

# Winners and Losers of the Industrial Revolution



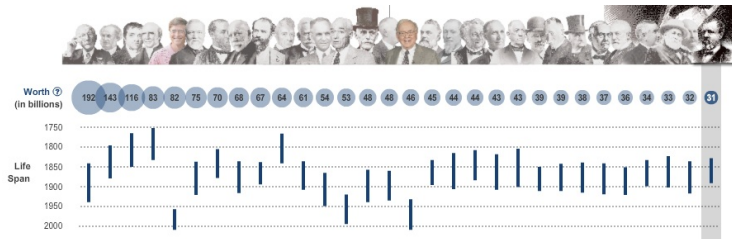
# The Industrial Revolution and Inequality

- So it seems that wealth and income inequality are lower now than in preindustrial times
- Inequality between unskilled and skilled wages is lower
- Inequality between male and female wages is lower
- Inequality in life prospects is much lower
- Why didn't all of the pessimistic predictions materialize?

# The Industrial Revolution and Inequality

- Labor income has become a bigger share of total income
- Land (which can be very unequally distributed) has declined in importance
- Movement away from brute strength to dexterity in production helped narrow male-female wage gap
- It turns out that machines did not make unskilled labor completely obsolete (machines are bad at interacting with people, identifying and manipulating physical objects in complicated ways)
- So where are the fat cats?

# The Industrial Revolution and Inequality



[http://www.nytimes.com/ref/business/20070715\\_GILDED\\_GRAPHIC.html](http://www.nytimes.com/ref/business/20070715_GILDED_GRAPHIC.html)

# The Industrial Revolution and Inequality

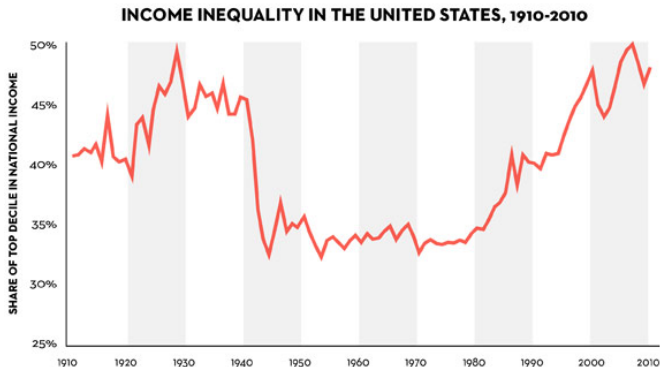
**The Ten Wealthiest Americans**

Rank	Name	Wealth	Lifetime	Industry
1	John D. Rockefeller	\$192 billion	1839-1937	Standard Oil
2	Commodore Cornelius Vanderbilt	\$143 billion	1794-1877	steamboats and railroads
3	John Jacob Astor	\$116 billion	1763-1848	fur trader, NYC real estate
4	Stephen Girard	\$83 billion	1750-1831	shipping
5	Bill Gates	\$82 billion	1955-	Microsoft
6	Andrew Carnegie	\$75 billion	1835-1919	steel
7	A.T. Stewart	\$70 billion	1803-1876	department stores
8	Frederick Weyerhaeuser	\$68 billion	1834-1914	lumber railroad, "Mephistopheles of Wall Street"
9	Jay Gould	\$67 billion	1836-1892	patron (aristocrat granted land by the Dutch)
10	Stephen Van Rensselaer	\$64 billion	1764-1839	

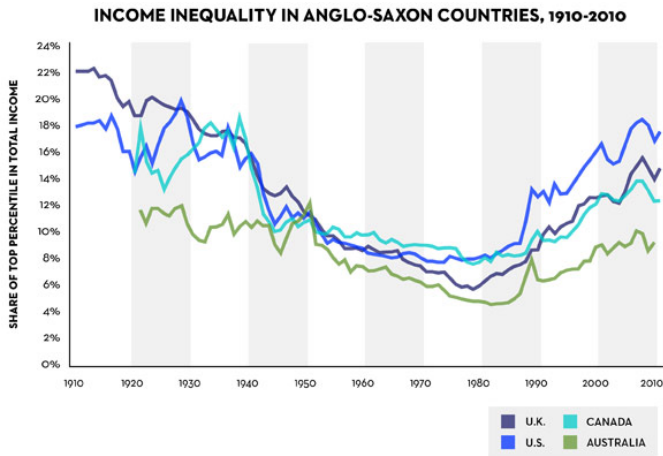
# The Industrial Revolution and Inequality



# Within-Country Inequality Over Time

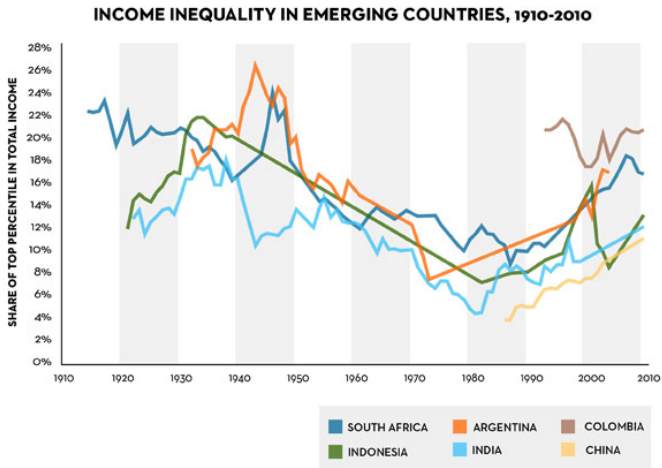


# Within-Country Inequality Over Time





# Within-Country Inequality Over Time



# The Industrial Revolution and Inequality



Augustus Caesar, 63 BC - 14 AD, personal wealth equal to  
one fifth of Roman Empire

# The Industrial Revolution and Inequality



Mansa Musa, 1280 - 1337, king of Timbuktu, more gold  
than you could imagine

# The Industrial Revolution and Inequality

President	Peak net worth (millions of 2010 \$)	Lifespan
George Washington	525	1732–1799
Thomas Jefferson	212	1743–1826
Theodore Roosevelt	125	1858–1919
Andrew Jackson	119	1767–1845
James Madison	101	1751–1836
Lyndon Johnson	98	1908–1973
Herbert Hoover	75	1874–1964
Franklin D. Roosevelt	60	1882–1945
Bill Clinton	55	1946–present
John Tyler	51	1790–1862

# Where are the super-rich capitalists?

- Many of the capitalists did not receive extraordinary profits
- Those invested in textiles faced a very competitive industry
- With a homogenous product and no major barriers to entry, textiles weren't a way to get rich
- Consumers were the ones getting the rewards
- The exception is railroads (which had barriers to entry)
- Even with railroads, there was enough competition in Britain to make consumers big beneficiaries (US railroad owners get incredibly rich)

# The Industrial Revolution and Inequality

- The distribution of income tells us a fair amount about income equality
- However, it does not necessarily tell us about equality of opportunity
- We may tolerate more inequality if there is also more mobility
- We may tolerate less inequality if there are no opportunities to move up in the income distribution

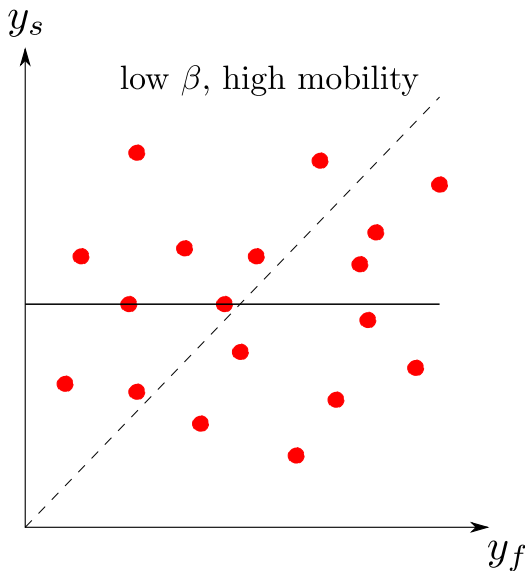
# Modern Intergenerational Mobility

- With modern data, we can estimate intergenerational mobility by looking at the strength of the relationship between father and son earnings
- In particular, we can estimate an equation like the following:

$$\ln y_s = \alpha + \beta \ln y_f + \varepsilon$$

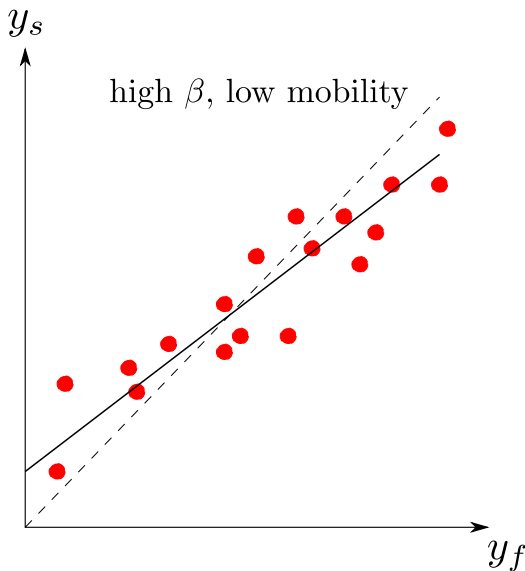
- The larger the coefficient we get for  $\beta$ , the greater the impact of father's income on son's income
- So larger values for  $\beta$  indicate lower levels of income mobility
- We call  $\beta$  the intergenerational income elasticity

# Modern Intergenerational Mobility





# Modern Intergenerational Mobility



# Modern Intergenerational Mobility

Country	Source	Elasticity
Brazil	Dunn (2007) (scaled)	0.52 (0.011)
US	Solon (1992)	0.41 (0.09)
UK	Dearden, Machin and Reed (1997) (scaled) and averaged with Nicoletti and Ermisch (2007)	0.37 (0.05)
Italy	Piraino (2007) (scaled)	0.33 (0.026)
France	Lefranc and Trannoy (2005) (scaled)	0.32 (0.045)
Norway	Nilsen et al (2008)	0.25 (0.006)
Australia	Leigh (2007a) revised as in Björklund and Jäntti (2008)	0.25 (.080)
Germany	Vogel (2006)	0.24 (.053)
Sweden	Björklund and Chadwick (2003)	0.24 (0.011)
Canada	Corak and Heisz (1999)	0.23 (0.01)
Finland	Pekkarinen et al. (2006) Österbacka (2001) Averaged as in Björklund and Jäntti (2008)	0.20 (.020)
Denmark	Munk et al (2008)	0.14 (0.004)

# Modern Intergenerational Mobility

NATIONAL QUINTILE TRANSITION MATRIX

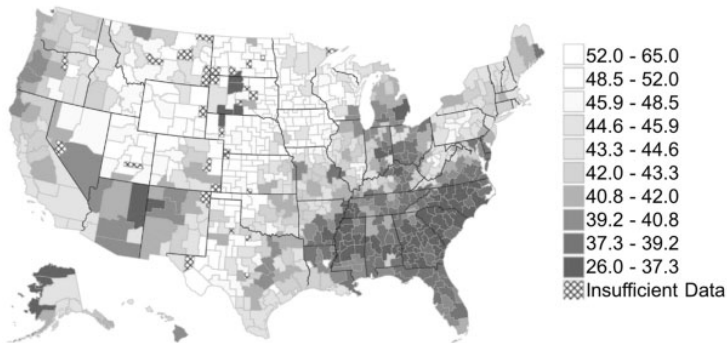
Child quintile	Parent quintile				
	1	2	3	4	5
1	33.7%	24.2%	17.8%	13.4%	10.9%
2	28.0%	24.2%	19.8%	16.0%	11.9%
3	18.4%	21.7%	22.1%	20.9%	17.0%
4	12.3%	17.6%	22.0%	24.4%	23.6%
5	7.5%	12.3%	18.3%	25.4%	36.5%

*Notes.* Each cell reports the percentage of children with family income in the quintile given by the row conditional on having parents with family income in the quintile given by the column for the 9,867,736 children in the core sample (1980–1982 birth cohorts). See notes to Table I for income and sample definitions. See Online Appendix Table VI for an analogous transition matrix constructed using the 1980–1985 cohorts.

Chetty et al., Quarterly Journal of Economics, 2014

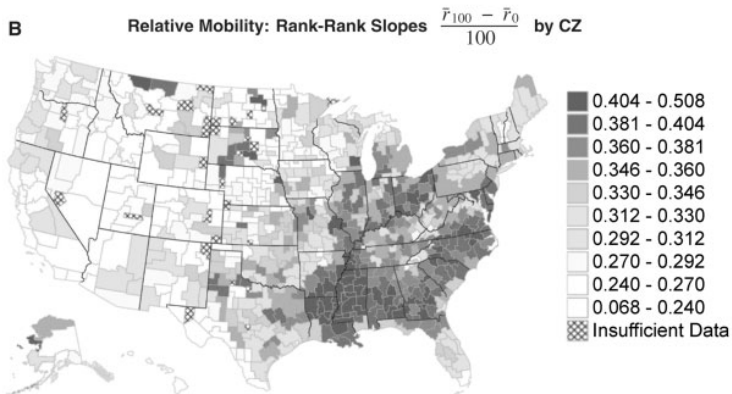
# Modern Intergenerational Mobility

**A Absolute Upward Mobility: Mean Child Rank for Parents at 25th Percentile ( $\bar{r}_{25}$ ) by CZ**



Chetty et al., Quarterly Journal of Economics, 2014

# Modern Intergenerational Mobility



Chetty et al., Quarterly Journal of Economics, 2014

# Some Warnings about Intergenerational Mobility Estimates

- We need to be a bit cautious with how we interpret intergenerational income elasticities (or other annual income-based measures)
- There are a few reasons why they may overstate mobility
  - Measurement error in income
  - Transitory fluctuations in income
  - The nature of income transmission

# Somewhat Modern Intergenerational Mobility

- Income data let us see how mobility differs across countries today
- How do we tell how it has changed over time?
- As you know by now, historical income data is hard to come by
- This is especially true if we need to both parent and child incomes
- A couple of historical censuses let us look at income mobility for the US in the early 20th century

# Modern Intergenerational Mobility

Historical and modern mobility estimates for the United States

Intergenerational mobility measure:	Estimates		Sources	
	1915 to 1940	Modern	Historical	Modern
Intergenerational income elasticity	0.249	0.35 to 0.54	Feigenbaum (2015)	Lee and Solon (2009)
Income rank-rank coefficient	0.210	0.307 to 0.317	Feigenbaum (2015)	Chetty et al. (2014)
Educational persistence	0.187	0.46	Feigenbaum (2015)	Hertz et al. (2007)
Altham-Ferrie Statistic	16.03	20.76	Feigenbaum (2015)	Ferrie (2005)

This is a modified version of Table 1 in Feigenbaum (2015).



# Modern Intergenerational Mobility

TABLE 1—INTERGENERATIONAL OCCUPATIONAL MOBILITY IN BRITAIN AND THE US,  
1949–1955 TO 1972–1973, FREQUENCIES  
(*Column percent*)

Son's occupation	Father's occupation				Row sum
	White collar	Farmer	Skilled/semiskilled	Unskilled	
Britain (Table P)					
White collar	174 (68.2)	11 (25.6)	206 (30.7)	38 (24.5)	429
Farmer	2 (0.8)	9 (20.9)	3 (0.4)	1 (0.6)	15
Skilled/semiskilled	71 (27.8)	19 (44.2)	417 (62.2)	102 (65.8)	609
Unskilled	8 (3.1)	4 (9.3)	44 (6.6)	14 (9.0)	70
Column sum	255	43	670	155	1,123
US (Table Q)					
White collar	595 (71.4)	144 (31.9)	539 (43.6)	164 (35.1)	1,442
Farmer	3 (0.4)	61 (13.5)	7 (0.6)	5 (1.1)	76
Skilled/semiskilled	186 (22.3)	193 (42.8)	576 (46.6)	236 (50.5)	1,191
Unskilled	49 (5.9)	53 (11.8)	115 (9.3)	62 (13.3)	279
Column sum	833	451	1,237	467	2,988

*Note:* Occupation of father when respondent was age 14 (Britain) or age 16 (US), compared to occupation at survey in 1972 (Britain) or 1973 (US), males 31–37 (Britain) and 33–39 (US) in survey year.

# Modern Intergenerational Mobility

TABLE 3—INTERGENERATIONAL OCCUPATIONAL MOBILITY IN BRITAIN AND THE US,  
1850–1851 TO 1880–1881, FREQUENCIES (*Column percent*)

	Father's occupation				
Son's occupation	White collar	Farmer	Skilled/semiskilled	Unskilled	Row sum
Britain (Table P)					
White collar	103 (36.6)	31 (11.1)	219 (13.3)	63 (7.3)	416
Farmer	8 (2.8)	114 (40.9)	39 (2.4)	21 (2.4)	182
Skilled/semiskilled	143 (50.0)	90 (32.3)	1,155 (70.2)	386 (44.6)	1,774
Unskilled	32 (11.2)	44 (15.8)	233 (14.2)	395 (45.7)	704
Column sum	286	279	1,646	865	3,076
US (Table Q)					
White collar	55 (38.5)	177 (12.9)	82 (22.6)	30 (23.3)	344
Farmer	44 (30.8)	850 (62.0)	92 (25.3)	35 (27.1)	1,021
Skilled/semiskilled	33 (23.1)	214 (15.6)	166 (45.7)	40 (31.0)	453
Unskilled	11 (7.7)	129 (9.4)	23 (6.3)	24 (18.6)	187
Column sum	143	1,370	363	129	2,005

*Note:* Occupation of father in 1851 (Britain) or 1850 (US) when son was age 13–19, compared to occupation of son in 1881 (Britain) or 1880 (US), males 43–49 in 1881 (Britain) or 1880 (US).

# Somewhat Modern Intergenerational Mobility

- Intergenerational income data is too rare to make income mobility useful for other countries or other time periods
- One alternative is to look at occupational mobility across generations although even that is tough
- Looking at occupational transitions, mobility has declined in the US over the past 150 years (see Ferrie and Long's work)
- What about going way back?

# Historical Intergenerational Mobility

- We don't really stand a chance of finding father and son's incomes or occupations prior to the Industrial Revolution (or really the 20th century)
- We need some alternative way to consider mobility across generations
- One possibility: use surnames that tell us whether ancestors were high status or low status
- Then look at high or low status groups in more recent periods to see how frequently these names appear
- We'll look at evidence from *The Son Also Rises* on artisan names and locative names

# Historical Intergenerational Mobility

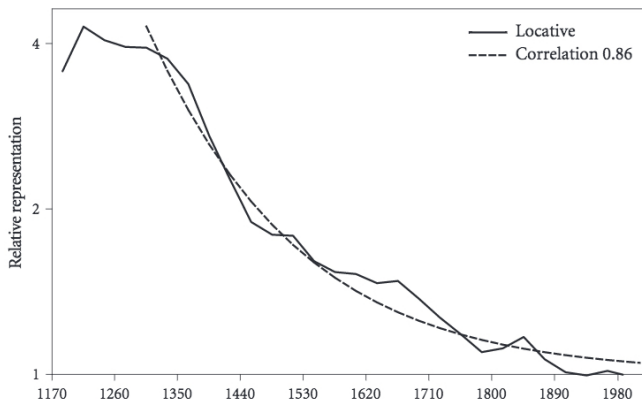


FIGURE 4.4. Locative surnames at Oxford and Cambridge, 1170–2012.

Examples: Mandeville, Montgomery, Baskerville, Percy, Neville,  
Beaumont

# Historical Intergenerational Mobility

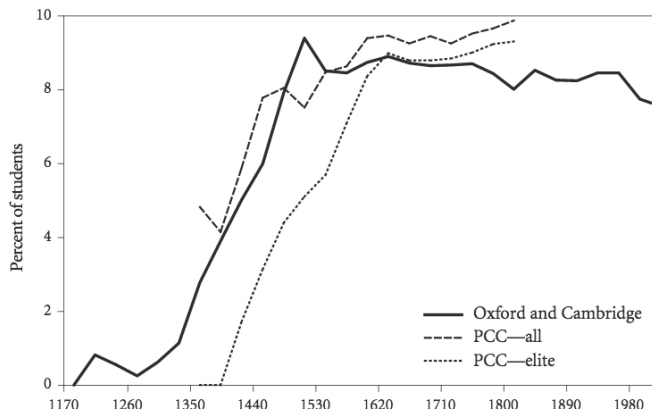


FIGURE 4.1. Percentage of artisan surnames among English elites, 1170–2012.

Examples: Smith, Baker, Cook, Carter, Wright, Shepherd, Butler

# Changes in Intergenerational Mobility Over Time

- Elites and non-elites rose and fell in socioeconomic status at rates comparable to modern times
- Consider our two living super-rich Americans
- Bill Gates' grandfather was a national bank president and his father was a prominent lawyer
- Warren Buffet's father was a four-term congressman
- We may not have hereditary titles or a landed elite, but we do have status passed from one generation to the next today
- Why might that be the case in what we like to think of our society as a meritocracy?

# Changes in Intergenerational Mobility Over Time

- In many ways, a meritocracy places strong value on human capital
- We have all sorts of ways that parents with means can invest in their children's human capital
- Think about private schools, tutors, college tuition, books, etc.
- This will tend to decrease mobility
- Working in the opposite direction are the effects of public education
- To see the complex relationship between mobility and human capital, let's take a look at what happened when public high schools were introduced in the US



# Changes in Intergenerational Mobility Over Time

- The High School Movement occurred during the early 20th century
- Common schools were replaced with graded schools, high schools were built letting students expand their studies past the traditional 8 years
- High school became an option for everyone, not just those planning to go a traditional college route
- Overall, access to school and the quality of schools rose tremendously
- What did this do to mobility?

# Changes in Intergenerational Mobility Over Time



# Changes in Intergenerational Mobility Over Time

Card No. <u>469</u>	Name <u>John H. Cigans</u>	Age <u>4 1/2</u>
Sex <u>Female</u>	County <u>Adair</u>	P.O. <u>Frontonville</u>
Color <u>White</u>	Town or Township <u>Frontonville</u>	Ward _____
Married <input checked="" type="checkbox"/> Widowed _____	Occupation <u>Teacher</u>	Months in 1914 Unemployed <u>1</u>
Single _____ Divorced _____	Total earnings for 1914 from occupation \$ <u>19.00</u>	
Months in School 1914 _____	Extent of Education { Common <u>8</u> High School <u>3</u> College <u>2</u>	
Public _____ High _____	Birth Place <u>Iowa</u>	Do you own your home or farm? { Yes _____ No _____
Private _____ College _____	Incumbrance on farm or home \$ _____	Value of farm or home \$ _____
Read <u>Y</u>	Military Service: Civil War _____ Mexican _____ Spanish _____ Infantry _____ Cavalry _____	
Write <u>Y</u>	Artillery _____ Navy _____ State _____ Regiment _____ Company _____	
Blind _____ Deaf _____	Church Affiliation <u>Congregational</u>	
Insane _____ Idiot _____	Father's Birthplace <u>Ohio</u>	
If Foreign Born are you Naturalized _____	Remarks <u>✓ G.B. Miller</u>	
Years in U. S. _____	Signed _____	
Years in Iowa <u>40</u>		

# Changes in Intergenerational Mobility Over Time

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TWELFTH CENSUS OF THE UNITED STATES.

Schedule No. 1.—POPULATION.

State Iowa County Clark Supervisor's District No. 8 Sheet No. 37

Township or other division of county Pray Township Name of Institution, X

Name of incorporated city, town, or village, within the above-named division Meccary Village Ward of city, X

Examined by me on the 15 day of June, 1900, E. R. O'Leary Enumerator.

LOCATIONS	NAME	RELATION	PERSONAL DESCRIPTION	SATIVITY			CITIZENSHIP	OCCUPATION, TRADE, OR PROFESSION	EDUCATION	NUMBER OF BORN
				Place of birth of this person	Place of birth of father	Place of birth of mother				
1	2	3	4	5	6	7	8	9	10	11
1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6
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99	99	99	99	99	99	99	99	99	99	99
100	100	100	100	100	100	100	100	100	100	100

# Changes in Intergenerational Mobility Over Time

Annual Report of		Apparose		County for 1900																				
DISTRICTS		SCHOOLS		TEACHERS AND PUPILS										GENERAL										
Name of School Township and Independent Districts		Number of Schools	Number of Teachers	Number of Pupils	Number of Teachers	Average Compensation per Month	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils	Number of Pupils
Bellevue School Tr. 1		5	5	71	5	510.55	2140	66	68	146	100	162	5	1250										
Bellevue		4	4	6	4	514.55	3235	19	194	280	180	12	9	3600										
Bellevue		6	6	61	6	530	2825	1	51	145	100	12	6	1800										
Bellevue		5	5	54	5	526.55	2550	13	80	145	133	19	9	510										
Bellevue		8	8	64	8	627.55	2450	127	113	262	164	140	8	3900										
Bellevue		7	6	65	7	627.55	2363	36	91	141	122	13	7	1500										
Bellevue		6	6	6	6	326	26	67	65	122	92	82	6	1400										
Bellevue		5	5	6	5	527.62	2541	111	104	154	122	131	5	2375										
Bellevue		6	7	66	6	423.62	2415	100	128	239	126	137	6	1900										
Bellevue		7	7	81	7	102.75	2278	153	145	215	114	122	7	2000										
Bellevue		6	6	72	6	152.51	22352	198	156	269	175	160	9	2700										
Bellevue		7	7	8	7	92.66	2276	168	179	321	209	127	9	4800										
Bellevue		10	10	77	6	132.75	2439	197	210	286	176	197	10	1375										
Bellevue		1	1	27	5	30		136	121	177	108	83	2	900										
Bellevue		2	2	3	2	284.75	4312	105	113	146	129	124	3	8375										
Bellevue		4	4	1	4	251	217	350	233	99			1	6700										
Bellevue		2	2	1	2	238.93	25	49	35	84	41	106	1	1200										
Bellevue		2	2	3	2	2870		115	59	67	123	67	89	1	1800									
Bellevue		1	1	1	1	360	30	15	36	1	260	25	68	1	20									
Bellevue		4	4	2	4	540	38	203	215	393	280	25	1	20000										
Bellevue		4	4	1	4	975	30	304	261	451	281	115	3	9400										
Bellevue		2	2	1	2	210.25	2350	285	27	66	86	98	1	800										
Bellevue		16	2	3042		64	68	112	59	103	1	900	15	4	2									
Bellevue		3	3	1	3	150	30	38	72	120	40	22	1	3200										
Bellevue		2	2	1	2	265.00	1960	31	301	77	40	58	1	200										
Bellevue		1	1	1	1	35	20	17	17	27	14		1	600										
Bellevue		1	6	1	6	30		37	32	58	49	103	1	100										
Bellevue		1	6	1	6	25		18	14	29	17	47	1	300										
Bellevue		1	6	2	6	2666		19	17	35	25	106	1	700										
Bellevue		1	6	1	6	2267		6	8	5	4594		1	400										
Bellevue		1	7	1	7	126.57	2657	13	11	18	11	242	1	775										
Bellevue		1	8	1	8	131	20	26	22	40	23	142	1	600										
Bellevue		1	7	2	7	140	20	16	18	34	23	143	1	300										
Bellevue		1	7	2	7	232.4		12	16	18	15	47	1	200										
Bellevue		1	7	2	7	232.1		18	10	26	12	146	1	200										
Bellevue		1	7	2	7	242.9		11	8	19	11	240	1	200										
Bellevue		1	7	1	7	238.00		15	16	33	22	123	1	200										
Bellevue		2	7	4	7	321.4		41	33	71	26	123	2	700										
Bellevue		1	7	3	7	17.89		22	12	30	19	109	1	300										
Bellevue		1	7	1	7	128	20	16	16	27	20	148	1	500										
Bellevue		1	7	2	7	120	20	14	14	21	20	148	1	500										
Bellevue		1	7	2	7	287.1		13	11	20	14	151	1	500										
Bellevue		1	5	2	5	240.0		22	18	23	12	168	1	200										
Bellevue		1	7	2	7	242.8		5	8	12	7747		1	300										
Bellevue		1	7	1	7	230	22	18	8	23	17	107	1	500										
Bellevue		1	7	1	7	120	20	9	12	20	18	143	1	300										
Bellevue		1	8	1	8	256.9		29	29	39	24	106	1	400										

# Changes in Intergenerational Mobility Over Time

Table 3: Intergenerational Income Elasticities, 1915  
and 2001

Sample	Elasticity
Iowa, full sample	0.109 (0.030)
PSID, 20-35	0.289 (0.037)
PSID, 25-40	0.312 (0.034)

Standard errors given in parentheses.

# Changes in Intergenerational Mobility Over Time

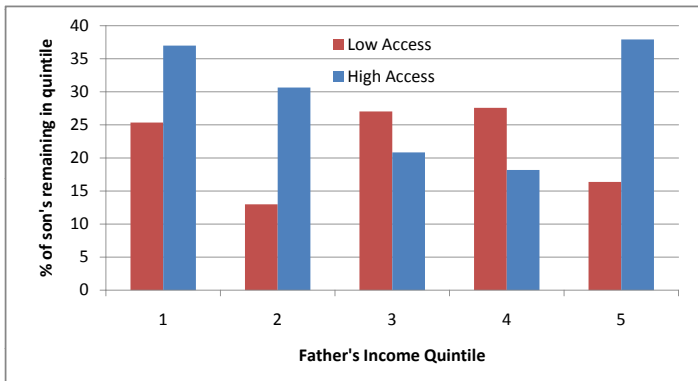
Table 6: Coefficients for school quality/access interaction terms

School Measure	Earnings x Schooling Measure Coefficient	
	Urban Districts	Rural Districts
graded schools dummy	--	-.044
	--	(.059)
spending per student	0.024	.012
	(.068)	(.008)
classrooms per sq. mile	-.033	.230
	(.009)	(.128)
graded classrooms	-.027	.275
per sq. mile	(.008)	(.111)
student-teacher ratio	-.000	-.004
	(.000)	(.001)
subsidy per student	.000	.017
	(.011)	(.004)

Standard errors in parentheses

# Changes in Intergenerational Mobility Over Time

Figure 6: Percentage of sons remaining in their father's income quintile.

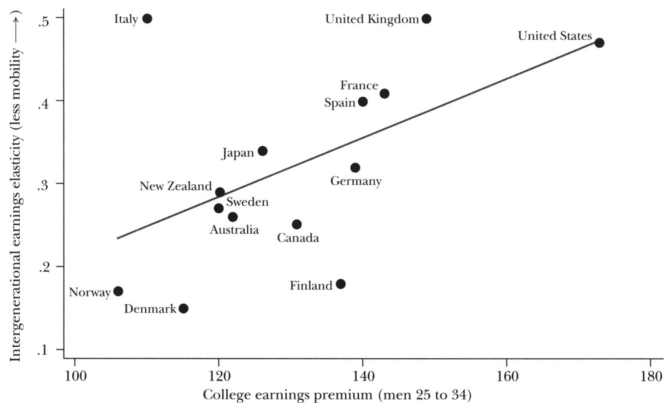




# Inequality and Mobility

*Figure 4*

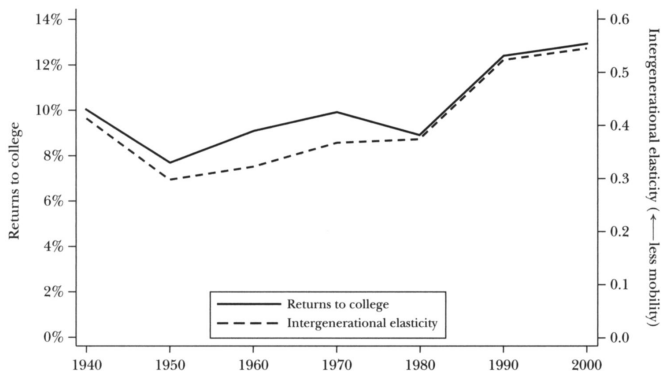
**Higher Returns to Schooling are Associated with Lower Intergenerational Earnings Mobility**



# Inequality and Mobility

*Figure 5*

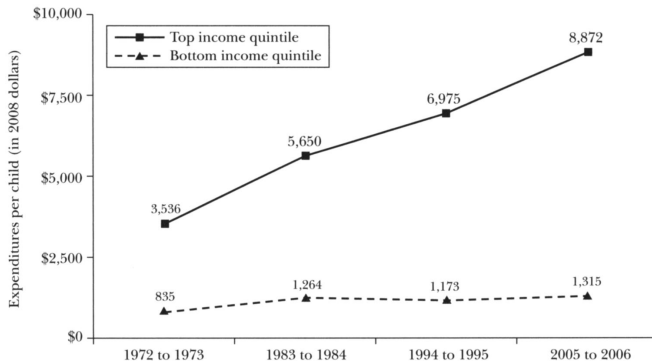
**The Higher the Return to College, the Lower the Degree of Intergenerational Mobility: United States, 1940 to 2000**



# Inequality and Mobility

Figure 6

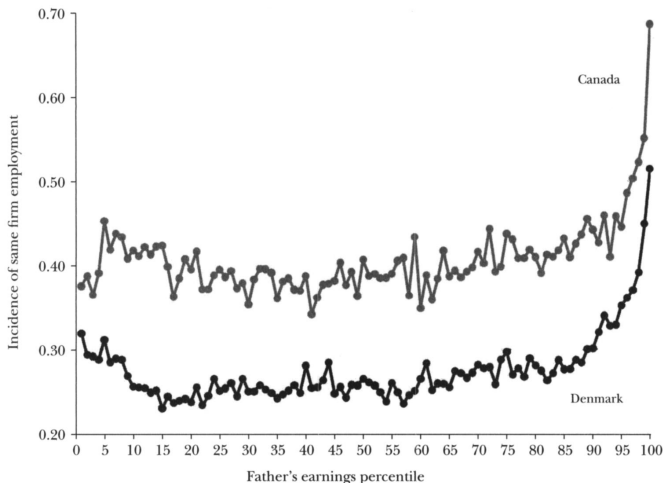
**Money Matters: Higher-Income Families in the United States Have Higher Enrichment Expenditures on Their Children**



# Inequality and Mobility

Figure 7

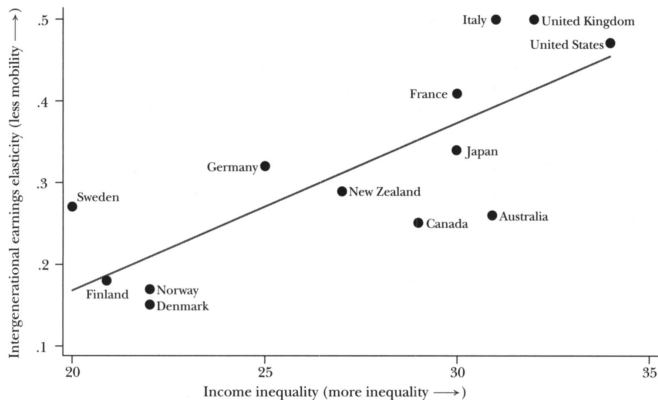
**Proportion of Sons Currently Employed or Employed at Some Point with an Employer their Father had Worked for in the Past: Canada and Denmark**  
(by father's earnings percentile)



# Inequality and Mobility

*Figure 1*

**The Great Gatsby Curve: More Inequality is Associated with Less Mobility across the Generations**



*In 1972 a storm of protest from blue-collar workers greeted Senator McGovern's proposal for confiscatory estate taxes. They apparently wanted some big prizes maintained in the game. The silent majority did not want the yacht clubs closed forever to their children and grandchildren while those who had already become members kept sailing along. – Arthur Okun, 1975*