Mulligan (1999): Distinguishing Becker-Tomes from Galton

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Spring 2015
The Economics of Intergenerational Elasticities

- What is the economic content of regressions of the form:

\[ \ln Y_{i,t+1} = \alpha + \beta \ln Y_{i,t} + \varepsilon_{i,t+1} \]

for two generations \( t \) and \( t + 1 \)?

- Human capital inheritance model (Becker and Tomes 1979, 1986) assumes (partially-) altruistic parents invest in their children
  - \( \beta \) reflects this investment as well as inheritance of earnings ability
  - Key difference to standard consumption-smoothing: parents may not be able to borrow against children's future earnings

- Galton (1877, 1889) suggests an “economics-free” interpretation of \( \beta \)
  - Simple regression to the mean (as with other characteristics)
  - Goldberger (1989): Becker-Tomes may not positively dominate Galton
  - Han and Mulligan (1997): can’t distinguish without more assumptions
  - Mulligan (1999): five refinements to B-T give testable implications
TABLE 1

STUDIES OF THE INTERGENERATIONAL PERSISTENCE OF SOME ECONOMIC CHARACTERISTICS

<table>
<thead>
<tr>
<th>Economic Characteristic</th>
<th>Number of Estimates</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Years of schooling</td>
<td>8</td>
<td>.14–.45</td>
<td>.29</td>
</tr>
<tr>
<td>2. Log earnings or wages</td>
<td>16</td>
<td>.11–.59</td>
<td>.34</td>
</tr>
<tr>
<td>3. Log family income</td>
<td>10</td>
<td>.14–.65</td>
<td>.43</td>
</tr>
<tr>
<td>4. Log family wealth</td>
<td>9</td>
<td>.27–.76</td>
<td>.50</td>
</tr>
<tr>
<td>5. Log family consumption</td>
<td>2</td>
<td>.59–.77</td>
<td>.68</td>
</tr>
</tbody>
</table>


Different predictions of consumption transmission vs. income/wealth key to differentiating Becker-Tomes
Regression to the Mean

- Galton (pioneer of regression 😊 ... and eugenics 😊) modeled inheritance as

\[ X_{t+1} = (1 - \alpha)k + \alpha X_t + \nu_{t+1} \]

for \( \alpha \in (0, 1) \). Famously estimated \( \alpha = 2/3 \) for height, but also looked at some economic outcomes ("success" and "eminence")

- Adult child’s characteristics positively correlated with parents’, but on average closer to population mean \( k \) ("regression to the mean")

- When \( \nu_t \) distribution stationary, \( \mathbb{E}[X_t] \to k \) (i.e. simplest model doesn’t allow for secular trends in cross-sectional inequality)

- Simplest model also doesn’t differentiate within- vs. across-groups
  - Two groups selected by parental \( X_t \) will become less unequal over time
  - Williamson and Lindert (1980): U.S. wealth inequality similar in 1776
  - Mulligan (1997): \( \beta \) seems similar estimated within/across groups
The Human Capital Approach

- Child earnings $e_{t+1} = B_{t+1} \lambda_{t+1} h_{t+1}^{\nu}$ for human capital investment $h_{t+1}$, known ability $B_{t+1}$ and unknown ability $\lambda_{t+1}$ (where $\nu \in (0,1)$)
- Parents spend income on consumption, transfers, and child schooling:
  \[ I_t = c_t + x_{t+1} + h_{t+1} \]
- Children consume $c_{t+1} = (1 + r_{t+1})x_{t+1} + e_{t+1}$ where
  \[ 1 + r_{t+1} = (1 + r)x_{t+1} \]
  for unanticipated $\chi_{t+1}$
- Parents behave altruistically; for $\alpha > 0$:
  \[ U_t = \frac{\sigma}{\sigma - 1} c_t^{(\sigma - 1)/\sigma} + \alpha \frac{\sigma}{\sigma - 1} E_{\lambda, \chi} [c_{t+1}^{(\sigma - 1)/\sigma}] \]
- Becker and Tomes (1986) impose $x_{t+1} \geq 0$ (parents can’t borrow against childrens’ earnings); else essentially Friedman’s (1957) PIH
Unconstrained Solution

- When $x_{t+1}^* \geq 0$ doesn’t bind, optimal $(h_{t+1}^*, x_{t+1}^*)$ equates risk-adjusted expected returns on human and financial capital

$$E[\lambda_{t+1} c_{t+1}^{-1/\sigma}] B_{t+1} v h_{t+1}^{v-1} = E[\chi_{t+1} c_{t+1}^{-1/\sigma}] (1 + r)$$

- Mulligan (1999) first assumes $\chi = \lambda$ (efficient human capital investment only depends on $r$ and $B_{t+1}$, not on parental income):

$$h_{t+1}^* = \left( v \frac{B_{t+1}}{1 + r} \right)^{1-v}$$

- Child earnings and consumption given by

$$e_{t+1}^* = B_{t+1}^{1/(1-v)} \left( \frac{v}{1 + r} \right)^{v/(1-v)} \lambda_{t+1}$$

$$c_{t+1}^* = e_{t+1}^* + (1 + r_{t+1})(l - h_{t+1}^* - c_t^*)$$
Consumption Mobility Predictions

Mulligan (1999) shows unconstrained consumption satisfies

\[ \ln c_{t+1} = f(\alpha, r) + \ln c_t + \ln \lambda_{t+1} - E[\ln \lambda_{t+1}] + \varepsilon_{t+1} \]

\[ \implies \text{Consumption does not regress to the mean among families that participate in financial markets (intuitively, it’s perfectly smoothed)} \]

- If \( \alpha \) and \( r \) are constant or observed & controlled for, intergenerational consumption elasticity should be one among such families
  - But selecting families is difficult and may induce selection bias (unless share of constrained is small and/or \( \alpha \) and \( r \) don’t vary “much”)

- Since ability \( B_{t+1} \) regresses to the mean, so do unconstrained earnings
  \[ \implies \text{If few enough families are constrained, consumption regresses to the mean less rapidly than earnings (seems true in Table 1)} \]
**Consumption Regresses to the Mean**

<table>
<thead>
<tr>
<th>PSID Sample</th>
<th>Sample Size</th>
<th>OLS</th>
<th>Instrumental Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Group 1: $x_{t+1} \geq$ $25,000$</td>
<td>Group 2: $x_{t+1} &lt;$ $25,000$</td>
</tr>
<tr>
<td>All</td>
<td>219</td>
<td>.45 (0.08)</td>
<td>.55 (0.03)</td>
</tr>
<tr>
<td>SRC only</td>
<td>135</td>
<td>.63 (0.10)</td>
<td>.58 (0.04)</td>
</tr>
<tr>
<td>Sons only</td>
<td>106</td>
<td>.41 (0.12)</td>
<td>.55 (0.05)</td>
</tr>
</tbody>
</table>

- Even among children with sizable inheritances ($x_{t+1}$), can usually reject 1 in the PSID (both SRC/SEO surveys)
  - Instrument is log family income (assumed uncorrelated with $\alpha$ and $r$ in Becker-Tomes)

- Coefficient among constrained should give
  \[
  \beta = \frac{\nu}{\nu + \sigma(1 - \nu)} < 1
  \]
Earnings Mobility Predictions

- Unconstrained/constrained earnings are shown to satisfy:

\[
\ln e_{t+1} = g(1+r) + \frac{1}{1-\nu} \ln B_{t+1} + \varepsilon_{t+1}
\]

\[
\ln e_{t+1} = h(l_t, B_{t+1}, 1+r) + \varepsilon_{t+1}
\]

where \( \partial h/\partial B_{t+1} < \frac{1}{1-\nu} \) and \( \partial h/\partial \ln l_t > 0 \)

If \( B_{t+1} \) varies little across families relative to \( l_t \), \( l_t \) will be a poor predictor of \( \ln e_{t+1} \) for unconstrained but not for constrained

\( \implies \) Earnings more persistent for constrained families

- Can also show variance of \( \ln e_{t+1} \) driven by differences in \( l_t \) among constrained but not unconstrained families

\( \implies \) Earnings more equal among unconstrained families
Earnings Comparisons Give Mixed Support

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</tr>
<tr>
<td></td>
<td></td>
<td>Group 1:</td>
<td>Group 2:</td>
</tr>
<tr>
<td>All</td>
<td>185</td>
<td>1,243</td>
<td>.33</td>
</tr>
<tr>
<td>SRC only</td>
<td>115</td>
<td>651</td>
<td>.31</td>
</tr>
<tr>
<td>Sons only</td>
<td>90</td>
<td>612</td>
<td>.41</td>
</tr>
</tbody>
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B. Intergenerational Persistence of Log Wage

- Earnings not consistently more persistent for constrained families
- Earnings std. dev. actually slightly higher (at 0.59) in unconstrained families relative to those not receiving an inheritance (at 0.54)
Human Capital Predictions

- Unconstrained/constrained schooling investments satisfy

\[
\ln h_{t+1} = \frac{1}{1-v} \ln v - \frac{1}{1-v} \ln(1+r) + \frac{1}{1-v} \ln B_{t+1}
\]

\[
\ln h_{t+1} = \frac{1}{v} h(I_t, B_{t+1}, 1+r) - \frac{1}{v} \ln B_{t+1}
\]

\[\Rightarrow\] If $B_{t+1}$ does not vary much across families, correlation between $\ln h_{t+1}$ and $I_t$ will be higher for constrained families

- Tomes (1981) and Mulligan (1997) show some evidence for this

- Borrowing constraints increases intergenerational consumption mobility and decreases intergenerational earnings mobility

\[\Rightarrow\] Public provision of schooling relaxes borrowing constraint; should increase/decrease intergenerational earnings/consumption mobility
## Mobility Seems Unrelated to School Quality

**PUBLIC SCHOOLING QUALITY AND INTERGENERATIONAL MOBILITY**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Teacher Salary</th>
<th>Spending per Pupil</th>
<th>Teacher/Pupil (Attendance)</th>
<th>Teacher/Pupil (Enrollment)</th>
<th>Public Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Top 10 – Bottom 10 Intergenerational Wage Persistence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>-.03</td>
<td>.04</td>
<td>.05</td>
<td>-.11</td>
<td>.01</td>
</tr>
<tr>
<td>SRC only</td>
<td>.09</td>
<td>-.06</td>
<td>.14</td>
<td>-.09</td>
<td>-.11</td>
</tr>
<tr>
<td>Sons only</td>
<td>-.12</td>
<td>.02</td>
<td>.10</td>
<td>.01</td>
<td>-.06</td>
</tr>
<tr>
<td><strong>B. Top 10 – Bottom 10 Intergenerational Consumption Persistence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>.10</td>
<td>.18</td>
<td>.06</td>
<td>-.01</td>
<td>-.12</td>
</tr>
<tr>
<td>SRC only</td>
<td>.22</td>
<td>.24</td>
<td>-.05</td>
<td>-.12</td>
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</tr>
<tr>
<td>Sons only</td>
<td>.26</td>
<td>.23</td>
<td>-.13</td>
<td>-.32</td>
<td>-.04</td>
</tr>
</tbody>
</table>

Note.—Reported are the differences between coefficients on log parental wage (family consumption) in two-stage least-squares regressions of log adult child’s wage (family consumption) on a dummy for daughters, parental and child marriage variables, and a quadratic in both the child and the parental head of household’s age for a sample of residents of the top 10 public schooling quality states and residents of the bottom 10 schooling quality states. Samples and first-stage regressors are as in table 3.

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- Greater quality of public schooling seems to decrease wage persistence in some cases but increases it in others
- Consumption results slightly more consistent, at least for expenditure
Takeaways

- Many non-Galton predictions (Mulligan ’99 actually has two more with multi-dimensional $B_{t+1}$), but only some are supported
  - Consumption regresses to the mean more slowly than earnings
  - Constrained families have somewhat higher correlation of $h_{t+1}$ and $l_t$
  - School quality doesn’t seem related to mobility

- Mulligan: “one can conclude that observed intergenerational dynamics ... are not the result of borrowing constraints”
  - Though constraints may still exist (just not in the relevant rage)

- Mulligan: “the challenge ... is to produce a model of intergenerational mobility with predictions that are (a) distinct from Galton’s and (b) true”
  - So far challenge appears unanswered
  - Proposed directions: crime and social interactions. Others?