Intergenerational Transmission of Wealth: England, 1540-1790

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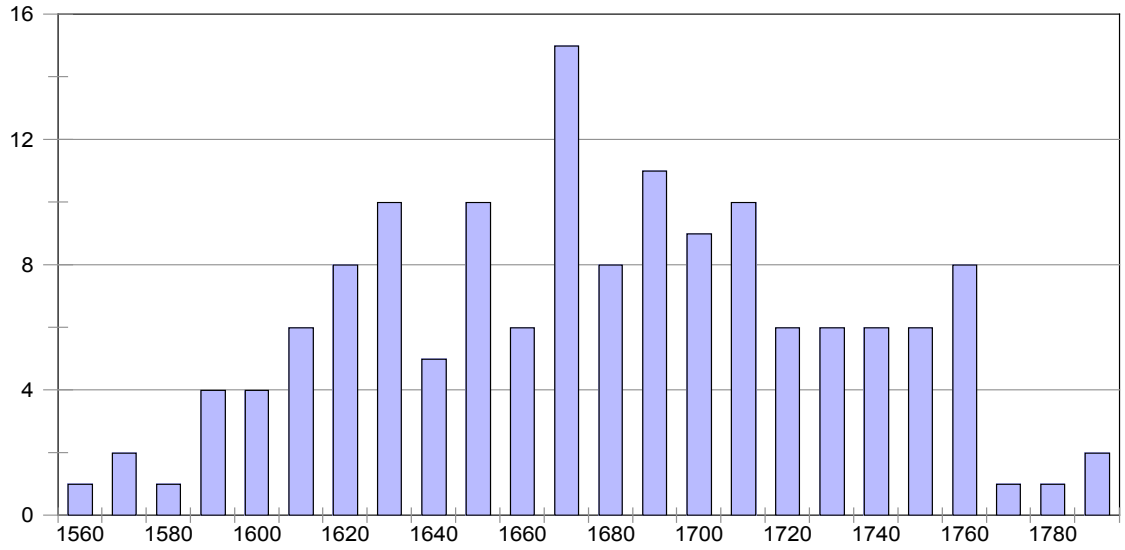
A. Data

The source of our information on wealth is male wills in pre-industrial England in the years 1540-1790. Wills as a source are described in detail in Clark and Hamilton (2006). The sample consists of wills of fathers and sons, though with a smaller sample of brothers. The relationship of testators was established through the details contained in the wills, and sometimes additional material from church registers of baptisms, burials and marriages. There is some uncertainty in these matches: for a match to be declared someone of the son's name had to appear in the will of the father, and if the son's first and last names were common then some other details in the son's will would have to match with the father's– mother's name with wife of father, brother's and sister's names with children of the father, children's names with grandchildren of the father, property owned with property bequeathed by the father, residence, occupation.

The current sample is small, 146 father-son pairs, and 16 sibling pairs, but will be extended to a much larger size in future work. The wills used are mainly from testators in East Anglia - Essex and Suffolk. That stems just from the chance availability in these counties of a large number of wills, more than 8,000, that have been transcribed from the years 1560-1800. The wills also frequently reveal the occupation/social status of the father and son. Thus I can also examine occupational mobility. Figure 1 shows the location of the sample in time, by the date of the son's wills.

Figure 1: The Dates of the Son's Wills



A special problem that arises immediately with this type of sample is that not all men made wills, and the frequency of will making was correlated with wealth. For a given set of fathers making wills richer sons were more likely to also make wills, and so to enter the data set. I show below this will bias downwards the estimation of the coefficient □ measuring the link between the wealth of generations or of brothers. A second problem present in this data is that wealth is measured with a substantial error, again biasing downwards the estimate of □. To get an estimate of the true □ I thus need to correct for these biases.

Another bias that enters is that for a father-son pair of will makers to be identified the father has to have a son who survives to age 16 or more. Since England in these years as a Malthusian pre-industrial society had slow population growth, the average man had only slightly more than one son surviving at time of death. However the numbers of surviving children was higher for the wealthier individuals who were more likely to leave wills. The poorest testators left one son on average, the

richest 2 sons. Given that wealth correlates across generations this again creates a higher likelihood of wealthier father-son pairs. This bias will not affect, however, the estimate of □, the intergenerational linkage.

Table 1 shows for a much larger group of testators as a whole in England in these years the frequency of wills by social category, as well as average literacy rates and estimated wealth at death by these occupational/status categories. As can be seen there is a fairly good agreement between the social ranking used here and other measures such as literacy and average wealth. But within any social category there are actually huge variations in the size of the bequests. The table confirms that higher income individuals were more likely to make wills: there were many more laborers in pre-industrial England than gentleman. But there are plenty of wills available for those at the bottom of the hierarchy such as laborers, sailors, shepherds, and husbandmen.

Table 1: Characteristics of the Social Categories, England

Social Group	Numbers of wills giving asset information	Fraction of testators literate	Average value of bequest (£)	Minimum estimated value of bequest (£)	Maximum value of bequest (£)
Gentry	102	0.94	1,371	0	8,040
Merchants/Professionals	118	0.88	268	0	1,633
Farmers/Yeomen	867	0.54	377	0	6,352
Unknown	450	0.48	146	0	2,022
Traders	123	0.44	129	0	1,226
Craftsmen	350	0.43	80	0	600
Husbandmen	383	0.27	84	0	1,898
Laborers	111	0.17	42	0	210

These wills were typically made close to the death of the deceased. The maximum time between the writing of the will and the death of the testator can be established by comparing the date of the will with the date probate was granted.[1] 47 percent of the wills were probated within 60 days of their composition, and 77 percent within one year. Thus more than 77 percent of these wills were made within a year of the testator's death, and give a picture of the testator's surviving children and their economic status at the time of their death. Wills known to be probated more than 5 years after their construction were excluded when analyzing the reproductive success of testators. Wills which gave no details on any sort on the assets bequeathed were also excluded.[2]

The wills employed contain some or all of the following information: the occupation of the testator, the marital status (single, married, widowed, remarried),[3] the number and genders of children, the literacy of the testator,[4] all monies bequeathed, and to whom, the number of houses bequeathed, whether land was bequeathed (generally the amount of land was indicated in only about 20 percent of wills) and other goods bequeathed that have an ascertainable value (silver spoons, gold rings, horses, cattle, sheep, pigs, grains). Some important information is almost never present, however, such as the age of the testator.

Below is the summary of a typical will from Suffolk in 1623

JOHN WISEMAN of Thorington, Carpenter (signed with X), 31 January 1623.

> To youngest son Thomas Wiseman, £15 paid by executrix when 22. Wife Joan to be executrix, and she to bring up said Thomas well and honestly in good order and education till he be 14, and then she is to bind him as apprentice. To eldest son John Wiseman, £5. To son Robert Wiseman, £5 when 22. To daughter Margery, £2, and to daughter Elizabeth, £2. To son Matthew Wiseman, £0.25. Rest of

[1] Where a dated codicil was attached to a will, that date was taken as the date of composition of the will.
[2] Wills were of two types. The majority were written wells signed (or marked) by the testator. There were also "nuncupative" wills which were statements of the testamentary wishes of the testator constructed by witnesses after their death. These wills were only included where they were detailed enough to include specific bequests.
[3] Widowed was inferred from specific statements about former wife, or absence of wife in will when children were left bequests.
[4] Measured by whether the will was signed, the testator bequeathed books other than a bible, or the testator had an occupation requiring literacy such as an attorney or cleric.

> goods, ready money, bonds, and lease of house where testator dwells and lands belonging to go to wife Joan. Probate, 15 May 1623. (Allen (1989), p. 266.)

Where they can be valued bequests to daughters are generally smaller than for sons. For example, John Pratt of Cheveley, Cambridge left each son £5, but each daughter only £2 (Evans (1993), p. 108). Also daughters often received gifts at marriage that were to have been regarded as being their share of the inheritance. John Hynson of Fordham, Cambridge left to his two unmarried daughters Margaret and Mary £30 each. His three married daughters, whose names were not even given, were described thus "To my 3 daughters who are married 10s (£0.5) each" (Evans (1993), p. 217).

Estimating Wealth at Death

From the information in the wills we can estimate the economic status of the testator in two ways. The first is from the occupation ascribed to the testator. The second from estimating the value of assets bequeathed.

The estimated assets of testators were constructed from the information in wills by adding together the cash payments directed by the testator, with the estimated value of houses, land, animals, grain bequeathed by the testator. While land was bequeathed in 975 of the wills in our sample, in only 209 cases, one in five, was the area of the land indicated. To infer the area in the other 766 cases we estimated for the observed cases area as a function of other features of the will: the number of houses bequeathed, the number of additional parishes the land was described as lying in, the total amount of cash and goods bequeathed, an indicator for the literacy of the testator, an indicator for whether the testator lived in a town, an indicator of whether the person engaged in

farming, and indicators for each occupational group. The functional form that best fitted the observed cases was chosen by experiment. Thus the estimated expression was

$$\log(AREA) = a + b_1 HOUSE1 + b_2 HOUSE2 + b_3 HOUSE3 + b_4 MOREPAR + b_3 BEQROOT + b_4 DLIT + b_5 DLITUNKNOWN + b_6 DTOWN + b_7 FARMER + \sum_i c_i OCCUP_i + e$$

where HOUSE1 was an indicator set to 1 if one house was bequeathed, HOUSE2 an indicator for two houses, HOUSE3 an indicator for three or more houses, MOREPAR an indicator for land left in more than one parish, BEQROOT the square root of the value of cash and stock bequeathed, DLIT an indictor for a literate testator, DLITUNKNOWN an indicator for someone whose literacy is unknown, DTOWN an indicator for a town dweller, DFARMER an indicator for someone engaged in farming, and $OCCUP_i$ indicators for the 6 occupational groups defined above other than laborers. DFARMER was set to 1 if the testator left farm animals or grain in the will, or left farm implements. To normalize for changes in the price level over the years the "BEQROOT" variable in the above equation was constructed using the actual cash bequests in the will normalized by the average price level in each of the decades 1580-9, 1590-9, 1600-9, 1610-9, 1620-9 and 1630-9. To this was added the value of the stock left calculated using a standard set of values normalized to the 1630s: horses £5, cattle £4, sheep £0.5, pigs £2, wheat (bu.) £0.21, barley/malt (bu.) £0.10, oats (bu.) £0.07, peas/beans (bu.) £0.12, silver spoons £0.375, gold rings £1.

Table 2 shows the estimated coefficients and their statistical significance. Most of the statistically significant associations are in the direction we would expect. People leaving more houses and cash leave more land, as do literate people, people engaged in farming, and people of higher occupational status such as gentry, farmers, and merchants. The R^2 is 0.512, which means that we explain more than half of all the variation in reported land areas with the reported characteristics. The areas of land actually observed ranged from 0.25 to 235 acres. The areas imputed ranged from 0.9 to 653 acres. The imputation of areas will thus be extremely noisy for

cases where the area imputed is greater than 200 acres. But since any imputation of area of above 100 acres puts the person in our top income class we think this is not a major problem.

Table 2: Estimating Missing Land Areas

Variable	Coefficient Value	Standard Error
Intercept	-0.508	0.416
One house	0.368	0.206
Two houses	0.818**	0.235
More than two houses	1.042**	0.261
More than one parish	0.541*	0.231
Square root of other bequests	0.0465**	0.0137
Literacy Unknown	0.290	0.195
Literate	0.496**	0.164
Town Dweller	-0.752	0.437
Engaged in Farming	0.181	0.170
Gentry	2.620**	0.630
Merchants/Professionals	1.248*	0.483
Farmers	1.895**	0.390
Traders	0.993	0.562
Craftsmen	0.730	0.437
Husbandmen	1.148**	0.403
Unknown	1.416**	0.407

Note: *Statistically significant at the 5% level, **statistically significant at the 1% level.

We then constructed a monetary measure of the wealth bequeathed by the testator at the time of death by adding to the value of the money and stock bequeathed an estimated value for houses (£40 each) and for land (£10 per acre).[5] That is

$$WEALTH = CASH + VALUE\ OF\ STOCK + HOUSES \times 40 + LAND \times 10$$

[5] The house values are from Clark (2002a), and the land values from Clark (2002b). We are aware that houses in country parishes were worth less than those in towns, but felt that not too much distortion was introduced by simply having a common value for all housing.

For male testators where we have enough information to estimate assets bequeathed the average value of assets equaled £235 in 1630s prices (1.1 houses (£44), 9.9 acres of land (£99), £88 in cash bequests (in the prices of 1630-9) and £4 in stock). But the median value was only £99.8. This would generate an annual income of about £6 at the return on capital typical of this period. The yearly earnings of a carpenter in this period would be about £18, and of a laborer £12.[6]

One problem with the above method of estimating the total bequest is that often the cash payments to children were to be paid by those who got the real assets, so rather than being in addition to the real assets they were a charge on them. But instead of trying to distinguish cases where the cash was an addition to real assets listed, rather than just a charge on these assets, we took the view that a true index of the wealth of the testator was likely to be more accurately revealed by the sum of these four components. Where more cash is charged against real assets the greater are these real assets likely to be.

B Estimation of Intergenerational and Sibling Connections

Figure 2 shows the raw connection between the log of wealth of the father and the log of wealth of the son at time of death. There is clearly a significant relationship. In fact the measure used is log(1+wealth) since there are some zero values. The picture of bequests in levels is not very informative since the distribution of bequest sizes, from £0 to £8,040 is huge relative to the median bequest of fathers of £260.

[6] See Clark (1998) for the rates of return. Clark (2005) gives the wage rates.

As mentioned the wills do not give ages. We can link a subgroup of 544 testators, however, to parish records of birth dates and/or marriage dates and thus infer their age at death. The average age at death was 55.3 years. For this sub-group we there is no link between age at death and assets bequeathed after age 30, which is the age of death of nearly 95 percent of testators, so that there is actually no need to control in the estimate for age. Figure 3 thus shows bequest by age (in £), along with the fitted relationship of assets and age with age and age squared in the regression. The R^2 of this regression is 0.003. Thus controls for age will explain almost none of the variance in bequest sizes. Figure 4 shows less parametrically average wealth by age group (where one observation of more than £8,040 from the age group 70-79 was omitted as an outlier). This picture shows that there is some sign of wealth gains at the ages 16-29, but nothing thereafter.

Our underlying model of the intergenerational and interfamilial wealth connection is

$$w_s = \alpha + \beta w_f + \varepsilon$$

where w is the log of 1+Bequest. If w_f and w_s are measured correctly, and for each of a sample of fathers we observe the bequests of all sons, then we can estimate b correctly by OLS (correcting for clustering of the errors if there are multiple sons per father). b will show the percentage increase in the bequest of the son produced by a 1% increase in the father's bequest.

Using OLS the estimate is

$$w_s = \underset{(.070)}{0.513 w_f} + 2.559 \qquad n = 146,\ R^2 = 0.27$$

We do not have to worry too much about clustering since of 121 fathers only 19 had two sons with wills, and 3 had three. But, as noted, this estimate is subject to two potential biases.

Figure 2: The Raw Connection between the log of wealth of fathers and sons.

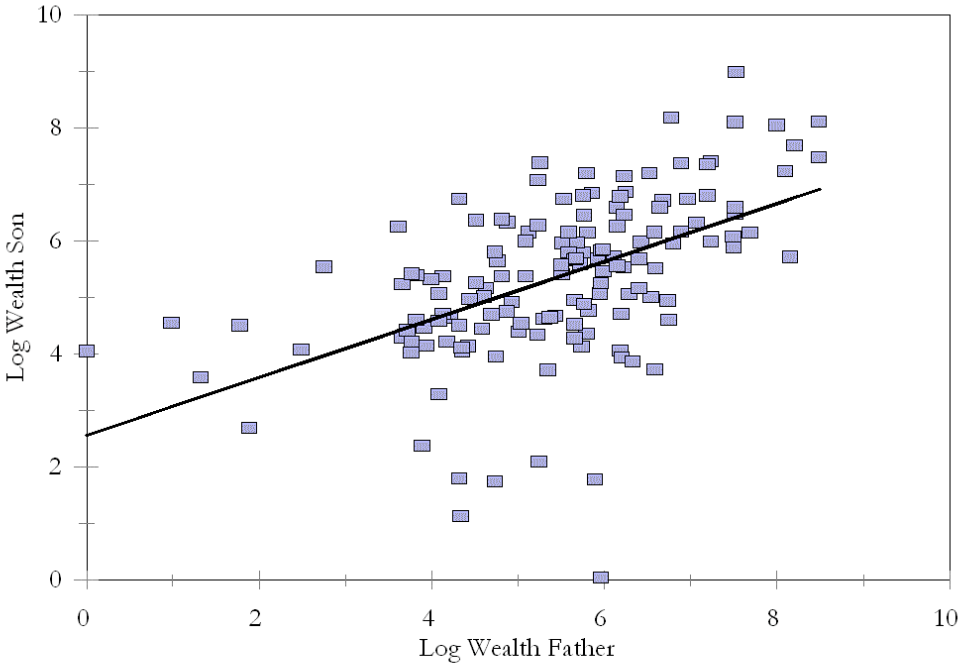


Figure 3: Bequest versus age.

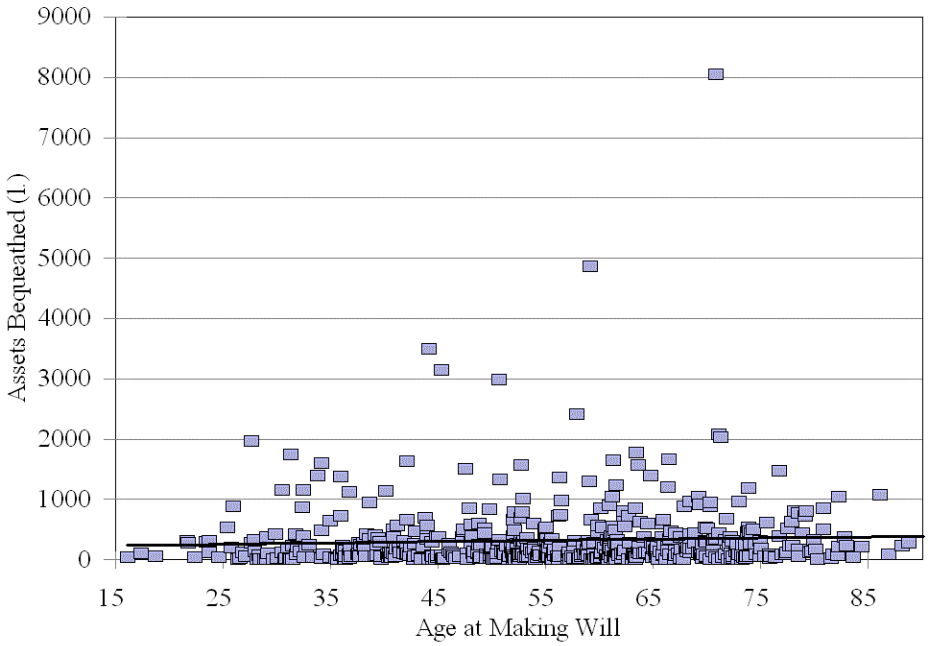
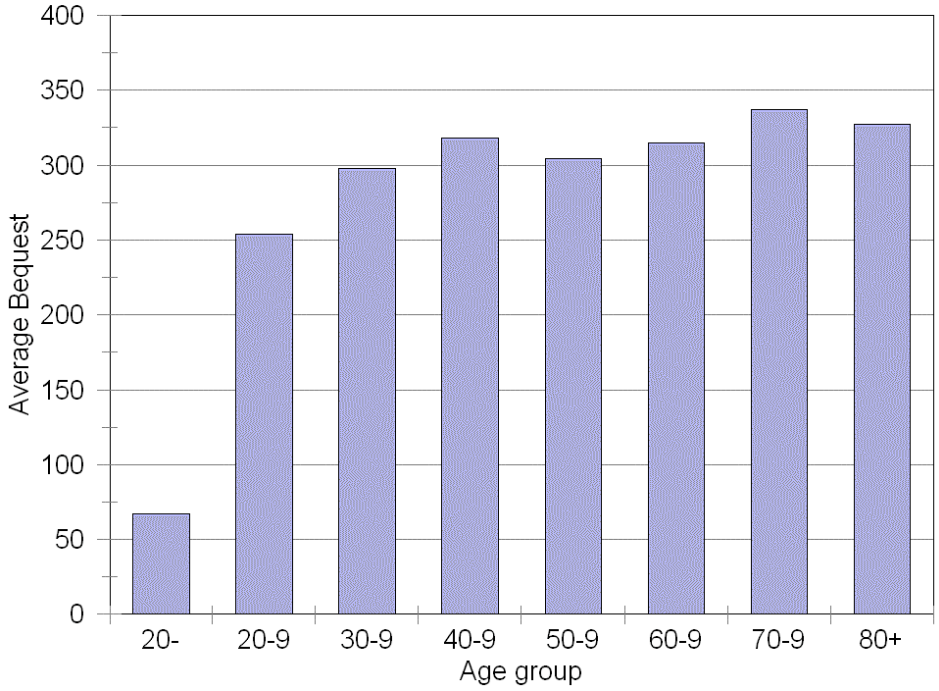


Figure 4: Average Bequest versus age-group.



The first potential source of bias we have to contend with stems from the greater likelihood of richer men leaving a surviving will. Figure 5 shows the frequency distribution of all wills by men by bequest class, versus the frequency distribution of those of men who are in the father-son sample. As can be seen, wealthier men are greatly overrepresented in this sample, even compared to all will makers, and the poorest men are underrepresented. This effect is evident in figure 2 showing the distribution of the log of bequests by father and son. If the wills of fathers and sons were representative in frequency of the general will population, then nearly one third of each would have a value below 4 (in logs). Figure 6 shows the actual distribution compared to this cutoff, shown as the bold lines. The area below the bold line has 16 observations compared to an expected 38, and to the left 15 compared to the same expected number. The effect is strongest for the bottom left rectangle defined by the two bold lines, which has four observations. Even if there was no

Figure 5: Distribution of will makers – all versus father-son

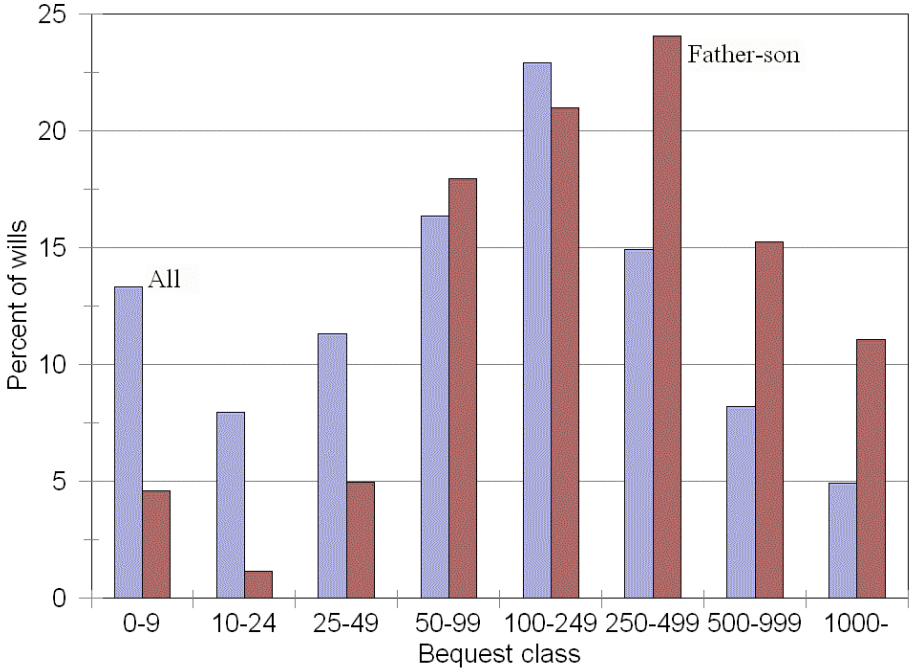
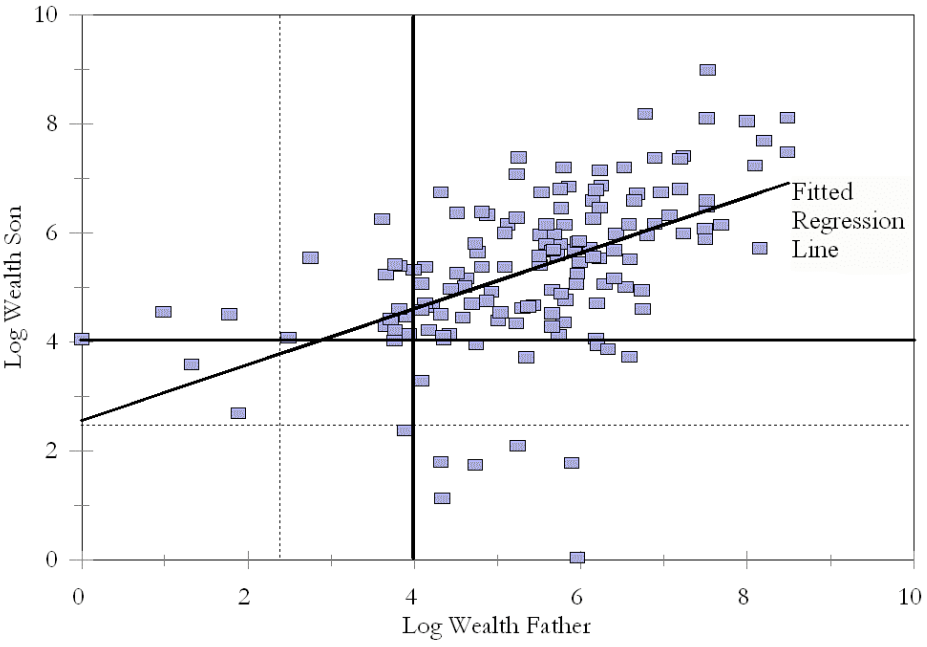


Figure 6: Will Distribution of Linked Testators



inheritance of bequest size from father to son, the bottom rectangle so defined should have about 12 observations (and with perfect inheritance 38 observations). This shows up even more dramatically if we look at the bottom left rectangle defined by the dotted line. With no correlation between fathers and sons this would have 2 observations, with a perfect correlation 14 observations, compared to the 0 observed.

The effect of these omissions, since they are concentrated in the bottom left hand corner of the diagram will be two-fold. First it will bias downwards the estimate of the estimate of β, $\hat{\beta}$, since the missing observations are concentrated below the regression line on the left hand side. Further it will reduce the R^2 of the fit. We can crudely correct for this problem by dropping all cases where the father's assets are below £50. This removes 18 observations. Now the estimated fit is

$$w_s = \underset{(.101)}{0.694 w_f} + 1.456 \qquad n = 127,\ R^2 = 0.27$$

This should still, however, be an underestimate of the true β since there are still omitted observations more commonly below the left side of the remaining data.

A more complete strategy to control for this bias, which will be implemented once more data is assembled, will be to run **weighted least squares** with the weight on each observation determined by the inverse of the product $P(w_f) \bullet P(w_s)$ where P(..) is the estimated probability of a will being created for each wealth class (this is not done yet since the successful implementation depends on finding at least some observations in the bottom left hand corner of figure 6, and also of estimating the correct weighting function).

A second problem in the data, which will also produce a downward bias, is that I actually have not the true bequest, but an approximation of this estimated from the will. For example, often the land area has to be estimated. The number of houses is also generated from the will with error.

The value of houses and land will actually vary depending on location, though they are given a constant value in the attribution procedure.

Let W_f, W_s be the measured bequests, related to the true requests through random errors $\square$, and $\square$

$$W_f = w_f + \square$$

$$W_s = w_s + \square$$

In this case the estimate of $\square$, $\hat{\beta}$, will have an expected value

$$E(\hat{\beta}) = \frac{\beta}{1 + \frac{\text{var}_v}{\text{var}_{w_f}}}$$

The bias will be downwards, and the size of this bias depends on the variance of the error in measuring the father's bequest relative to the variance of father's bequests. Since land is on average 42 percent of wealth, and we can calculate the errors in the procedures for measuring land areas, I should in principle be able to measure the variance of the error from this source relative to the overall variance in wealth.

Sibling Connections

Exactly the same biases described above will apply to the estimation of the correlation between the wealth of brothers at death. Figure 7 shows the raw plot of the data for 31 sibling pairs and the fitted regression line. The estimation is

$$w_1 = \underset{(.190)}{2.59 + 0.481 w_0} \qquad n = 31,\ R^2 = 0.18$$

However if we reverse the order the regression the coefficient estimate is instead 0.376, so given the symmetry the best uncorrected estimate of $\square$ for siblings is 0.428.

Figure 7 reveals, as with the father son observations, that it is rare to observe a pairing where both brothers left £50 or less. To partially correct for the downward bias this induces I again carried out the estimate dropping X values below 4 (= ln(55)). The β estimates were then 0.509 and 0.593, for an average of 0.551. This is not statistically significantly different from the father-son β.

The Mechanism of Inheritance

Suppose sons' wealth at death is a function of two things, bequest received B_s and abilities T_s. Suppose also that

$$W_s = AB_s^{\theta} T_s^{1-\theta} e^{\eta}$$

where η is a normal error term, and θ is the relative weight of bequests versus talent. If $\theta = 1$, then only bequests matter. If $\theta = 0$, then all that matters is talent. Since the bequest per child depends on the number of surviving children, $B_s = W_f/N$. Thus in logs

$$w_s = a + \theta w_s - \theta n + (1-\theta) t_s + \eta$$

where n in the logarithm of the number of children. If N was the same for all families then we could not estimate θ using OLS since B_s and abilities T_s are correlated. The estimate of θ will thus be biased upwards. But if we can assume that N and T_s have a low correlation then we can estimate θ by OLS. And even if N and T_s have a positive correlation, in this case the bias on the estimate of θ will be downward. If the two estimates on θ are the same it implies that it is the bequest alone that transfers advantages to the sons. If it is talent alone that matters then the estimate of θ from the coefficient on *n* will be 0, or even negative (if *n* is correlated with talent).

The estimated coefficients are

W	=	2.66	+	0.526w	-	0.124n
				(.077)		(.212)

The coefficient on n is indistinguishable from 0 statistically. Though the numbers of children in the fathers' families varied from 1 to 11, there is no clear effect of this on the wealth of the son at death. Thus some transmitted talent from fathers to sons must play a role in the inheritance of wealth.

Conclusion

Though there are important estimation issues still to be resolved, the describing the connection between the wealth at death of fathers and sons, and of brothers, in pre-industrial England is likely high, greater than 0.5 and perhaps close to 1. The signs are that this was because of some shared characteristic other than bequests received of fathers and sons.

References

Allen, Marion E. 1989. *Wills of the Archdeaconry of Suffolk, 1620-24***.** Woodbridge, Suffolk: Boydell Press.

Clark, Gregory. 2005. "The Condition of the Working-Class in England, 1209-2004" *Journal of Political Economy, 113*(6): 1307-40.

Clark, Gregory. 2006. "Farm Wages, Population and Economic Growth, England, 1209-1869" *Economic History Review, --*:

Clark, Gregory and Gillian Hamilton. 2006. "Survival of the Richest: The Malthusian Method in England, 1585-1638" *Journal of Economic History,----*

Clark, Gregory. 2007. *A Farewell to Alms: A Brief Economic History of the World.* Princeton: Princeton University Press.

Cronk, Lee. 1991. "Wealth, status, and reproductive success among the Mukogodo of Kenya." *American Anthropologist, 93*: 345-60.

Emmison, F. G. 2000. *Essex Wills. Vol. 12.* Chelmsford: Essex Record Office.

Evans, Nesta. 1987. *The Wills of the Archdeaconry of Sudbury, 1630-35.* Suffolk Records Society, Vol. 29. Woodbridge, Suffolk: Boydell Press.

Hamilton, Gillian and Clark, Gregory. "Economic Status and Reproductive Success in New France" Mimeo, 2006.

Wrigley, E. A., R. S. Davies, J. E. Oeppen, and R. S. Schofield. 1997. *English Population History from Family Reconstruction: 1580-1837.* Cambridge; New York: Cambridge University Press.