The Inheritance of Inequality

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Introduction

Why are the rich rich and the poor poor?

- Getting ahead and succeed in life
- Hard work
- Willingness to take risks
- Money inherited from family
- Parents and the family environment
- Connections and knowing the right people

Intergenerational Transmission

- How level is the intergenerational playing field?
- What are the causal mechanisms that underlie the intergenerational transmission of economic status?
- Can we impose public policies to make the economic success more fair, when we understand these mechanisms?

Table 3

The Main Causal Channels of Intergenerational Status Transmission in the U.S.

Channel	*Earnings*	*Income*
IQ, conditioned on schooling	0.05	0.04
Schooling, conditioned on IQ	0.10	0.07
Wealth		0.12
Personality (fatalism)	0.03	0.02
Race	0.07	0.07
Total Intergenerational Correlation Accounted For	0.25	0.32

Notes: For each channel, the entry is the correlation of parent income with the indicated predictor of offspring income, multiplied by its normalized regression coefficient in an earnings or income equation. The total is the intergenerational correlation resulting from these channels, in the absence of a direct effect of parents' status on offspring status.
Source: Calculations described in text and Bowles and Gintis (2001).

- Wealth, race, and schooling are important to inheritance of economic status
- IQ is not a major contributor
- Many things are still unclear

Some Early Work

Blau and Duncan (1967) studied the statistical relationship between parents' and their childcare's economic status

- Only a weak connection and U.S. seems was the "land of opportunity"

Becker and Tomes (1986) find that

- the correlations between parents' and son's income or earnings were averaged around 0.15

Becker (1988) "Low earnings as well as high earnings are not strongly transmitted from fathers to sons"

Measurement Errors

Bowles (1972), Bowles and Nelson (1974), Atkinson, Maynard and Trinder (1983), Solon (1992, 1999)

- mistakes in reporting income, particularly when recall the income of their parents
- transitory components in current income uncorrelated with underlying permanent income

After corrected, the intergenerational correlations for economic status appear to be substantial, many of them three times the average of the U.S. studies by Becker and Tomes (1986).

Some most accepted facts

- Brothers' incomes are much more similar than those of randomly chosen males of the same race and similar age difference
- the income of identical twins are much more similar than fraternal twins or non-twin brothers
- the children of well-off parents obtain more and higher quality schooling
- wealth inheritance makes an important contribution to the wealth owned by the offspring of the very rich

Heterogeneous Mechanisms

- Genetic
- Cultural transmission of cognitive and non-cognitive skills
- the inheritance of wealth and income-enhancing group memberships: race, health status

However, there is a black box of understanding the transmission of economic success across generations This paper found that

- cognitive performance and educational attainment are important, explaining at most 60% of the intergenerational transmission of economic status
- genetic transmission of IQ appears to be relatively unimportant

Measuring the Intergenerational Transmission of Economic Status

Let p denote parental measures, y is an individual's economic status. $\bar{y}$ is mean and assumed to be constant across generations

$$y - \bar{y} = \beta_y(y_p - \bar{y}) + \varepsilon_y \tag{1}$$

- β_y is the intergenerational income elasticity, ρ_{y,y_p} is intergenerational correlation

$$\rho_{y,y_p} = \beta_y \frac{\sigma_{y_p}}{\sigma_y} \tag{2}$$

- If inequality is constant across generation $\sigma_{y_p} = \sigma_y$: $\rho_y = \beta_y$
- If inequality declining $\sigma_{y_p} > \sigma_y$: $\rho_y > \beta_y$
- If inequality increasing $\sigma_{y_p} < \sigma_y$: $\rho_y < \beta_y$

Some Estimates of Income Elasticity

Mulligan (1997)

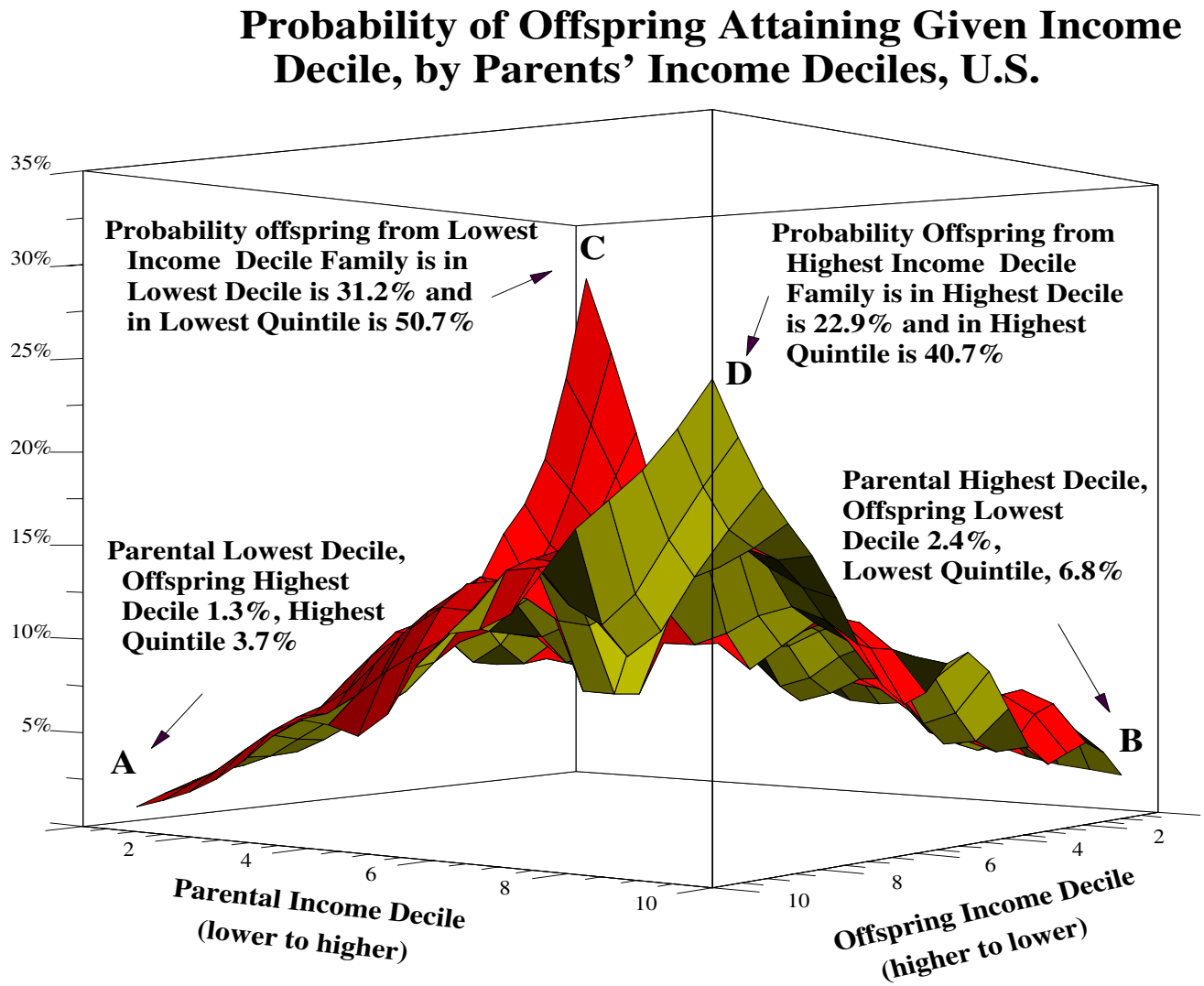
- Consumption 0.68, wealth 0.50, income 0.43, earnings (or wages) 0.34, years of schooling 0.29
- persistence rises with age
- is greater for sons than daughters
- is greater when multiple years of income or earnings are averaged

Mazumder

- 0.27: averaging son's earnings over three years and father earnings over two years
- 0.47: six years of the father's earnings
- 0.65: 15 years are averaged

Hertz (2002)

intergenerational correlation of incomes: 0.42



Hertz (2002)

The paper suggests that different mechanisms may be at work at different positions of income distributions

- wealth bequests may play a major role at the top of the income distribution
- at the bottom: violence or other adverse health
- downward mobility from the top quartile to the bottom quartile is nearly five times as large for blacks as for whites
- blacks born to the bottom quartile attain the top quartile at one half the rate of whites

Sources of Persistence: Cultural, Genetic and Bequest

They try to decompose the intergenerational correlation (or intergenerational income elasticity) into additive components reflecting the contribution of various causal mechanisms

$$r_{yy_p} = \beta_{y_p y} + r_{y_p s}\beta_{ys}.$$

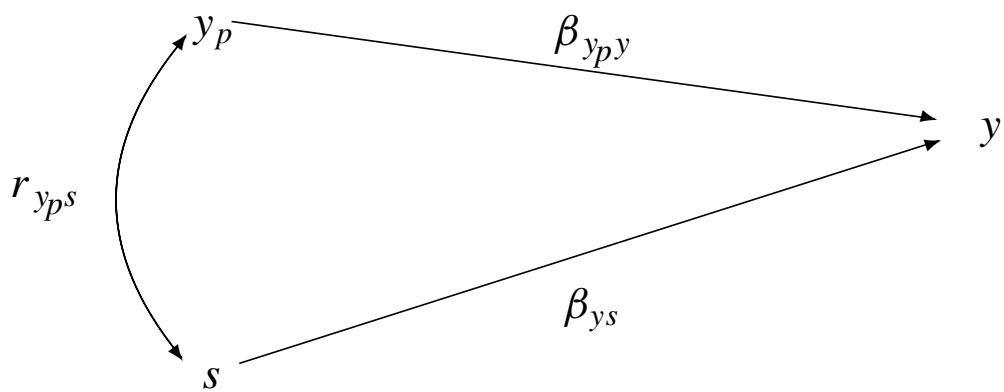


Figure 2: Representing a Correlation as the Sum of Direct and Indirect Effects.

We should notice that this decomposition method cannot identify causal effects but authors think this method would be helpful to identify the direction for future studies to examine the causal effects.

The Role of Genetic Inheritance of Cognitive Skill

- Correlations of IQ between parents and offspring range from 0.42 to 0.72
- The effects on income:
  - direct effect: estimates with a variety of control variables including a cognitive test measure
  - indirect effect: via education: childhood IQ could predict the level of schooling obtained

The Role of Genetic Inheritance of Cognitive Skill

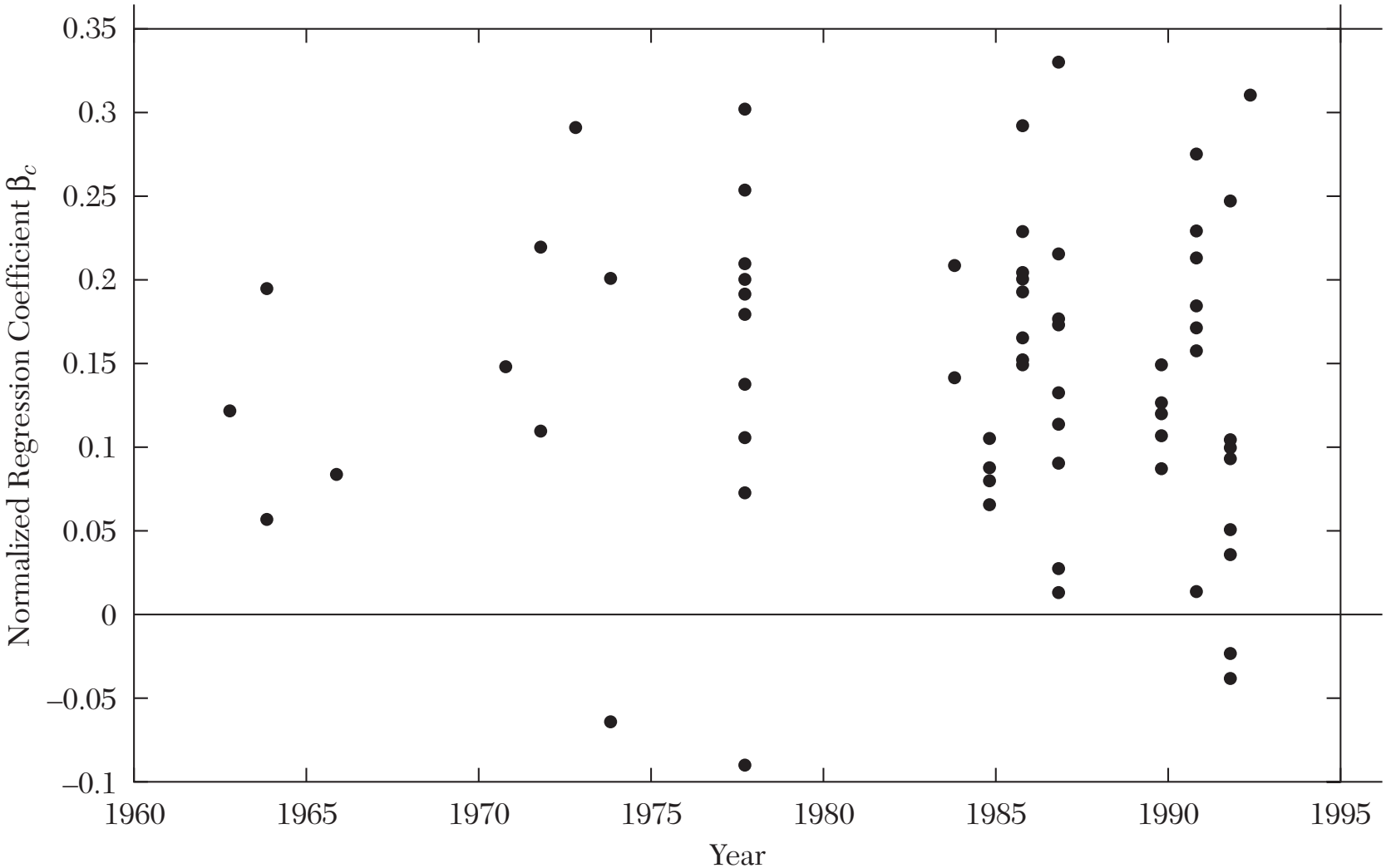


Figure 6. Normalized Regression Coefficient β_c of Cognitive Score on the Logarithm of Income or Earnings by Year: 65 Estimates from 24 Studies

The Role of Genetic Inheritance of Cognitive Skill

- The mean of these estimates is 0.15
- The mean of the coefficients of years of schooling in the same equation is 0.22
- Winship and Korenman (1999) show that the causal impact of early cognitive skills (AFQT) on years of schooling is 0.53

A rough estimate of the direct and indirect effect of IQ on earnings, b:

$$b = 0.15 + 0.53 \times 0.22 = 0.266$$

Questions

They have found that:

- The similarity of parents' and offspring's cognitive scores
- an important direct and indirect causal role for IQ on earnings

Question: do these two facts imply a major role for genetic inheritance of cognitive ability in the transmission of intergenerational economic status?
Let's introduce some new terms

- phenotype: test score (IQ)
- genotype: genes influencing IQ, genotype IQ
- Heritability: the relationship between phenotype and genotype ($h^2_{IQ} = \frac{\sigma^2_g}{\sigma^2_{IQ}}$)

For example, for a given environment, a standard deviation difference in genotype is associated with a fraction h of a standard deviation difference in IQ. Then h^2_{IQ} is the heritability of IQ

Estimation

Estimation of h^2_{IQ}

- Estimates of h^2_{IQ} are based on the degree of similarity of IQ among twins, siblings, cousins and others
- most recent estimates are substantially lower, possible around 0.5 (Devlin, Daniels and Roeder, 1997; Feldman, Otto and Christiansen 2000; Polmin 1999)

Genetic Correlation

- If parents are random mating: the correlation should be 0.5
- If couples are tend to be more similar in IQ, let m denote the correlation of parents' genotype: genetic correlation between parent and offspring is $(1 + m)/2$

IQ is Important?

Therefore the correlation γ between parental and offspring IQ is from

- Heritability of IQ
- genetic correlation

$$\gamma = h_{IQ}^2(1+m)/2$$

The the correlation between parent and offspring income that is attributable to genetic inheritance of IQ is γ times the normalized effect of IQ on the income of parents b, times the similar effect for the offspring b. That is γb^2

$$\gamma b^2 = (h_{IQ}^2(1+m)/2)b^2 = (0.5 \times (1+0.2)/2) * 0.266^2 \approx 0.02$$

The estimate results show that IQ is not an important enough determinant of economic success!

Genetic and Environmental Inheritance

Other genetically transmitted traits: environmental component
Assumptions

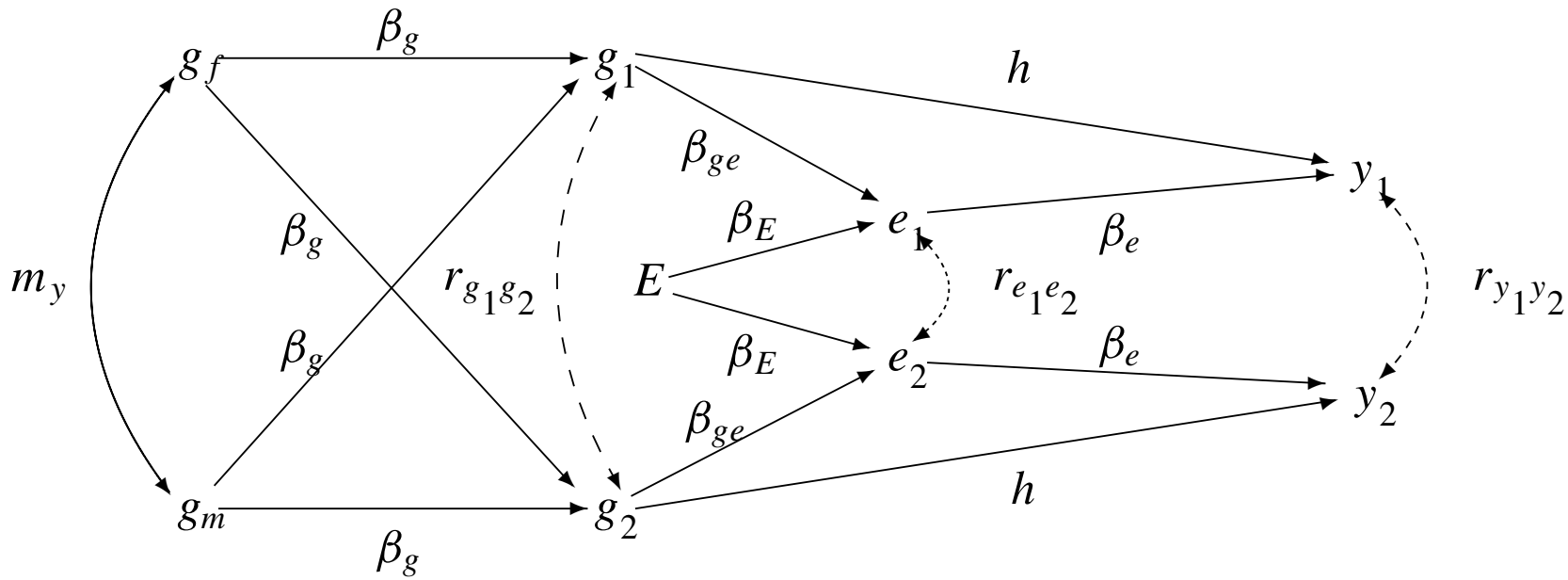
- Genes and environments have additive effects i.e.,

$$\text{earnings} = h(\text{genes}) + \beta(\text{environment}) + \text{idiosyncratic effects}$$

- within-pair genetic differences (for the fraternals) are uncorrelated with within-pair environmental differences (e.g., the good-looking twin does not get more loving attention)
- the environments affecting individual development are as similar for members of fraternal pairs of twins as for the identical twin pairs
- the earnings genotypes of the two parents are uncorrelated (random mating)

Earnings of brothers

Denote E as the common family environment, g_i is genotype for individual i, e_i is individual i's environment, m_y is the correlation of parents' genotype, and r means correlation relationship.



Notes: In this diagram, g_f and g_m are the genotypes of father and mother, g_1 and g_2 are the genotypes of brothers, E is the common environment of brothers, e_1 and e_2 are the total environment of brothers and y_1 and y_2 are the earnings of brothers. Here, m_y is the genetic relatedness of parents based on assortative mating and as explained below, $\beta_g = 1/2$, while h^2 is the heritability of earnings. The path labeled β_{ge} represents the tendency of genes to affect the environments ($\beta_{ge} > 0$ means that identical twins experience more similar environments than fraternal twins).

Estimation strategy

$$
\begin{aligned}
y_i &= \beta e_i + h g_i + \varepsilon_{y_i} \\
e_i &= \beta_E E + \beta_{ge} g_i + \varepsilon_{e_i}
\end{aligned}
$$

$$
y_i = (\beta\beta_E)E + (\beta\beta_{ge} + h)g_i + \eta_i
$$

- β and h can not be identified
- They try to examine β and h given different values of β_{ge} and β_E

$$
\begin{aligned}
r^{fr}_{e_1 e_2} &= \beta_E^2 + r^{fr}_{g_1 g_2}\beta_{ge}^2 = \beta_E^2 + (1 + m_y)\beta_{ge}^2/2 \\
r^{id}_{e_1 e_2} &= \beta_E^2 + r^{id}_{g_1 g_2}\beta_{ge}^2 = \beta_E^2 + \beta_{ge}^2
\end{aligned}
$$

$$
r^{fr}_{g_1 g_2} = E(g_1 g_2) = (\tfrac{1}{2})^2 E(g_f^2) + (\tfrac{1}{2})^2 E(g_m^2) + 2(\tfrac{1}{2})^2 E(g_m g_f) = (1 + m_y)/2
$$

Table 1

Estimating the Heritability of Earnings

Assumed Correlation of Genes and Environment	0.00	0.50	0.70	0.80
Heritability of Earnings (h^2)	0.50	0.29	0.19	0.13
Normalized Regression Coefficient:				
Genes on Earnings (h)	0.71	0.54	0.44	0.36
Environment on Earnings (β)	0.29	0.33	0.38	0.44
Correlation of Environments:				
Fraternal Twins	0.70	0.70	0.70	0.70
Identical Twins	0.70	0.80	0.90	0.97

Notes: The association of genes with environment is represented by the normalized regression coefficient of genes on environment. This table assumes that parental earnings-determining genes are correlated 0.2, and the correlation of fraternal twins' environment is 0.7. We use the correlations of income for identical twins of 0.56 and of fraternal twins of 0.36, taken from the U.S. Twinsburg Study, and assume that these are also the correlations of earnings.

Table 2

Contribution of Environmental, Genetic and Wealth Effects to Intergenerational Transmission

	Earnings	*Income*
Environmental	0.28	0.20
Genetic	0.12	0.09
Wealth		0.12
Intergenerational correlation	0.40	0.41

- Environmental contribution $\times$ a correlation of parents' earnings and environment:

$$0.38 \times 0.74 \approx 0.28$$

- Genetic: $h^2(1+m)/2 = 0.44^2 * 1.2/2 \approx 0.12$
- Here genetic inheritance may account for almost one-third of intergenerational correlation!
- The surprising importance of both environment and genes point to puzzle
- What are the mechanisms?

Human Capital

Intergenerational correlation between income and years of education

- the correlation of parent income and offspring schooling (0.45)
- the coefficient of schooling in an earning equation (0.22)

Commonly assumed that once improving the measure of schooling quality, the only effects of parental economic status on offspring earnings

- Only through effects on cognitive functioning and schooling
- The direct effect of parental status on offspring earnings should vanish

However, although the measure of school quality is improving, the direct effect of parental earnings on offspring earnings are remarkably robust

- Mulligan (1999) used NLSY data and estimate $lny_s = \beta \ln y_p + \epsilon$
- He found that $\frac{2}{5}$ or $\frac{1}{2}$ of the gross statistical relationship of parental and offspring earnings remains even after controlling for other variables

Wealth Effects

- Inheritances of wealth matter for the top of the income distribution
- Mulligan (1997) estimates the estates passing on sufficient wealth to be subject to inheritance tax in the U.S. constituted between 2 and 4 percent of deaths over the years 1960-1995
- risk preference
- raise the rate of return to schooling and other human investments
- Charles and Hurst (2002) used PSID and find that the correlation between parent income and child wealth is 0.24

Group Membership and Personality

Other traits are persistent across generations are also important: race, first language, etc

- obesity is a predictor of low earnings for women
- height predicts high earnings for men
- Good looks predict high earnings for both men and women

Race

- Bjorklund et al (2002) found that in U.S., the correlation among brother's earnings is 0.43, falls by 0.10 when the sample is restricted to whites
- This paper find that race contribute 0.07 to the intergenerational correlation
- We know relative little about the workings of the intergenerational transmission process for personality traits relevant to economic success

Conclusion

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- IQ is not a major contributor
- Many things are still unclear