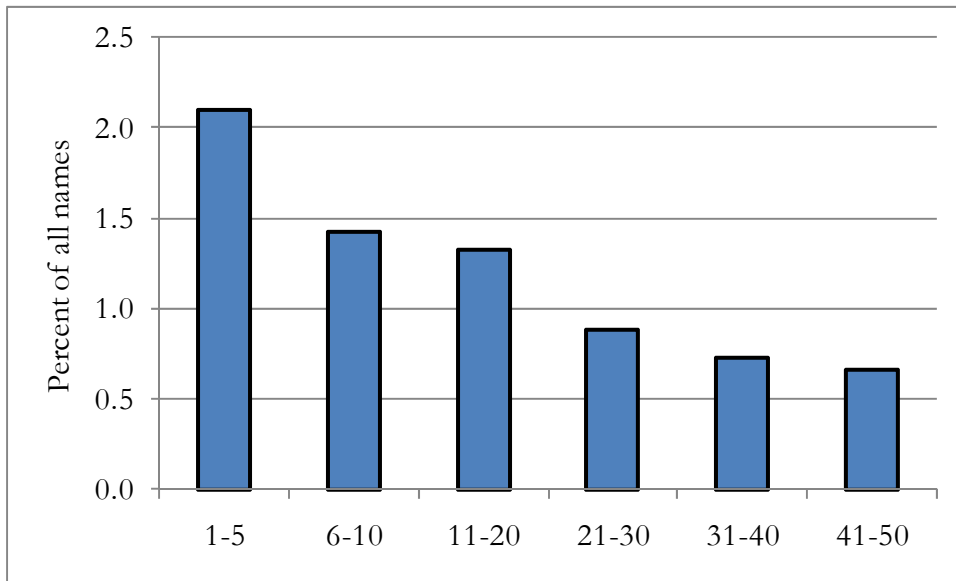
Such rare surnames arose in various ways: immigration of foreigners to England, such as the Huguenots after 1685 (example, *Abanzit*, *Bazalgette*), spelling mutations from more common surnames (*Bisshopp*), or just names that were always held by very few people, such as *Binford* or *Blacksmith*.

Through two forces – the fact that many of those with rare names were related, and the operation of chance – the average social status of those with rare surnames will vary greatly at any time. We can thus divide people post 1650 into constructed social and economic classes of rich and poor by focusing on those with rare surnames. We will not be able to discern exactly which later person with a surname was related to which earlier one. But by treating everyone with the surname as one large family we can follow people over many generations.

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<sup>20</sup> See the interesting study of Güell, Rodríguez Mora, Telmer (2007) which also measures social mobility through rare surnames, but using cross-section data.

**Figure 4.1: Relative Frequency of Rare Surnames, 1881 Census, England**



In this paper we construct of initial rich and poor surname samples for the years 1800 on by choosing rare surnames where the average person at death in the interval 1858-1887 was either wealthy or poor. The exact way this is done is described below. This initial window was chosen because national measures of wealth at death become available only in 1858.

We can then measure the average wealth of these surnames for each of four subsequent death generations, 1888-1917, 1918-1952, 1953-1989, 1990-2024. Probate records give an indication of the wealth at death of everyone in England and Wales by name 1858 and later.<sup>21</sup> The generations were allocated on the assumption that the average child was born at age 30 of the parent. The average child would thus die 30 years later, plus any gain in average years lived by adults of that generation.

The *Bazalgette* surname, for example, yielded 19 deaths in the first generation, 17 in the second, 19 in the third, 18 in the fourth, and 12 in the fifth. We have measures of the stock of each name in 1881 from the census, and in 1998 from the

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<sup>21</sup> Those not probated typically have wealth at death close to 0.

Office of National Statistics.<sup>22</sup> We check against immigration of unrelated people with these surnames from outside England and Wales by making sure the stock in 1998 is close to that predicted by the 1881 stock plus all births since 1881 minus all deaths.

A drawback with such an analysis of wealth at death is that the average age at death was close to 80 by 2010. Thus the people dying in 2010 on average were born in 1930, and completed secondary schooling 1946-48. However the existence of birth and death registers for England and Wales from 1837 on, with age of death recorded after 1866, allows us to also divide our surnames into birth cohorts. Since the average adult 1858-1887 died around age 60, this means we can start with a birth generation of 1780-1809, and then follow with 5 more strict 30 year generations of 1810-39, 1840-69, 1870-99, 1900-29, and 1930-59. Those in the last birth cohort will only be captured if they die age 81 or younger. And this allows us to consider people who completed secondary schooling as late as 1977.

We derive other measures of social status for these same surnames by generation. Most importantly we have measures of the numbers of people with these names who were or are students at Cambridge, Durham, London, Oxford, Sheffield and Southampton Universities in 1800-2011. We can thus consider educational attainment over 8 generations of students: 1800-1829, 1830-59, 1860-89, 1890-1919, 1920-49, 1950-79, 1980-2009, 2000-14.

### **Rich and Poor Rare Surnames, probates 1858-1887**

Rich and poor surname samples were created from surnames held by 40 or less people in 1881, where there was at least one adult death in 1858-1887.<sup>23</sup> Surnames were designated rich or poor based on the log average wealth at death (estimated as personality) of all those 21 and above with a surname dying in these 30 years.

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<sup>22</sup> A drawback of the ONS list of surname frequencies is that it excludes names with 4 or less occurrences.

<sup>23</sup> To identify the the poor surnames we checked the probate records for 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, issued by Parliament. 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.

Throughout wealth is normalized by the average wage in England in the year of probate. The rich and poor groups were further subdivided into the very rich and the rich. The poor were subdivided into the very poor, where no-one dying 1858-1857 was probated, and the poor.<sup>24</sup>

In 1858-87, the average wealth at death of the very rich was 455 times the annual wage, that of the rich was 355 times the annual wage. While the very poor had an estimated wealth of 0.1 of the annual wage on average, the merely poor had estimated bequests of 18 times annual wages on average.

Table 4.1 gives a summary of the data by death generations. There are a declining number of surnames in the sample over time because some rare surnames die out due to the vagaries of fertility and mortality.<sup>25</sup>

Figure 4.2 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 2000-2011 probate rates for the richest surname group are still above the average of England by at least 16%.

Figure 4.3 shows the average value of the logarithm of normalized probate values of those probated among rich and poor by decade, as well as for the *Brown* surname. In the years 1988-1998 the majority of probates were expressed in the form of a limited number of values that the estate was “not exceeding.” Thus in 1990 there were 17 probates with actual values, 9 “not exceeding” £100,000 and 19 “not exceeding” £115,000. We consequently omitted the years 1988-1998 from the

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<sup>24</sup> We assumed throughout that those not probated had an average wealth of 0.1 of the average wage. We do this because the minimum values for required probate were £10 (1858-1900), £50 (1901-1930), £50-500 (1931-1965), £500 (1965-1974), £1,500 (1975-1983), and £5,000 (1984-2011) (Turner, 628). These values were generally close to 0.2 of the average wage. The minimum value requiring probate jumped from 0.15 of the wage to 0.73 of the wage in 1901. But this had little effect on the implied value of the omitted probates in 1901 compared to 1900. Thus whatever the exact cutoff the bulk of the omitted probates were close to 0 in value.

<sup>25</sup> Since the death register 1858-1865 does not give age at death for these years we estimated age at death where possible from records of age in the 1861, 1851, and 1841 censuses, as well as from the birth records 1837-1865.

**Table 4.1: Summary of the Sample**

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<b>Period</b>	<b>Surnames</b>	<b>Probates</b>	<b>Deaths</b>	<b>Deaths 21+</b>
<hr/>				
RICH				
1858-87	181	1,142	2,263	1,767*
1888-1917	172	1,072	1,987	1,792
1918-1952	168	1,582	2,478	2,383
1953-89	156	1,310	2,008	1,983
1990-2011	143	564	989	980
POOR				
1858-87	273	107	3,300	1,798*
1888-1917	255	275	3,106	1,889
1918-1952	242	638	3,085	2,610
1953-89	246	1,305	3,776	3,654
1990-2011	214	836	2,165	2,135

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Note: \* Where age was unknown 1858-65, the fraction above 21 was estimated from the 1866-87 ratio of deaths 21+ to all deaths.

Figure 4.2: Probate Rates of Rich, Poor and *Brown* samples, by decade

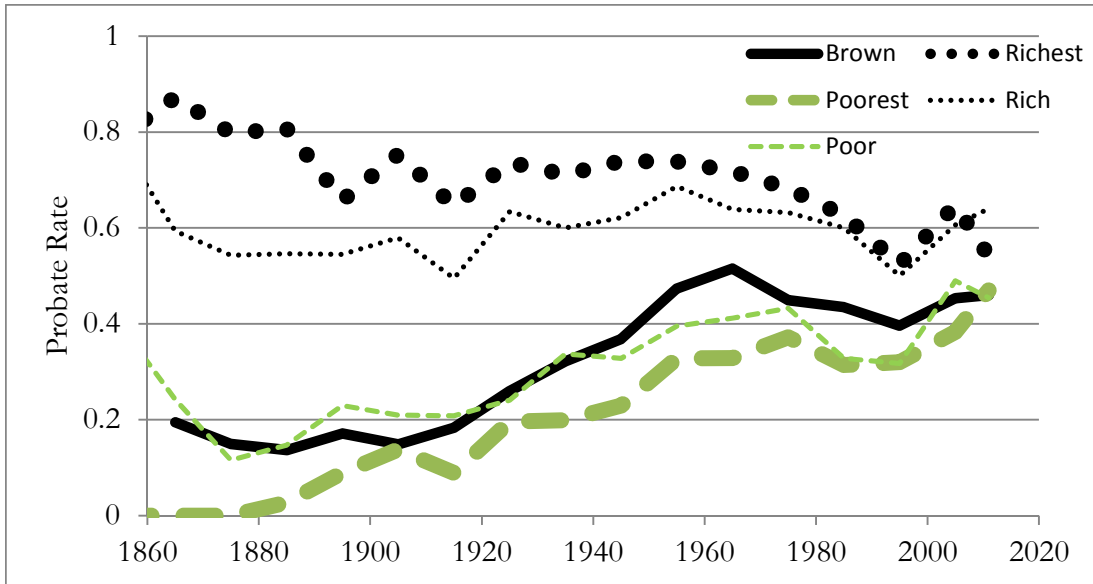
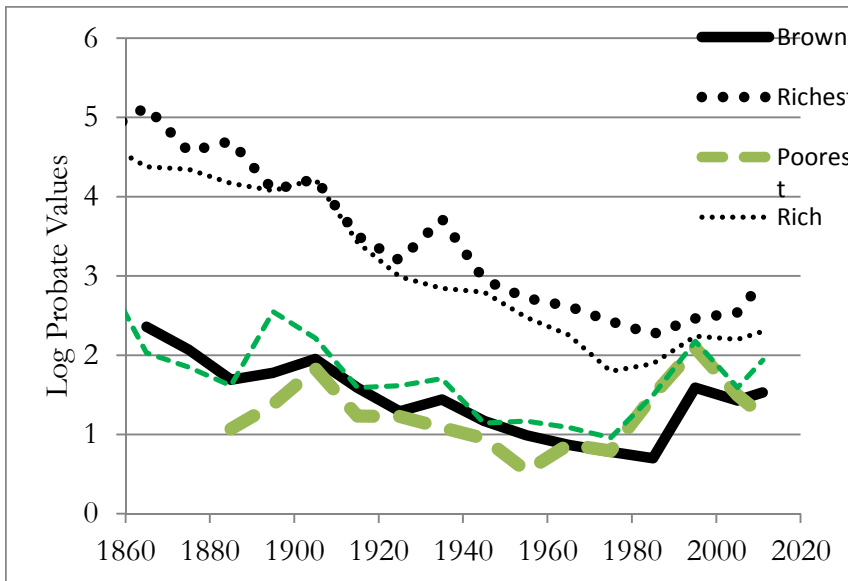


Figure 4.3: Average Log Probate Value, those probated, by decade



analysis of probate values. For 1981-87 when fewer probates had these value bands, and the so described limits were at the much lower levels of either £25,000 or £40,000, we replaced these values with an expected actual value for this range. This was the average of actual values for these years that fell below £25,000 and £40,000.

The average values for those probated among the rich approach those of the poor surname group over time, but are still higher in 2000-11. Finally figure 4.4 combines the information in figures 4.2 and 4.3 to produce an estimate of the average normalized log wealth at death of the rich and poor surname groups by decade.

Figure 4.4 shows that there is clearly a process of long run convergence in wealth of the two surname groups towards the social mean (represented by the *Browns*), and that process continued 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 is much slower than recent estimates of *bs* for income, earnings and education would suggest. Average wealth at death in 2000-11 was still significantly higher for the group identified as rich in 1858-1887. Indeed the average wealth of the richest surname group from 1858-1887 was still 5.6 times that of the poorest surname group in 2000-11.

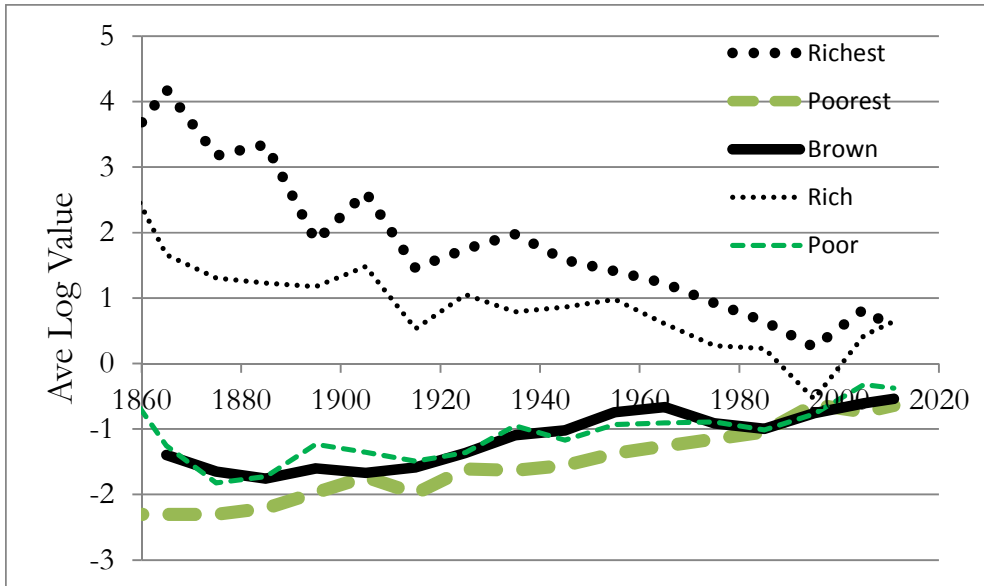
### **Estimated *bs* by generation**

We can estimate the *bs*, for wealth, in several different ways. If we define  $\bar{y}_{Ri}$  and  $\bar{y}_{Pi}$  as the average of ln normalized wealth for generation *i* for the rich and poor surname groups, then the *b* linking this generation with the *n*th future generation can be measured simply as

$$\bar{y}_{Ri+n} - \bar{y}_{Pi+n} = b(\bar{y}_{Ri} - \bar{y}_{Pi})$$

This measure will be, as described in the mathematical appendix, in expectation the same as the traditional intergenerational *b* estimates.

Figure 4.4: Average Log Probate Value, Including Those Not Probated



This estimation has an advantage described above 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. Figure 4.5 shows the mean log wealth of each group by generation, and table 4.2 the implied  $b$ s, along with bootstrapped standard errors.

Table 4.2 suggests two things. One is that the average  $b$  values between generations are much higher than are conventionally estimated. The average  $b$  value across 4 generations is 0.72, much higher than the conventional figures for wealth between generations reported in table 1. These values are so high that there is still a significant connection between wealth 4 generations after the first.

The second suggestion of table 4.2, however, is that the  $b$  may have fallen for the last generation, those dying 1999-2011. However, we shall see that there is other evidence that suggests little increase in the rate of mobility in recent generations, and clear evidence that complete equality between the original rich and poor in wealth at death will not be accomplished before 2100. Modern social mobility is no faster than medieval.

Figure 4.5: Average Log Probate value, by generation

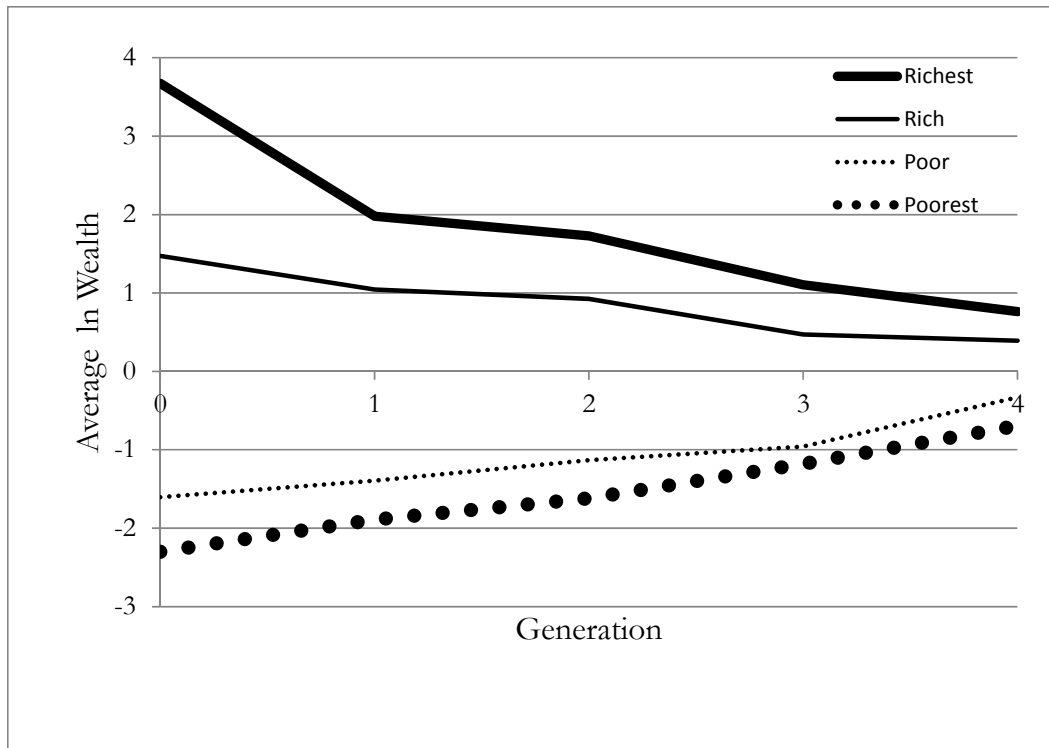


Table 4.2: b Values Between Death Generations

	1888-1917	1918-1952	1953-1987	1999-2011
1858-1887	<b>0.71</b> (.03)	0.62 (.02)	0.42 (.02)	0.26 (.03)
1888-1917		<b>0.86</b> (.03)	0.59 (.03)	0.36 (.04)
1918-1952			<b>0.68</b> (.03)	0.41 (.05)
1953-1987				<b>0.61</b> (.07)

Note: Standard errors in parentheses.

The rise in the average age of death, however, implies that this generation was born on average in 1927, and had left High School by 1945. To get an estimate of  $b$  that is a more contemporaneous we can instead divide testators into 30 year long birth cohorts, with the first such cohort 1780-1809, and the last (the sixth) 1930-59. The last cohort, however, will have only those who died relatively young for their generation. Since the age-wealth profile is steeper for the rich surname groups, this will bias us towards finding more convergence in this last truncated 1930-59 generation. We thus correct for this in the estimate.

Table 4.3 shows the composition of these birth cohorts. The truncation of the sample at either end implies that the first cohort 1780-1809 dies unusually old for the period, while the last cohort represents people dying unusually young. The truncation also implies that at the ends we do not observe people on average at the midpoints of the 30 year birth cohort. Thus the average birth date for 1780-1809 is 1798, not 1795. And the average birth date for the 1930-59 birth cohort is 1939, not 1945.

Figure 4.6 shows the average log wealth of these birth cohorts. In the last truncated cohort, those born 1930-59, we observe few people aged 80 or above, and disproportionately many younger people. This will bias downwards, in particular, the estimated wealth of the higher status groups in the last period (since these have a stronger age-wealth gradient). We do not attempt to control for this, but it does imply that the last period estimated  $b$  is too low. Again we get a nice pattern predicting eventual regression to the mean. As average wealth narrows across the groups they always retain their initial ranking in terms of wealth.

Table 4.4 shows the implied  $b$  estimates between each period, as well as the bootstrapped standard errors.<sup>26</sup> Over now six generations of these birth cohorts the average one period  $b$  is 0.70, compared with 0.72 for the death generations. But there is no longer clear sign that the  $b$  has declined for recent generations. Instead the  $b$  is lower just for one generation, the move from those born 1870-99 to those born 1900-29. In the last generation observed, 1930-59, who would all have finished secondary schooling post WWII, there is just as strong a connection of wealth with

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<sup>26</sup> The raw  $b$ 's have been revised downwards, by an average of 4%, to allow for the slightly less than 30 interval between the birth dates of the observed cohorts.

**Table 4.3: Wealth at Death by Birth Cohorts, Summary**

<b>Birth Period</b>	<b>Surnames</b>	<b>Observations</b>	<b>Average Birth Year (21+)</b>	<b>Average Age at Death (21+)</b>
<b>RICH</b>				
1780-1809	172	828	1797	76.6
1810-39	164	1,489	1826	67.0
1840-69	159	2,134	1855	66.6
1870-99	147	2,121	1883	68.2
1900-29	142	1,144	1912	69.5
1930-59	80	181	1941	57.4
<b>POOR</b>				
1780-1809	204	581	1798	76.0
1810-39	188	1,281	1826	65.1
1840-69	188	1,881	1855	62.3
1870-99	189	2,523	1885	67.1
1900-29	179	1,893	1912	68.7
1930-59	116	354	1942	57.0

Figure 4.6: Average log wealth by Birth Generation, 1780-1959

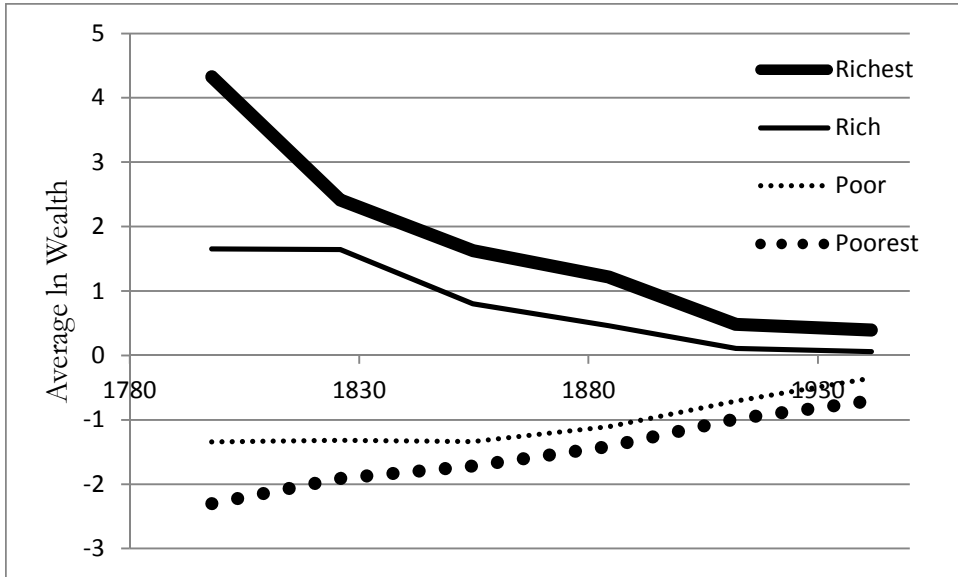


Table 4.4: b values between birth generations, 1780-1809 to 1930-1959

	1810-39	1840-69	1870-99	1900-29	1930-59
1780-1809	<b>0.72</b> (0.03)	0.54 (0.02)	0.41 (0.02)	0.22 (0.02)	0.16 (0.04)
1810-39		<b>0.75</b> (0.03)	0.57 (0.02)	0.31 (0.02)	0.23 (0.06)
1840-69			<b>0.76</b> (0.03)	0.41 (0.03)	0.30 (0.07)
1870-99				<b>0.55</b> (0.04)	0.40 (0.10)
1900-29					<b>0.73</b> (0.18)

Notes: b values corrected to a 30 year generation gap. Standard errors bootstrapped.

their parent's generation as in the nineteenth century. And since this estimate does not include people aged 80 and above, who have much higher wealth among the descendants of the rich, this  $b$  estimate is downward biased.<sup>27</sup> However, this last estimate has high standard errors because of the small numbers of observations, and the declining difference in wealth between the original rich and poor groups.

Table 4.4 also shows that the wealth of people born before 1810 with rare surnames still correlates significantly with the wealth of people with those same surnames 6 generations later born 1930-59. The average wealth at death of the group identified as wealthiest in 1780-1809 still is 3 times as great as those with the surnames of the poorest in 1780-1809, for those dying 1999-2011 and born 1930-59. We will show below that that correlation will continue to those born 1960-1989, and 1990-2011.

People born 1930-1959 were mainly exposed to the post WWII education and access regimes, including the national health service, and quite high redistributive tax rates during their work lives. Yet there is no sign of any greater social mobility than in earlier generations.

A 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 in the regressions

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

where here  $y_{i+n}$  is the average log wealth by surname in period  $i+n$ , and we weight by the average number of observations in each surname group in the relevant periods. Table 4.5 shows these estimates and the associated standard errors. As discussed above the average estimate one period  $b$  is below that of the previous method (0.62 versus 0.72).

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<sup>27</sup> A rough method of correction we can employ is to reweight the observations from the last period in terms of the age distributions of all those dying 1999-2011, using the wealth of those dying aged 70-79 to proxy for those dying 80 and above. This implies a  $b$  estimate for the last period of 0.89.

**Table 4.5: b Estimates between Death Generations, Conventional Regression**

	1888-1917	1918-1952	1953-1987	1999-2011
1858-1887	<b>.66</b> (.030)	.58 (.026)	.38 (.025)	.28 (.038)
1888-1917		<b>.71</b> (.030)	.50 (.029)	.28 (.048)
1918-1952			<b>.60</b> (.029)	.37 (.052)
1953-1987				<b>.53</b> (.065)

Note: Standard errors in parentheses.

**Table 4.6: Attenuation Corrected b Values between Death Generations**

	1888-1917	1918-1952	1953-1987	1999-2011
1858-1887	<b>.82</b>	.64	.54	-
1888-1917		<b>.86</b>	.54	.47
1918-1952			<b>.70</b>	.46
1953-1987				<b>.61</b>

Note: Standard errors in parentheses.

If, however, the one period  $b$ 's in table 6 were correctly estimated, then we would expect  $\hat{b}_{04} = \hat{b}_{01} \cdot \hat{b}_{12} \cdot \hat{b}_{23} \cdot \hat{b}_{34}$ . In fact

$$\hat{b}_{04} = 0.28 > \hat{b}_{01} \cdot \hat{b}_{12} \cdot \hat{b}_{23} \cdot \hat{b}_{34} = 0.66 \times .71 \times .60 \times .53 = 0.15 \quad .$$

The long run regression to the mean is slower than the one period  $b$ s predict. Presumably this is because of measurement error, so that the estimated one period  $b$ s are the true  $b$ s times an attenuation factor  $\theta < 1$ . In this case

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

With a constant attenuation factor can get better estimates of the true  $b$ s between periods by taking the ratios of the estimated  $b$ s. Thus, for example,

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

Table 4.6 shows these attenuation corrected  $b$  estimates. These echo those of table 3, except for being significantly higher between the first and second generations. But as noted earlier the estimates in table 3 for the first generation will also suffer from attenuation bias. The one generation corrected  $b$ s average 0.75.

Table 4.7 shows the conventional regression estimates of  $b$ 's between birth generations, and table 9 the attenuation corrected estimates. The one generation  $b$ 's again average about 0.75. The pattern of estimates here again suggest some decline in  $b$  in the most recent generations, but the final period  $b$  is underestimated because of the exclusion of the rich descendants born 1930-59 who have not yet died.

**Table 4.7: b Estimates between Birth Generations, Conventional Regressions**

	<b>1810-39</b>	<b>1840-69</b>	<b>1870-99</b>	<b>1900-29</b>	<b>1930-59</b>
1780-1809	<b>0.63</b> (.029)	0.56 (.025)	0.40 (.024)	0.21 (.027)	0.12 (.045)
1810-39		<b>0.57</b> (.032)	0.51 (.027)	0.28 (.031)	0.13 (.053)
1840-69			<b>0.71</b> (.028)	0.37 (.037)	0.22 (.064)
1870-99				<b>0.48</b> (.040)	0.26 (.075)
1900-29					<b>0.31</b> (.097)

**Table 4.8: Attenuation Corrected b Values between Birth Generations**

	<b>1810-39</b>	<b>1840-69</b>	<b>1870-99</b>	<b>1900-29</b>	<b>1930-59</b>
1780-1809	<b>0.89</b>	0.56	0.43	0.38	-
1810-39		<b>0.77</b>	0.61	0.38	0.18
1840-69			<b>0.84</b>	0.62	0.23
1870-99				<b>0.68</b>	0.32
1900-29					<b>0.54</b>

## Education

I show above slow rates of regression to the mean for wealth in England 1800-2011. These wealth measures have some drawbacks as a general index of social mobility. First it may be objected that of various components of social status – education, occupation, earnings, health, and wealth – wealth since it can be directly inherited will be the slowest to regress to the mean. Second the wealth measures we have above are for people at the end of their lives, now typically nearly 80. Thus even when we move to birth generations we can only observe the status of people born before 1959.

Using measures of educational attainment we can extend our coverage of the original rich group born 1780-1809 to seven further generations, and to descendants born 1990-1993. The measure is university education. Since almost all people in England attended university between ages 18 and 22 this gives quite precise measures of the fates of succeeding birth cohorts. Here we look at university graduates in the periods 1800-29, 1830-59, 1860-89, 1890-1919, 1920-49, 1950-79, and 1980-2009, and 2010-14.<sup>28</sup> These measures thus now span eight generations. These show, again, universal regression to the mean, but at even slower rates than for wealth, so that even now there are differences in educational attainment between the descendants of the 1780-1809 generation.

The specific measure we use here is the relative rates of university attendance of those with rich and poor rare surnames. To this end we have constructed a database of all those who graduated from a number of English Universities 1800-2011: currently the database has data from Cambridge 1800-2014, Oxford 1800-86, and 2011-14, University of London 1837-1926, 2010-14, Durham 1920-2014, Sheffield 2011-14, Southampton, 2007.

The measure we use is the *relative representation* of each surname group at university, where the relative representation is the share of a surname at the university relative to the population share of that surname. Relative representation will be 1 for a surname that is distributed as is the general population in terms of

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<sup>28</sup> We have records of individuals currently attending universities who will graduate 2011-2014.

educational status.

Table 4.9 shows the relative representation of the high and low average wealth rare surnames, based on the wealth at death of those born 1780-1809 who died 1858 and later. In 1800-1829 the high wealth surnames show up at 77 times their share in the population among graduates of Oxford and Cambridge, and there were no graduates with surnames from the poor birth cohort.

The relative representation is estimated after 1837 using the birth and death registers, which allow us to calculate for each name the number of 20 year olds in each decade.<sup>29</sup>

The table shows that the rich group is steadily converging in relative representation towards 1. However, the rate of convergence is again slow. Looking at students graduating university in 2010-11, or currently attending university in 2011 (and so graduating 2011-2014), the rare surnames of those born 1780-1809 who were identified as wealthy are still 7 times more frequent relative to the stock of 20 year olds with that name than are common indigenous English names such as *Brown(e)* or *Clark(e)*. For the high wealth group of surnames, the relative representation at the elite universities of Oxford and Cambridge echoes that for all universities in the sample shown in table 4.9.

What does the pattern in decline of relative representation shown in table 10 imply about the b for education?

Based on the numbers of graduates with common surnames such as *Brown* relative to the estimated numbers of 20 year old *Browns*, graduates at Oxford or Cambridge represent an elite of about 0.7% of the indigenous population in England now, but only 0.3% in the 1870s. But earlier very few women attended university, so effectively Oxbridge was taking 0.6% of each cohort in the 1870s. Thus Oxbridge has represented a fairly similar elite 1800-2014.

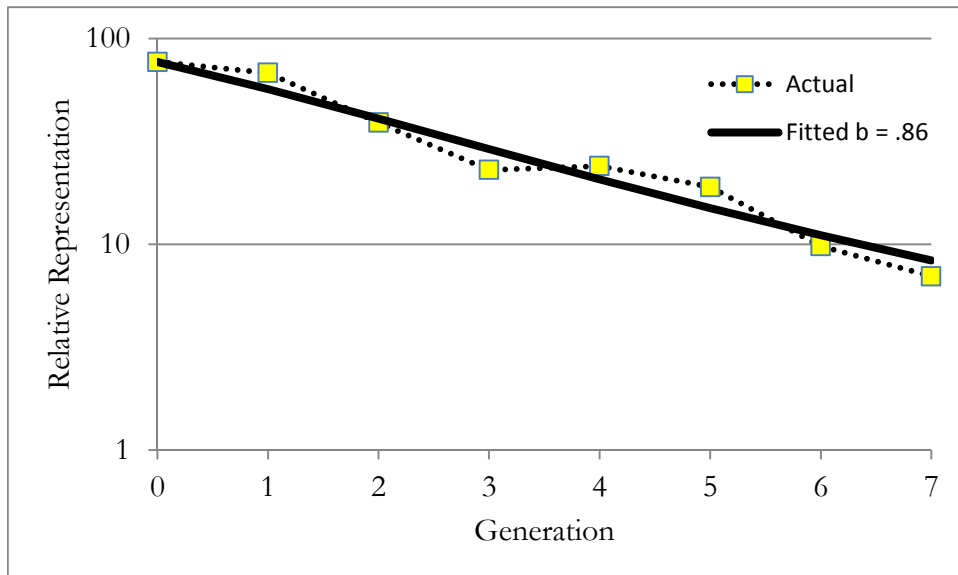
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<sup>29</sup> For the years 1800-1865 there have to be varying degrees of approximation to this stock of 20 year olds.

**Table 4.9: Representation by Birth Cohorts at Universities, 1800-2011**

Generation	Period	Sample Size	Relative Representation, High Status	Relative Representation, Low Status
0	1800-29	10,138	77	0
1	1830-59	14,178	68	0.5
2	1860-89	21,312	39	0
3	1890-1919	13,615	23	0.7
4	1920-49	39,044	24	0.8
5	1950-79	90,193	19	0.9
6	1980-2009	178,833	9.8	0.9
7	2010-14	85,739	7.0	2.3

**Figure 4.7: Relative Representation at Oxbridge, 1800-2014**



If we assume a normal distribution of status, and that all those of high status had the same variance as the general population, then we can estimate what the  $b$  for educational status was 1800-2014 (see the mathematical appendix). Since the high status surnames had a relative representation of 77 among the top 0.7% of the educational hierarchy in 1800-29, this fixes what the mean status of those names had to be, relative to the social mean. For each possible  $b$  their relative representation would decline generation by generation in a predictable manner. Figure 4.7 shows the actual pattern, as well as the single  $b$  that best fits the data.<sup>30</sup> That is  $b = 0.86$ . Notice also that there is no strong sign that educational mobility has speeded up in the last few generations.<sup>31</sup>

Thus despite the many changes in England over these generations, the educational elite of 1800-29 is losing its place only slowly. Yet in this interval the nature of universities, and the way in which they recruited students, changed dramatically.

In the early nineteenth century, when Oxford and Cambridge were the only English universities, they were places largely closed to those outside the established Church of England. Not until 1871 were all religious tests for graduation from Oxford and Cambridge finally removed. As late as 1859 one of the rich group in our sample, Alfred de Rothschild, who was Jewish, had to petition to be excused attendance at Anglican service at Trinity College, Cambridge, which was granted as an especial indulgence.<sup>32</sup>

Before 1902 there was little or no public support for university education. Oxford and Cambridge supplied financial support for some students. But most of their scholarships went to students from elite endowed schools, who had the preparation to excel at the scholarship exams. In 1900-13, for example, nine schools, which had been identified as the elite of English secondary education in the Clarendon report of 1864, and which includes Eton, Harrow and Rugby, supplied 28% of male entrants to Oxford.<sup>33</sup> Further before 1940 entrants to Oxford were

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<sup>30</sup> Judged by minimizing the sum of squared deviations.

<sup>31</sup> Assuming the variance of status among the elite was lower than for the general population would result in a higher estimate of the  $b$  in this case, since then the mean estimated status of the elite would be closer to the social mean in the first generation.

<sup>32</sup> Winstanley, 1940, 83.

<sup>33</sup> Greenstein, 1994, 47.

required to complete a Latin entrance exam, which excluded students from less exclusive educational backgrounds.

Many more university students were provided financial support by local authorities 1920-1939. After World War II, there was a major increase in government financial support for secondary education, and for universities. Also Oxford and Cambridge devised entry procedures which should have reduced the admissions advantage of the tradition endowed feeder schools. This would seemingly imply a great deal more regression to the mean for elite surname frequencies at Oxford and Cambridge in the student generations 1950-79, 1980-2009, and 2010-14. Yet there is no evidence of this in figure 8. The elite we identified through wealth at death, born 1780-1809, has persisted even more tenaciously as an educational elite than as a wealth elite.

The implied rate of mobility is so low that the rich elite names would not, at this rate, have a relative representation at Oxford and Cambridge below 1.1 until after another 20 generations (600 years). If we just focus on the decline of relative representation between 1980-2009 and 2010-14, however, the estimated  $b$  would be 0.83, but this for a generation gap of only 17 years. Projecting that to the regular 30 year generation gap would imply a  $b$  as low as 0.72 for this current generation. This is still very high, but would ensure convergence in only another 10 generations (300 years).

On the other hand, the low status surnames had fully moved to the average by 2010. But here the absence of evidence as to where exactly this group started in the social hierarchy, make an accurate estimate of their  $b$  impossible.

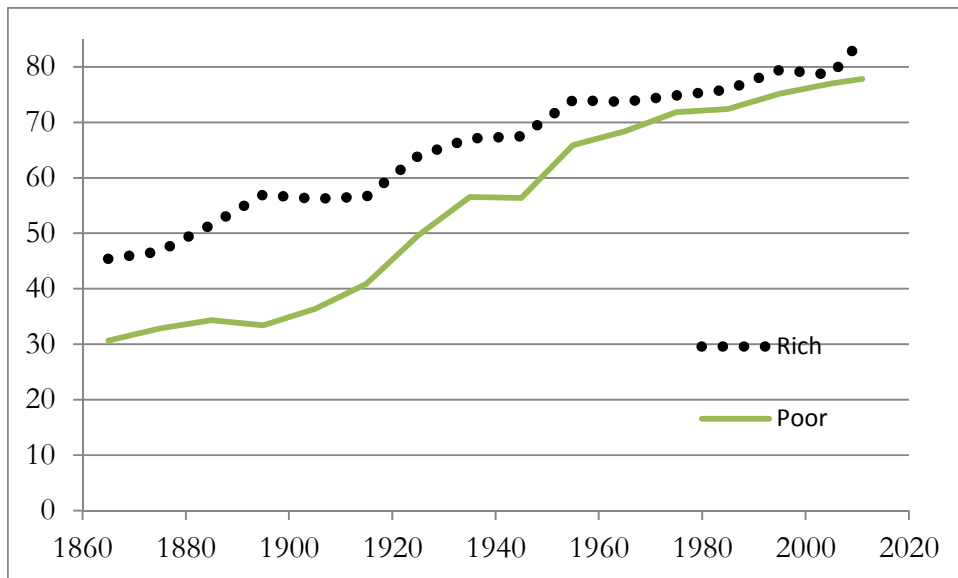
## **Other Status Measures**

Another measure of group status is the shares of these surnames in elite jobs such as doctor, solicitor, or barrister in 2011. Table 4:10 shows these measures for the current stock of doctors, solicitors and barristers, compared to a sample of common surnames such as Smith, Clark, Taylor, and White. Those with the surnames of the formerly rich are 4 times as likely as someone with a common surname to be a doctor or attorney, where the measure is the number of

Table 4:10: Occupational Status, 2011

Surname	Stock 1998	Doctors /1000	Lawyers /1000
		Generations 5-6	Generations 5-6
<b>Common</b>	1,985,332	2.8	2.1
<b>Rich</b>	3,141	10.5	8.6
<b>Poor</b>	10,545	3.2	2.7

Figure 4.8: Average Age at Death, by Decade



Source: England and Wales, Death Register, 1866-2011.

doctors/attorneys with a surname relative to the stock of people in the England and Wales in 1998 with that surname. There has not yet been complete regression to the mean for generations 5 and 6 by birth cohorts from the original high status generations of 1780-1809. This is consistent with the university attendance results, though the overrepresentation in these professions is less than we would expect from the overrepresentation of these surname groups of the same birth generation in universities.

But for the poor there is sign of complete regression to the mean within these generations. Our poor surname sample is actually moderately overrepresented compared to common surnames among doctors, and attorneys. This probably reflects not a greater speed of upward mobility, but rather the fact that the rich surname group started off much further from the social mean than the poor surname group.

Another indicator of status is average age at death. Life expectancy in England, as in other societies, 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.<sup>34</sup>

Figure 4.8 shows the average age of death of the rich and poor surnames (measured from the death cohorts of 1858-1887), by decade from 1866 to 2011. 1866 was when the death register in England and Wales began recording age at death. In 1858-1887 average age of death by surname group differs dramatically: 47.8 for the rich, 32.6 for the poor. As figure 9 shows these average ages at death converged steadily over time. For the fifth generation, deaths 1990-2011 the average age of death of the rich surname group was 79.3, compared to 76.1 for the poor surname group, a difference of 3.2 years. Again the poor surname group had converged on the average age at death, as represented by the *Brown* surname, by this generation. But the rich surname group was dying at above average age.

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 greater

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<sup>34</sup> Office of National Statistics, "Variations persist in life expectancy by social class", <http://www.statistics.gov.uk/pdfdir/le1007.pdf>.

fertility by the poor which exposed more of the poor population in the early years to high child mortality risks.

Since the age at death difference between rich and poor surnames was 4.7 years for generation 3, and 3.2 years for generation 4, we can calculate an analogous 'b' for this difference by generation of 0.68 for the last generation. This is again high, and implies that complete convergence in age at death will take several more generations.

A final measure we have of differences in status, is location. From the 2002 electoral register we were able to obtain the addresses of registered voters with rich and poor surnames. We calculated from ---- the average value of houses by the first 3 characters of the British postal codes (such as G72) in 2010. Names identified as wealthy among deaths 1858-1887 lived in postal code districts with an average house value of £308,000, while those identified as poor lived in districts with an average house value of £225,000.

## Conclusions

What the rare surname datasets imply for modern England is somewhat paradoxical. On the one hand the Beckerian vision of ultimate regression to the social mean seems to apply to England all the way from 1800 to 2011. The rich and the poor of the early nineteenth century have seen their descendants regress towards the mean, though they are not at the mean yet for the descendants of the rich. There were, and are, no permanent upper classes and under classes, but instead long run equality. The Herrnstein and Murray dystopia of perfectly persistent upper and lower classes did not hold in the past, and shows no sign of arising in the present.<sup>35</sup>

On the other hand, the estimated persistence of wealth is much higher than would be expected from modern two-generation studies. The true  $b$  for wealth in England in these years averages 0.72-0.75, compared to an average of about 0.5 suggested by other studies. Because the amount of variance in wealth in future generations explained by inheritance is  $b^2$ , difference in terms of the importance of inheritance in explaining outcomes is much greater than might appear. A  $b$  of 0.5

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<sup>35</sup> Herrnstein and Murray, 1996.

implies inheritance explain 25% of wealth variation, but a  $b$  of 0.75 means it explains 56% percent of wealth variance, more than twice as much.

In education again we see universal regression to the mean. But the persistence parameter here for the initial elite is 0.86, implying 74% of educational status is derived from inheritance of characteristics from parents. The persistence of the wealthy born 1780-1809 as an educational elite is indeed much greater than their persistence in terms of wealth. These  $b$  estimates are again much greater than is conventionally estimated. We may not be in the Herrstein and Murray dystopia, but we are very close to it.

A further surprise is that the rate of regression to the mean for both wealth and educational status seems to have changed little over time, even though between 1800 and 2011 there have been enormous institutional changes in England. Wealth and income was lightly taxed, or not taxed at all, for most of the nineteenth century, but heavily taxed for much of the late twentieth century. The elite universities, Oxford and Cambridge, were exclusive clubs with strong ties to particular schools in the nineteenth century. By the 1940s they began a process of opening up admissions to students from a wider variety of educational backgrounds. And state financial support for students from poorer backgrounds became very considerable.

The modest effects of major institutional changes on social mobility implies that the important determination of persistence is transmission within families – either through genes or family environments. Indeed there almost seems to be a *social physics* here within families which controls the rate of regression to the mean, and makes it largely immutable from many outside institutional changes.

## Chapter 5: Games with Names

The study of mobility through surnames depends on the idea that the vast majority of names are inherited through simple rules that are invariant to social status. Societies, however, vary in their legal and social rules on naming. England is completely *laissez-faire*. Under English law anyone can assume any name at any time, as long as there is no attempt to deceive. Parents can give their children whatever surname they wish, and adults can change surname. Nor is it required that anyone use the formal legal procedure for surname changes, the Deed Poll.<sup>36</sup>

Other societies have more rigid naming rules. Thus in Sweden the 1901 Names Adoption Act required each family to have an unchanging surname. It was adopted in part because of complaints that people were assuming the surnames of the Swedish aristocratic families, and prevented anyone from assuming such names. Only in 1982 did it become possible for people to change their inherited surname. But the 1982 law established restrictive criteria for registering a new surname. People are not allowed to change their surname to one held by existing families. Thus while new names are now arising frequently in Sweden, the old name stock is only transmitted across generations by genetic inheritance or adoption.

Economists would predict that since names are arbitrary markers, as meaningful ultimately as credit card numbers, then if there are distinctions in status between names people would switch to those of higher status. If this switching was done by everyone with a lower status surname, then regression to the mean measured by surnames will overestimate true social mobility. If the switching was instead selectively done by those of lower status who had achieved higher status, then social mobility measured by surnames would be lower than true social mobility.

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<sup>36</sup> From **1914 to 1952**, all deed polls enrolled in the Supreme Court had to be advertised in the [London Gazette](#), and these records give an idea of who was changing surnames. Thus, “Notice IS hereby given that by a Deed Poll dated the 22nd day of March 1960 and duly enrolled in the Supreme Court of Judicature on the 28th day of March 1960, I, GEOFFREY COX, of 17 Malvern Road, Primrose Hill, Huddersfield, in the county of York. Electrician., a citizen of the United Kingdom and Colonies by birth, renounced and abandoned the surname of Cock.— (Dated the 28th day of March 1960).” *London Gazette*, 8<sup>th</sup> April, 1960, p. 2598.



We see above that in England, despite the evidence of the upward mobility of groups such as the artisan surnames, some names have retained a surprising residuum of status, even 950 years after their creation. Thus if we take the class of surnames that traces from Norman and Breton landholders in the Domesday Book of 1086 - names such as *D'Arcey*, *De Courcey*, *de Vere*, *Montgomery*, *Sackville*, *Villiers* - these are still have higher than average status now in 2011. Their holders are found among doctors, solicitors, barristers and university students at a 60% greater rate than for the most common surnames. Is this sign of the incredibly persistence of privilege over a millennium?

Here I show that this is not the case. The actual descendants of the Normans likely have average status now. But a select group of high status people have been changing their names from the mundane *Smith*, *Taylor*, and *Green* of their undistinguished ancestors to surnames with more social caché. Among these chosen surnames are many of Norman origin.

In popular culture throughout the Anglo-Saxon world, some surnames are perceived to be of higher status. The surnames, for example, of those associated with the early medieval elite, still had and have a certain social resonance, often because they are French sounding: *D'Arcy*, *Darcey*, *D'Oyley*, *Beaumont*, *Montgomery*, *Montague*, *Mandeville*, *Turberville*, *De Courcey*, *Baskerville*, *Berkeley*, *St Claire*. Thus English authors seeking to identify characters as high or low status appeal to such status differences in surnames. Jane Austen signals the status of her eligible bachelor in *Pride and Prejudice* partly by naming him Mr Darcy. In Thomas Hardy's *Tess of the D'Urbervilles* the poor *Durbeyfield* family discovers they are allegedly descendants of an extinct elite Norman family the *D'Urbervilles*.

Hyphenated surnames, *Brown-Smith*, also have a suggestion of the upper classes, even when the constituent names are common. In addition minor changes in spelling can lend luster to a name – *Smyth* as opposed to *Smith*, *Whyte* as opposed to *White*, *Browne* as opposed to *Brown*. Adding an “St” to the beginning of a name, can transform the common *John* into the elite *St John*.

When these various naming signals are combined we get names that reek of the upper classes. Consider, for example, this list of English barristers in 2011:

Franklin St Clair Melville Evans  
Durand David Grenville Malet  
Michael John Davy Vere-Hodge  
Michael David Melville-Shreeve  
Matthew Sean de la Hay Browne Brotherton  
Jeremy Gaywood Grout-Smith  
Alexandra Marika Niki Smith-Hughes  
Mungo William Wenban-Smith  
Alexander George Lavander Hill-Smith.

These are not people you expect to meet at your local chip shop.

Below I show two things. The first is that our intuition about the social status of surnames is generally correct. Surnames that strike people as being higher status generally are so. The second, however, is that this is not because of the long persistence of any ruling class, such as the Norman elite. Instead it stems from a small upper class echelon of the English, less than 2%, selectively changing their surnames towards higher status forms. Those of the social elite have employed that liberty.

To demonstrate that surname changing is the cause of some common surnames now having higher status first consider table 5.1. It shows some measures of status for a common or garden surname like *Smith*. First is the numbers of these surnames on the General Medical Councils list of licensed medical practitioners in 2011 per 1000 people with such surnames in 2002. Next are similar measures for solicitors and barristers. Finally there is the number of students at Oxford and Cambridge with these surnames per 1,000 such surnames born by the general population. Per 1,000 Smiths in England and Wales there are now 2.1 doctors with this name, 1.8 solicitors and barristers, and 0.49 Oxbridge students. Note also that between the 1881 census and 2002 the numbers of *Smiths* in England and Wales increased by 81 percent.

In the same table are shown the corresponding ratios for some well know Norman surnames – *De Vere*, *Sinclair/St Clair*, *Villiers*, *Melville*, *Montgomery*, *D’Arcy*, *Somerville*, *Grenville*, and *de Courcy*. These names show up among doctors, legal professionals and Oxbridge students at 3-4 times the rate of the Smiths, relative to their share of the general population. Note however, another oddity of these names.

**Table 5.1: The Status of Norman Surnames, 2011**

<b>Surname</b>	<b>Count 2002</b>	<b>2002 relative to 1881</b>	<b>Doctors  Rate/1000</b>	<b>Solicitors Barristers Rate/1000</b>	<b>Oxbridge  Rate/1000</b>	<b>All</b>
Smith	669,187	1.8	2.4	1.8	0.5	4.7
De Vere	384	5.8	8.4	2.8	5.6	16.8
Sinclair/St Clair	17,728	4.4	7.6	3.5	0.8	11.9
Villiers	1,354	3.7	11.9	2.4	0.8	15.1
Melville	3,380	3.5	10.2	5.4	0.3	15.9
Montgomery	7,551	3.4	8.4	3.8	0.9	14.5
D’Arcy	4,175	3.4	8.0	2.3	1.3	11.6
Somerville	3,829	3.4	10.7	2.0	0.6	13.2
Grenville	287	2.8	11.2	7.5	3.8	22.5
De Courcey	467	2.8	13.8	4.6	0.0	18.4
All Norman	251,010	2.0	5.1	2.9	0.7	8.8
Norman high recruitment	– 63,437	3.2	8.5	3.8	1.0	13.2

Note: The surname count reported here for 2002 includes people who died 1998-2002. The true stock of these names in 2002 is thus estimated to be 0.93 times the numbers reported here.

This is that they have all grown substantially in frequency since 1881 in the general population. At an extreme there are now 5.8 times as many *De Veres* as in 1881. Since this represents an elite group the nature of demography since 1881 would predict that their share of the population would decline, because of the lower fertility of the upper classes after 1900. Thus we would expect that there should be less than 81% more of these surnames now than in 1881.

The explanation for the surprising retention of status by these names over 950 years is thus likely not the class bound nature of English society. It is instead that a substantial fraction of the modern bearers of these names will either have no genetic connection with the original Norman conquerors, or the surname has been selectively preserved through other than the male line of descent, by those of higher social status and aspiration. Many modern Normans are fake Normans, and the higher their position in the social ladder, the more likely are they to have come by the name by other than descent through the male line. Such surnames clearly are markers of status.

Table 5.1 shows that Norman names which have increased in frequency by 125% or more since 1881 show up at nearly three times the rate of *Smiths* among the elite groups here, while the average Norman name only has twice the frequency. Norman origin names outside this fast growing group are also more prevalent among elites, by about 50 percent, but the evidence is that these will include some upper class adopters of the surname as well when such names have elements that strike people as more elite.

Other evidence that name changing by the elite is responsible for some common names retaining higher status comes when we look at hyphenated surnames and spelling variants of common surnames. Table 5.2 shows the share of “mundane” names such as Smith and Taylor, in their simple non-hyphenated versions, without spelling variants, among the elite, and the rise in frequency of those names in the last 120 years. They all grow in frequency at about the same rate, and they have similar average status (though curiously Smith seems the lowest status). Table 5.3 shows exactly the same data for hyphenated versions of the names – *Wrett-Smith* and the like. These hyphenated variants constituted only about an additional 2 percent of such names in 2002. But they are of a radically different status. Roughly 4 times as many of these names are in the social elite. And indeed they are of higher status even than the fast growing Norman surnames.

**Table 5.2: Common Surnames – standard spelling, no hyphenation**

Surname	Count 2002	2002 relative to 1881	Doctors Rate/1000	Solicitors Barristers Rate/1000	Oxbridge Rate/1000	All
Smith(e)	652,218	1.8	1.9	1.68	0.39	4.0
Taylor	309,680	1.8	2.9	2.33	0.41	5.6
Brown(e)	291,872	1.8	3.2	2.08	0.50	5.8
Clark(e)	255,552	1.9	2.9	2.25	0.46	5.6
White	155,931	1.8	2.6	1.80	0.55	4.9
Green	145,856	1.8	2.5	2.15	0.42	5.0
Hall	145,231	1.7	2.8	2.33	0.43	5.5
John	20,214	1.8	2.9	3.19	0.27	6.3
Clair(e)/Clare	8,778	1.9	2.3	3.06	0.73	6.1
All	1,985,332	1.8	2.5	2.03	0.44	5.0

But as can be seen the vast majority of these variants of surnames, 97 percent, came into existence since 1881. Those creating new names are much more from the social elite, and this shows in the status of such new surnames.

Another way to lend distinction to a mundane surname, however, is simply to spell it slightly differently. In the late sixteenth century, for example, the name *Smith* was spelt in a variety of ways: *Smith*, *Smyth*, *Smithe*, *Smythe*. In sixteenth century records of marriages, *Smith* is spelt with a “y” nearly 10 percent of the time. By 1881 “y” spellings had declined to less than 1% of *Smiths* recorded in the census. Yet by 2002 “y” spellings had increased to 2 percent of all *Smiths*. This spelling is likely a modern affection for most *Smyths*. Another earlier variant that increased

**Table 5.3: Common Surnames – Standard Spelling, Hyphenated**

Surname	Count 2002	2002 relative to 1881	Doctors Rate/1000	Solicitors Barristers Rate/1000	Oxbridge Rate/1000	All
Smith(e)	16,969	66.3	16.9	4.31	3.80	25.0
Taylor	4,336	105.8	9.7	4.22	3.97	17.9
Brown	6,199	88.6	12.3	3.12	1.39	16.8
Clark(e)	2,567	122.2	8.8	4.19	3.77	16.8
White	1,802	53.0	14.9	1.19	3.58	19.7
Green	1,290	49.6	7.5	4.17	4.17	15.8
Hall	1,539	20.8	8.4	3.49	2.79	14.7
John	1,047	209.4	6.2	4.11	3.08	13.4
Clair(e)/Clare	56	28.0	0.0	38.40	0.00	38.4
All	35,805	67.7	13.5	3.93	3.33	20.8

substantially in some names since 1881 is the silent “e” at the end of a name. Table 4 also shows the results for variants of the mundane names in table 2: *Smyth(e)*, *Whyte*, *Browne*, *Greene*, and *Halle*. All these names have grown significantly faster in numbers than general names 1881-2002. Table 4 also shows the same profiles for two names with the suffix Saint, *St John* and *St Claire*. The majority of these names again seem to be modern creations, since there are nearly 5 times as many bearers as in 1881.

All these spelling variants, as well as the names with the added suffixes, show considerable higher social status than their more common alternatives. Interestingly in the case of my own name *Clark*, the spelling variant *Clarke* shows no higher social status. But while *Greene* is much rarer than *Green*, and *Browne* much rarer than *Brown*,

**Table 5.4: Common Surnames – Unusual Spelling**

Surname	Count 2002	2002 relative to 1881	Doctors Rate/1000	Solicitors Barristers Rate/1000	Oxbridge Rate/1000	All
Smyth(e)	13,468	4.56	7.4	4.2	0.48	12.1
Browne	17,626	3.30	5.9	3.9	1.04	10.9
Whyte	6,982	10.96	6.3	2.3	1.23	9.9
Greene	5,711	7.16	6.0	4.0	0.75	10.7
Halle	230	3.48	14.0	4.7	0.00	18.7
St John	1,601	4.37	9.4	2.7	2.01	14.1
St Clair(e)/St Clare	1,010	5.23	7.5	2.1	2.13	11.7
All	46,628	4.50	6.6	3.7	0.92	11.2

*Clarke* is actually commoner than *Clark*. So for a spelling variant to denote higher status one condition seems to be that it remain rare relative to the common spelling.

As well as high status names are there currently low status names in England? We can certainly find a class of names with seemingly unfortunate connotations that people have been abandoning over the last 120 years. The mundane names increased in frequency by about 80 percent over these years. Any name with substantial numbers in 1881 that increases by much less than 80 percent between then and 2002 will be one that people have been actively changing away from. The likelihood is that those of higher social status have been the most active in this process, so that names with bad connotations will also be of lower general social status.

Surnames that were, or came to be regarded as, comical or unfortunate include *Balls, Bastard, Bottom, Bumble, Cheater, Cock, Cockshot, Cockhead, Conman, Goat, Hardon, Killer, Lover, Manlove, Nutter, Pigg, Pratt, Prick, Prigg, Ride, Slow, Sly, Slugg, Smellie, and Trash*. Presumably some of these words changed meaning over time, others were conferred on unwilling recipients as nicknames in the rough and tumble world of the medieval village, and some such as *Smellie* were foreign imports (from Scotland).

In 2002 there were no *Pricks* in England and Wales. Yet based on the relative frequency of the name in records of the period 1538-1599 there should now be 8,343. Similarly though there are only 73 *Bastards* now, there should be 2,230. We are also missing about 50,000 *Cocks*, 8,000 *Balls*, and 3,000 *Piggs*, among others. Are the surviving bearers of these disfavored surnames of lower than average social status. Table 4.5 shows the same data as before for the growth of these surnames since 1881, and their social distribution. The names reported here are those with unfortunate connotations, which declined in absolute numbers between 1881 and 2002.

Table 4.5 also shows the average status of the common surnames reported in Table 4.2 in all their forms. These disfavored names show as having slightly lower status, but the difference is modest. Even if we take those names that are now just half as frequent as in 1881, those such as *Cock(e)* and *Balls*, the average presence in the elite per 1,000 people in the population holding the name is 4.2, not much less than the common average of 5.4 reported here. Thus while there is some evidence that elite inheritors of these names are abandoning them more quickly, the relative rate of decline among the elite cannot be too much higher.

Note also in table 4.5 that the numbers of such disfavored names is very small. They now constitute only .05% of the surname stock. Even if we added those names that have similarly bad connotations, but have decline more modestly, these names are less than 0.2% of all names.

**Table 5.5: The Status of “Bad” Surnames**

<b>Surname</b>	<b>Count 2002</b>	<b>2002 relative to 1881</b>	<b>Doctors  Rate/1000</b>	<b>Solicitors Barristers Rate/1000</b>	<b>Oxbridge Rate/1000</b>	<b>All</b>
Cock(e)	956	0.3	2.2	1.1	0.00	3.4
Balls	1,400	0.4	1.5	1.5	0.00	3.1
Pigg(e)	553	0.6	0.0	1.9	0.00	1.9
Longbottom	1,907	0.7	3.4	1.7	0.00	5.1
Nutter	1,809	0.8	0.6	2.4	0.59	3.6
Bottom(s)	1,046	0.8	1.0	1.0	0.00	2.1
Badcock	1,411	0.8	3.0	2.3	0.76	6.1
Rider	2,716	0.9	3.2	2.0	0.40	5.5
Laycock	4,073	1.0	3.2	2.1	0.00	5.3
All	22,952	0.7	2.4	2.2	0.28	4.9
Common Names	1,985,332	1.8	2.8	2.1	0.50	5.4

The general rule again is that even in recent years the bulk of English people stay with the names they inherit, and the vast majority of children inherit their name from one of their parents. However now the path of inheritance is much more likely to be through the mother than in earlier England. From 1920 to 1960 only 3-5% of children in England derived their surname from their mother. By 2001-5 that proportion rose to around 29% for births in England and Wales. But surnames are seemingly still a good guide to the genetic links between generations, though such links are weakened by adoption and by father’s both intentionally and unintentionally conferring their surnames on children who are not their biological offspring.

## Chapter 6 Sweden, 1600-2011: Surprising Rigidities

Modern Sweden is known to be a place of high degrees of intergenerational income mobility. Thus Black and Devereux (2010) report in their survey of mobility across countries that the  $b$  for income in Sweden for men of 0.26, and for women of 0.19. This would imply that after two generations someone whose income was double the average would have grandchildren who had incomes only 1-2% above the average. Suppose these estimates are indicative of general social mobility in Sweden over the last three generations in which the social democrats were important actors in the political system, 1917-2011. Then there should be little connection between the social status of the current generation, and the status of Swedes before 1914.

Such enhanced mobility in a country like Sweden would also suggest that institutional arrangements – the support for public education, for example, or the progressive taxation of wealth - play a vital role in determining rates of social mobility. The implication is that the lower rates of social mobility observed in countries such as England or the USA represent a social failure. The life chances of the descendants of high and low status ancestors can be equalized at low social cost. Sweden is, after all, one of the richest economies in the world.

Here I show, however, that at least in the case of Sweden the true intergenerational mobility of status was likely no greater than that of England over the past 200 years. Whatever the short run mobility of income, there is considerable persistence of status – measured through wealth, education and occupation - over many generations in Sweden.

To look at long run mobility in Sweden I employ two types of surnames: surnames of nobles, and Latinized surnames. In the sixteenth to eighteenth century, when most Swedes did not have inherited surnames, the educated class – clerics, academics, and some merchants - adopted such Latinized surnames (typically ending “ius” or “aeus”), which became characteristic of them as a class.

## Noble Surnames

Sweden has a formal guild of noble families, the *Riddarhuset* (House of Nobility). Though noble families existed since medieval times, the modern *Riddarhuset* was created in 1626. During the Diet of the Four Estates, 1668-1865, the *Riddarhuset* functioned as one of the four governing estates of the kingdom (analogous to the House of Lords in England).<sup>38</sup> Since 2003 the *Riddarhuset* has been a purely private institution, which maintains the records of the Swedish noble families, and lobbies on their behalf.

The families enrolled in the *Riddarhuset* come in three ranks: counts, barons, and “untitled” nobility. Each family has a number corresponding to their order of enrollment. In total 2,330 families have been enrolled, though only about 700 have living representatives. Though the Swedish King could create nobles up until 1975, these ennobled had to independently seek enrollment in the *Riddarhuset*. The last person ennobled by the King was in 1902.

The great period of expansion of the Swedish mobility was in 1626-1658, when Sweden enjoyed a period of conquest that brought its territories to their maximum extent of 1658-1721. At this point Sweden had possession also of Finland, Estonia, and some north German states. In this period the crown rewarded many military commanders with ennoblement. This is reflected in the foreign (particularly German) names of many of the nobility, who served the crown as military commanders.

From 1680 the nobility gradually lost its privileges, starting with the reclamation by the crown in 1680 of much of the land granted to nobles in previous years. By 1866 the nobles had no privileges on any economic significance.

When families were enrolled in the *Riddarhuset* they typically adopted a new surname if they were Swedish, embodying status elements such as “Gyllen” (gold), “Silfver” (silver), “Adler” (eagle), “Leijon” (lion). Many of the noble surnames in Sweden, however, are German in origin, reflecting the importance of German military commanders in the service of the Swedish crown in the seventeenth century.

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<sup>38</sup> The organization has an elaborate building in Stockholm, also called the *Riddarhuset*, erected in the seventeenth century, which functioned 1688-1865 as one of the houses of the Parliament.

One important privilege that the nobility obtained in the Names Adoption Act of 1901 was a ban on anyone else adopting their surnames.<sup>39</sup> Thus apart from foreign imports, and name changing before 1901, the surnames of the enrolled nobles in the *Ridderbuset* identify uniquely the lineage of these noble families. The modern generation with these surnames are all descended from a privileged class dating typically from 1721 and before.

### **Latinized Surnames**

A second category of surnames in Sweden which reveals that the holder had ancestors of higher social status are those that have been Latinized. Such names would have been typically adopted as family surnames before 1800 by educated people. This is reflected in the names of a number of famous Swedish scientists of the seventeenth and eighteenth centuries: Carolus Linnaeus (1707-78), Anders Celsius (1701-44), Jöns Jakob Berzelius (1779-1848), Olaus Rudbeckius (1630-1702), Olaus Rudbeckius (Junior) (1660-1740).

Indeed, taking a sample of such surnames held now by 200 people or more – Afzelius, Ahlenius, Alenius, Arrhenius, Axtelius, Bergius, Bruzelius, Forselius, Helenius, Landelius, Montelius, Sandelius, Stenius – the date when the name first appears in just a sample of Swedish parish records of baptisms, burials and marriages was: 1669, 1745, 1646, 1630, 1749, 1591, 1747, 1626, 1666, 1743, 1668, 1682, 1724.<sup>40</sup>

### **Surname Changing**

Are modern Swedes with Latinized surnames mostly the descendants of the clerical and professional classes of 1550-1800? A potential problem here is that for many Swedes before the 1860s a system of patronyms, such as Andersson, changing by generation with the first name of the father, served as surnames. In the late nineteenth century these transient patronyms were translated into fixed surnames. In this process did many people adopt Latinized surnames, as opposed to ossifying their

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<sup>39</sup> There had been concern that disreputable people had been adopting noble surnames.

<sup>40</sup> The sample names were checked against the International Genealogical Index of the Church of Jesus Christ of Latter-Day Saints, searching under the first names Johan, Anders, Karl, Erik and Nils ([http://www.familysearch.org/eng/search/frameset\\_search.asp](http://www.familysearch.org/eng/search/frameset_search.asp)). These records give only a limited sample of parish records in Sweden before 1800.

current transient patronym?

We can examine this question by looking at frequency changes for names between the censuses of 1880 and 1900. Between these two dates the numbers of Anderssons reported in the census rose by 23%. Over the same interval the numbers of those with the above reported 13 Latinized surnames rose modestly more, by 27%. This could easily be just differences in birth rates between these groups, or differences in emigration rates. So there is no sign in the late nineteenth century of any large scale switch to Latinized surnames.

After 1901 surnames in Sweden became much more rigidly attached to people with the arrival of the formal system of surname registration in the 1901 Names Adoption Act. This abolished the system of generation specific patronyms, and required each family to have an unchanging surname. Only in 1982 did it become possible for people to change their surname. But the 1982 law that permits this establishes restrictive criteria for registering a new surname. People are not allowed to change their surname to one held by existing families, with two exceptions. They are allowed to reclaim surnames that have been used by their ancestors for at least two generations within the last 100 years. And they are allowed to produce spelling variants of their surname (“Andersson” can be changed to “Anderson” for example).<sup>41</sup>

However, among the new surnames the current law allows people to adopt are those with the Latinized ending “ius”. Thus some of the “ius” ending names have potentially been created since 1982. But since the law also demands uniqueness in the formation of new surnames, the numbers of people holding each such neologistic surnames will be less than 10 in almost all cases. I can thus control for the effect of such recent creations by also confining the Latinized surnames to those held by 10 or more people in 2010.

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<sup>41</sup> New surnames also have to be unique. Surnames also cannot end in “son.”

## **Current Status by Surname**

I have a number of measures of the current social status of Swedes by surname. These are

1. Earned income as reported for individuals by the Swedish Tax Agency, 2008. Earned income includes wages and salaries, as well as business income.
2. Capital income as reported by the Swedish Tax Agency, 2008.
3. Assessments for the net wealth tax, Swedish Tax Agency, 2008 (the last year this tax was collected).
4. Frequency of surnames among attorneys as compared to the general population, 2011, as witnessed by membership of the Swedish Bar Association.
5. Frequency of these surnames among registered physicians. The advantage of this source is that since it gives the date of licensing, it is possible to look at mobility also in the last few decades, through the rate of decline in the elite of formally privileged names.
6. Frequency of surnames among university student theses as compared to the general population, 2011. This uses lists of theses from Goteberg, Lund, Malmo, Uppsala, and Stockholm Universities.

## **Labor and Capital Income by Surname Category**

Table 6.1 shows the average earned and capital incomes of people in Stockholm and 5 adjacent towns with varying levels of prosperity of a common indigenous name, *Andersson*, the second most common surname in Sweden, where the towns are ranked by the average total incomes of the Anderssons. Also shown are the corresponding incomes of people with surnames from a sample of “noble” Swedish names. This sample includes all those with the rank of “count” (146 families initially), as well as the first 203 baronial families. Some noble surnames such as

**Table 6.1: Income by Surname Type, 2008**

<b>Surname</b>	<b>Kommun</b>	<b>Number</b>	<b>Earned Income (1000 SEK)</b>	<b>Capital Income (1000 SEK)</b>	<b>Total Income (1000 SEK)</b>
Andersson	Stockholm	3,844	435	90.1	525
Andersson	Täby	412	412	70.6	483
Andersson	Nacka	581	405	66.8	471
Andersson	Haninge	683	343	47.1	390
Andersson	Huddinge	645	355	30.4	385
Andersson	Botkyrka	502	326	17.1	344
<b>Andersson</b>	<b>ALL</b>	<b>6,667</b>	<b>406</b>	<b>71.2</b>	<b>477</b>
<i>Noble</i>	Stockholm	1,076	513	216.2	729
<i>Noble</i>	Täby	128	443	98.0	541
<i>Noble</i>	Haninge	143	424	108.6	532
<i>Noble</i>	Huddinge	41	302	30.8	333
<i>Noble</i>	Botkyrka	59	423	11.3	434
<i>Noble</i>	Haninge	33	310	73.3	384
<b><i>Noble</i></b>	<b>ALL</b>	<b>1,480</b>	<b>484</b>	<b>179.1</b>	<b>663</b>

Olsson are shared with many other people. Thus only those names were included in the sample with less than 600 people in 2010 holding the name.<sup>42</sup> This produces 169 *noble* surnames held by living Swedes.

There are clear indicators in the income data that those with the surnames of the

<sup>42</sup> This excluded the names Carlsson (29,973), Dahlberg (9,460), Fahlström (965), Hård (813), Olsson (111,169), Palmqvist (3,457), Roos (5,902), and Torstensson (4,277).

enobled are still distinguished in social status from the common population, though some of these differences are modest. Earned income among the nobles averages 19% higher than that of the Anderssons for these sample towns (and this difference is statistically significant at the 1% level). But the much bigger difference is in income from capital, which is 151% higher for the *nobles* than for *Anderssons*. The total effect on net income is that the *nobles* have average total incomes 39% higher than for the Anderssons.

I have not yet fully analyzed the wealth tax assessments, but there is a substantial difference here also. 30% of the *noble* surnames paid the wealth tax, as opposed to only 13% among the *Anderssons*.

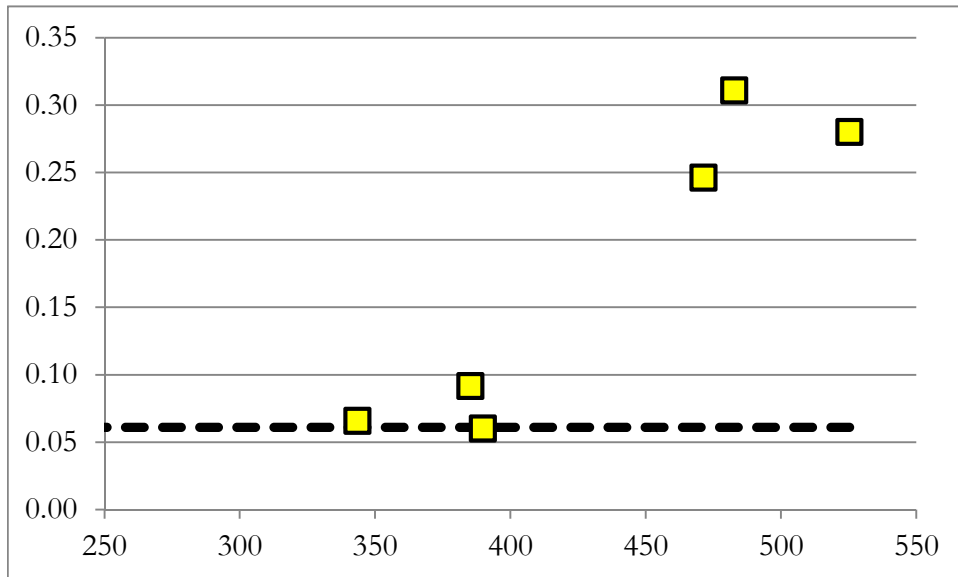
This is not a representative sample of towns. Stockholm, Täby, and Nacka are among the richest Kommuns in Sweden. But the pattern of differences in earnings and property income across these towns between *nobles* and *Anderssons* suggests that at the national level these same patterns would be found. For a substantial contributor to the differences in income comes from the fact that the *nobles* are distributed differently across towns of different average income level than the *Andersons*. Figure 6.1 shows this pattern. The horizontal axis shows the average income per taxpayer of the kommun as estimated from the *Anderssons*. The vertical axis shows the ratio of *Nobles* to *Andersons* by kommun. The dotted line indicates the ratio of *Nobles* to *Andersons* in the general population.<sup>43</sup> There is a strong positive association between the income level of Kommuns and the ratio of *Nobles* to *Andersons*. In the high income kommun there are about 4 times more *Nobles* per *Anderson*.

Further sign of the continuing high status of those with noble lineage comes when we look at their relative representation among university students and attorneys. The share among university students can be judged by the practice of Swedish universities in recent years of making available on the web the theses of undergraduates and masters students. Here I can measure the numbers of theses whose authors are from our *Noble* surname sample, and the numbers from *Anderssons*. Table 2 shows the results. *Noble* surnames are four times more frequent among the authors of student theses (mostly from the years 2000-11) than the common name Anderson, relative to the stock of these names in the population.

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<sup>43</sup> As reported by Statistics Sweden for 2010.

**Figure 6.1: kommun Income and Location of Nobles**



Notes: kommun – Stockholm, Huddinge, Haninge, Nacka, Täby, Botkyrka.

**Table 6.2: Surnames Frequency, Universities and Law (per 1,000 in population)**

Name Type	Lund	Stockholm	Upsalla	All Universities	Swedish Bar
<i>Andersson</i>	3.0	0.8	0.8	4.5	0.3
<i>Noble</i>	10.7	5.8	1.8	18.3	3.2
<i>Noble (&lt;200)</i>	14.0	5.5	2.3	21.8	3.8
<i>Noble (≥200)</i>	7.9	6.1	1.4	15.4	2.8
<i>Latinized</i>	5.6	1.6	2.6	9.8	1.9

Further I can divide the noble names into those with less than 200 holders now, and those with 200 or more holders. The names with the lowest frequency now will be those with the highest chance that a bearer is genetically descended from the original ennobled family of this name. The table shows that these names have an even higher relative representation in universities.

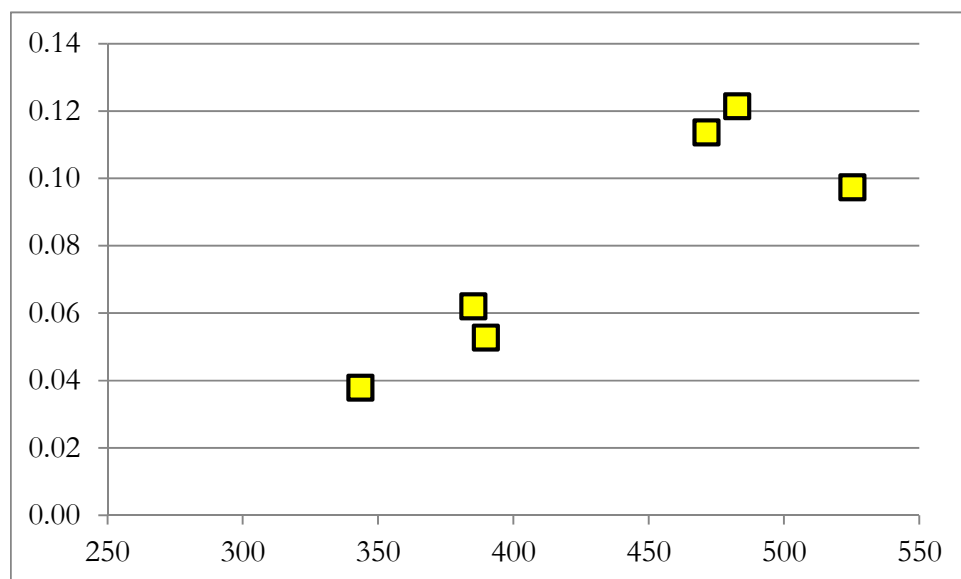
The overrepresentation of the *nobles* among recent university students is echoed in an even more dramatic overrepresentation among members of the Swedish Bar Association. Here the overrepresentation is more than 10 fold, with that of the surnames held by fewer than 200 people being 12 fold.

Thus 400-200 years after their ancestors acquired noble status, the descendants of the nobility in Sweden remain an elite in many ways: in income, wealth, location, education and occupations. The modest extent of their distinction on some of these measures such as income shows that as in England regression to the mean is at work, and will eventually remove all distinction from the bearers of these names. But the fact that these *noble* surname bearers are still distinct 7-13 decades after their ancestors acquired their distinction shows that social mobility must be at much lower rates than measures based on income would suggest for Sweden. Their overrepresentation in universities in 2011, for example, is just as great as that of the English elite analyzed above. Thus educational mobility in Sweden appears to be no greater than that of England.

### **Latinized Names**

A second elite we can follow in Sweden is the educational elite of the seventeenth and eighteenth centuries. Such surnames typically ended in “ius” or “aeus”, and have small numbers of holders now. I have not yet analyzed average income and wealth for this group, but there is clear indication from their residence that it will exceed that of the Anderssons. For, as with the *nobles*, the ratio of the *Latinized* to the Anderssons is strongly correlated with average income by Kommun in the six towns examined, as figure 6.2 shows. The *Latinized* live among the rich in Sweden, though the effect is not as powerful as for the *nobles*. They are found only at double the expected frequency in the highest income locations.

**Figure 6.2: Ratio of Latinized Surnames to *Andersson*, by income of *Andersson***



Notes: kommuns – Stockholm, Huddinge, Haninge, Nacka, Täby, Botkyrka.

In educational attainment again the *Latinized* are still distinct from the *Anderssons*. They show up as authors of student theses at about double the rate of Anderssons relative to their population stock. Once more they seem to lie half way between the Anderssons and the nobles.

Finally in occupations, the *Latinized* appear as members of the Bar Association at 6 times the rate of the *Anderssons*. Again this is about half the excess rate of the *nobles*.

Thus in muted form, modern Sweden has preserved the class distinctions of the seventeenth and eighteenth centuries. The Nobles are at the top, then a middle class of the Latinized, and at the bottom the common man, the Anderssons.

The doubling of the expected representation of the educational elite of the seventeenth and eighteenth centuries among modern university students in Sweden again can be compared to the experience England. The educational elite of 1800-29 is still found there in universities at about 6 times the rate of the general population

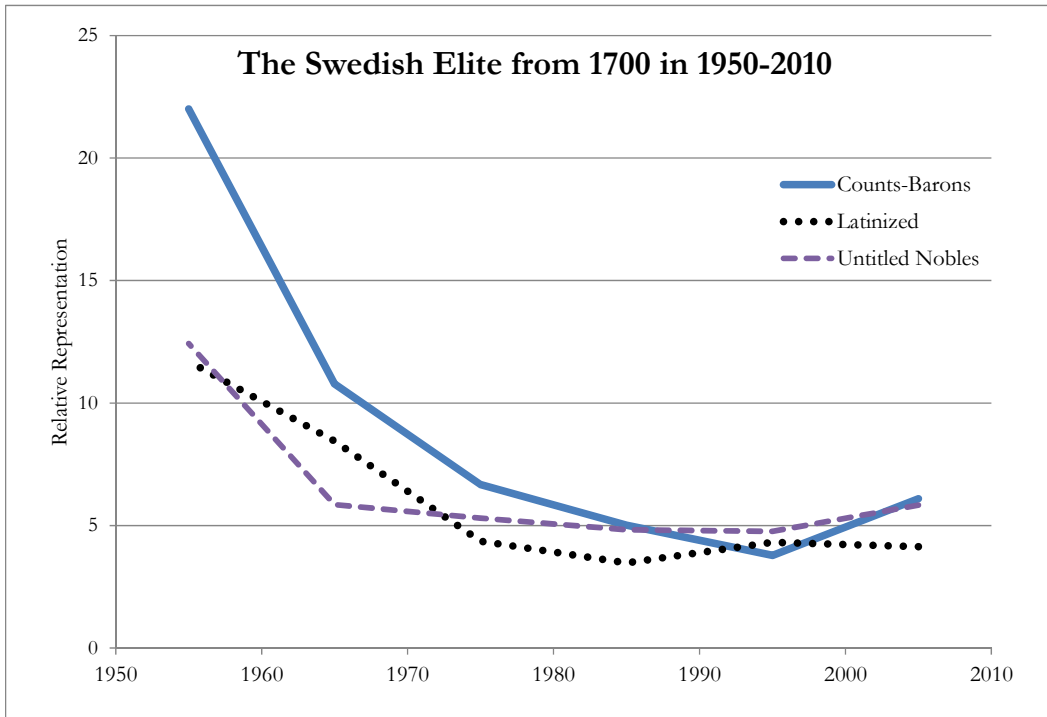
of English descent. But since the Swedish educated elite dates in many cases from 1600 and earlier, as we saw above, they should have been regressing to the mean even before 1800.

## Physicians

Another source on social mobility, which can reveal not rates of mobility between 1700 and now, but also mobility within the last few decades, is the list of registered physicians. This list contains records of doctors first registering between the 1940s and 2010. Figure 6.3 shows the relative representation among doctors of the surnames of the high nobility (Barons and Counts), a surname sample from the “untitled” nobility, and a surname sample from latinized surnames. The comparison group are the eight most common patronymic surnames - Andersson, Johansson, Karlsson, Nilsson, Eriksson, Larsson, Olsson, Persson, and Svensson – which together compose 16% of the Swedish population. The figure shows these results by decade from the 1950s to the 2000s. Former nobles, and those with latinized surnames, were still five times as likely as those with patronymic surnames to enter medical practice in the 2000s in Sweden. This is in line with the results reported for university graduates and for the Swedish Bar reported in table 6.2.

There is also sign of regression to the mean continuing in the modern era. In the 1950s the overrepresentation of all these groups was much greater than in the 2000s, with the higher nobles at the extreme then having a 22 fold relative representation. However, while there was reasonably rapid downward mobility of these elites between the 1950s and 1970s, between the 1970s and the 2000s, a period of 30 years, a full generation, there is no sign of further regression to the mean. Modern Sweden may thus have lower social mobility rates than medieval England. However, the medical training in Sweden is rationed by the universities because of excess student demand. So this appearance of rigidity may owe not to a breakdown in the general law of regression to the mean, but to a temporary disruption caused by changes in administrative decisions about how to ration access to medical training.

**Figure 6.3**



### **Interpretation**

Studies of social mobility in Sweden, which have focused on income, seem to have greatly overestimated the true degree of status mobility in Sweden. It is an interesting feature of the society that earned income differences across social groups have been so substantially compressed. But despite this compression in earned incomes, other elements of status seem to persist just as strongly in Sweden as in England. University attendance in 2011 is predictable from the status of forbears in the period 1550-1750, 350 years earlier. Nearly 100 years of Swedish social democracy has been unable to fully equalize the life chances of the current younger generation.

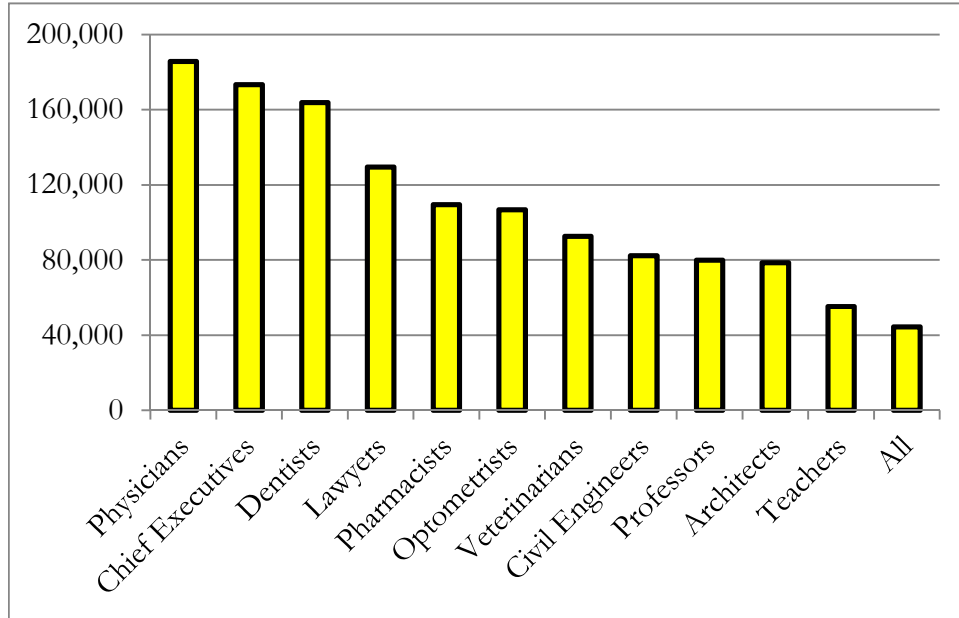
## Chapter 7 USA, 1650-2011: A New Society

We see above surprising degrees of persistence in both England and Sweden, old world societies with an established elite, as we entered the modern era. How does mobility in the USA compare to these societies? To look at this we can again exploit the very high status of physicians in the modern world. Particularly in the USA this group constitutes a very well paid and high status elite. Thus figure 7.1 shows the mean earnings of physicians in the US in 2010 compared to overall mean earnings, and the mean earnings of some other high status occupations. Physicians in general earn more than four time the mean earnings of all salaried workers, and more even than Chief Executives, Lawyers, Engineers, College Professors, or Architects.

*The Directory of Physicians in the United States*, issued under this and earlier titles by the American Medical Association, lists annually all recognized physicians and doctors of osteopathy residing in the US, even those now retired. The listing thus includes more than 900,000 people, with dates of medical school graduation from the 1930s to 2010. This list is used as a guard against fraudulent claims of medical expertise and so is carefully maintained.

The Census Bureau established the frequency in the US in 2000 of all surnames with at least 100 holders. Using this frequency and scaling the population to the level of 2009, the 2009 *Directory* lists 2.97 doctors per 1,000 of the US population. However, there are great variations by surname type. If we take a classically Jewish surname, for example, *Cohen* or *Cohn*, the rate of appearance is 14.6 per 1,000, 4.8 times the average rate. As is well known the Jewish population in the US is heavily overrepresented in elite groups. There are also in the US surnames who holders, as revealed by self-declarations of race in the 2000 census, are overwhelmingly Black. Table 7.1 shows some of these more common surnames, and the share of holders in 2000 who declared themselves Black or White.

**Figure 7.1: Mean Earnings by Occupation, US, 2010 (\$)**



Source: Bureau of Labor Statistics, 2010.

**Table 7.1 “Black” Surnames in the US, 2000**

Surname	Frequency, 2000	Fraction Black	Fraction White	Doctors per 1,000 (2009)
Washington	163,036	90	5	0.9
Smalls	10,897	93	3	0.5
Cooks	5,526	90	6	0.4
Gadson	4,720	93	4	0.4
Merriweather	4,463	90	6	0.2
Broadnax	4,335	91	5	1.4
Boykins	3,588	92	5	0.3
Pettaway	2,500	92	4	0.8
Gadsden	2,415	90	6	0.8
Glasper	2,274	91	6	0.0
Wigfall	2,091	92	3	1.4

The surnames in table 7.1 are chosen to be those of English origin, so that the holders are descended from the Black population in the USA by 1800. The table thus excludes such predominantly Black surnames, such as *Diallo*, which are of African origin. It also excludes those of French origin, such as *Batiste* which may belong to the more than half million US Blacks of Haitian origin. Finally it excludes Arabic surnames, such as *Shabazz*, which may belong to African immigrants, or have been adopted by the Black Muslim population in the US. The “Black” surnames of the type shown in table 7.1 show up as physicians at a rate of only 0.8 per thousand. However, if we adjust for the white share of such surnames, the rate per thousand for Black holders is only 0.67. This is a fifth the general rate for the US of physicians per 1,000. Again to no surprise the US Black population is poorly represented in this elite.

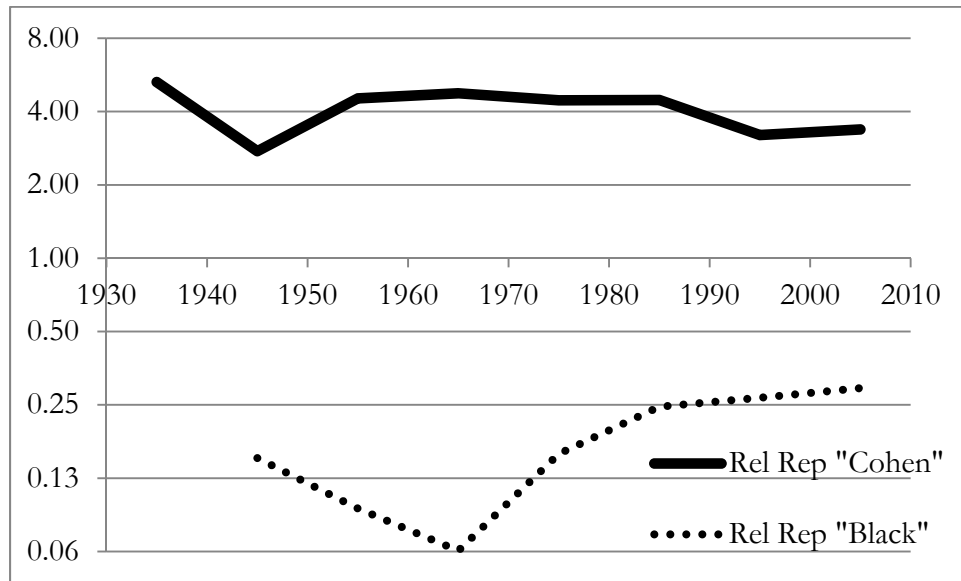
Figure 7.2 shows the relative representation rates of the *Cohen* surname, and of *Black* surnames, by decade from the 1930s to the 2000s. Ideally we would like the number of doctors completing medical school relative to the stock of people in each decade with the names who are aged 20-29. For figure 7.2 the measure is just the number of entrants relative to the estimated population stock of the surnames at the beginning of each decade.<sup>44</sup> To fit both groups on the same diagram the vertical axis is in logs.

The figure shows that the Black surnames are regressing towards the mean relative representation (of 1), but that rate of regression in recent decades has been extremely slow. The relative representation of such surnames in the 1980s was 0.25, in the 1990s, 0.27, and in the 2000s 0.29. At this rate of gain it will be more than 300 years before these names have the same relative representation as the average name in the US. Interestingly there are known divisions within the Black population illustrated by these heavily Black surnames. Surnames such as *Diallo*, or *Mensab*, which are mainly

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<sup>44</sup> This stock is estimated by interpolating between the stock reported in the 1930 and 2000 US censuses.

**Figure 7.2: Representation of Surnames among US physicians**



African in origin, show much higher rates of frequency among physicians.

The *Cobens* are also regressing towards the mean, but again at extremely slow rates. The relative representation fell from 4.5 in the 1970s, to 3.4 by the 2000s.

## Chapter 8 India, 1757-2011: Caste versus Class

India, at least in popular imagination, is a society where social mobility until recently has been unusually constrained by the caste nature of the society. Indeed social mobility between caste groups is reported so limited for men that upper castes have distinct genetic signatures, with more similarity to Europeans in the Y chromosome than for lower castes.<sup>45</sup>

In India, also, surnames originally were linked with social status. The use of surnames was likely not widespread before British Rule and its bureaucratic imperatives. And indeed in the modern Indian population there are many poorer people without fixed surnames. But as in England and Sweden, surname use appeared first among the elite, and was present by the time the East India Company took over Bengal after victory at the Battle of Plassey in 1757.

In the area we focus on, Bengal, there are a set of surnames, for example, that were exclusively associated with the highest status groups within the Hindu Brahmin caste: Mukhopadhyaya (Mukherji), Bandopadhyaya (Banerji), Chattopadhyaya (Chatterji), Bhattacharya (Bhattacharji), Gangopadhyaya (Ganguli), Goswami (Gosain). These names belonged to the so-called Kulin Brahmins, who supposedly migrated to Bengal from north India in the 10<sup>th</sup> or 11<sup>th</sup> centuries AD. If they maintained this status by descent into the modern era then this implies a society of astonishing social rigidity. However, here we will just look at social mobility using these names for 1757-2011.

There were other names less caste specific that similarly denoted high status: Thakur or Tagores (landlord), Chakraborty (Chakravarti), Majumdar [friend of the emperor], Ray/Roy, Choudhary, Roy Chowdhury, Mishra. These surnames were already in use in Bengal by the mid eighteenth century, as evidenced by the names of zamindars appointed by the East India Company in the eighteenth century when they took control.

To look at mobility using the method above we need to first define an elite or a disadvantaged group using surnames, then follow their share among the elite or among the poor, as well as estimating the general frequency of the surname in the population. The first elite group we look at is the traditionally most noble of Bengali

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<sup>45</sup> Watkins et al., 2008.

Brahmins, the Kulin.

To estimate the share of the population bearing these surnames we utilize a large sample of 2.2 million surnames from the 2010 Kolkata voters rolls. These rolls also give the house address of the person, and their age and gender, so we can derive further measures of status from the roll itself. We have a number of different measures of the share of these names in higher status groups. First there are residential phone subscribers. Next there are residential phone subscribers with the honorific “doctor” attached to their name (2.02% of all residential phone listings). Finally there are the shares of doctors listed on the web pages of Kolkata hospitals.

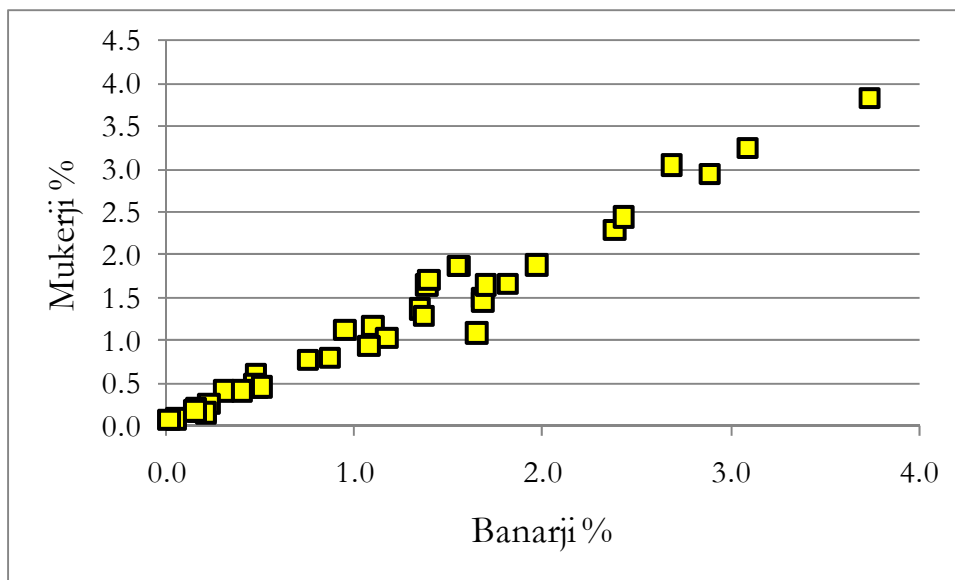
Table 8.1 shows the respective shares of each of these six Brahmin names, and this Brahmin group as a whole for 2010. This group constituted 4.36% of the Kolkata electoral roll, implying that their population share was likely somewhat less than this, since as we shall see they are higher status, and thus if anything more likely to register as a voter. But they show up as 12% of the entries in the phone book, and as 15-16% of doctors in the city. Thus in 2010 the Brahmin surname group is still about 3.5 times overrepresented among the elite in the city (meaning the top 1-2% of the population). In this respect India differs from England from the late middle ages on. After 1600 in England, as we saw, it is not possible to find common surnames that are similarly overrepresented.

The different social status of names in modern Kolkata is revealed when we look at residential correlation across names. Taking all the postal codes in Kolkata with at least 10,000 voters we plot in figure 8.2 on the horizontal axis the share of the voters within in code area with the surname “Banarji.” On the vertical axis we show for the same postal areas the share of the population with the surname “Mukerji.” There is an astonishing correlation between these two measures. If a postage area has a high share of Banarji’s then it will also have a high share of Mukerji’s. We interpret this as just revealing the underlying socio-economic status of the different postal areas, and the strong shared socio-economic status of the Banarjis and Mukerjis.

**Table 7.1: The Relative Share of Kulin Brahmin names in Kolkata, 2010**

Surname	Electoral Roll 2010 (%)	Phone Book 2010 (%)	Phone Book (Doctors) 2010 (%)	Hospital Doctors 2010 (%)
Bandopadhyaya (Banerji)	1.14	3.03	4.16	3.93
Bhattacharya (Bhattacharji)	0.78	2.62	3.81	1.87
Chattopadhyaya (Chatterji)	0.85	2.39	3.48	3.64
Mukhopadhyaya (Mukherji)	1.16	2.82	3.45	4.11
Gangopadhyaya (Ganguli)	0.28	0.79	0.82	0.84
Goswami (Gossain)	0.15	0.33	0.36	0.47
Brahmin	4.36%	11.97%	16.08%	14.86%
Brahmin - relative representation	1.00	2.75	3.69	3.41

**Figure 8.1: Co-residence by Banarjis and Mukerjis in Kolkata**



To know what this implies about the rate of social mobility we need evidence on the earlier share of the elite and the general population that had these Brahmin surnames. Table 8.2 lists the various sources we have on their share of the elite in earlier generations. There are three main sources on the earlier elite. First is the East India Company court records for the 18<sup>th</sup> century, which records mainly those with contracts for tax collection. These records show that already by 1773-5 most of this elite (indeed almost 99 percent) possessed surnames. But strikingly the later Brahmin elite is not so strongly represented as at present. Indeed the Brahmin surname share of this group in 1773-05 is only 3.8%, less than their population share in Kolkata in 2010 of 4.4% as suggested by the electoral rolls. Thus quite possibly at the time of the arrival of British Rule the Brahmin group was not a particularly rich elite (though we shall see that their likely share of the population was smaller for all of Bengal then).

The next source we have on the distribution of the Brahmin elite across occupations are the Directories produced annually for various parts of British India, which listed high government and army functionaries, as well as attorneys, doctors and college professors. Before 1840 these directories are devoted almost exclusively to the British. But from then on they devote increasing space to a rising elite group of Indian's, serving as bankers, civil servants, attorneys, doctors, and college instructors.

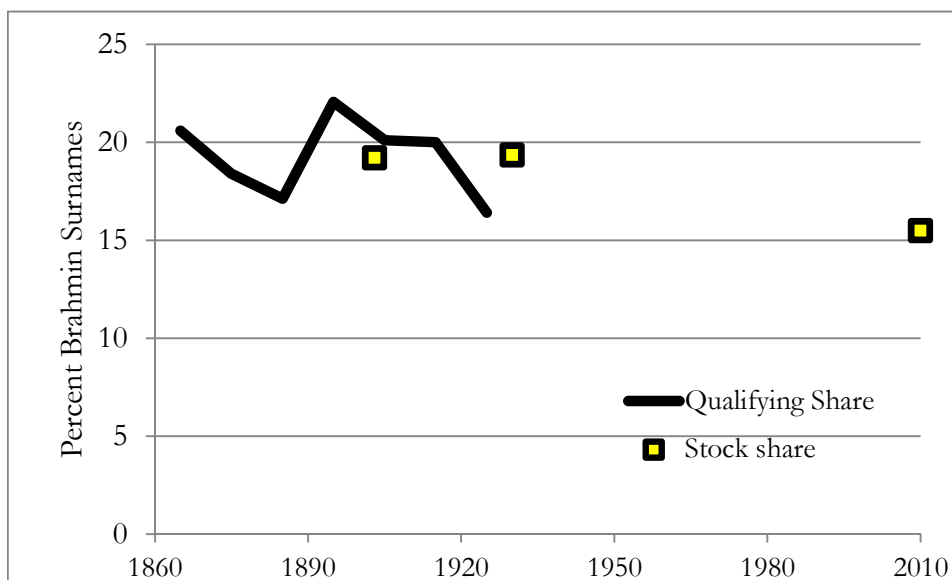
The third source are government lists of licensed medical practitioners and attorneys. These were issued annually from at least 1903 but only a few have survived. For 1903 we have the list for Bengal. For 1930 only the list for the neighboring states of Orissa and Bihar. However, these lists indicate where doctors received their qualification. So for Orissa and Bihar we use just doctors trained in Bengal. The doctor lists also give the year of qualification, so we can assign the doctors in them to a particular decade. This gives us information all the way from the 1850/60s to the 1920s on the share of Kulin Brahmin surnames among doctors.

Figure 8.2 shows the results for doctors qualifying by decade, and for the stock of practitioners in 1903, 1930 and in Kolkata in 2010. There is very little decline in that share from 19.2 percent in 1903, and 19.4 percent in 1930, to 15.5 percent by 2010.

**Table 8.2: Sources of Earlier Elite Surname Distributions in Bengal**

Period	Group	Source
1773-5	Zamindars	<i>East India Company, Court Records</i>
1840	Attorneys	<i>Bengal Directory and General Register</i>
1870	Attorneys, Doctors	<i>Thacker's Bengal Directory</i>
1903	Doctors	<i>Government of India, Bengal Presidency, List of Qualified Medical Practitioners</i>
1930	Doctors	<i>Government of Bihar and Orissa. 1930.</i>
1931	Attorneys	<i>Government of Burma, List of Pleaders</i>
1942	Doctors, Attorneys	<i>Thacker's Indian Directory, 1941-2.</i>
1960	Doctors, Attorneys	<i>Thacker's Indian Directory, 1960</i>

**Figure 8.2: Share of Doctors with Brahmin Surnames, Bengal, 1860-2010**



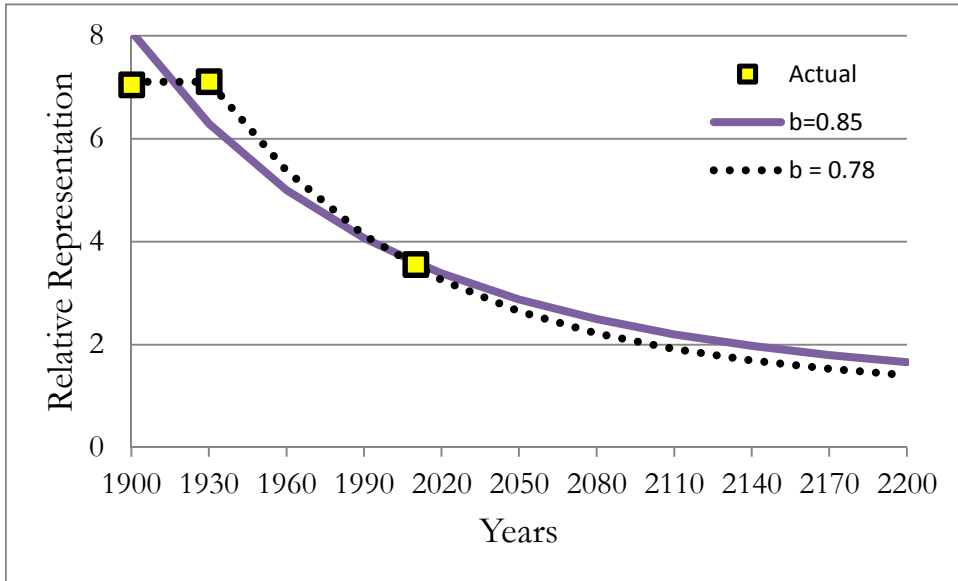
What was the share of these Brahmin names in the Bengali population in earlier years? As noted, these Brahmin names were 4.36 percent of the electoral roll in 2010 for Kolkata. However, the Bengal Presidency in 1903 was a much larger area than the modern West Bengal. In particular it included East Bengal (now Bangladesh), as well as Orissa and Bihar. East Bengal encompasses much of the former Muslim population of the Bengal Presidency. In the 1901 census of British India East Bengal had a population of 30.5 million, compared to 81.2 million in the Bengal Presidency as a whole. Thus the expected share of the Bengal population with Brahmin surnames, if Brahmin surnames were the same share of the Hindu population as in 2010, would be only 2.7% in 1903.

Figure 8.3 shows the relative representation of the Brahmin surnames on this basis in 1903, 1930 and 2010. On this basis that relative representation declines from 7.1 in 1903 to 3.6 in 2010. This implies a  $b$  for this elite of between 0.78 and 0.85. The range of  $b$ s is produced depending what assuming we make about the variance of status in the Brahmin group in 1903. If that variance was as great as for the general population then we get the highest  $b$  (see the mathematical appendix). If that variance was lower than for the general population, then the implied  $b$  is correspondingly lower. It implies that projecting forward the Brahmin surnames will still be twice as common among doctors as among the general population in Kolkata as late as 2100.

However, there is uncertainty about the Brahmin share in the population in Bengal in 1901. Brahmins may have had lower net fertility since 1901 than the population as a whole, making them a larger share in 1901 than employed above, and implying an even higher  $b$  for them.

Kingsley Davis, for example, shows that in 1931 the Brahmins in India (a broader group than the surname population we look at here) had a lower ratio of children 0-6 to women 14-43 than any other Hindu group. Indeed the ratio for Brahmins was only 88% of that for other groups on average. This was mainly a consequence of the social taboo on widow remarriage among Brahmins (Davis, 1946, table 3, 248). Since the Brahmins as a group with higher incomes on average may have had better child survival rates in years subsequent to age 6, we cannot be sure they have lower fertility than the bulk of the population.

Figure 8.3: Possible bs with the Brahmin Surname Distributions



Whatever the precise value of the  $b$  for this Brahmin surname group what is remarkable is that this elite, in a society supposedly constrained by strong caste boundaries to intermarriage for most of the last 200 years, is no more overrepresented than the descendants of Swedish aristocrats, or the descendants of the wealthy in 19<sup>th</sup> century England. India does not stand out as a society of rigidity, to be contrasted with the mobility of more modern Sweden.

## Chapter 9 Japan, 1869-2011 - A Dispossessed Elite

The *Kazoku* was the hereditary peerage of the Japanese Empire that existed between 1869 and 1947. After the Meiji Restoration, the new leadership, as a component of their Westernization program, merged the *keuge*, the ancient court nobility of Kyoto, with the *daimyo*, the feudal lords, into an expanded aristocratic class. The new *kazoku* peerage initially consisted of just 427 families.

In 1884 and later years the Meiji government expanded the hereditary peerage by adding to the ranks of the *kazoku* persons who had made distinguished contributions to the nation. The 1884 Peerage Act also divided the *kazoku* into five ranks, based on those of the British peerage, but with titles deriving from ancient Chinese nobility:

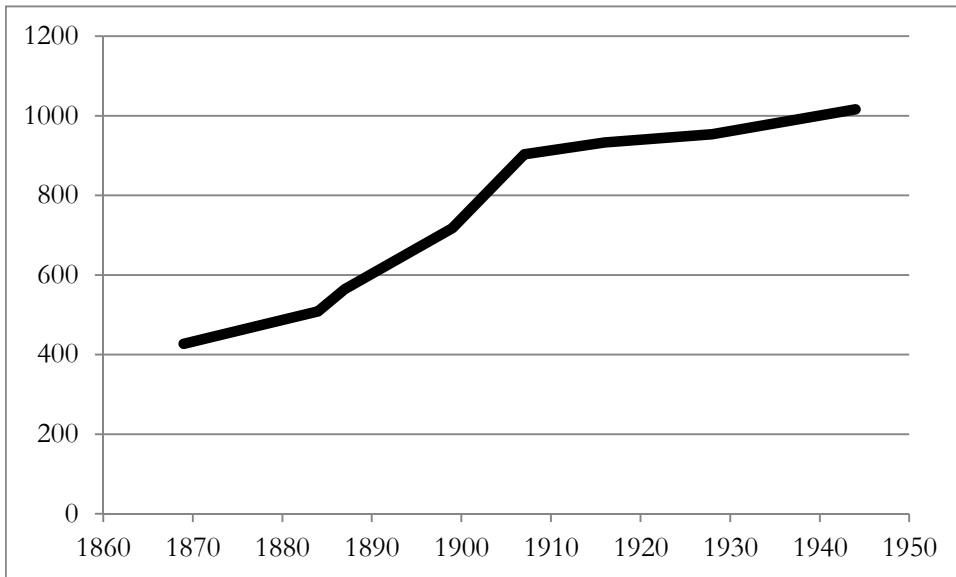
1. Prince or Duke (公爵 *kōshaku*)
2. Marquis (侯爵 *kōshaku*)
3. Count (伯爵 *hakushaku*)
4. Viscount (子爵 *shishaku*)
5. Baron (男爵 *danshaku*)

The great majority of the members of the *kazoku* were in the lowest two ranks.

The total membership grew as is shown in figure 9.1. The expansion of the *Kozaku* through the addition of meritorious individuals after 1884 was thus largely complete by 1907. Thus the *Kozaku* families represent mainly an elite of wealth and position in Japan that dates from before 1907. The newly created *Kozaku* were mainly of Baron status.

Before its abolition in the 1946 post war Constitution, the *kazoku* had a number of privileges, in addition to whatever private wealth they had retained from the earlier regime. A number of them received hereditary pensions from the state. The titles and pensions passed by inheritance to the oldest son. Only the holder of a title was considered part of the *kazoku*, with other children having no special status. The *kazoku* were entitled to elect representatives from their ranks to serve in the House of Peers.

**Figure 9.1: Kazoku Membership, 1869-1944**



Source: Lebra, 1993, 47-55.

Measuring inheritance of position by surname for this Japanese elite is complicated, however, by the prevalence of adoption. When there was no male heir, Kozaku families would traditionally adopt a son to carry on the title and family line. Supposedly this tradition carried on even after they lost all official position in 1947.<sup>46</sup> However, those who were adopted were typically sons of other Kozaku families. So the surnames of these families still carry information about the status of the group as a whole.

However, we are able to locate 82 surnames among those of the former Kozaku where the numbers of holders of the surname in modern Japan average only 243 (with a maximum for any surname of 717). These surnames are associated with high status even now. Thus table 9.1 shows the citation frequency for these surnames as authors in Google Scholar for 2011, compared to the rates for the most common 10 Japanese surnames. The rarer half of the surnames, those where there is most likelihood of a connection between modern holders of the surname and the original *kazoku*, are the most heavily overrepresented, by a factor of 12 for citations.

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<sup>46</sup> Lebra, 1993, 106-132.

**Table 9.1: Citation Frequency for Kazoku**

Surname	Number of Holders	Citations per holder	Works per Holder
Common	12,953,742	0.27	0.27
Rarest Kazoku*	2,899	3.38	2.20
Rare Kazoku*	17,057	1.51	0.97
Rarest Kazoku relative representation	-	12.6	8.1

Notes: \* Rarest = 1-129 current holders of the surname (41 names), rare = 130-717 current holders of the surname (41 names).

To measure the status of these families more systematically over generations we have a more limited set of resources in Japan. We have not been able to obtain (yet) as in England, Sweden and India lists of doctors, attorneys, and university students. The primary measure we will use are the *Who's Whos* periodically issued in Japan from at least 1912 on. The 2002 *Who's Who* (*Shintei gendai Nihon jinmeiroku* 2002), for example, lists about 130,000 notable Japanese, with their dates of birth and field of distinction. In this way we can build a panel of generations of those with *kazoku* names and their relative representation among different kinds of elite in Japan for those born 1840-69, 1870-99, 1900-29, 1930-59, and 1960-89 and measure how quickly this group is regressing to the mean, especially for the generations 1930-59 and 1960-89 which spent all of their careers in the era after the *kazoku* lost all formal position in post WWII Japan.

## Mathematical Appendix

Suppose we have some measure of social status,  $y$ , which can be measured by a number: income, wealth, occupational prestige, years of education, years lived. Then we can calculate the value of the coefficient  $b$  connecting the socio-economic status of any two generations of families where

$$y_{t+1} = a + by_t + u_{t+1} \quad (1)$$

by statistically choosing constants  $a$  and  $b$  to minimize the implied errors  $u$ .

To simplify the interpretation of the coefficient  $b$  we normally do two things. The first is to measure status not as a logarithm. This has the advantage of making the units that  $y$  is measured in unimportant. Thus average nominal incomes and wealth change over time because of both inflation and economic growth. Secondly by dividing by the average value of  $y$  for each generation before taking the logarithm, we can make the constant by definition 0, and thus reduce the expression to

$$y_{t+1} = by_t + u_{t+1} \quad (2)$$

where now  $y_t$  is the logarithm of wealth or income relative to the average value.

If we assume that expression (2) holds for every generation  $t$ , then by iteration

$$y_{t+n} = b^n y_t + u_{t+n}^*$$

$$\text{where } u_{t+n}^* = u_{t+n} + bu_{t+n-1} + \dots + b^{n-1}u_{t+1} \quad (3)$$

As long as  $b < 1$ , as  $n \rightarrow \infty$ ,  $b^n \rightarrow 0$ , and  $y_{t+n} \rightarrow u_{t+n}^*$ . Thus whatever the starting income or status in generation  $t$ , in the long run the expected value of status for any lineage is 0. But the random shocks mean that there will still be a distribution of status within each generation.

From (2) it follows that the variance of income in generation  $t+1$ ,  $\text{var}(y_{t+1})$  is

$$\text{var}(y_{t+1}) = b^2 \text{var}(y_{t+1}) + \text{var}(u_{t+1}) \quad (4)$$

If we assume a constant variance of income or wealth,  $\sigma_y^2$ , then (4) implies

$$\sigma_y^2 = \frac{b^2}{1-\sigma_u^2} \quad (5)$$

That is the lower is persistence  $b$ , then the larger will be the influence of random shocks in explaining income or wealth variation. And the share of the variance of current income or wealth explained by inheritance will be  $b^2$ .

Estimates of  $b$  involving income or wealth typically encounter a problem of measurement error. Typically this measurement error will bias the estimated coefficient  $b$  towards 0. Suppose

$$E(\widehat{b}) = b\theta$$

where  $0 < \theta < 1$  is the unknown attenuation factor from measurement error. If the errors in measurement of income or wealth are the same across each generation then going across two generations we would find our expected value of  $b^2$  will have the property

$$E(\widehat{b^2}) = b^2\theta$$

But this implies

$$E\left(\frac{\widehat{b^2}}{\widehat{b}}\right) \approx \frac{E(\widehat{b^2})}{E(\widehat{b})} = \frac{b^2\theta}{b\theta} = b \quad (6)$$

So by dividing the two estimates we will get an unbiased estimate of the true first generation  $b$ . So by using multiple generations identified by surnames we can get around the problem of measurement error.<sup>47</sup>

A second factor that operates in exactly the same way as measurement error is the substantial component of chance in the attained social status of any specific

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<sup>47</sup> I am grateful to Colin Cameron for pointing this out.

individual. Individuals will happen to be employed by successful businesses, as opposed to those which go bankrupt. Some will just pass the test for university admission, others will just fail. This correctly measures an aspect of social mobility. It is not measurement error, and should be included in the estimates of the  $b$  between generations and their successors. But if we use the  $b$  estimated from such observations of parents and children, and try to then project the long run movement of incomes as  $b^2, b^3, \dots$  we will fail. Specifically we will overestimate the rapidity of convergence, because in the first generation richer people will have had good luck on average, poorer people bad luck. But again over later generations the descendants of rich and poor will have average luck. So the tendency to regress to the mean will decline after the first generation.

This can be illustrated with a simple example. Suppose that there is not universal regression to the mean, but a society divided into permanent social classes. Suppose that the observed (log) income of any family  $i$  of class  $j$  in generation  $t$  is

$$y_{ijt} = z_j + e_{ijt} \quad (7)$$

where income is correctly measured but has a substantial random component  $e$ . Children inherit perfectly the social class of their parents.

In this society if we regress income of families in one generation on that of the previous generation then we will estimate classic regression to the mean. That is, if we estimate,

$$y_{ijt+1} = a + by_{ijt} + u_{ijt}$$

then the estimated value of  $b$  will be

$$\hat{b} = \frac{\sigma_z^2}{\sigma_z^2 + \sigma_e^2} < 1 \quad (8)$$

But this would give us completely the wrong impression about the long run convergence of incomes towards the mean. For the  $b$  estimated between two groups  $n$  generations apart would always be just this first generation estimate. Here the long run  $b$  is actually close to 1. The longer the distance between generations, the closer to 1 would we estimate the true  $b$ .

$$\widehat{b}^n = \frac{\sigma_z^2}{\sigma_z^2 + \sigma_e^2} \rightarrow 1 \text{ as } n \rightarrow \infty \quad (9)$$

### Surname Cohorts

We are concerned to measure the connection in status between parents and children when we estimate  $b$  in the expression

$$y_{ij,t+1} = a + by_{it} + u_{ij,t+1} \quad (1)$$

where  $i$  indexes the family, and  $j$  the individual children. Yet when we employ surname cohorts we instead estimate

$$\bar{y}_{it+1} = a + b\bar{y}_{it} + u_{it+1} \quad (10)$$

$\bar{y}_{it+1}$  and  $\bar{y}_{it}$  are now measured as averages across a group of parents and a group of children with the same surname. Will the  $b$  estimated in this way be the same as that within the family?

Suppose each man with surname  $i$ , indexed by  $j$ , in generation  $t$  has  $n_{jt}$  children who carry his surname, and that the total number of members of each surname cohort is  $N_{it}$ . Denote each child in the next generation with the given surname as  $y_{ijk}$ ,  $n_{jt} \geq k \geq 1$ . Then

$$\bar{y}_{it} = \sum_{ij} \frac{y_{ij}}{N_{it}}$$

and

$$\begin{aligned} \bar{y}_{it+1} &= \sum_j \sum_k \frac{y_{ikjt+1}}{N_{it+1}} = \frac{1}{N_{it+1}} \sum_j \sum_1^{n_{jt}} (a + by_{ijt} + u_{ij,t+1}) \\ &= a + b \frac{1}{N_{it+1}} \sum_{ij} n_{jt} y_{ijt} + u_{t+1} \end{aligned} \quad (11)$$

where  $N_{it+1} = \sum_{ij} n_{jt}$ .

Estimating  $b$  in (1) using (10), rather than the correct expression which weights every  $y_{it}$  by the number of children observed in the next generation, as above in (11), will thus produce only an approximation to the true  $b$ . The method used here thus weights equally people in generation  $t$  who have no children as those who have many children. Thus it will introduce some measurement error in  $y_t$ , which will reduce the observed value of  $b$ .

As the number of observations gets large this measurement error will disappear, as will the downwards bias on  $b$ , as long as there is no correlation between  $n_j$  and  $y_j$ . However, in pre-industrial England  $n_j$  and  $y_j$  was strongly positively correlated. This implies that  $b$  estimated from surname cohorts will tend to be overstated. Children in the second generation will come disproportionately from richer fathers, so that the wealth of the initial generation will be estimated as too low.

In contrast in England 1850-1950  $n_j$  and  $y_j$  was negatively correlated, with the consequent opposite bias on the estimate of  $b$  through surnames. In practice, however, these biases appear to be modest.

## Deriving $b$ from status distributions

Where we have information on wealth or occupations by surname, the procedures for estimating  $b$  are analogous to those in conventional mobility studies.

However, for a number of cases we observe such as medieval England or Bengal evidence on social status by surname takes a very different form. What we observe in high status surnames is that they are found at a higher frequency among elite groups, and then we can observe this frequency decline over time. Similarly for initially low status names we observe their frequency rise over time in high status occupations.

If we know where a surname started in the status distribution, then observing how many generations it took for such names to be distributed as widely as in the general population will give us a good measure of  $b$ . Suppose surname  $Z$  has an initial average status of  $\bar{y}_{z0}$  and a variance of status of  $\sigma_{z0}^2$ , while the general population has mean 0, and variance  $\sigma^2$ , these being constant across generations. Then if

$$y_{Z_{t+1}} = by_{Z_t} + u_t$$

t generations later the mean status of the Z surname will be

$$\bar{y}_{Zt} = \bar{y}_{Z0}b^t \quad (12)$$

Also since  $var(y_{Zt}) = b^2var(y_{Z_{t-1}}) + (1 - b^2)\sigma^2$ ,

$$var(y_{Zt}) = b^{2t}var(y_{Z0}) + (1 - b^{2t})\sigma^2 \quad (13)$$

Thus if we can measure the number of generations t which is required to make  $\bar{y}_{Zt} \rightarrow 0$ , and  $\sigma_{Zt}^2 \rightarrow \sigma^2$ , we can approximate b.

In the case where the surname starts at a particular point in the status distribution, so that  $\sigma_{Z0}^2 = 0$ , then as long as the location of the surname is not too far from mean status, the important element in limiting the approach of this surname status distribution to the general distribution will be the rise of the variance to that of the society as a whole. Thus time required for the rise of the artisan surnames into the ranks of the elite in medieval England can give us a fairly accurate measure of the implied b for this society.

In other cases what we observe at time 0 is a group of surnames concentrated in some social elite – such as doctors, or university graduates. We can then observe in subsequent generations a decline in the share of the elite this group composes. The estimation of b from the time until there is complete diffusion downwards of elite groups to the population distribution of status is more complex however. For in practice it is rare to find an elite that is found only in some top x% of the status distribution, as is portrayed in figure A1, where the top 2% of the population is composed only of an elite. Instead the situation is more commonly that portrayed in figure A2. The elite surname group also has variance in status. Their mean is higher than that of the general population, but within the surname group are high and low status members.

Figure A1: A Concentrated Elite

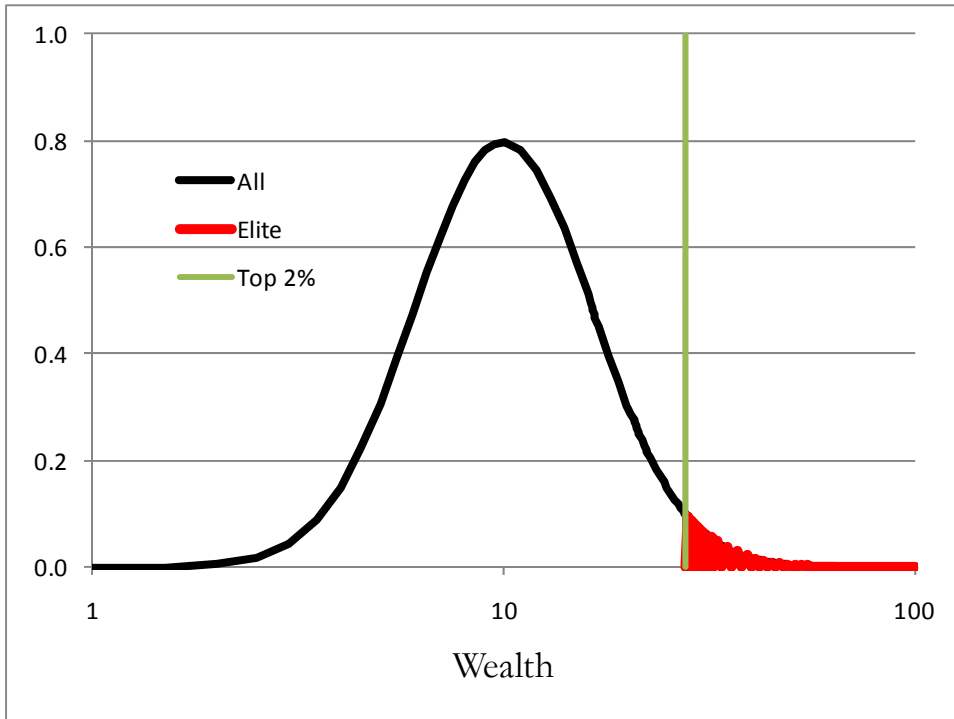
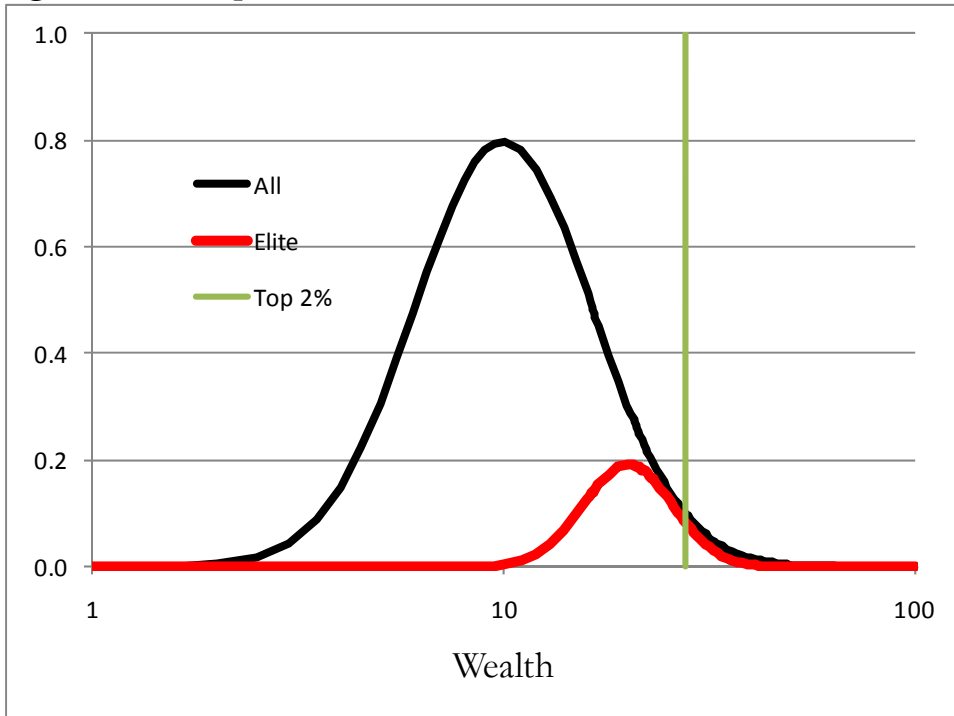


Figure A2: A Dispersed Elite



However, it is not generally possible to estimate the variance in the status of the elite group. Instead the information we generally have is the proportion of some elite – the top 2% in society, for example – that are from the elite surname group prepared to the proportion of society as a whole that is from that group. We can then define for such an elite group is its *relative representation* in some top percentile  $x$ , defined as

$$\text{relative representation} = RR = \frac{\text{surname share of group } x}{\text{surname share of population}}$$

Only when its relative representation is everywhere 1 will a group have the same distribution of socio-economic status as the population. In figure A2 the elite group is 12% of the population, but 60% of the top 2%, so it has a relative representation of 5 times the average among the elite.

To estimate  $b$  now from this information, and the length of time until the surname is fully dispersed we need to make an assumption about  $\text{var}(y_{z0})$ . However, while we can in general expect that

$$0 < \text{var}(y_{z0}) < \sigma^2$$

it turns out to matter little to the estimated size of  $b$  what specific variance is assumed. Consider the case, as in figure 10.2, where the majority of the high status surname group still lies outside the observed elite. If we assume  $\text{var}(y_{z0}) = \sigma^2$  then for a given  $b$  we will have the quickest convergence on the population distribution, since the variance of this surname's status is already at the population average, and the implied initial average status of this surname,  $\bar{y}_{z0}$  will be closest to the population mean. In contrast the case in which for a given  $b$  the elite would take the longest time to be distributed as is the general population is that where  $\text{var}(y_{zt}) = 0$ , and the mean status of the elite group is exactly at the upper 2% level of the distribution. So for any length of time  $T$  until effective convergence we can easily find the upper and lower bound implied for  $b$ .<sup>48</sup>

Suppose for example that the relative representation of an elite in the top 2% of the status distribution is 8, and that it takes 10 generations for that relative

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<sup>48</sup> Where a majority of a group lies above the observed threshold, the assumption that would provide quickest convergence for a given  $b$  would be 0 variance in the group, since that would produce the lowest group mean status.

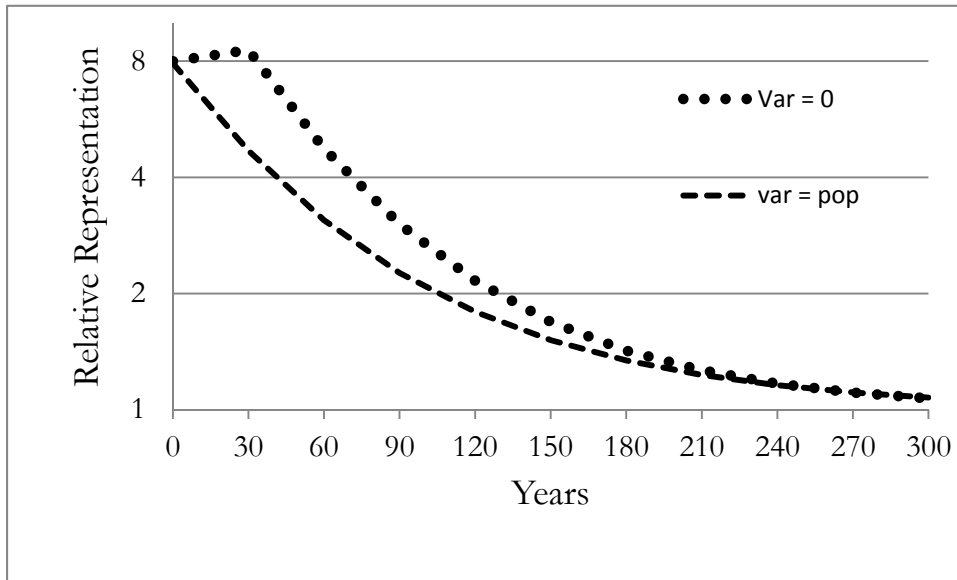
representation to fall below 1.1. If status is normally distributed both among the general population, and among the elite, what is the possible range of  $b$ ? The answer is that  $b$  would lie between 0.65 and 0.70: 0.65 if the initial variance of the elite status was 0, 0.70 if their initial variance was the same as that for the population. Thus if we assume that the status variance of any elite is the same as that of the population as a whole we will get in general upper bound estimates of the level of  $b$  by observing time to convergence.

Figure A3 shows the path of the relative representation of this group in the top 2% under each assumption, and the constraint that the relative representation falls below 1.1 by the tenth generation. Note that under the assumption of initially no variance among the elite, so that they are all clustered exactly at the upper 2% boundary, in the initial generation their share about 2% actually increases, since the fall of their mean is counteracted by increased variance.

Where we observe the relative representation of an elite generation by generation, we can use the different shaped convergence paths that different assumptions about initial variance imply to make an estimate of the initial variance also, and hence a more precise estimate of  $b$ .

Note that if an elite were elite enough that in figure A2 a majority of its members lay above the observed upper percentile in the society, then the assumptions of 0 variance among the elite, or equal dispersion to society as a whole, will also provide bounds on the true  $b$ . But now the assumption of 0 variance will produce the upper bound  $b$  estimate, and the assumption of equal dispersion the lower bound  $b$  estimate.

Figure A3: Convergence Path, Different Assumptions about Initial Variance



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