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Mulligan (1999): Distinguishing Becker-Tomes from Galton

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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
  - β reflects this investment as well as inheritance of earnings ability
  - Key difference to standard consumption-smoothing: parents may not be able to borrow against childrens' future earnings

- Galton (1877, 1889) suggests an "economics-free" interpretation of β
  - 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

Early Estimates of β

TABLE 1

STUDIES OF THE INTERGENERATIONAL PERSISTENCE OF SOME ECONOMIC CHARACTERISTICS

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

NOTE.—The studies surveyed include Soltow (1965), de Wolff and van Slijpe (1973), Olneck (1977), Harbury and Hitchens (1979), Menchik (1979), Atkinson, Maynard, and Trinder (1983), Behrman and Taubman (1985), Wahl (1985), Kearl and Pope (1986), Smith and Welch (1986), Peters (1992), Barro and Sala-i-Martin (1992), Solon (1992), Zimmerman (1992), Borjas (1994), Lillard and Willis (1994), Couch and Dunn (1995), and Mulligan (1997). See Mulligan (1997, chap. 7) for more details.

- 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 ν_t distribution stationary, $E[X_t] \to k$ (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): β 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 λ_{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

$$1 + r_{t+1} = (1 + r)\chi_{t+1}$$

  for unanticipated χ_{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

$$E[\lambda_{t+1} c_{t+1}^{-1/\sigma}] B_{t+1} \nu h^{*\nu-1}_{t+1} = E[\chi_{t+1} c_{t+1}^{-1/\sigma}](1+r)$$

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

$$h^*_{t+1} = \left(\nu \frac{B_{t+1}}{1+r} \right)^{1-\nu}$$

- Child earnings and consumption given by

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

$$c^*_{t+1} = e^*_{t+1} + (1 + r_{t+1})(I - h^*_{t+1} - c^*_t)$$

Consumption Mobility Predictions

- Mulligan (1999) shows unconstrained consumption satisfies

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

$\Longrightarrow$ Consumption does not regress to the mean among families that participate in financial markets (intuitively, it's perfectly smoothed)

- If α 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 α and r don't vary "much")

- Since ability B_{t+1} regresses to the mean, so do unconstrained earnings
  $\Longrightarrow$ 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

PSID Sample	Sample Size		OLS		Instrumental Variables	
			Group 1: $x_{t+1} \geq$ \$25,000	Group 2: $x_{t+1} <$ \$25,000	Group 1: $x_{t+1} \geq$ \$25,000	Group 2: $x_{t+1} <$ \$25,000
A. Intergenerational Persistence of Log Family Consumption						
All	219	1,562	.45	.55	.65	.70
			(.08)	(.03)	(.12)	(.04)
SRC only	135	739	.63	.58	.90	.74
			(.10)	(.04)	(.15)	(.06)
Sons only	106	761	.41	.55	.65	.71
			(.12)	(.05)	(.17)	(.06)

- 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 α 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:

$$\ln e_{t+1} = g(1+r) + \frac{1}{1-v} \ln B_{t+1} + \varepsilon_{t+1}$$
$$\ln e_{t+1} = h(I_t, B_{t+1}, 1+r) + \varepsilon_{t+1}$$

- where $\partial h / \partial B_{t+1} < \frac{1}{1-v}$ and $\partial h / \partial \ln I_t > 0$

  If B_{t+1} varies little across families relative to I_t, I_t wil be a poor predictor of $\ln e_{t+1}$ for unconstrained but not for constrained
  $\Longrightarrow$ Earnings more persistent for constrained families

- Can also show variance of $\ln e_{t+1}$ driven by differences in I_t among constrained but not unconstrained families
  $\Longrightarrow$ Earnings more equal among unconstrained families

Earnings Comparisons Give Mixed Support

PSID Sample	Sample Size		OLS		Instrumental Variables	
			Group 1: $x_{t+1} \geq$ \$25,000	Group 2: $x_{t+1} <$ \$25,000	Group 1: $x_{t+1} \geq$ \$25,000	Group 2: $x_{t+1} <$ \$25,000
	B. Intergenerational Persistence of Log Wage					
All	185	1,243	.33	.32	.42	.49
			(.08)	(.03)	(.11)	(.04)
SRC only	115	651	.31	.33	.35	.54
			(.10)	(.04)	(.14)	(.06)
Sons only	90	612	.41	.32	.61	.50
			(.13)	(.04)	(.19)	(.05)

- 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

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

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

$\Longrightarrow$ 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
  $\Longrightarrow$ 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

SAMPLE	PUBLIC SCHOOLING QUALITY MEASURE				
	Teacher Salary	Spending per Pupil	Teacher/ Pupil (Attendance)	Teacher/ Pupil (Enrollment)	Public Fraction
	A. Top 10 − Bottom 10 Intergenerational Wage Persistence				
All	−.03	.04	.05	−.11	.01
SRC only	.09	−.06	.14	−.09	−.11
Sons only	−.12	.02	.10	.01	−.06
	B. Top 10 − Bottom 10 Intergenerational Consumption Persistence				
All	.10	.18	.06	−.01	−.12
SRC only	.22	.24	−.05	−.12	−.12
Sons only	.26	.23	−.13	−.32	−.04

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.

- 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 I_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 constriants 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?

14.662 Labor Economics II

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