

Inter-generational Transmission of Wealth in Pre-modern Societies

Guidelines for data presentation and estimation

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0. Deadlines.

We are greatly looking forward to working with you. Preliminary memos with estimates of intergenerational transmission and sibling correlations must be sent to us by February 1. When we have all of them we will circulate them to all.

The memo that follows provides guidelines on what is required, and some likely empirical challenges that may come up. We are happy to consult on these and other issues. We can offer technical assistance either in the form of advice about data handling and estimation, or even doing the estimates if you send us the data right away (if you want to do this, let us know as we'll need to put you in touch with the person who will be doing the data work, not us). Please refer to the memo on the Kipsigis for an example of the kind of document we think will be most useful. This as well as some of the papers mentioned below is available at: [http://www.santafe.edu/events/workshops/index.php/Inter-generational Transmission of Wealth in Pre-modern Societies](http://www.santafe.edu/events/workshops/index.php/Inter-generational_Transmission_of_Wealth_in_Pre-modern_Societies). Or just go to the SFI home page, to events and forums, to event wiki, and then scroll down to our meeting.

1. Rationale and objectives.

We seek to better understand the dynamic processes leading to durable inequality in pre-modern societies. Among these, the transmission of wealth from parents to offspring must play an important role.

The beauty of this project is that (if successful) we will be able to do quantitative comparisons across widely differing societies and economies informed by rich ethnographic background about the particularities of the societies (in the spirit of the 15-small scale societies experimental project).

Suppose that an individual's wealth is acquired directly from parents (in the form of material bequests, skills, genotype, connections, parental socialization and so on) and from others in the population (in the form, say, of equal access to open access resources, common knowledge, group socialization, non-parental role models, distributions from the state, and the like). Because wealth will be measured in many different forms, we use a unit-free measure β , the percentage difference in the wealth of the offspring associated with a percent difference in the wealth of the parents. Just so you can compare your estimated β with other studies, values estimated for the U.S and U.K (for earnings, say) are about 0.5, while for some northern European nations the values are under 0.2. We expect that β for a

society will differ depending on the type of wealth considered (land versus cattle, for example). This statistic will allow comparisons across small scale societies as well as comparisons with estimates for perhaps 20 or so large scale high income societies (Bowles, Gintis, and Groves (2005), Bowles and Gintis (2002), and Corak (2006)). Most of these studies concern earnings, income, or schooling; few refer to wealth per se. However see Charles and Hurst (2003).

On the basis of our communications with you we expect that each of you will produce one or more estimates of β . It would be valuable to also have the simple correlation between parental and offspring wealth (not logged) which we denote r . The two measure slightly different things as is made clear in the Bowles and Gintis paper just referenced.

An alternative measure of intergenerational transmission is the correlation of wealth among siblings, which we denote ρ . The rationale is that if sibs are more similar in some respect than two randomly selected members of a population this must arise from the effects of things that sibs have in common that are not shared by randomly selected members of the population. Prominent among these sib-common attributes are a genetic correlation, wealth inheritance from parents, childhood socialization and other attributes thought to be involved in parent-offspring wealth similarity. The sibling method is far from perfect, of course because sibs share many things unrelated to having common parents (common location, etc) and may have not received common socialization (especially if they are quite different in age). An industry standard example of the use of sib correlations to study inter-generational transmission of economic status is Bjorklund, Eriksson, Jantti, et al. (2002).

2. Estimation

The inter-generational transmission coefficient, β , has been estimated using the following ordinary least squares estimating equation $w' = a + \beta w + \lambda$ where w' and w are respectively the natural logarithm of the offspring's and parents' wealth, a is an estimated constant and λ is a mean zero stochastic (error) term uncorrelated with w . Estimated in this way, β is a description of the extent of transmission. It says nothing about causation; the cattle, for example may not be passed on literally: the correlation of fathers and son's cattle could arise because wealthy individuals provide for good schooling for their children who later acquire cattle as a result. Our comparative study will identify estimates of β for different kinds of wealth including land, livestock, household wealth and other measures. Ideally wealth should be measured for parents and offspring when they are the same age. Because β is unit free (because wealth in both generations is measured in natural logarithms), we can compare across types of wealth measured in different units, and even across societies. (As you probably know $(1 - \beta)$ is what, since Francis Galton, has been called 'regression to the mean.')

Similar observations apply to the sibling correlations, ρ . As a practical matter you will probably want to confine yourselves to same-sex sibs of the same mother and father and in this case you will have few cases of more than a pair (2 brothers, say). In this case calculating the simple correlation is straightforward (the wealth of the older sib is one variable and the wealth of the younger sib is the other. Where you have more than two same sex sibs you may want to use the method in the paper by Bjorklund, et al (it is on the webpage).

3. *Data requirements and challenges.*

Estimation of β obviously requires data on one or more forms of wealth in both the parental and offspring generation. Based on our own work to date we anticipate the following challenges.

- a. *Selection bias* in the available data. One source is loss of offspring who have died or migrated, and are therefore not in the second generation sample. Another is missing data; where data are based on records (e.g. wills or dowries) individuals leaving no bequests will be lost, biasing the population estimates to the wealthy.
- b. *Errors in measurement* of land, cattle, and other forms wealth. Random errors will result in an underestimate of the true degree of transmission under plausible assumptions. Systematic errors, for example where retrospective reports on parental wealth are influenced by current wealth of offspring, will result in overestimates. The extent of errors can sometimes be measured (e.g. by the correlation of two respondents' answer to the same wealth question) and the resulting estimates adjusted to take account of the measurement error. (One way to do this is explained in Bowles and Nelson (1974); however, measurement error corrections are not expected or required in order for us to get started.)
- c. *Definition of family units* and the associated definitions of ownership of assets (for example how to treat half siblings).
- d. *Timing*: the most appropriate parental wealth measure is the parental wealth when the child was growing up; the most appropriate offspring measure is in adulthood (following bequests from parents, if any). If inter-vivos bequests are common and one does not address the timing issue systematically, one could observe a negative correlation between parental and offspring wealth.
- e. *Measurement of wealth* in cases where it does not take easily defined tangible forms. Examples are hunting success, exchange partnerships, or other forms of social capital. We need also to consider, when material wealth is used, how

well the measured variable captures overall wealth.

- f. Handling those with *zero wealth* (the logarithm of zero is minus infinity!) it is best to include these (arbitrarily give them a wealth of 1 (its log is zero) unless the zeros are very few in which case they may be ignored. This is unnecessary in estimating correlation coefficients (r and ρ) among the raw (un-logged) data.
- g. *Appropriate aggregation* of disparate types of wealth where this is done (how many cows is an acre of land worth?) The most obvious way to do this is to use relative prices (should these exist) to aggregate.

4. *Your memo*

In the memo due 1 February we would like the following

- a. *Description of the data set* (variables measured, in what units, means, standard deviations, range, and a simple correlation matrix). It will facilitate comparison across data sets and across generations if you also present for the parental and offspring generation separately the coefficient of variation (st.dv/mean) and the variance of the logarithm of the wealth measures (this is a commonly used unit free inequality measure).
- b. *Estimates of β , ρ and r* for as many types of wealth as you have. Most should be able to provide at a minimum estimates for at least one form of material wealth and years of schooling (along with the standard errors of the estimates, not just p values).
- c. *Interpretation of β , ρ and r* ; typically this might concern the main systems of inheritance you have been able to discern (bequest, parental support for schooling, socialization, etc), the specifics of the historical period sampled, whether the population is stable, growing or declining, whether the resource base is growing, stable or declining, etc.
- d. *Your ideas for next steps* in the empirical work and in the work of the group as a whole. (Issues we have been discussing include the potential for looking at intergenerational correlations in fertility; also the relative merits of averaging the wealth of offspring in order to reduce measurement error and circumvent problems with lack of independence). Concerning the former, the extent of intergenerational transmission of completed fertility (for older cohorts) can be measured by the correlation between an individual's number of siblings (whether living or not, as long as they reached reproductive age) and the individual's number of children. The beauty of this correlation is that it can be estimated from data from a single respondent (does not need two generations of respondents). Of course it can be estimated from two generation data sets too.

From two generation data sets we can look at correlations in RS over three generations (correlation between number of own surviving kids and number of sibs of one's parents.) Many other ideas will come up no doubt.

Works cited

- Bjorklund, Anders, Tor Eriksson, Markus Jantti, Oddbjorn Raaum, and Eva Osterbacka. 2002. "Brother Correlations in Earnings in Denmark, Finland, Norway and Sweden Compared to the United States." *Journal of Population Economics*, 15:4, pp. 757-73.
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