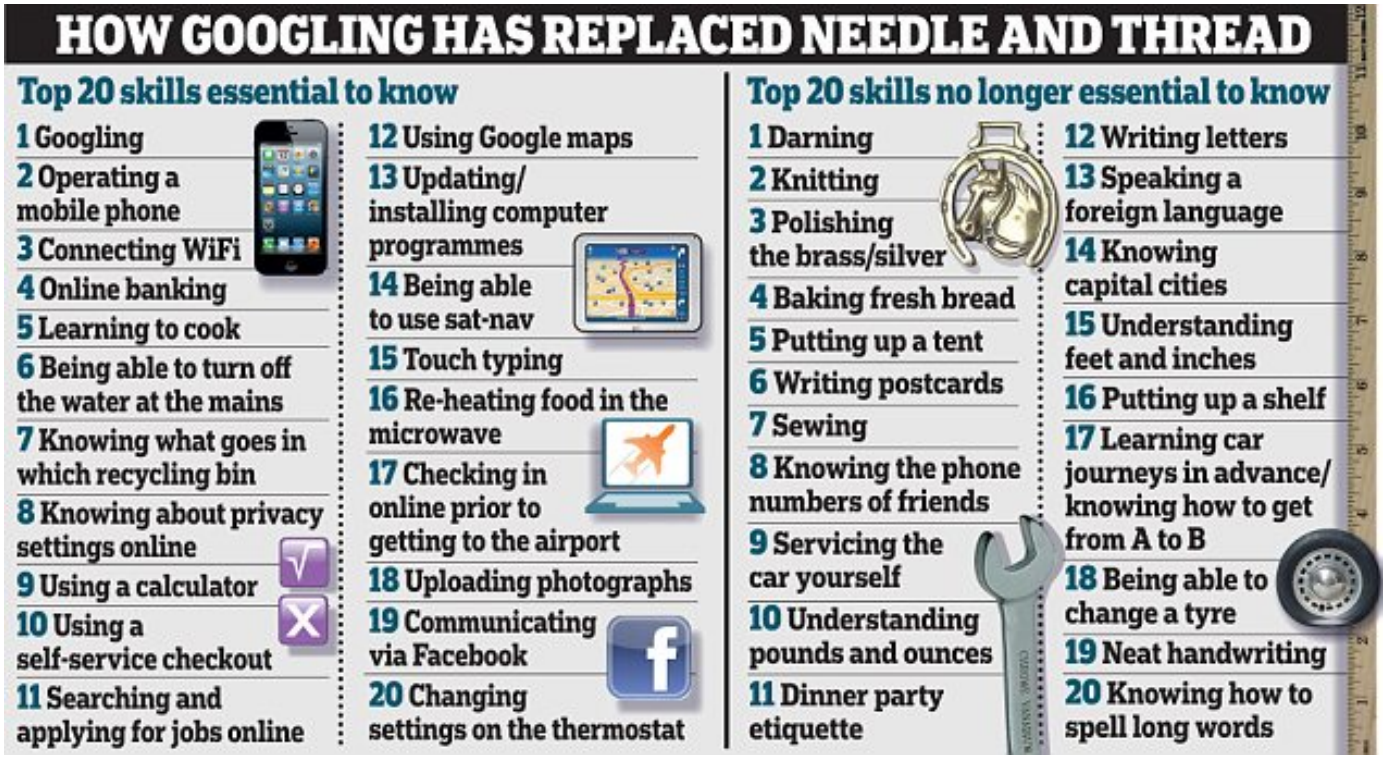
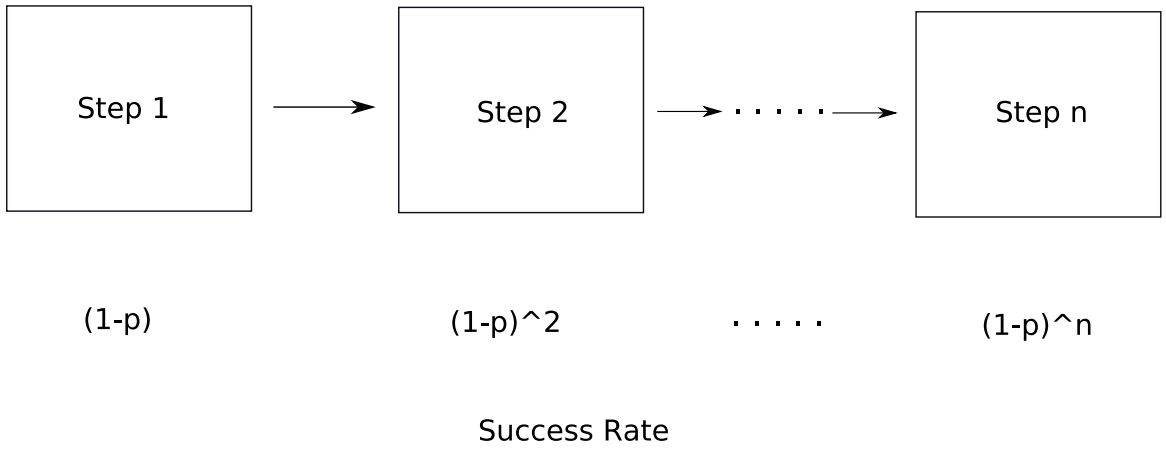
Technology-Skill Complementarities

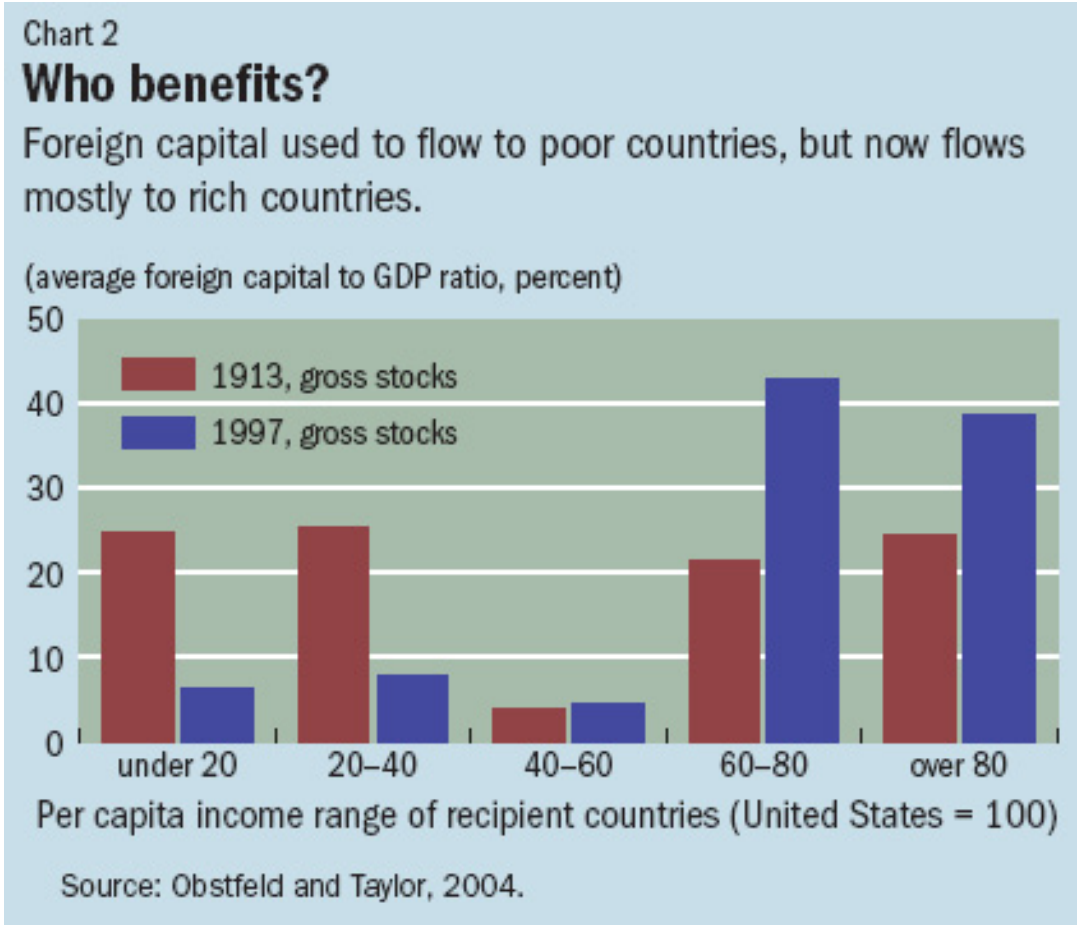


http://www.dailymail.co.uk/news/article-2413664/Forget-darning-baking-fixing-car–skills-REALLY-need-21st-century-setting-satnav-putting-rubbish-right-bin.html

Getting Back to the Great Divergence



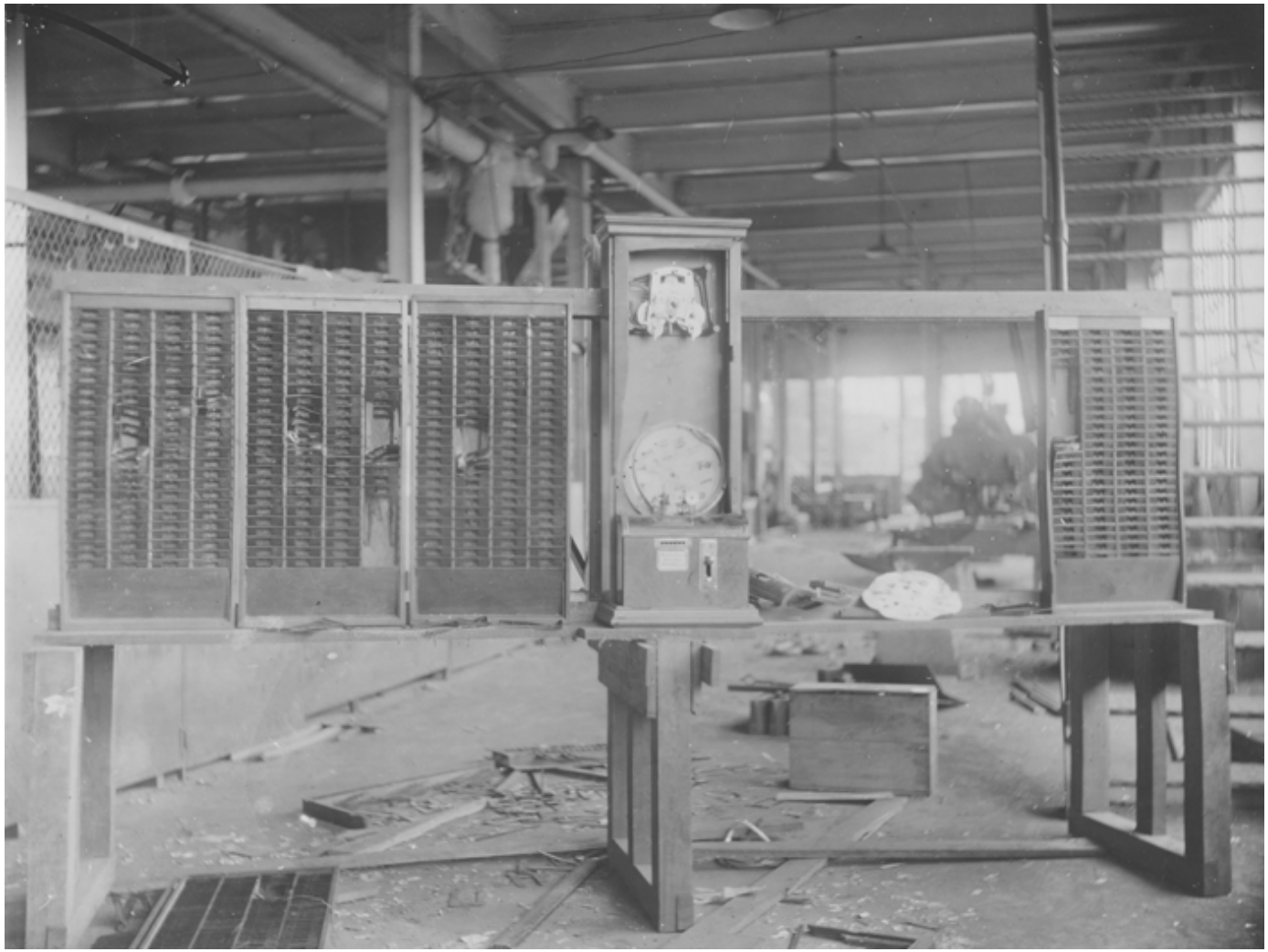
Getting Back to the Great Divergence



Technology and the Great Divergence

- So why is a low-skilled labor force problematic with modern technology?
- Modern production process are complex, one worker messing up can have dramatic impact on output
- Technology has also evolved in ways that favor high skill workers
- This isn't just about engineering skill, many sectors now require computer and communication skills
- There are new service sector jobs that may require less skill but may also require geographical (or cultural) proximity
- So the path of technological change has created bigger benefits for high-skilled countries and potentially left low-skilled countries behind

Winners and Losers of the Industrial Revolution



The Benefits of the Industrial Revolution

- How were the benefits of the Industrial Revolution distributed?
- Did some groups benefit at the expense of others?
- Which factors of production became more important and which became less important?
- Was the Industrial Revolution the triumph of greedy capitalists at the expense of workers?

A Pessimistic View of the Industrial Revolution

A Pessimistic View of the Industrial Revolution

A Pessimistic View of the Industrial Revolution

How do we determine who gained from the Industrial Revolution?

- We know that the big difference between the modern economy and the preindustrial world is sustained efficiency advances
- If more output is produced per unit of capital, labor and land, then payments to these factors must increase
- Brings us to a slight twist on our growth accounting equations:

$$g_A = ag_r + bg_w + cg_s$$

Land Rents

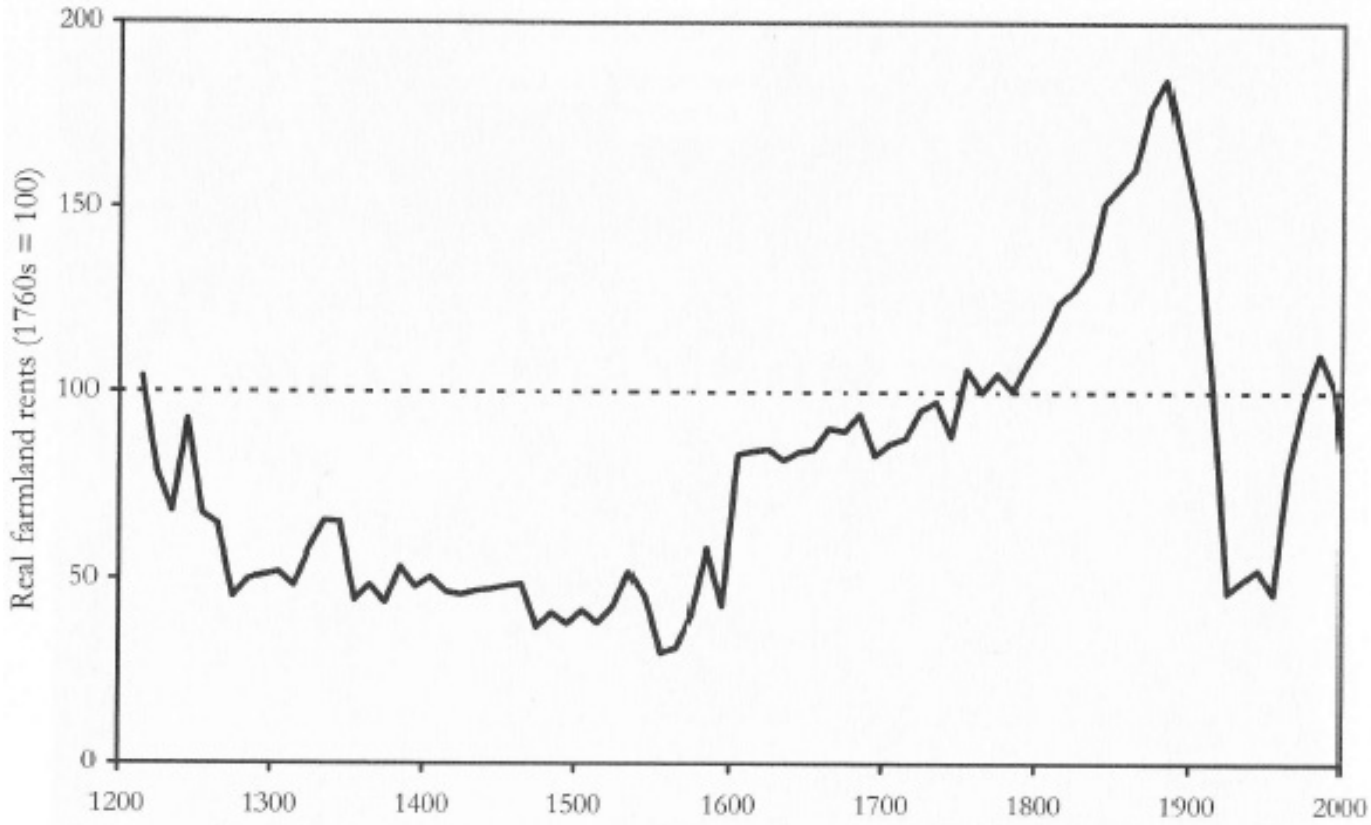


Figure 14.2 Real farmland rents per acre in England, 1210–2000.

What about urban land?

Modern Land Rents

Listing	Type	Land	Price per acre
Midtown Manhattan	Parking Lot	.22 acres	$21,894,500
Tuscarawas, OH	Pasture/Dairy	140 acres	$5,000
Dawson, MT	Farmland	480 acres	$700

What about urban land?

What about other natural resources?

What about other natural resources?

- 7.08 billion barrels of petroleum products were consumed in the US in 2015 (www.eia.gov)
- Crude oil averaged $49 a barrel in 2015 (www.weia.gov)
- US GDP was $17,947 billion in 2015 (www.bea.gov)
- So oil consumption represented roughly 1.9 percent of GDP

Land Rents

- So the owners of land don't seem to be the big gainers from the Industrial Revolution
- Farmland rents aren't any higher in real terms than they were before the Industrial Revolution
- Urban rents have risen quite a bit but still only represent a small fraction of the total share of income in modern economies
- So we could think of our accounting formula as being reduced to:

$$g_A \approx a g_r + b g_w$$

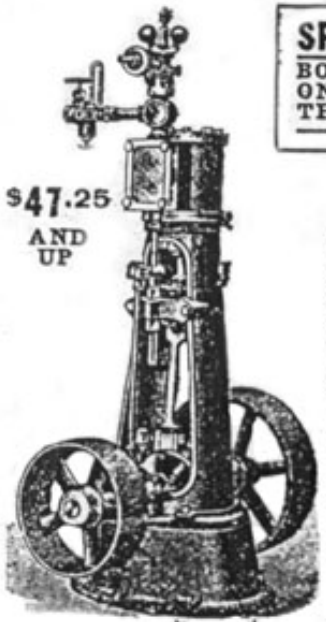
Returns to Physical Capital

- The rental rate of capital is just the real interest rate
- We've already seen that modern interest rates are lower than preindustrial interest rates
- So if anything, the growth in g_r has been close to zero or even negative
- However, payments to capital have expanded tremendously since the Industrial Revolution (just think of all those new factories)
- The increase in payments has been a result of the expansion of capital stock, not the return to a unit of capital

Returns to Physical Capital

554 SEARS, ROEBUCK & CO., CHICAGO,

STEAM ENGINES



$47.25 AND UP

SPECIAL NOTE WHEN YOU ORDER A VERTICAL ENGINE AND A BOILER TOGETHER THEY WILL BE MOUNTED ON SEPARATE BASES UNLESS YOU TELL US THAT YOU WANT THEM MOUNTED ON A COMBINED BASE.

Kenwood Vertical Steam Engines.

These engines are of the center crank type with throttling governor, perfect in design, thoroughly well built and of the best of materials. They are low and compact, combining great strength and rigidity, are nicely finished and handsomely painted. Every point which could add to the strength and durability of the engine has been carefully considered and adopted. They are the best plain side valve vertical steam engines which can be built, are up to date in every particular and give perfect satisfaction to every user. We guarantee that they will give you equally as perfect satisfaction, or they can be returned at our expense, and we will promptly return your money. These engines are sold under our regular free trial terms, excepting that we allow thirty days' trial on them instead of ten days. Each engine is furnished with governor, governor belt, governor pulley, oil cups, throttle valve, cylinder lubricator, belt pulley and fly wheel, and is complete, ready to start. Steam and exhaust pipe is not furnished unless a boiler is ordered with the engine, and foundation bolts or rods are not furnished by us under any circumstances. Shipped from factory in Southwestern Michigan.

NOTE OUR REDUCED PRICES

Catalogue Number	Horse Power	Size of Cylinder, Inches	Diameter of Shaft, Inches	Size of Fly Wheel, Inches	Size of Belt Pulley, Inches	Steam Pipe, Inches	Exhaust Pipe Inches	Revolutions, Per Minute	Weight in Pounds	Price
32K4801	1½	2½x3½	1⅛	13x3½	6x3½	⅝	½	400	250	$ 47.25
32K4802	2½	3 x4½	1⅜	16x4½	10x4½	½	¾	350	325	59.50
32K4803	3	3½x4½	1⅝	16x4½	10x4½	½	¾	350	350	65.75
32K4804	4	4 x5	1⅝	17x4½	12x4½	¾	1	325	500	75.90
32K4806	6	5 x6½	2	20x6	14x6½	1	1¼	250	750	99.50
32K4808	8	6 x8	2⅛	24x6	16x7	1¼	1½	200	1250	116.75
32K4810	10	7 x8	2½	26x6¾	18x8	1½	2	200	1500	138.00

3 HP for approximately $1,750 2015 USD

Returns to Physical Capital

ɔor Power Equipment / Lawn Mowers / Push Lawn Mowers

:300193832 Store SKU #1000023290

Yard Machines

20 in. 125cc OHV Briggs & Stratton Gas Push Mower

★★★½☆ (426) Write a Review Questions & Answers (6)

- 125 cc Briggs & Stratton 300e series engine
- 20 in. cutting deck with side discharge
- Fully assembled in the box, just unfold the handle

NEW LOWER PRICE Was $149.00

$139.00 /each

Save $10.00 (7%)

☐ **LET'S PROTECT THIS.**

Add a 2-year Home Depot Protection Plan for **$18.00**

Learn More

Returns to Physical Capital

The Model 60...has a 60-megabyte, half-height hard disk...It costs $7,499...The 130-Mb drive actually stores and retrieves data faster than its smaller sibling, thanks to a special memory controller device that comes with the Models 130 and 300. Yes, 300. The monster comes with a fixed disk that can hold more than 300 million characters of data...It costs $12,499. – New York Times, January 10, 1988

Returns to Physical Capital

Roll over image to zoom in

mosDART

mosDART 4GB 3pack USB2.0 Flash Drive Thumb Drive Pen Drive Jump Drive,Green/Blue/Pink

4.5 out of 5 stars ▾ 67 customer reviews

Price: ~~$25.89~~
Sale: $14.55 Prime | **FREE** One-Day
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Want it tomorrow, April 18? Order within **3 hrs 54 mins** and choose **One-Day Shipping** at checkout.
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- Super value usb flash drives: Includes 3pcs of 4GB Genuine memory bulk USB Flash Drive
- Plug And Use: No need to install any software, just simple plug into the USB port of computer or other devices and use it! The USB Flash Drive is compitable with Windows 98second

Returns to Physical Capital

- So the size of the capital stock is massive and a reasonably large share of payments go to capital
- But big values for g_K or a don't really matter for dividing up the gains from g_A
- What really matters is g_r
- If g_r is approximately zero, our accounting formula is further reduced to:

$$g_A \approx b g_w$$

- Note that this is not saying that there aren't rich owners of capital

Wages Over Time

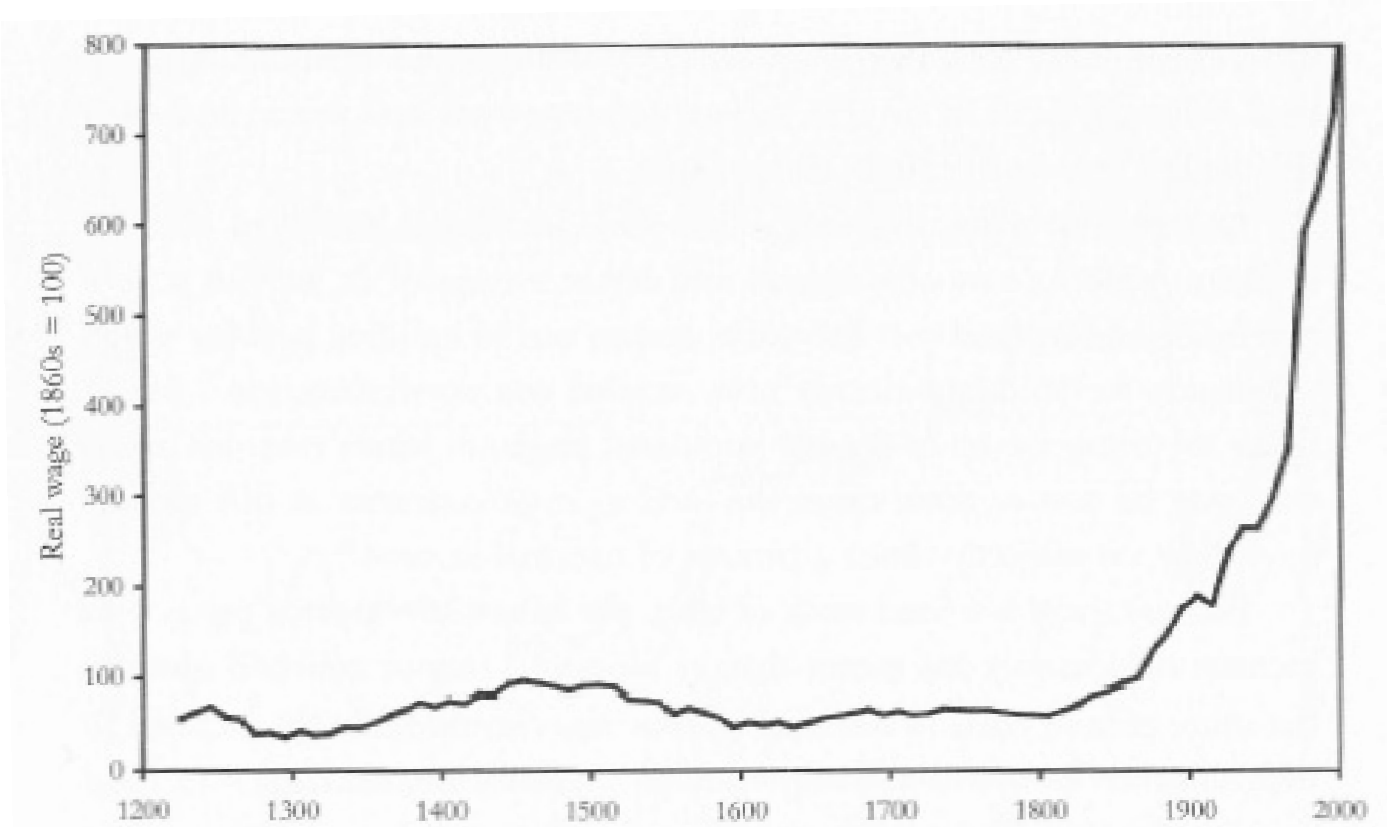


Figure 14.3 Real hourly wages for building laborers in England, 1220–2000. Data from Clark, 2005.

How much does an improvement in technology increase wages?

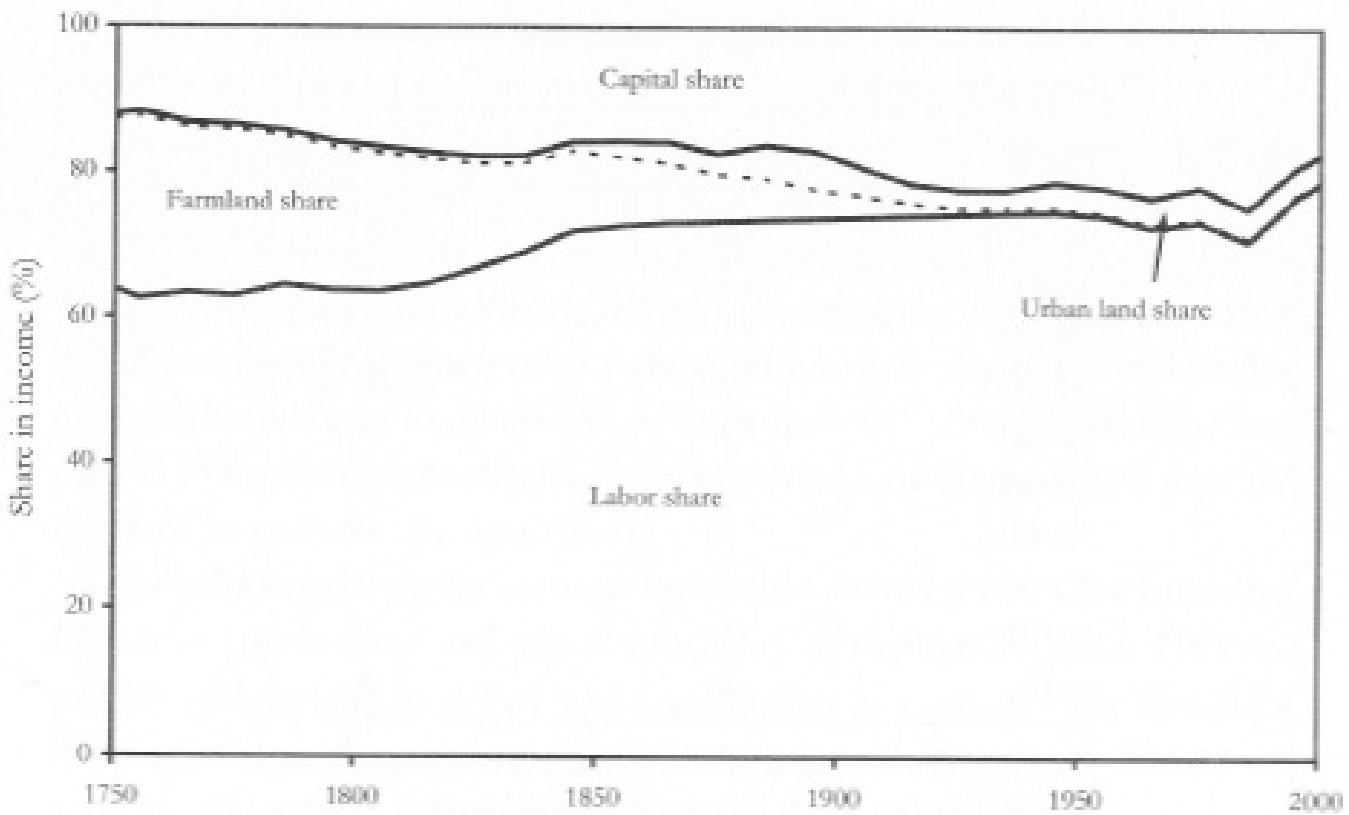


Figure 14.4 Shares of labor, capital, and land in net national income in England, 1750–2000. The urban and farmland shares were derived as in figure 10.3.

How much does an improvement in technology increase wages?

- The previous figures shows that roughly 75% of national income in England goes to labor
- If $g_A \approx b g_w$, then the growth in wages resulting from technological advance will be $\frac{4}{3} g_A$
- A one percent increase in efficiency produces an increase in average wages of 1.3 percent
- This doesn't tell us which types of workers were benefiting the most

The Modern Distribution of Wages and Wealth

Distribution of Wages and Wealth, United Kingdom, 2003-04

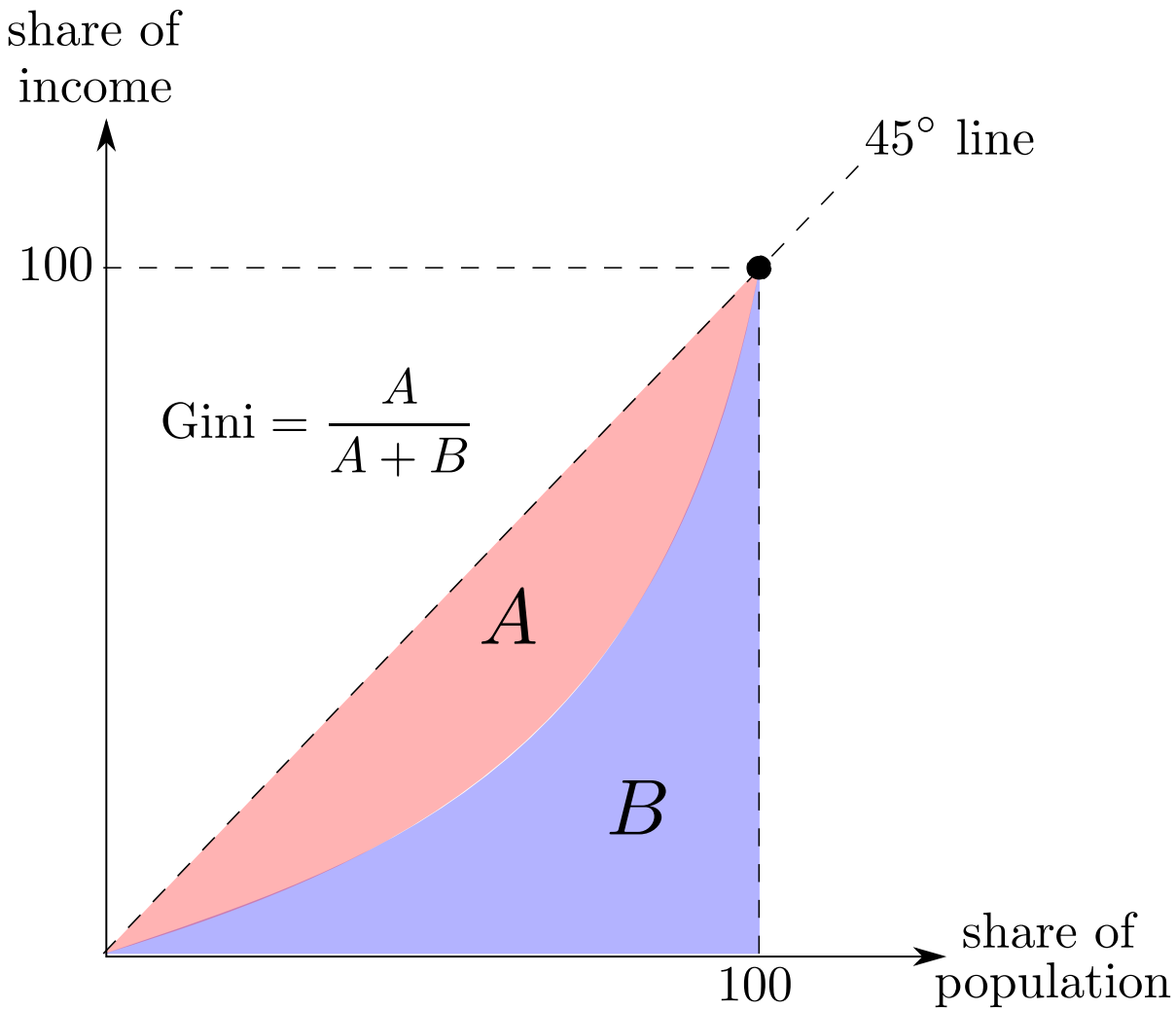
Decile	Share of wages	Share of wealth
90-100	26	45
80-90	14	16
70-80	12	10
60-70	10	10
50-60	9	8
40-50	8	5
30-40	7	4
20-30	6	2
10-20	5	0
0-10	4	0

The Preindustrial Distribution of Wealth

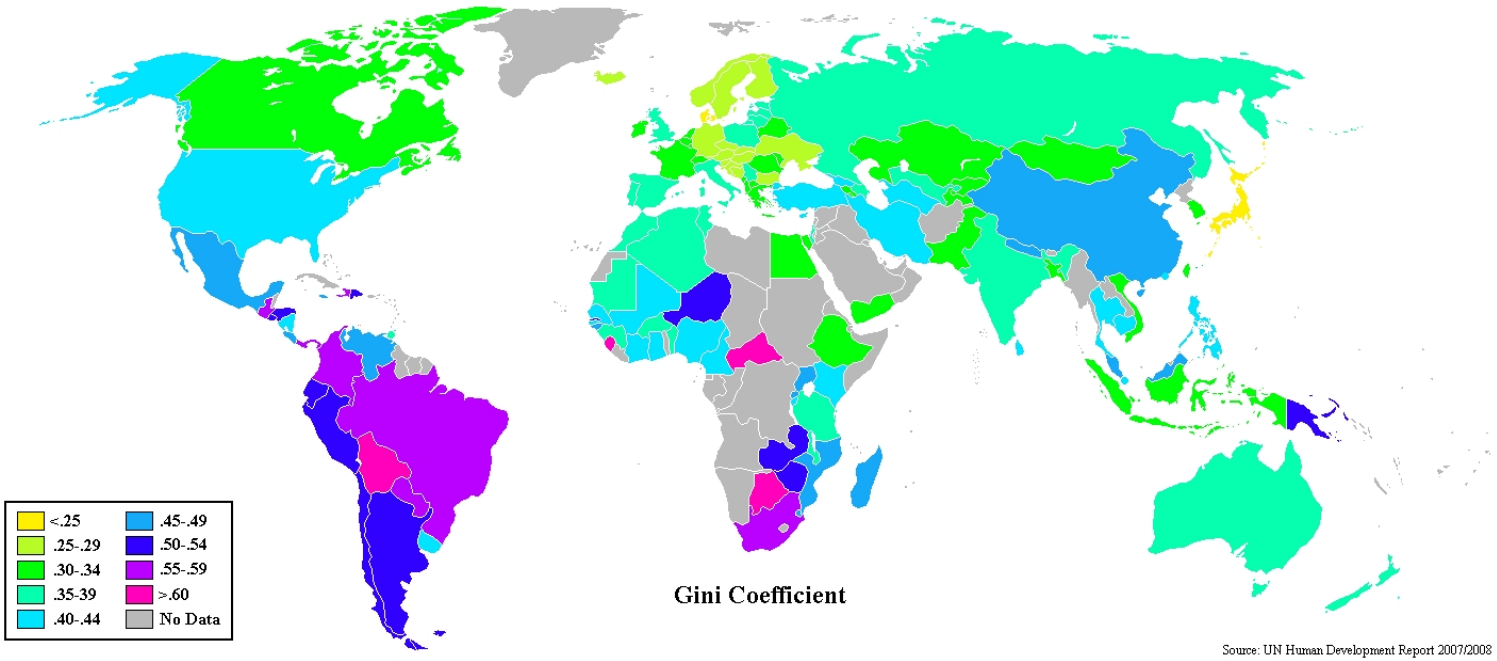
Preindustrial Wealth Distributions

Location	Year	Top 1%	Top 5%
Perugia	1285	18	29
Paris	1292	26	52
London	1319	34	57
Florence	1427	27	67
England	1670	49	73
England	1740	44	74
England	1875	61	74
United Kingdom	2003	17	32

The Distribution of Income



The Distribution of Income



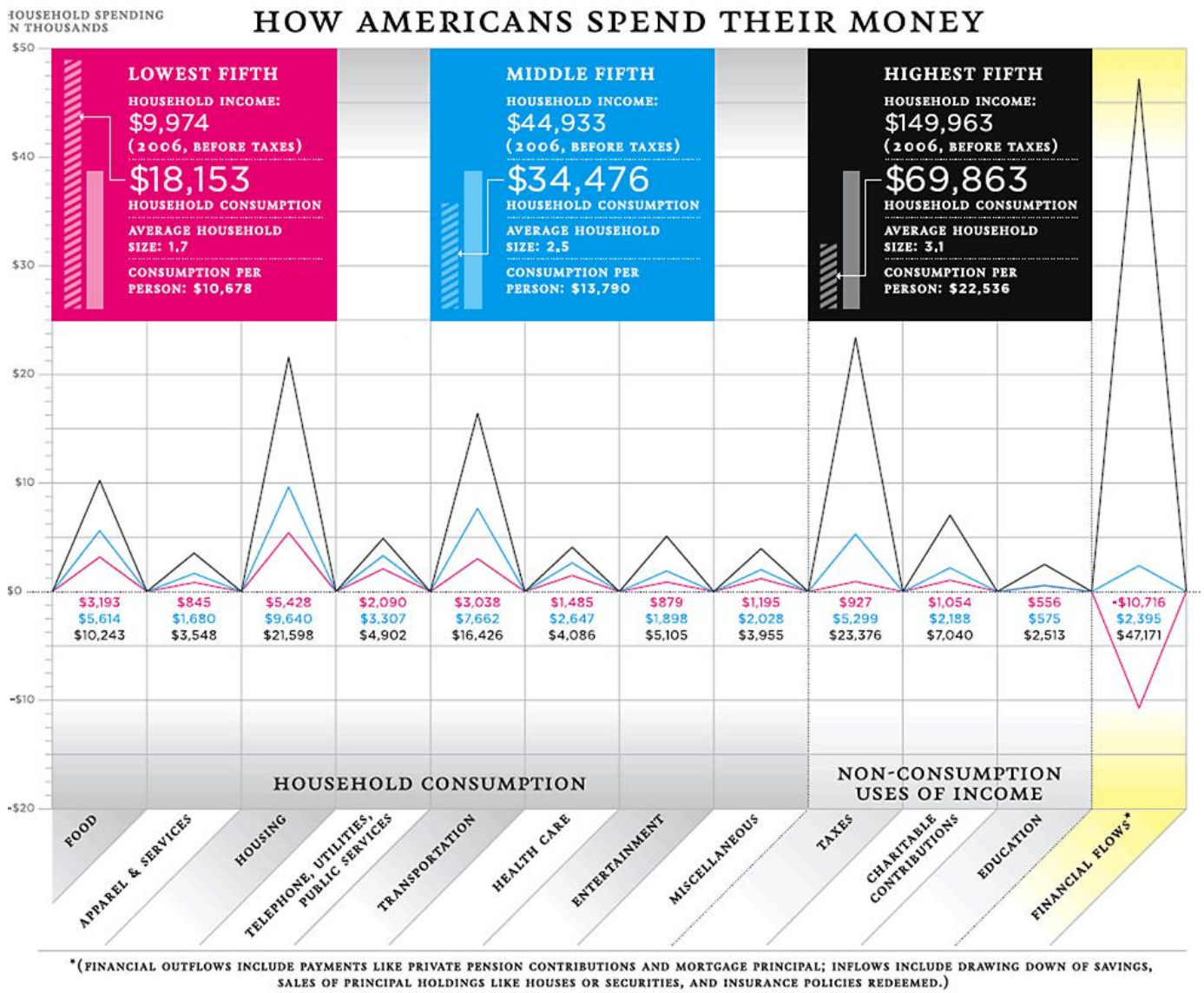
Gini coefficient for Byzantium (1000): .45, Gini coefficient for medieval France (1300): 0.7

Skill, Gender and Wages

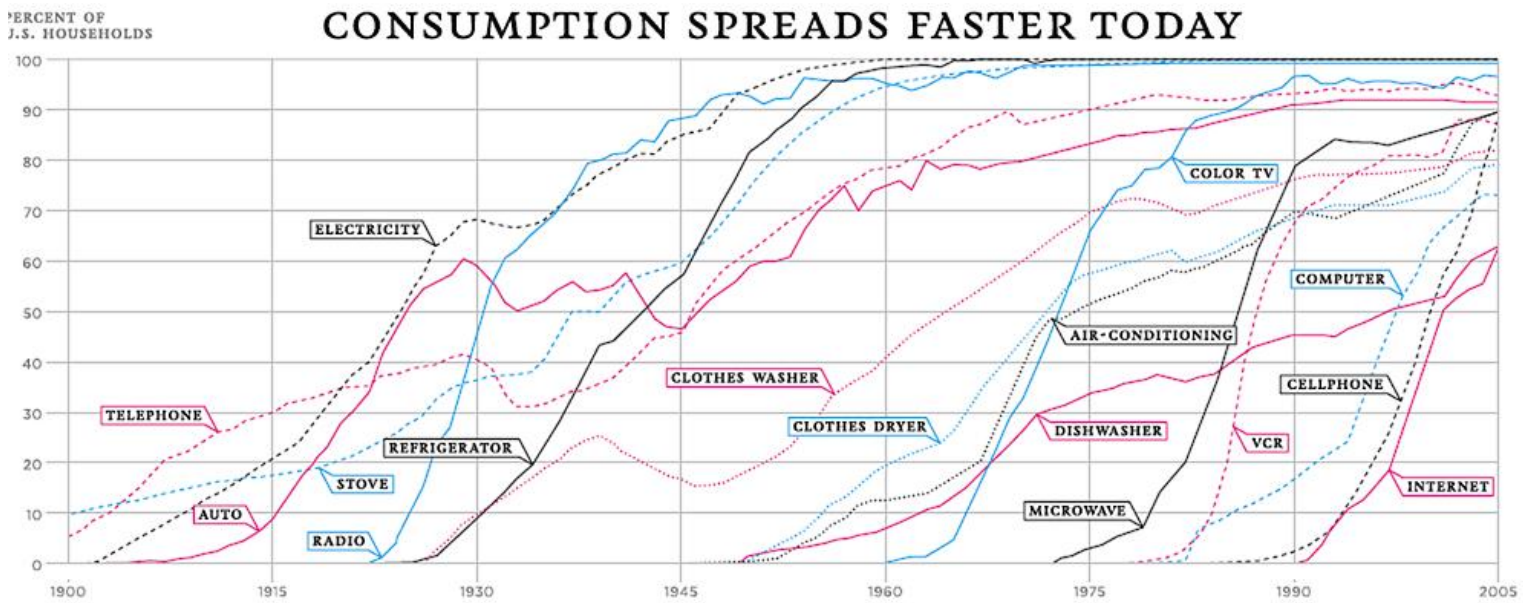
Income by skill and gender, England

	1770s	1850s	2004
Annual wage, unskilled men	15.40	27.20	16,898
Annual wage, unskilled women	6.90	12.30	12,516
Female to male wage ratio	0.45	0.45	0.74
Average adult wage	22.00	40.00	23,452
Unskilled to average wage ratio	0.51	0.49	0.63

What about consumption (rather than income or wealth)?



What about consumption (rather than income or wealth)?



What about other measures of well being?

Life Prospects of the Rich and Poor in England

Group	Stature (cm)	Life expectancy	Surviving children	Literacy
Preindustrial				
Rich	174	39	3.85	85
Poor	168.5	33	1.93	30
Difference	3%	18%	99%	183%
Modern				
Rich	178.2	80.8	1.33	100
Poor	176	74.3	1.64	88
Difference	1%	9%	-19%	14%

Announcements

- Empirical projects are due April 20th at 5pm
- Pay close attention to what each part is asking for
- Take advantage of office hours today and tomorrow or email me with questions
- We will not have class on Blowout (4/27), in its place I will hold office hours
- We go over final exam details in next Wednesday's lecture

Winners and Losers of the Industrial Revolution

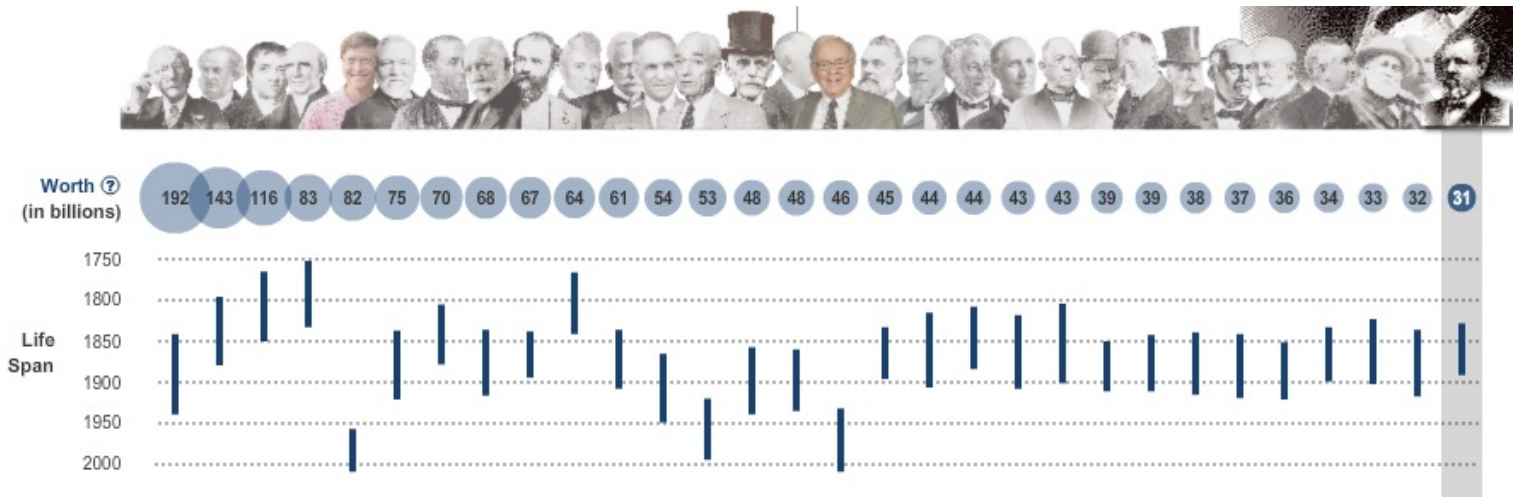
The Industrial Revolution and Inequality

- 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



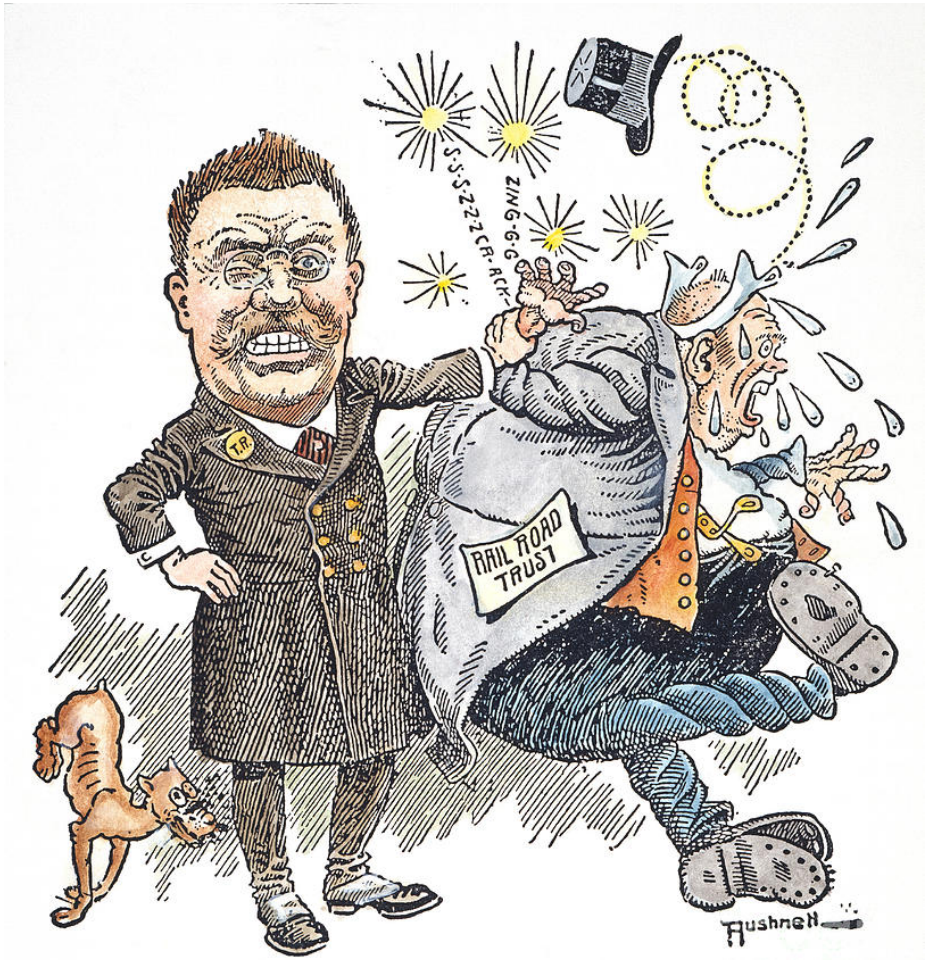
http://www.nytimes.com/ref/business/20070715_GILDED_GRAPHIC.html

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
9	Jay Gould	$67 billion	1836-1892	railroad, "Mephistopheles of Wall Street"
10	Stephen Van Rensselaer	$64 billion	1764-1839	patroon (aristocrat granted land by the Dutch)

The Industrial Revolution and Inequality



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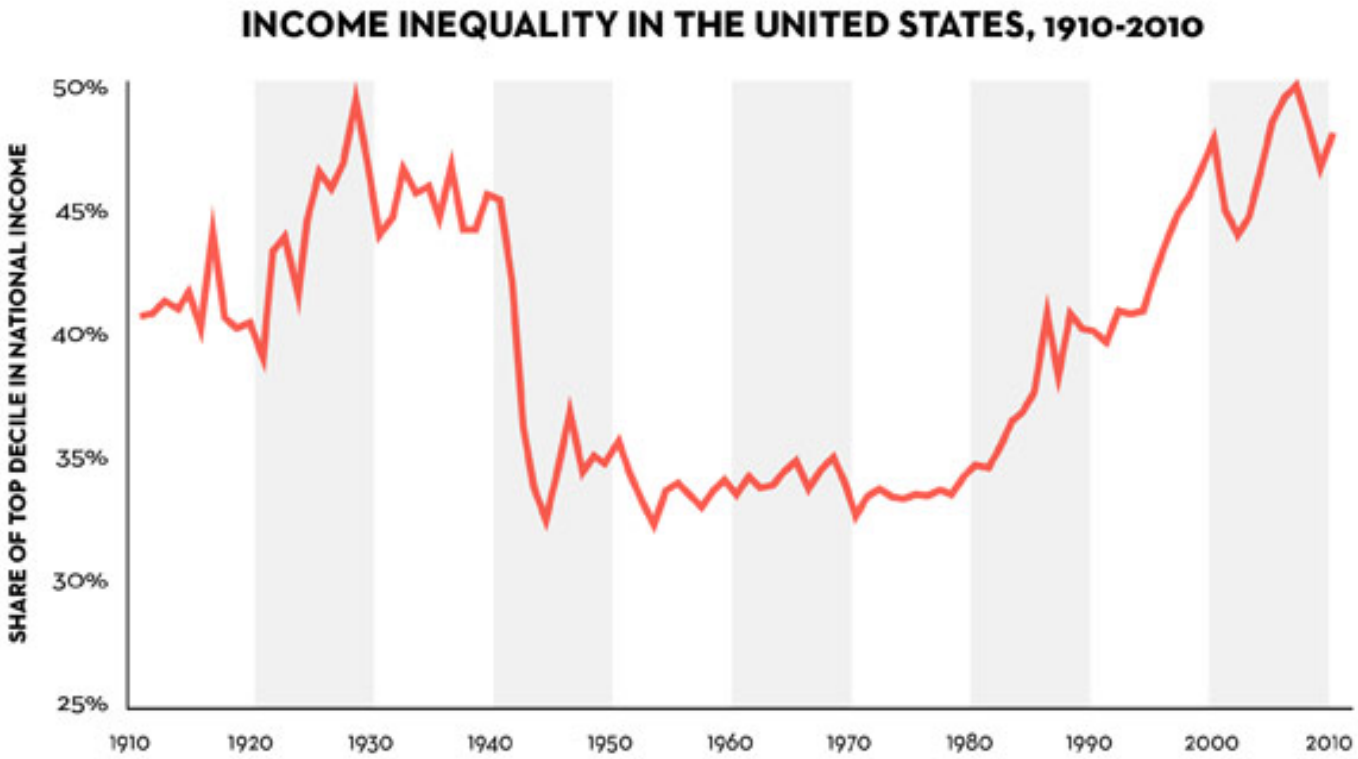
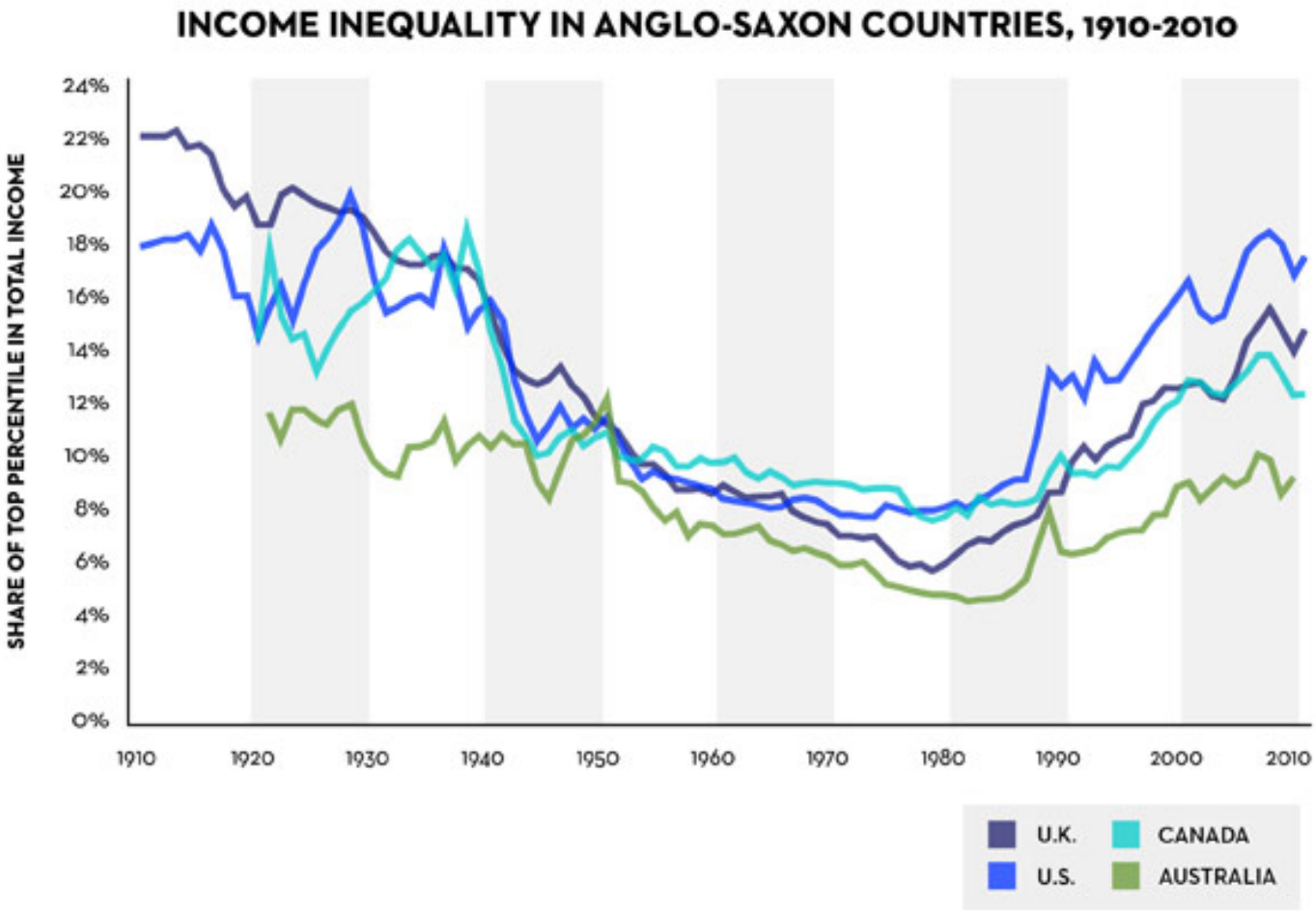
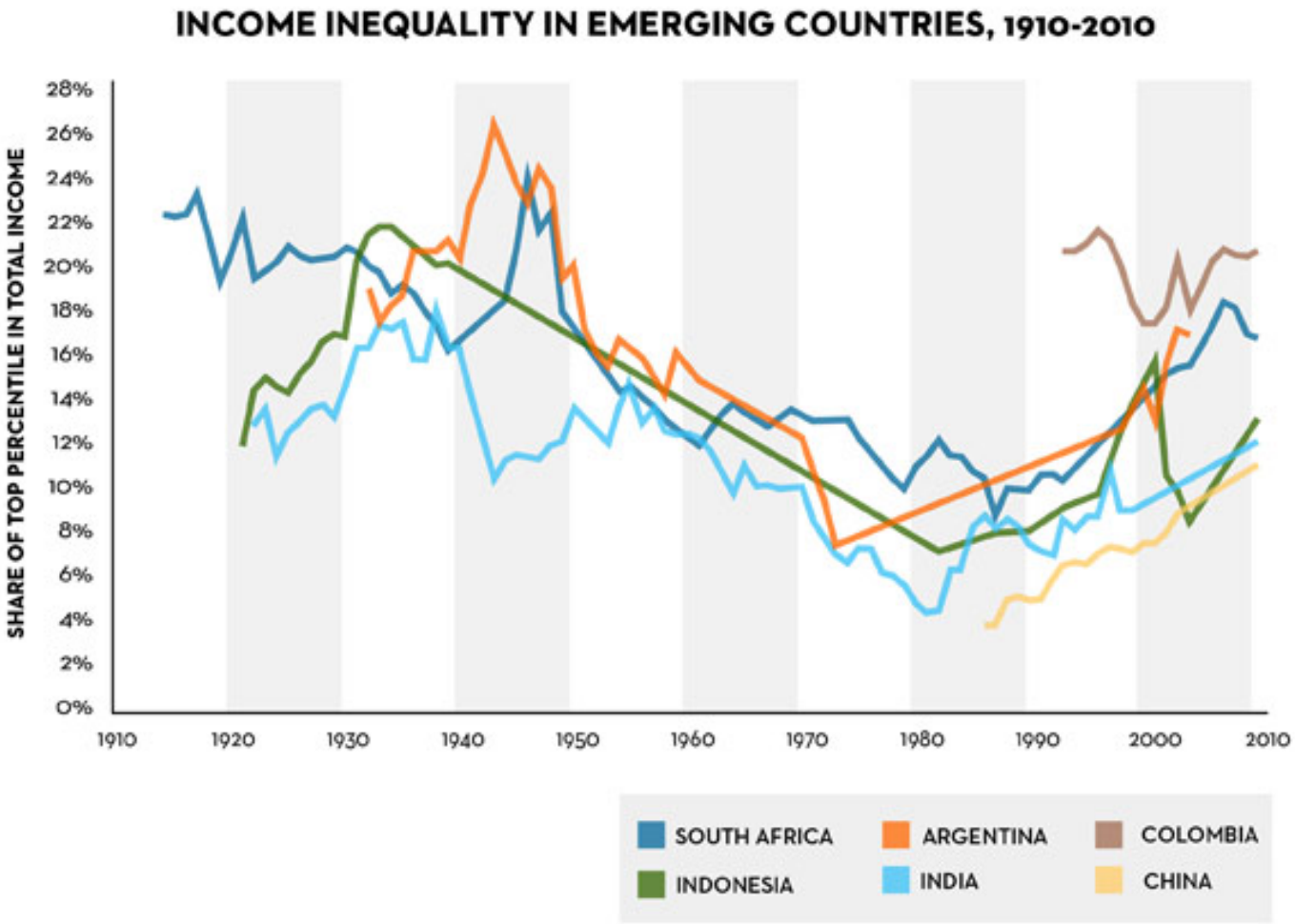
Within-Country Inequality Over Time



Within-Country Inequality Over Time



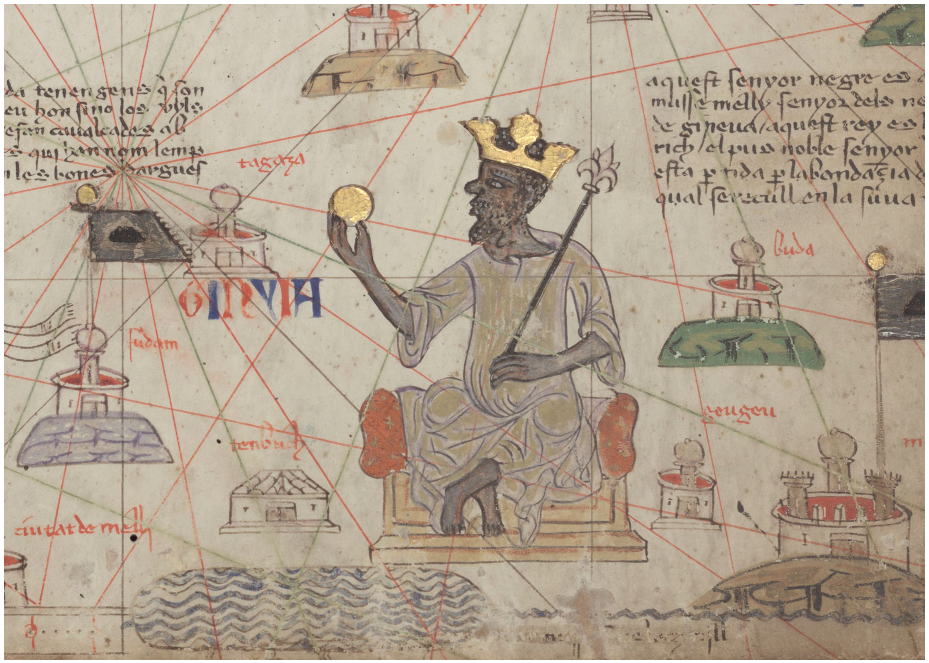
Within-Country Inequality Over Time



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

U.S. Presidents by Net Worth

President	Peak net worth (millions 2016 $)	Years in office	Life span
Donald Trump	3,100	from 2017	born 1946
John F. Kennedy	1,000	1961–1963	1917–1963
George Washington	580	1789–1797	1732–1799
Thomas Jefferson	234	1801–1809	1743–1826
Theodore Roosevelt	138	1901–1909	1858–1919
Andrew Jackson	131	1829–1837	1767–1845
James Madison	112	1809–1817	1751–1836
Lyndon B. Johnson	108	1963–1969	1908–1973
Herbert Hoover	82	1929–1933	1874–1964
Bill Clinton	75	1993–2001	born 1946
Franklin D. Roosevelt	66	1933–1945	1882–1945
John Tyler	57	1841–1845	1790–1862
Barack Obama	40	2009–2017	born 1961
George W. Bush	39	2001–2009	born 1946
James Monroe	30	1817–1825	1758–1831
Martin Van Buren	29	1837–1841	1782–1862
		1885–1889	
Grover Cleveland	28	1893–1897	1837–1908
George H. W. Bush	26	1989–1993	born 1924
John Quincy Adams	23	1825–1829	1767–1848
John Adams	21	1797–1801	1735–1826

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

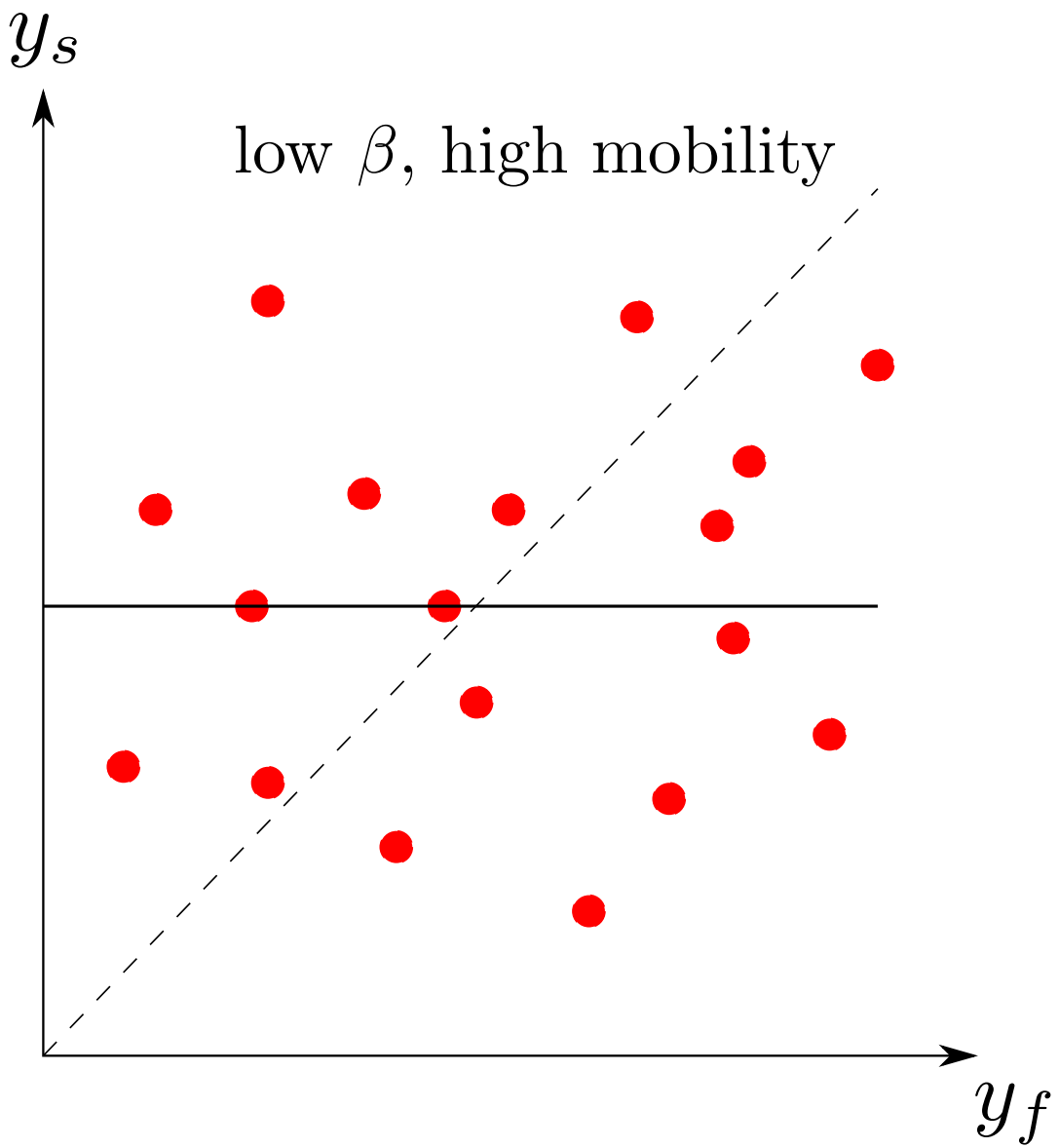
Modern Intergenerational Mobility

- 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:

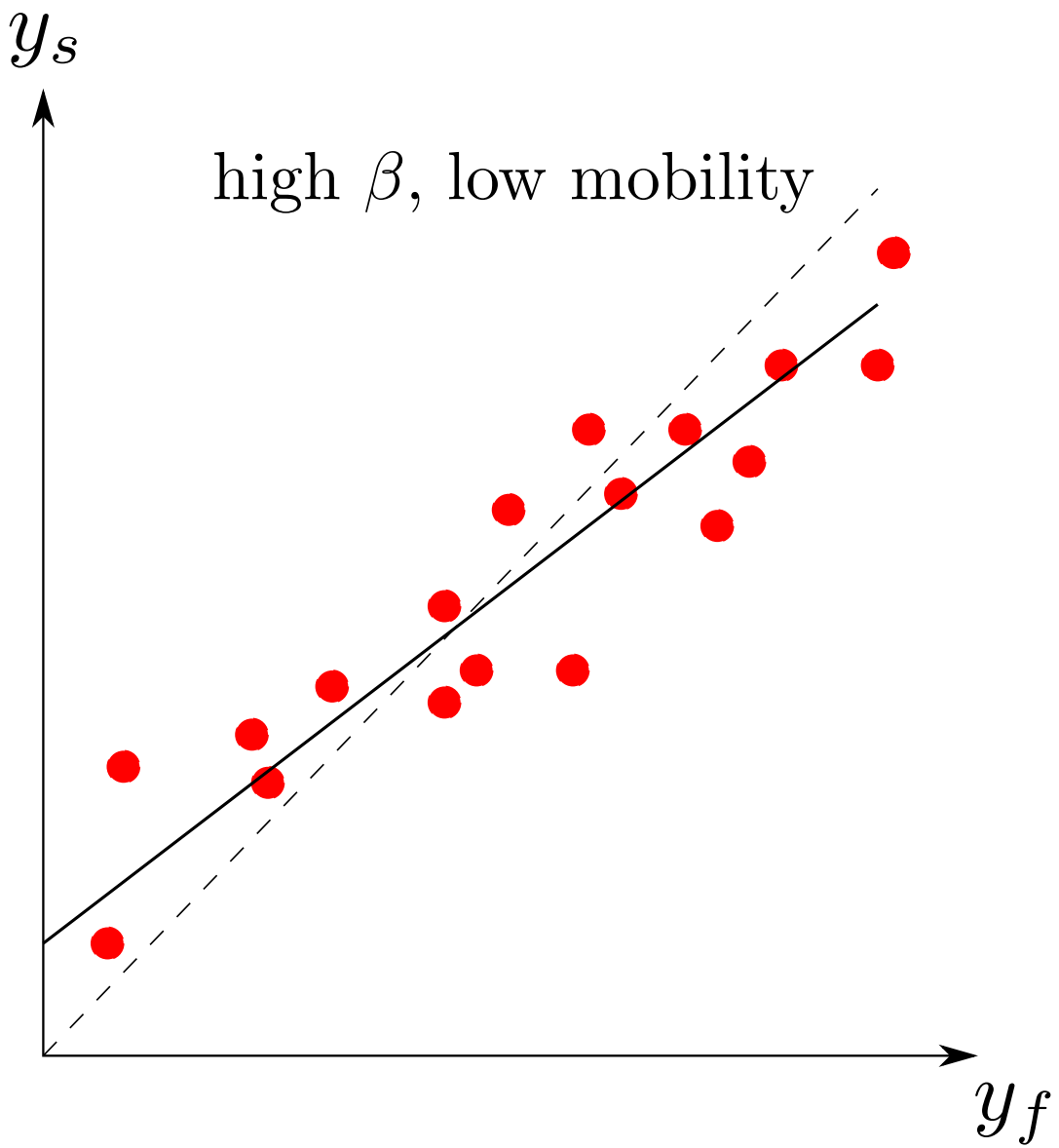
$$lny_s = \alpha + \beta lny_f + \varepsilon$$

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

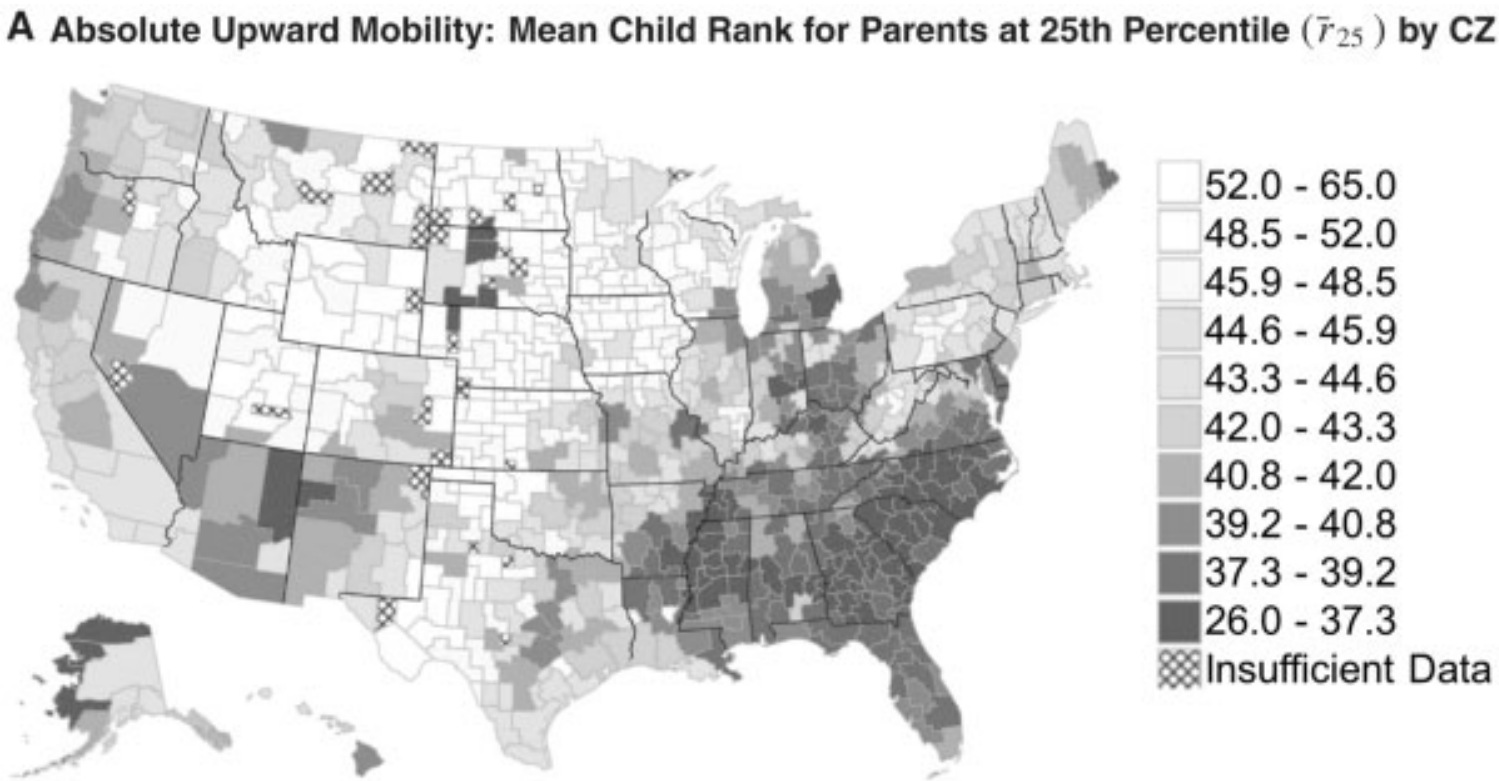
National Quintile Transition Matrix

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.

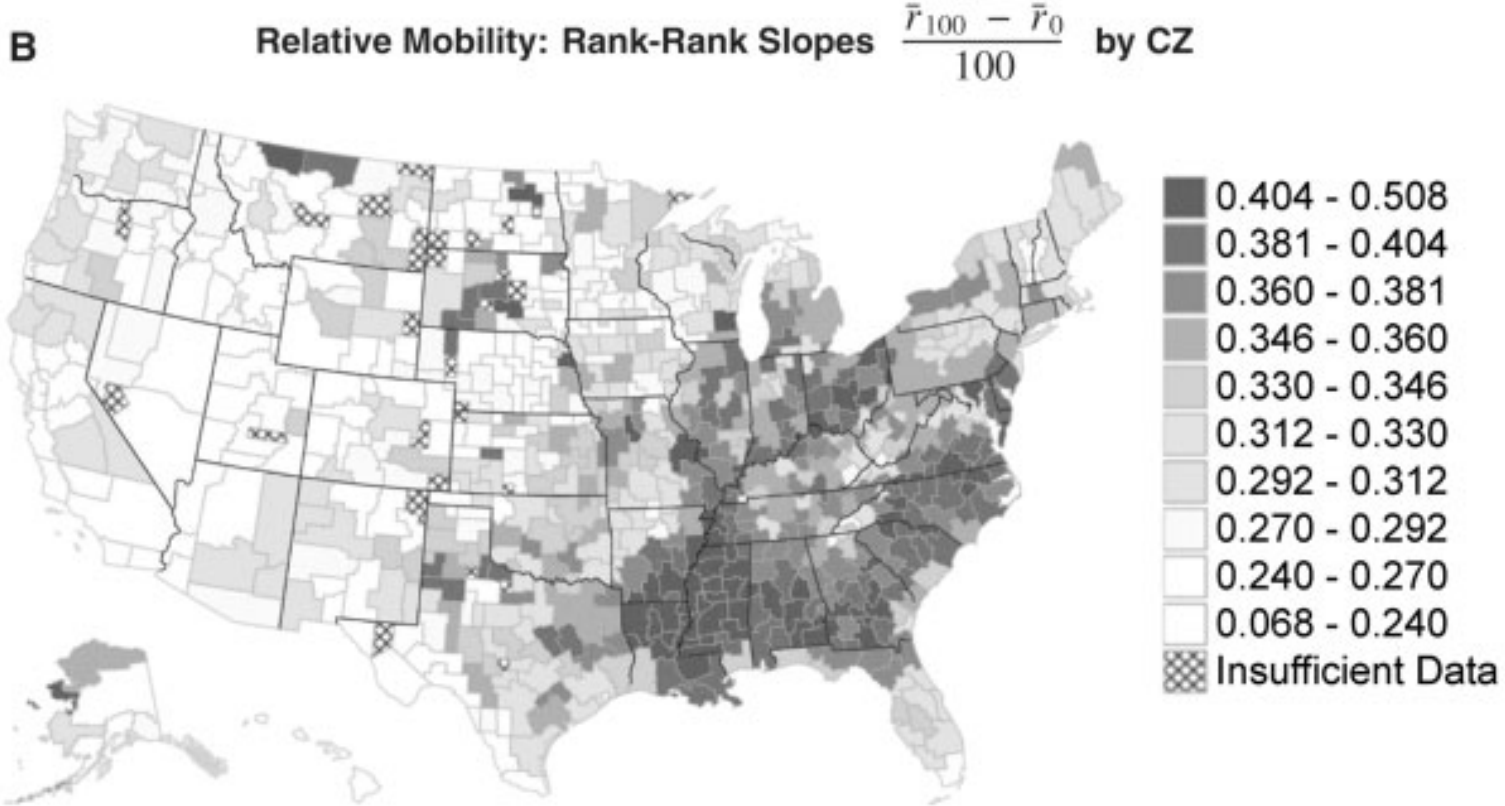
Chetty et al., Quarterly Journal of Economics, 2014

Modern Intergenerational Mobility



Chetty et al., Quarterly Journal of Economics, 2014

Modern Intergenerational Mobility



Chetty et al., Quarterly Journal of Economics, 2014

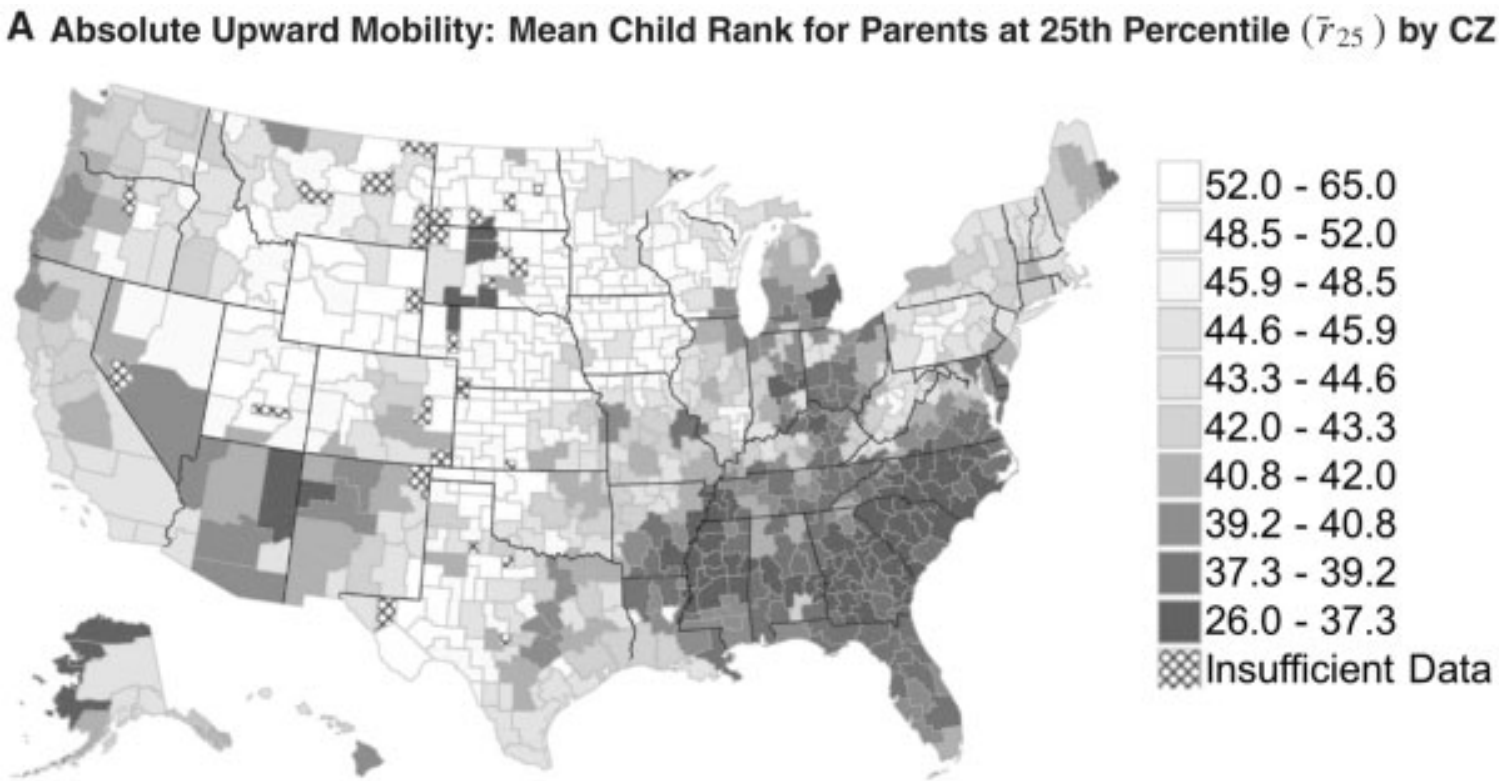
Some Warnings about Intergenerational Mobility Estimates

- 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

Announcements

- Empirical projects are due **today** at 5pm
- We will not have class on Blowout (4/27), in its place I will hold office hours
- We'll go over final exam details in next Wednesday's lecture
- During exam week, I'll hold office hours on Wednesday and Thursday from noon to 2pm

Modern Intergenerational Mobility



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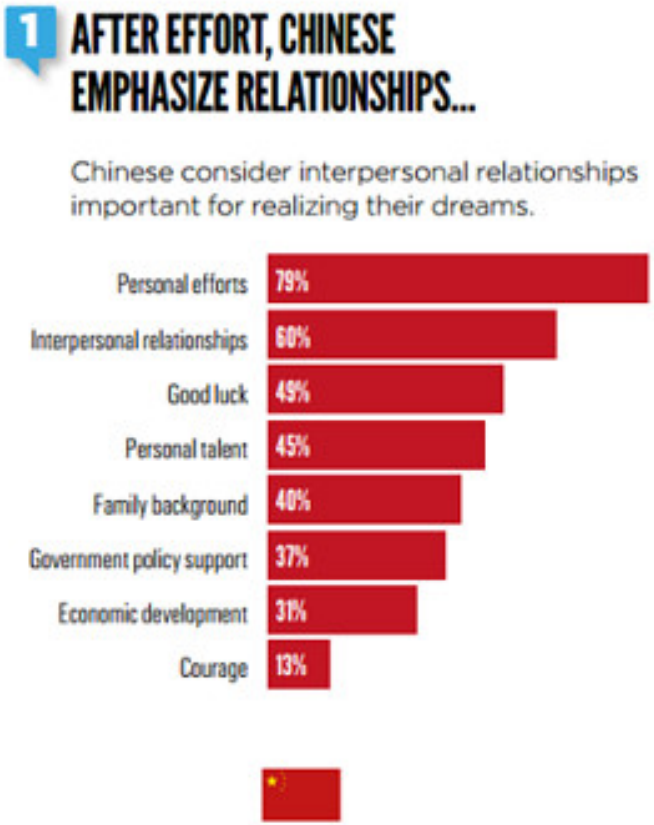
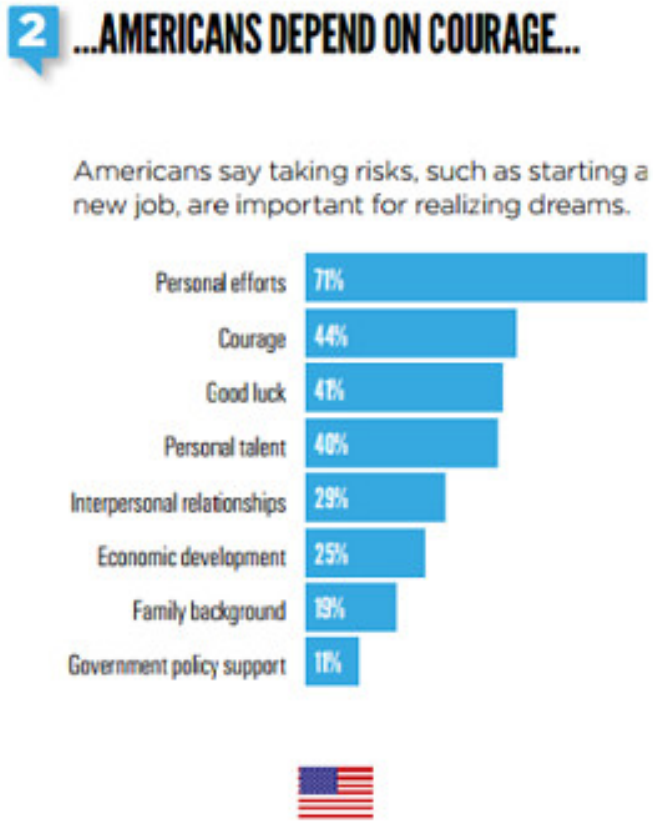
Modern Intergenerational Mobility





Somewhat 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).

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
- Long and Ferrie (2013) take this approach using linked US and British census data
- To estimate mobility, they construct and analyze occupation transition matrices

Somewhat Modern Intergenerational Mobility

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

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

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

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
- Clark and Cummins (2015) identify rich names from probate records and poor names from prisoner records
- In *The Son Also Rises*, Clark is also going to consider using artisan and locative names

Historical Intergenerational Mobility

Anderson	John	1844-March	24	None given	None given	Being a rogue and a vagabond
Andrews	Benjamin	1848-June	27	Collier	Uttering a counterfeit coin	None given
Andrews	Benjamin	1848-October	27	None given	None given	Misdemeanour
Andrews	Charles	1842-January	22	Labourer	Assualting a peace officer (See also George Hautin)	None given
Andrews	Eliza	1849-June	Not given	None given	Alleged theft from (victim)	None given
Andrews	George	1849-December	35	Waterman	Stealing trousers etc	None given
Andrews	George	1849-December	35	Waterman	Stealing ash poles	None given
Andrews	George	1850-April	35	None given	None given	Felony
Andrews	Henry	1845-March	22	Labourer	None given	Trespass in search of game
Andrews	Henry	1847-April	Not given	None given	Attempted defraud of (victim)	None given
Andrews	Henry	1849-July	Not given	None given	Alleged deception of (victim)	None given
Andrews	Jacob	1849-January	27	Labourer	Stealing wheat	None given
Andrews	Jacob	1849-April	27	None given	None given	Felony
Andrews	James	1842-October	22	Shoemaker	Stealing a basket and potatoes	None given
Andrews	James	1841-Summer	23	None given	None given	Larceny
Andrews	James	1842-February	38	Cordwainer	Stealing several trees	None given
Andrews	Jane	1844-December	28	None given	None given	Uttering counterfeit coin
Andrews	Mary	1845-October	20	Single woman	Obtaining mutton by false pretences	None given
Andrews	Sophia	1847-April	Not given	None given	Attempted defraud of (victim)	None given
Andrews	William	1840-October	56	Waterman	Stealing hops	None given
Andrews	William	1847-January	19	Labourer	Stealing a gun barrel etc	None given
Ankrett	Henry	1849-October	Not given	None given	Alleged theft from (victim)	None given

Historical Intergenerational Mobility

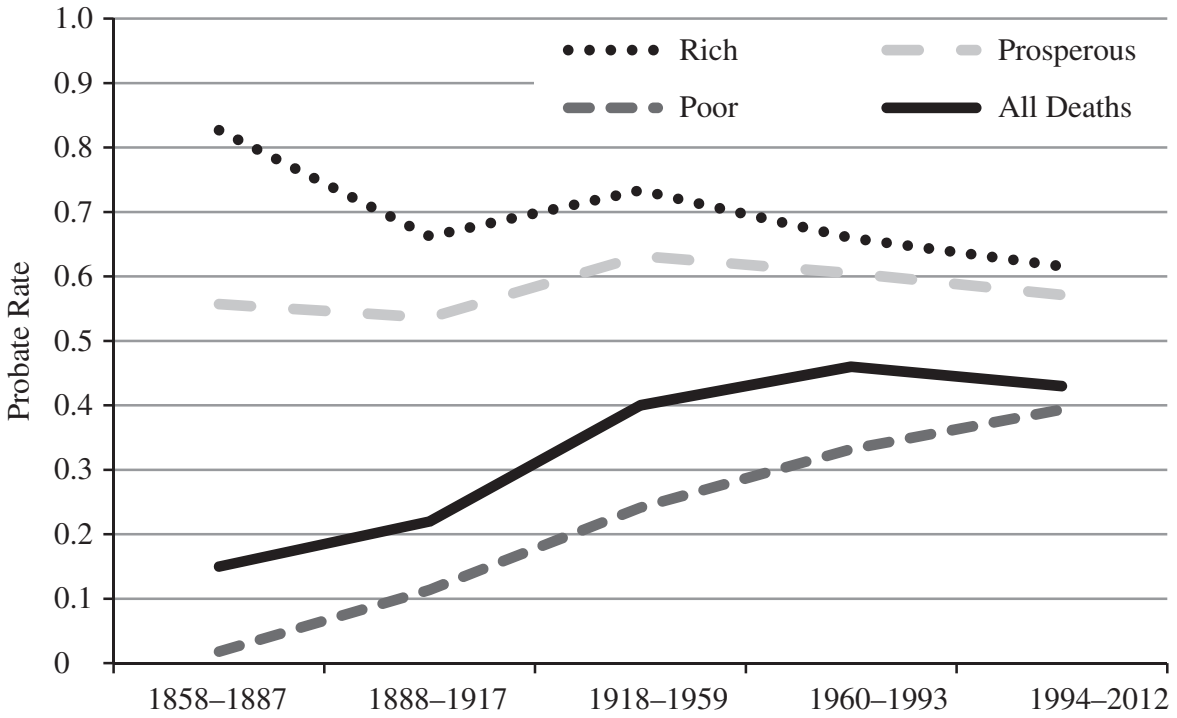


Fig. 3. *Probate Rates of Surname Types, by Generation*
Notes. The probate rate in a given generation is the number of people recorded in the probate registry divided by the number of people dying.
Source. Principal Probate Registry and GRO.

Historical Intergenerational Mobility

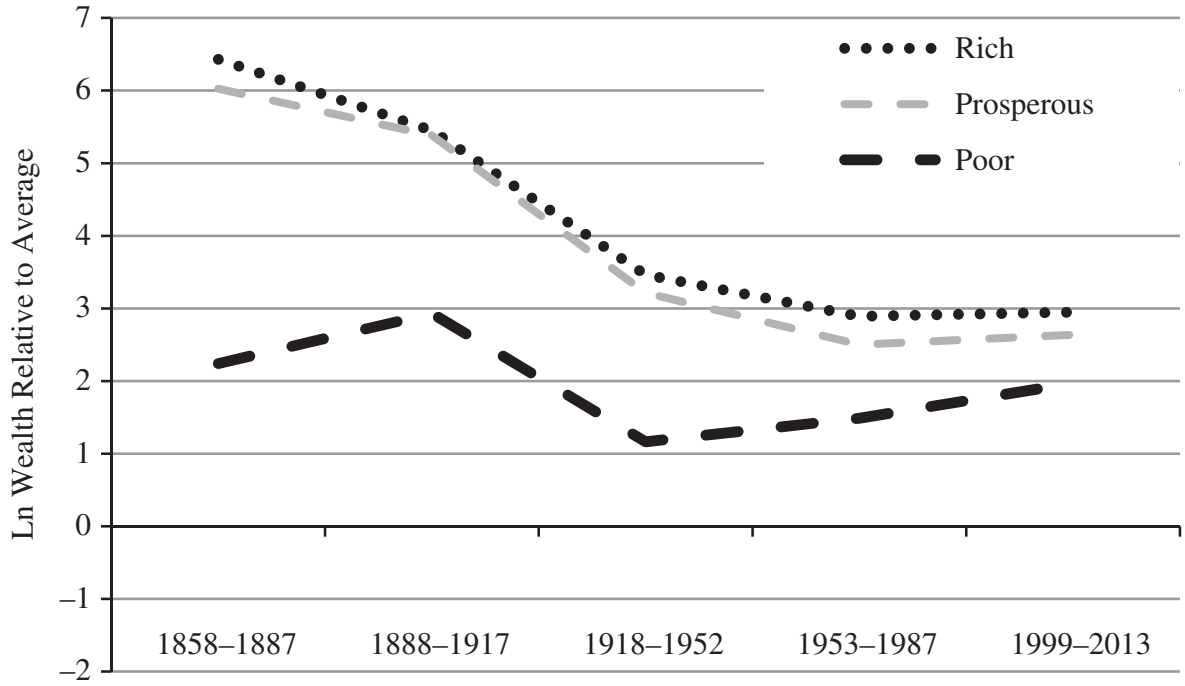


Fig. 4. *Average ln Probate Wealth, Those Probated, by Generation*
Notes. ln probate wealth by surname is measured as average ln wealth by surname minus the estimated overall average ln probate wealth (from the *Brown* surname).

Historical Intergenerational Mobility

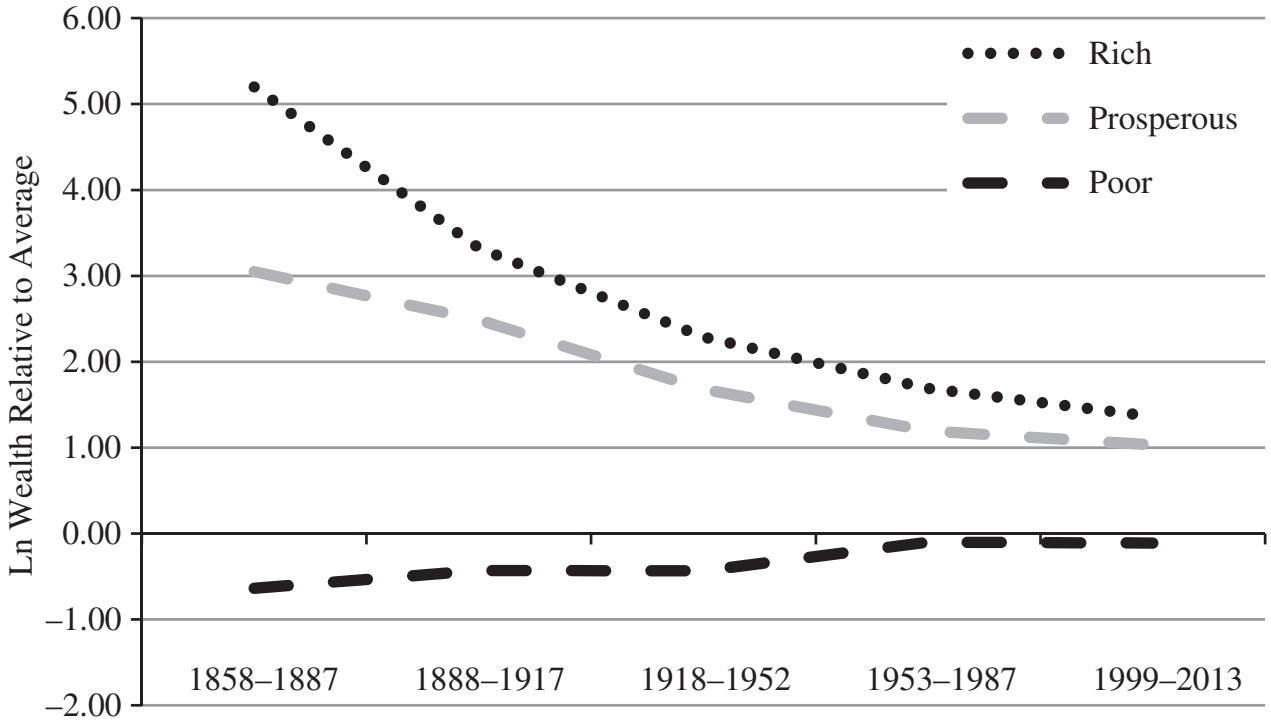


Fig. 5. *Average Log Probate Value, Including Those Not Probated, by Generation*
Source. Table 5.

Historical Intergenerational Mobility

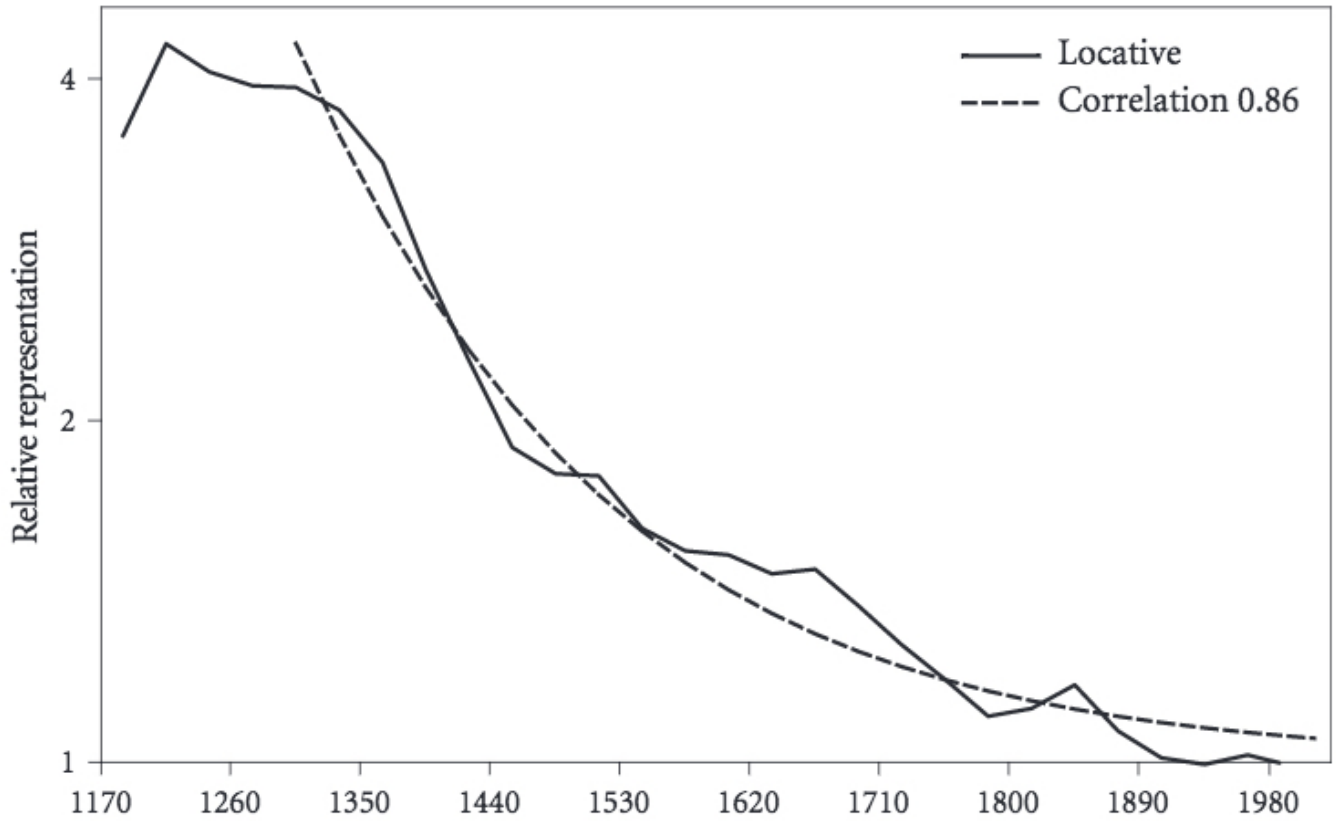


FIGURE 4.4. Locative surnames at Oxford and Cambridge, 1170–2012.

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

Historical Intergenerational Mobility

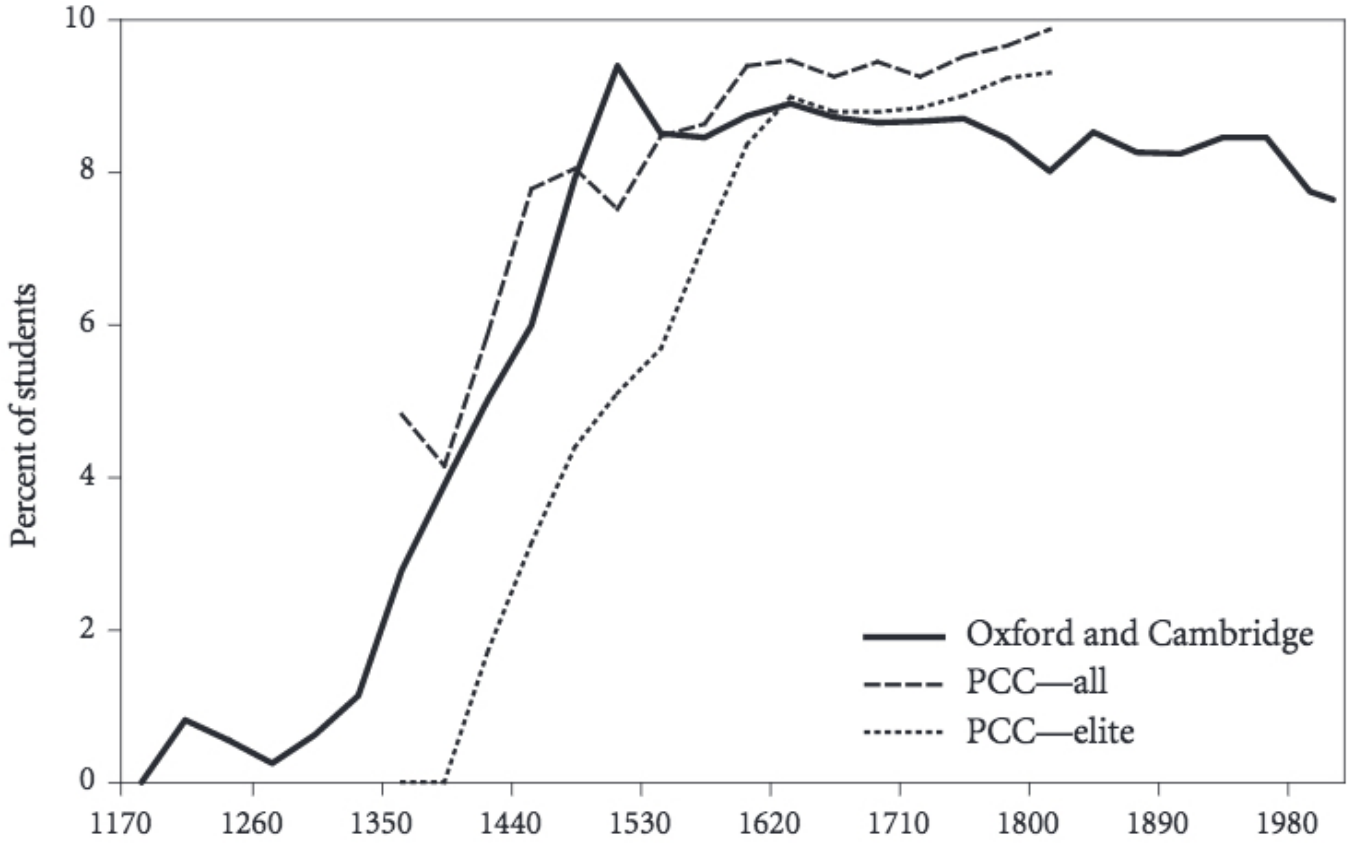


FIGURE 4.1. Percentage of artisan surnames among English elites, 1170–2012.

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

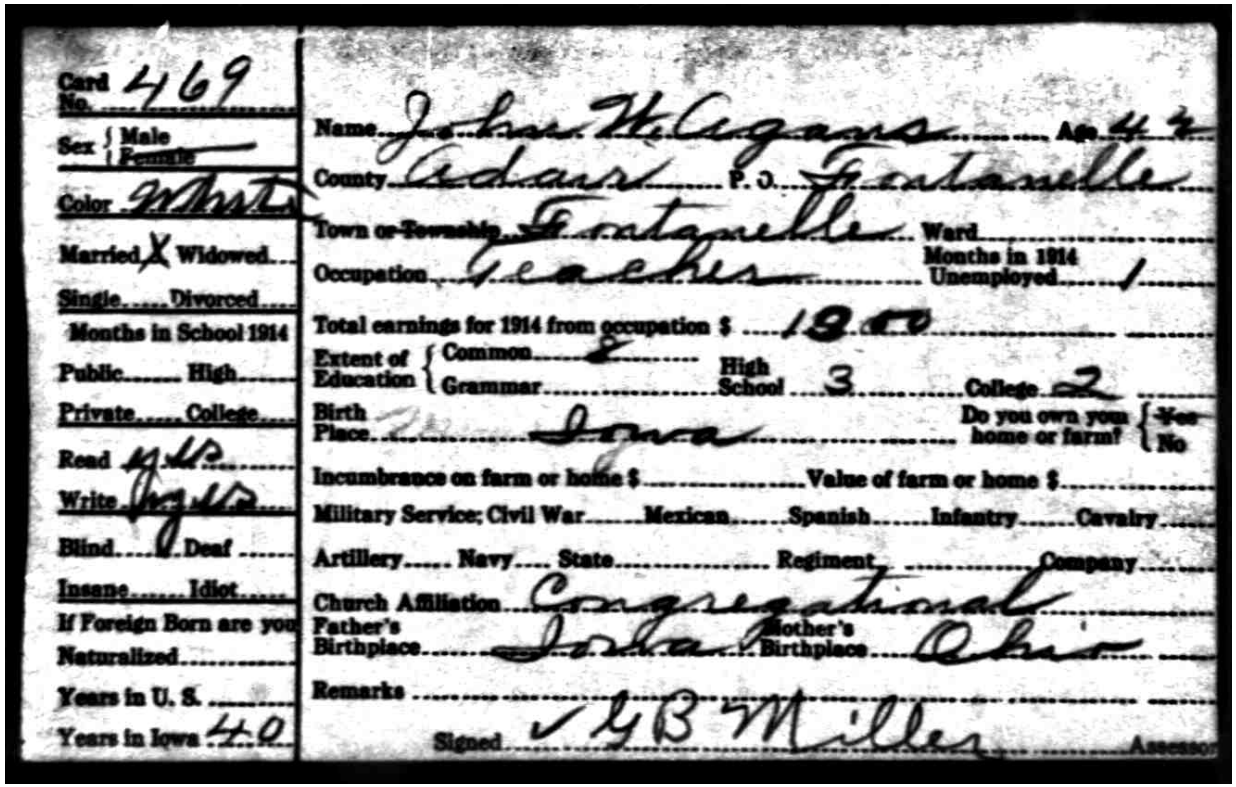
- In many ways, a meritocracy places strong value on human capital
- We have all sorts of ways that parents with means can invest in their children's human capital
- Think about private schools, tutors, college tuition, books, etc.
- This will tend to decrease mobility
- Working in the opposite direction 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

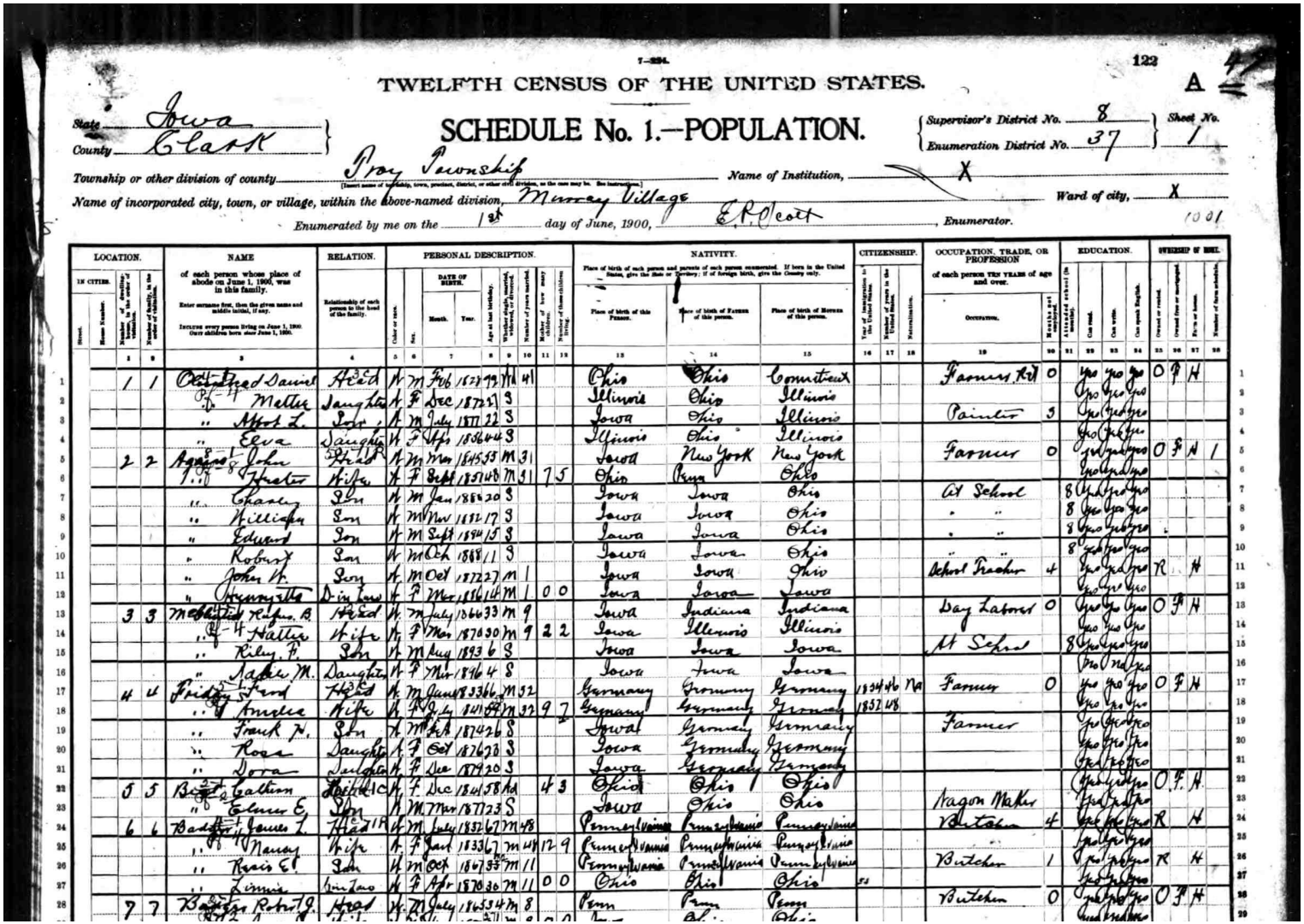
- The High School Movement occurred during the early 20th century
- Common schools were replaced with graded schools, high schools were built letting students expand their studies past the traditional 8 years
- High school became an option for everyone, not just those planning to go a traditional college 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



Changes in Intergenerational Mobility Over Time



TWELFTH CENSUS OF THE UNITED STATES.

SCHEDULE No. 1.—POPULATION.

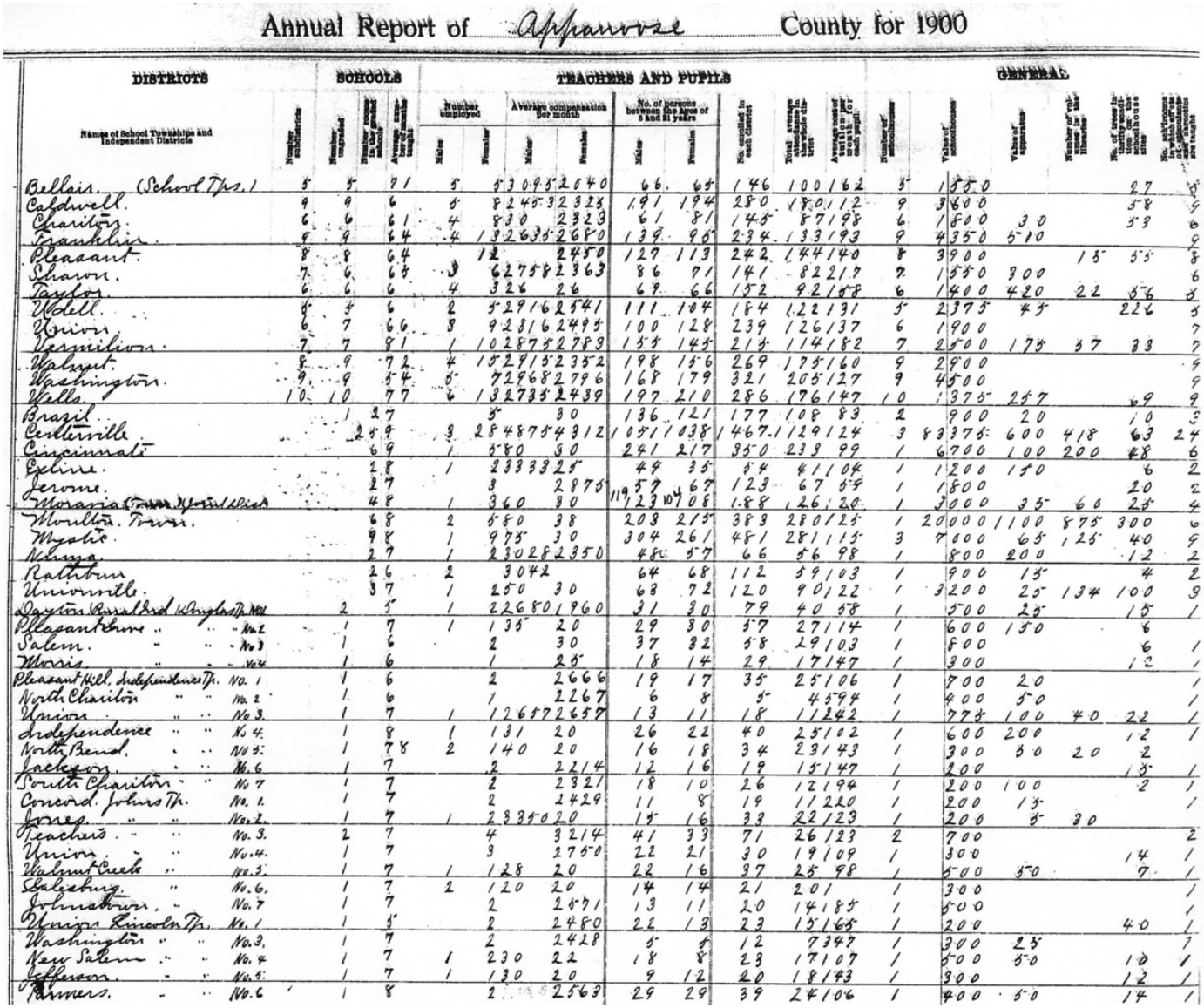
State Iowa
County Clark
Township or other division of county Troy Township
Name of Institution, X
Name of incorporated city, town, or village, within the above-named division, Murray Village
Ward of city, X
Enumerated by me on the 12th day of June, 1900, E. R. Scott, Enumerator.
Supervisor's District No. 8
Enumeration District No. 37
Sheet No. 1

122

A

	LOCATION.		NAME	RELATION.	PERSONAL DESCRIPTION.								NATIVITY.			CITIZENSHIP.			OCCUPATION, TRADE, OR PROFESSION		EDUCATION.			OWNERSHIP OF HOME.			
	Street.	House Number.	of each person whose place of abode on June 1, 1900, was in this family.	Relationship of each person to the head of the family.	Color or race.	Sex.	DATE OF BIRTH. Month.	DATE OF BIRTH. Year.	Age at last birthday.	Whether single, married, widowed, or divorced.	Number of years married.	Mother of how many children, and number living.	Place of birth of this Person.	Place of birth of Father of this person.	Place of birth of Mother of this person.	Year of immigration to the United States.	Number of years in the United States.	Naturalization.	Occupation.	Months not employed.	Attended school (in months).	Can read.	Can write.	Can speak English.	Owned or rented.	Owned free or mortgaged.	Farm or home.	Number of farm schedule.
1		1	1	Head	W	M	Feb	1871	29	M	4	1	Ohio	Ohio	Connecticut				Farmer Rd	0		yes	yes	yes	O	F	H	
2			Mettie	Daughter	W	F	Dec	1877	23	S			Illinois	Ohio	Illinois							yes	yes	yes				
3			" Albert L.	Son	W	M	July	1877	22	S			Iowa	Ohio	Illinois				Painter	3		yes	yes	yes				
4			" Elva	Daughter	W	F	Apr	1886	14	S			Illinois	Ohio	Illinois							yes	yes	yes				
5		2	2	Head	W	M	Mar	1845	55	M	31		Iowa	New York	New York				Farmer	0		yes	yes	yes	O	F	H	1
6			Hester	Wife	W	F	Sept	1851	48	M	31	7	Ohio	Penn	Ohio							yes	yes	no				
7			Chas.	Son	W	M	Jan	1884	20	S			Iowa	Iowa	Ohio				At School	8		yes	yes	yes				
8			" William	Son	W	M	Nov	1881	17	S			Iowa	Iowa	Ohio				" "	8		yes	yes	yes				
9			" Edward	Son	W	M	Sept	1884	15	S			Iowa	Iowa	Ohio				" "	8		yes	yes	yes				
10			" Robert	Son	W	M	Oct	1888	11	S			Iowa	Iowa	Ohio					8		yes	yes	yes				
11			" John H.	Son	W	M	Oct	1877	22	M	1		Iowa	Iowa	Ohio				School Teacher	4		yes	yes	yes	R		H	
12			" Gwynetta	Dau-law	W	F	Mar	1880	20	M	1	0	Iowa	Iowa	Iowa							yes	yes	yes				
13		3	3	Head	W	M	July	1866	33	M	9		Iowa	Indiana	Indiana				Day Laborer	0		yes	yes	yes	O	F	H	
14			" Hattie	Wife	W	F	Mar	1870	30	M	9	2	Iowa	Illinois	Illinois							yes	yes	yes				
15			" Riley F.	Son	W	M	Aug	1893	6	S			Iowa	Iowa	Iowa				At School	8		yes	yes	yes				
16			" Jakie M.	Daughter	W	F	Mar	1896	4	S			Iowa	Iowa	Iowa							yes	no	yes				
17		4	4	Head	W	M	June	1866	33	M	12		Germany	Germany	Germany	1884	16	NA	Farmer	0		yes	yes	yes	O	F	H	
18			" Amelia	Wife	W	F	July	1868	31	M	12	7	Germany	Germany	Germany	1852	48					yes	yes	yes				
19			" Frank N.	Son	W	M	Feb	1874	26	S			Iowa	Germany	Germany				Farmer			yes	yes	yes				
20			" Rosa	Daughter	W	F	Oct	1876	23	S			Iowa	Germany	Germany							yes	yes	yes				
21			" Dora	Daughter	W	F	Dec	1879	20	S			Iowa	Germany	Germany							yes	yes	yes				
22		5	5	Head	W	F	Dec	1845	54	M	4	3	Ohio	Ohio	Ohio							yes	yes	yes	O	F	H	
23			" Edmund E.	Son	W	M	Mar	1877	23	S			Iowa	Ohio	Ohio				Wagon Maker			yes	yes	yes				
24		6	6	Head	W	M	July	1832	67	M	48		Pennsylvania	Pennsylvania	Pennsylvania				Butcher	4		yes	yes	yes	R		H	
25			" Nancy	Wife	W	F	Jan	1833	67	M	44	9	Pennsylvania	Pennsylvania	Pennsylvania							yes	yes	yes				
26			" Ross E.	Son	W	M	Oct	1867	32	M	11		Pennsylvania	Pennsylvania	Pennsylvania				Butcher	1		yes	yes	yes	R		H	
27			" Minnie	Daughter	W	F	Apr	1870	30	M	11	0	Ohio	Ohio	Ohio	85						yes	yes	yes				
28		7	7	Head	W	M	July	1863	36	M	8		Penn	Penn	Penn				Butcher	0		yes	yes	yes	O	F	H	

Changes in Intergenerational Mobility Over Time



Annual Report of Appanoose County for 1900

DISTRICTS — Names of School Townships and Independent Districts	SCHOOLS — Number subdistricts	Number reported	Number taught	Average length	TEACHERS AND PUPILS — Number employed: Male	Number employed: Female	Average compensation per month: Male	Average compensation per month: Female	No. of persons between the ages of 5 and 21 years: Male	No. of persons between the ages of 5 and 21 years: Female	No. enrolled in each district	Total average attendance for the year	Average number of months taught in each district	GENERAL — Number of schoolhouses	Value of schoolhouses	Value of apparatus	Number of the above in Illinois	No. of frame schoolhouses	No. of brick schoolhouses
Bellair (School Tps. 1	5	5	7 1	5	5	30	95	40	66	64	146	100	62	5	1550			27	
Caldwell	9	9	6	5	8	45	32	23	191	194	280	180	12	9	3600			58	
Charilton	6	6	6 1	4	8	30	23	23	61	81	145	87	98	6	1800	30		53	
Franklin	9	9	6 4	4	13	26	35	26	139	95	234	133	93	9	4350	510			
Pleasant	8	8	6 4		12		24	50	127	113	242	144	40	8	3900		15	55	
Sharon	7	6	6 7	3	6	27	58	23	86	71	141	82	17	7	1550	300			
Taylor	6	6	6	4	3	26		26	69	66	152	92	58	6	1400	420	22	56	
Udell	4	4	6	2	5	29	16	25	111	104	184	122	31	5	2375	45		226	
Union	6	7	6 6	3	9	23	16	24	100	128	239	126	37	6	1900				
Vesuvius	7	7	8 1	1	0	28	75	27	155	145	215	114	82	7	2500	175	37	33	
Walnut	8	9	7 2	4	15	29	15	23	198	156	269	175	60	9	2900				
Washington	9	9	5 4	5	7	29	68	27	168	179	321	205	27	9	4500				
Wells	10	10	7 7	6	13	27	35	24	197	210	286	176	47	10	1375	257		69	
Brazil		1	2 7		5		30		136	121	177	108	83	2	900	20		10	
Centerville		2	5 9	3	28	48	75	43	1051	1038	1467	1129	24	3	83375	600	418	63	24
Cincinnati			6 9	1	5	80	30		241	217	350	233	99	1	6700	100	200	48	6
Exline			2 8	1	2	33	33	25	44	35	54	41	04	1	1200	150		6	2
Jerome			2 7		3		28	75	119	97	123	67	55	1	1800			20	2
Moravia (Town World Col.)			4 8	1	3	60	30		123	104	188	126	20	1	3000	35	66	25	4
Moulton Town			6 8	2	5	80	38		203	215	383	280	25	1	20000	1100	875	300	6
Myatt			9 8	1	9	75	30		304	261	481	281	15	3	7000	65	125	40	9
Numa			2 7	1	2	30	28	50	48	57	66	56	98	1	800	200		12	2
Rathbun			2 6	2		30	42		64	68	112	59	03	1	900	15		4	2
Unionville			3 7	1	2	50	30		63	72	120	90	22	1	3200	25	134	100	3
Dayton Rural Ind (Dayton Tp. No 2)		2	5	1	2	26	80	19	60	31	30	79	40	58	1	500	25		15	1
Pleasant View (No 2)		1	7	1	1	35		20	29	30	57	27	14	1	600	150		6	
Salem (No 3)		1	6		2		30		37	32	58	29	03	1	800			6	1
Morris (No 4)		1	6		1		25		18	14	29	17	47	1	300			12	1
Pleasant Hill Independence Tp. No. 1		1	6		2		26	66	19	17	35	25	06	1	700	20			1
North Chariton (No. 2)		1	6		1		22	67	6	8	5	4	94	1	400	50			1
Union (No 3)		1	7	1	2	65	26	57	13	11	18	11	42	1	775	100	40	22	1
Independence (No. 4)		1	8	1	1	31	20		26	22	40	25	02	1	600	200		12	1
North Bend (No 5)		1	7 8	2	1	40	20		16	18	34	23	43	1	300	30	20	2	
Jackson (No. 6)		1	7		2		22	14	12	16	19	15	47	1	200			15	1
South Chariton (No 7)		1	7		2		23	21	18	10	26	12	94	1	200	100		2	1
Concord Johns Tp. No. 1		1	7		2		24	29	11	8	19	11	20	1	200	15			1
Jones (No. 2)		1	7	1	2	38	50	20	15	16	33	22	23	1	200	5	30		
Peaches (No. 3)		2	7		4		32	14	41	39	71	26	23	2	700				2
Union (No. 4)		1	7		3		27	50	22	21	30	19	09	1	300			14	1
Walnut Creek (No. 5)		1	7	1	1	28	20		22	16	37	25	98	1	500	50		7	1
Salzburg (No. 6)		1	7	2	1	20	20		14	14	21	20	1	1	300				1
Johnsabrow (No. 7)		1	7		2		28	71	13	11	20	14	85	1	500				1
Union Lincoln Tp. No. 1		1	3		2		24	80	22	13	23	15	65	1	200			40	1
Washington (No. 3)		1	7		2		24	28	5	5	12	7	47	1	300	25			1
New Salem (No. 4)		1	7	1	2	30	22		18	8	23	17	07	1	500	50		10	1
Jefferson (No. 5)		1	7	1	1	30	20		9	12	20	18	43	1	300			12	1
Farmers (No. 6)		1	8		2		25	63	29	29	39	24	06	1	400	50		14	1

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

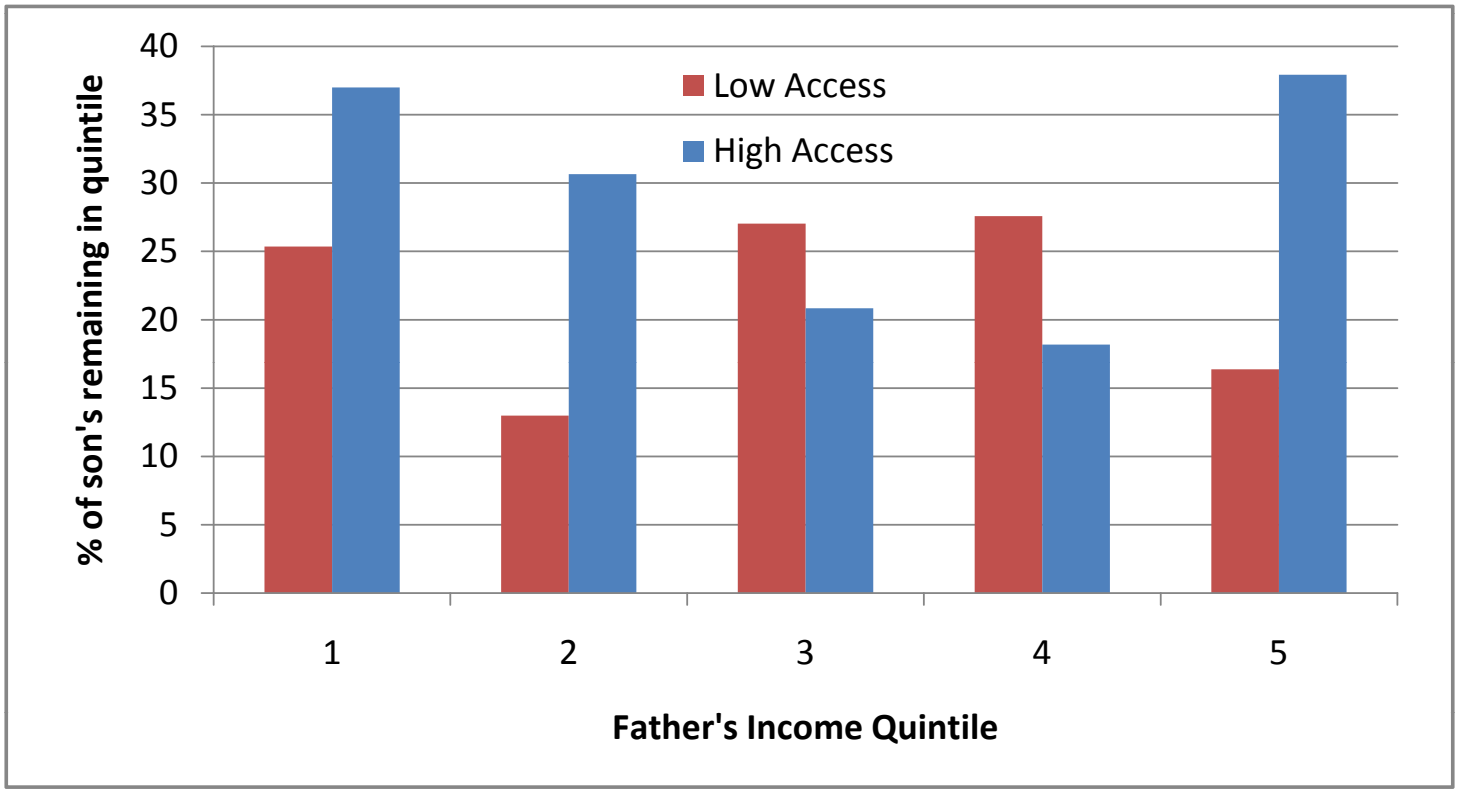
Table 6: Coefficients for school quality/access interaction terms

	Earnings x Schooling Measure Coefficient	
School Measure	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

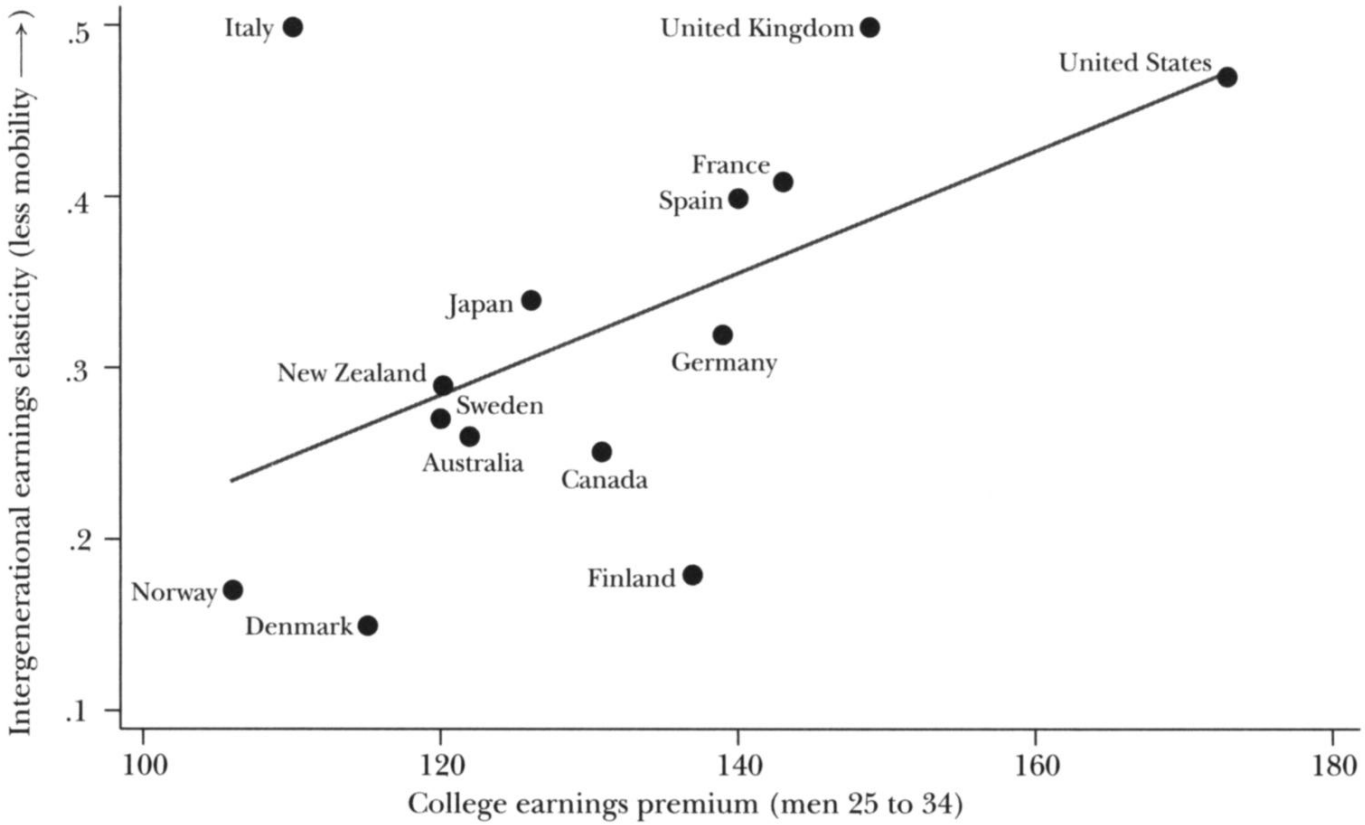
Figure 6: Percentage of sons remaining in their father's income quintile.



Inequality and Mobility

Figure 4

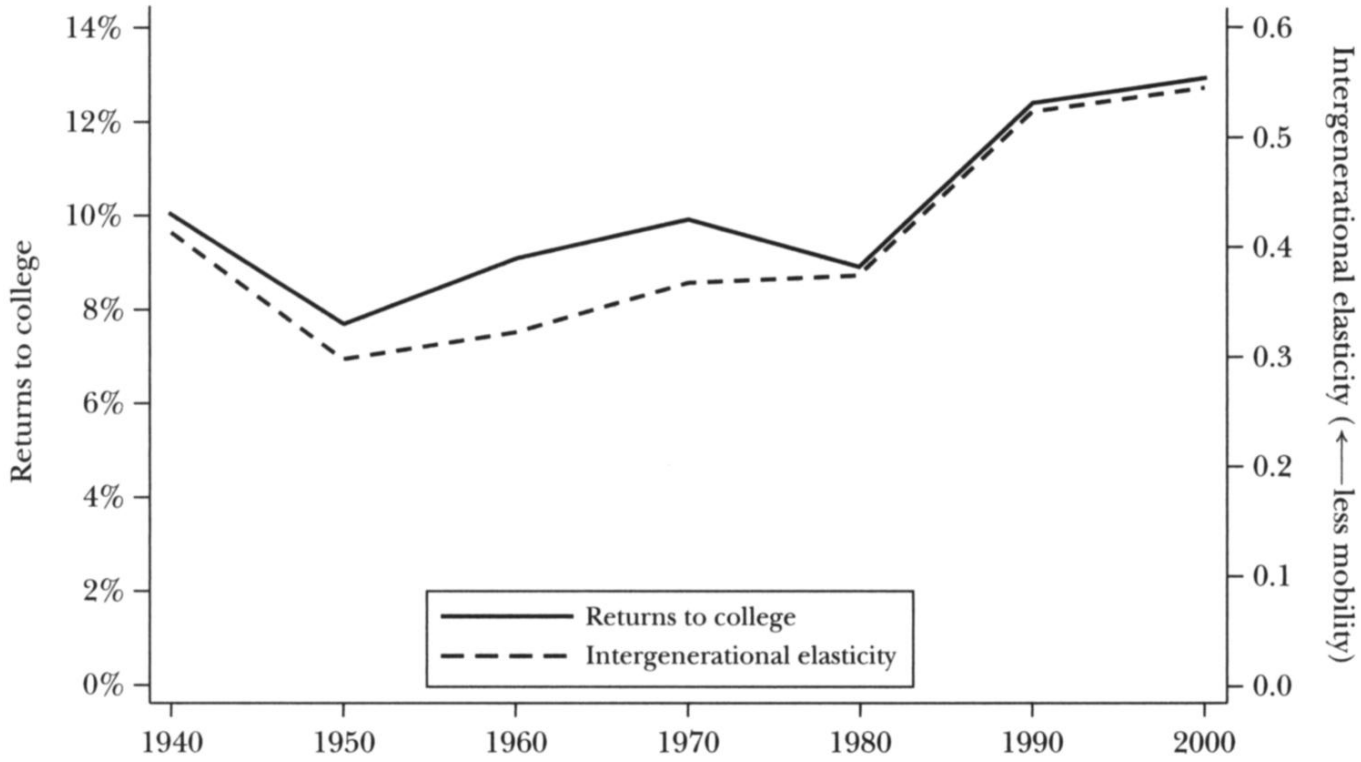
Higher Returns to Schooling are Associated with Lower Intergenerational Earnings Mobility



Inequality and Mobility

Figure 5

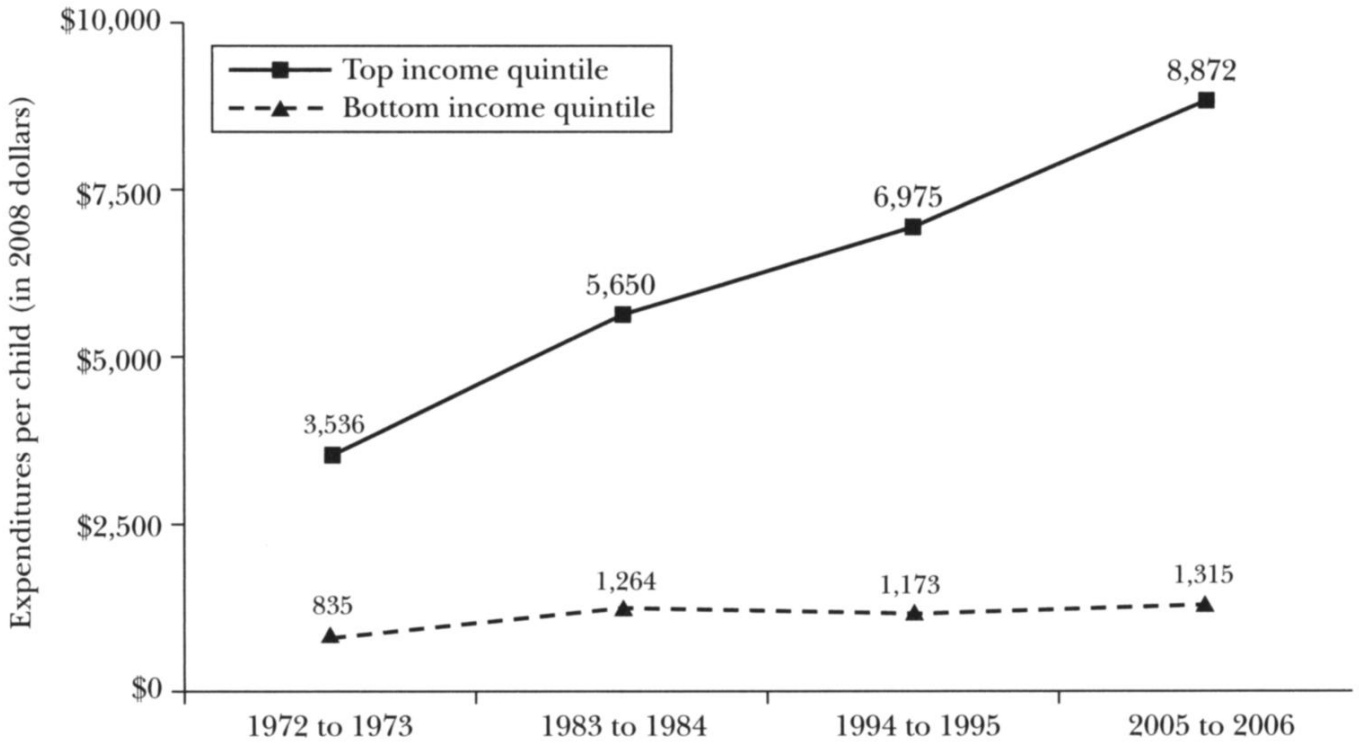
The Higher the Return to College, the Lower the Degree of Intergenerational Mobility: United States, 1940 to 2000



Inequality and Mobility

Figure 6

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

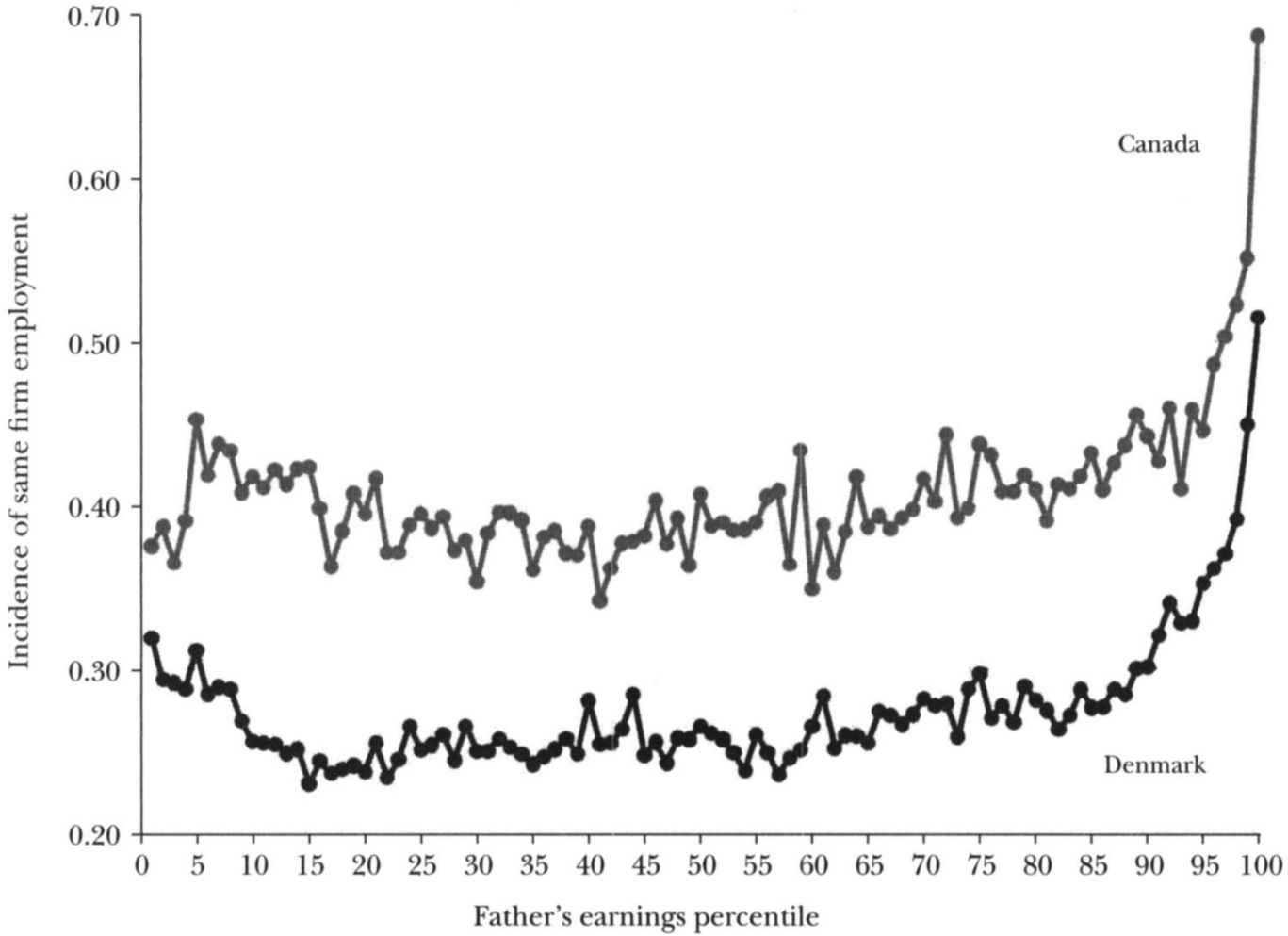


Inequality and Mobility

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

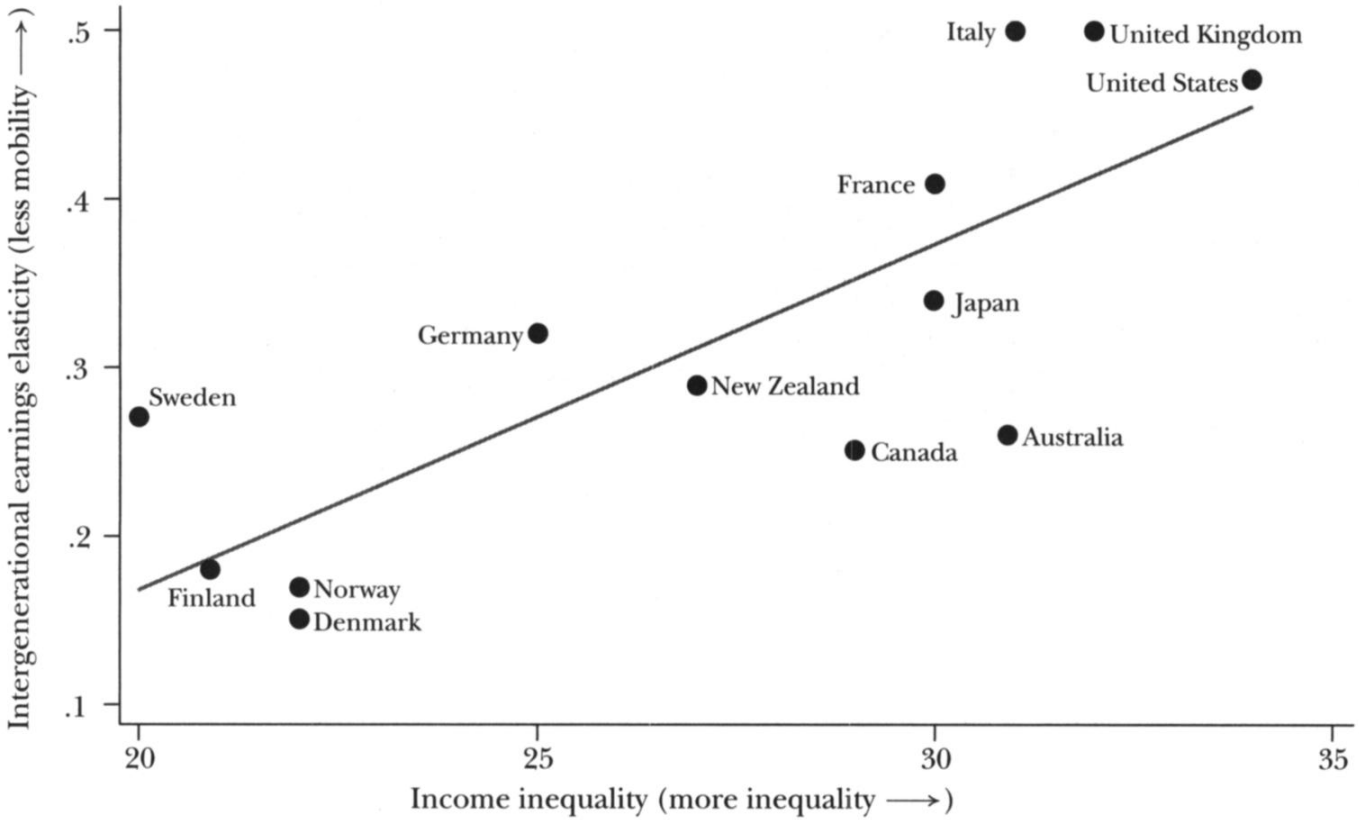
(by father's earnings percentile)



Inequality and Mobility

Figure 1

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



Inequality and Mobility

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

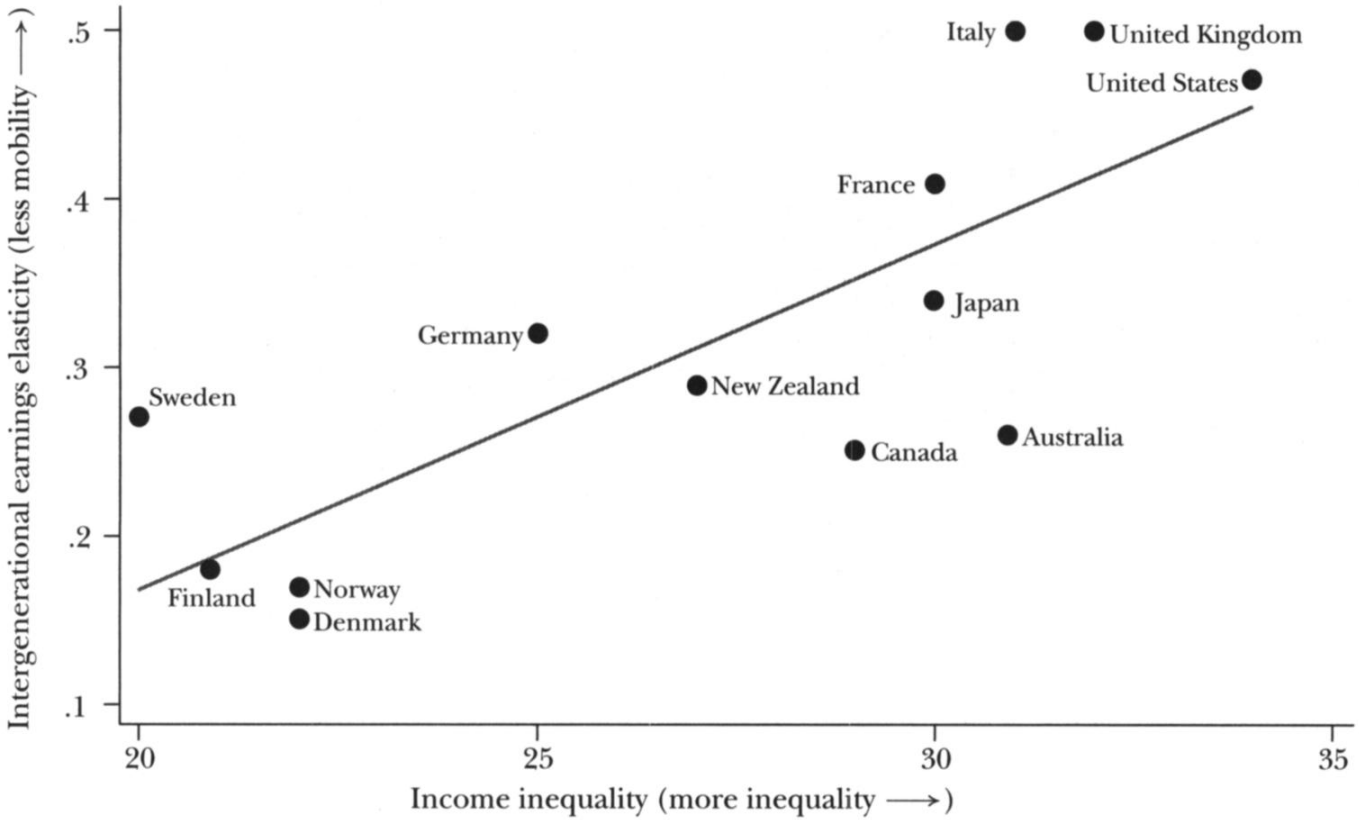
Announcements

- Let me know if you did not get an email from me confirming receipt of your empirical project
- We will not have class on Blowout (4/27), in its place I will hold office hours
- We'll go over final exam details in Wednesday's lecture
- During exam weeks, I'll hold office hours on Wednesday (5/2), Thursday (5/3) and Monday (5/7) from noon to 2pm
- Don't forget to fill out your course evaluation (evals.wm.edu)
- I'll provide time at the end of today's lecture to fill out evaluations

Inequality and Mobility

Figure 1

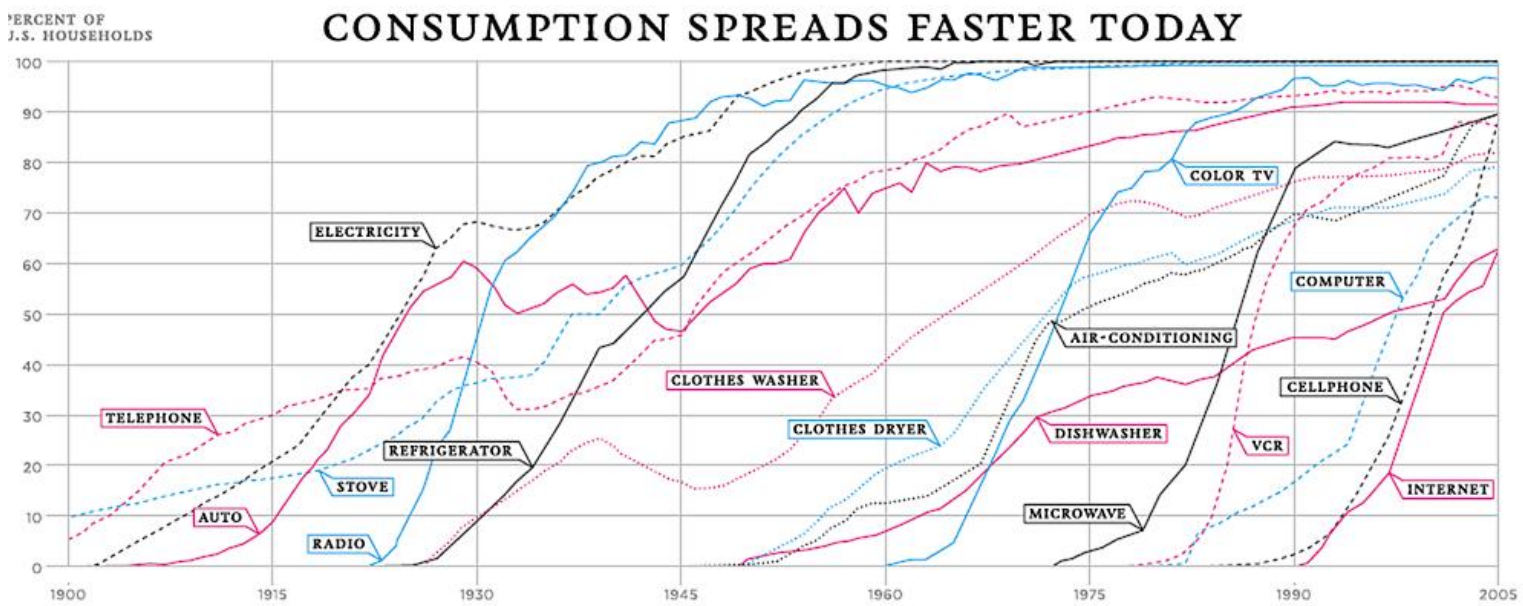
The Great Gatsby Curve: More Inequality is Associated with Less Mobility across the Generations



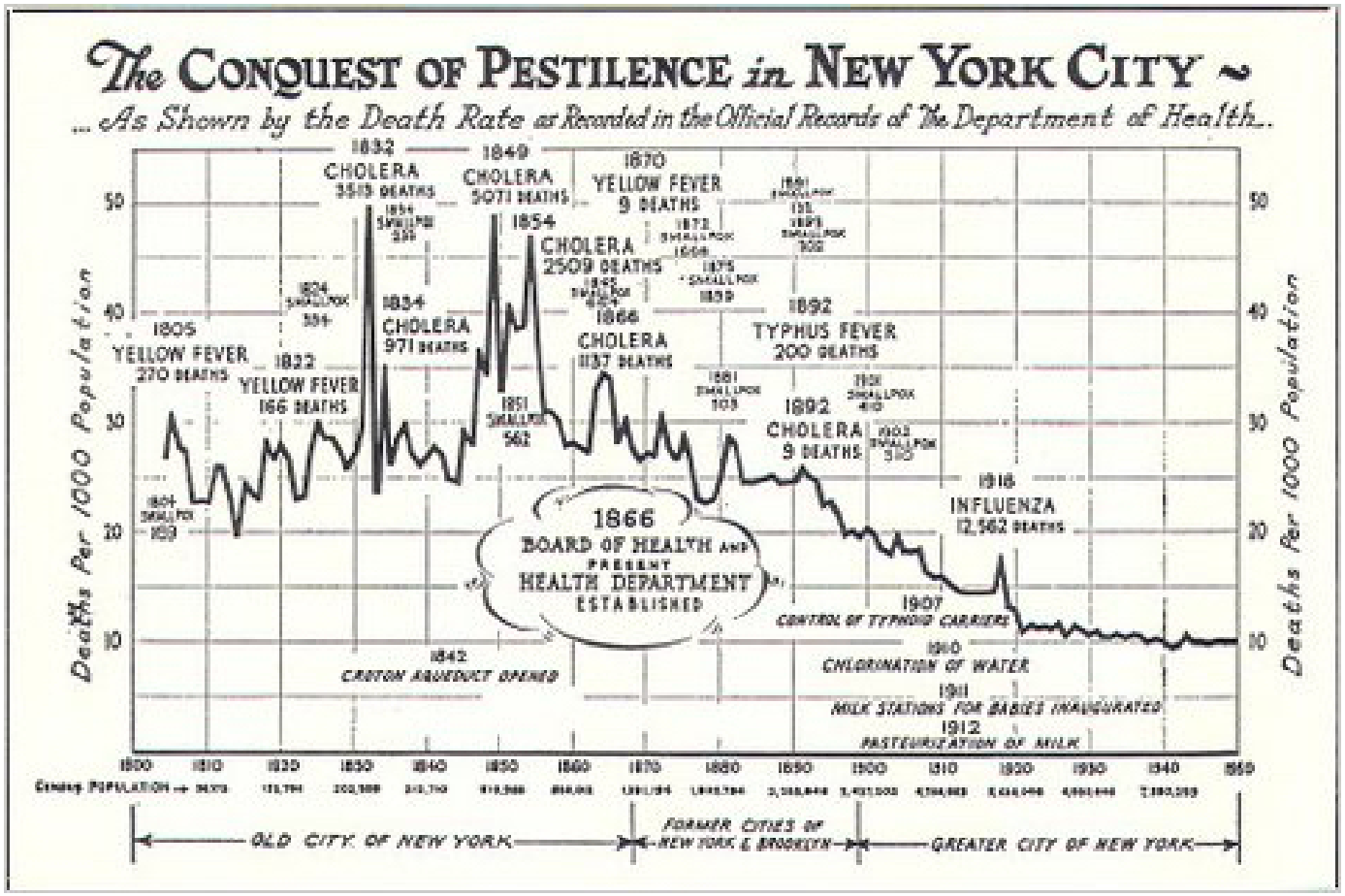
An Empirical Test of the Increases in the Standard of Living

- Let's now take a slightly different approach to assessing how much industrialization has improved the standard of living
- We'll forgo any more fancy analysis and instead take a much simpler approach
- It boils down to the following question: would you rather live in this era or some other era?
- To do this, we'll do two comparisons
  - Living today at the mean income or living in a previous decade in the US at the 90th income percentile
  - Living today at the poverty line or living in a previous century in Britain at the 99th income percentile

An Empirical Test of the Increases in the Standard of Living



An Empirical Test of the Increases in the Standard of Living

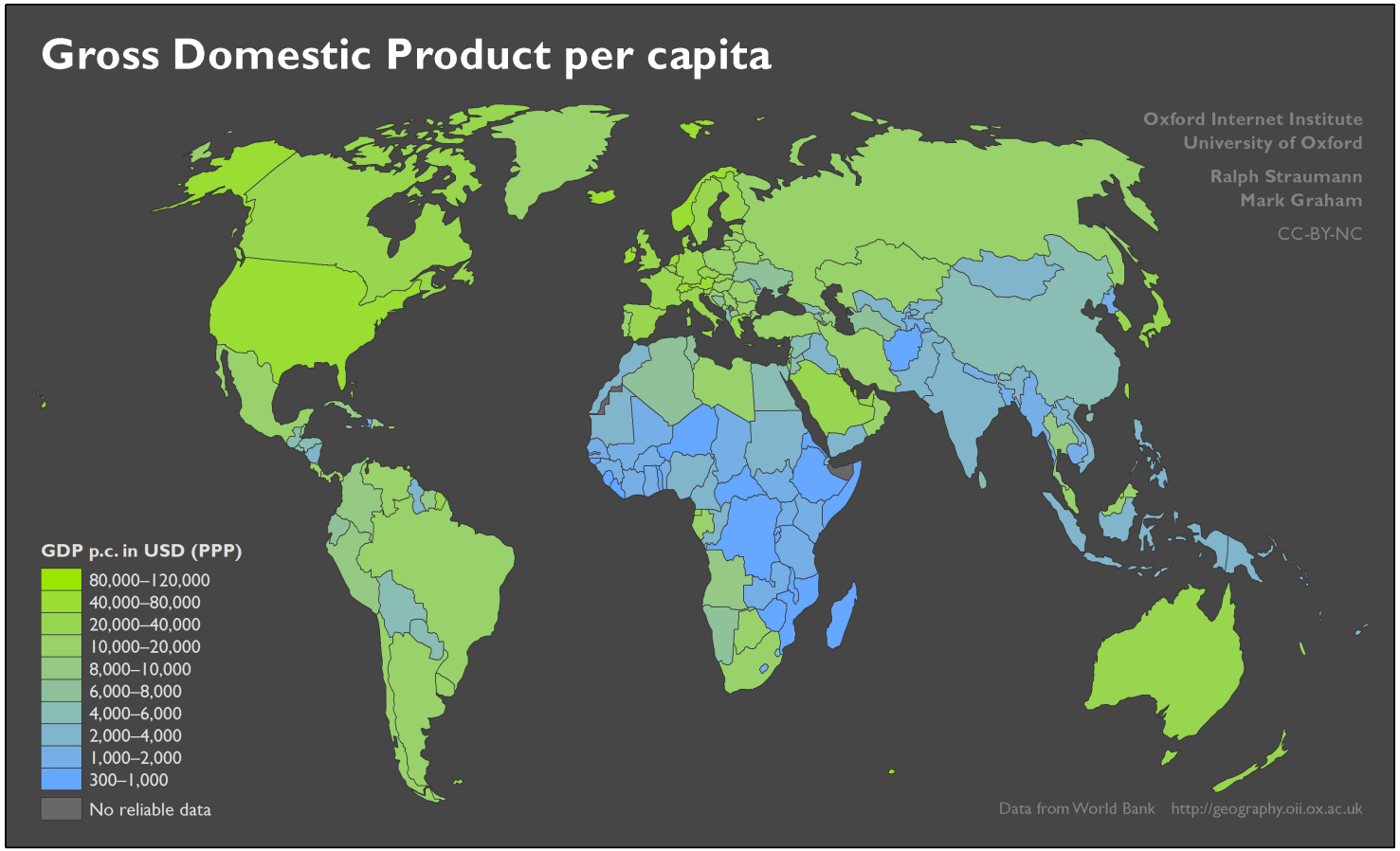


An Empirical Test of the Increases in the Standard of Living

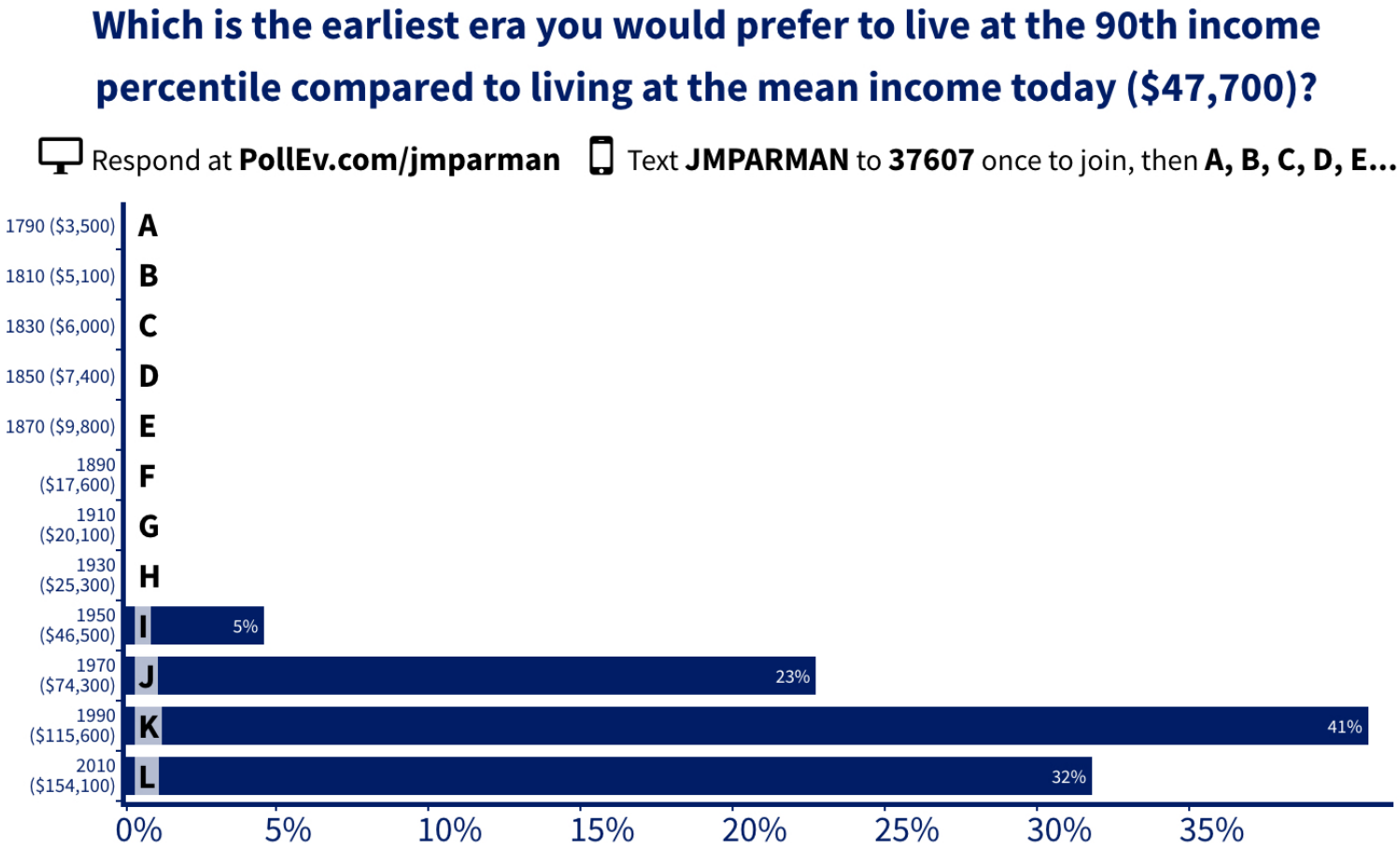
- The relevant era-specific incomes are given in parentheses
- All of the incomes are in 2010 US dollars
- To the poll...

Set your browser to PollEv.com/jmparman or text JMPARMAN to 37607 to join the poll.

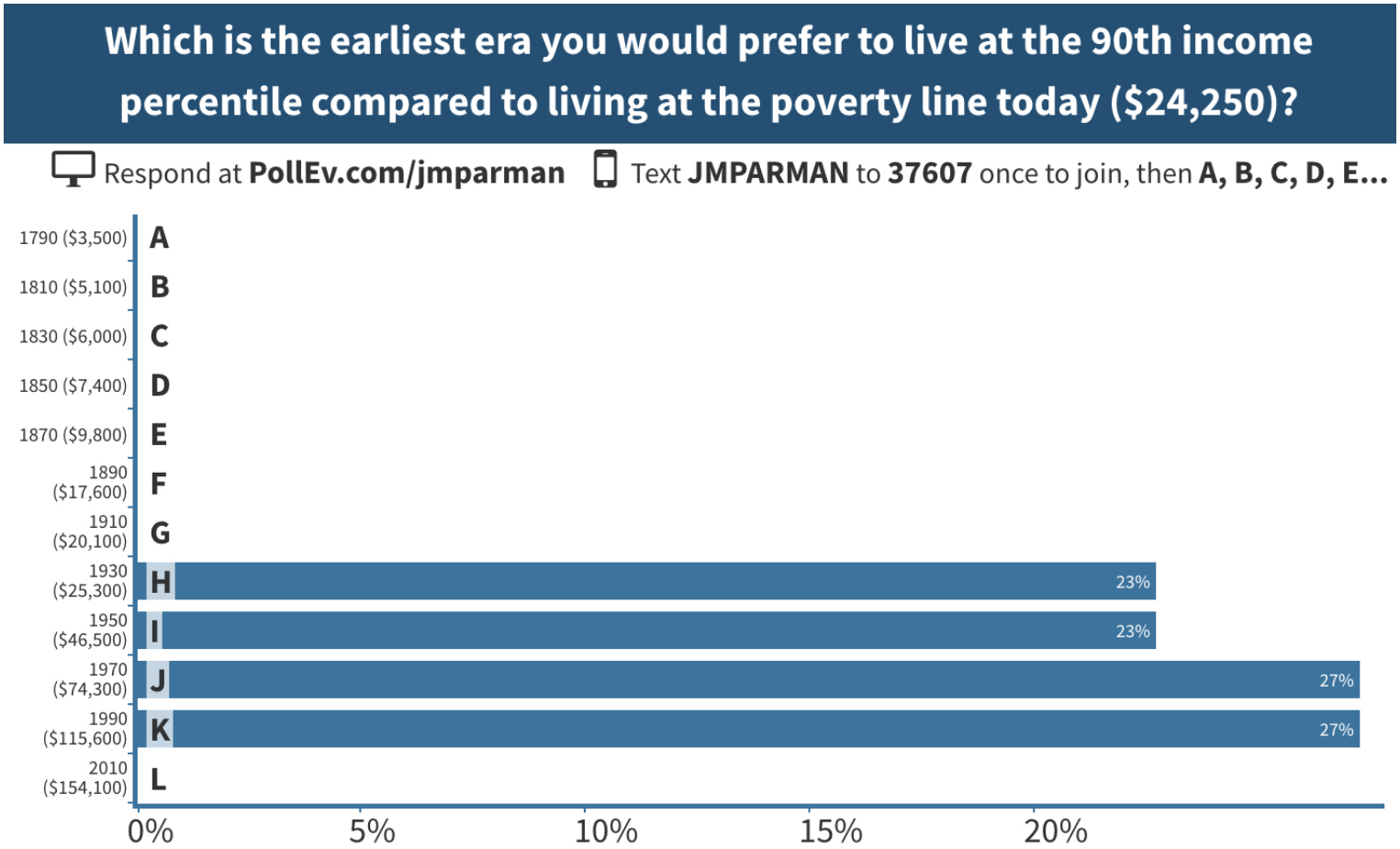
So the world is a happy place because of the Industrial Revolution?



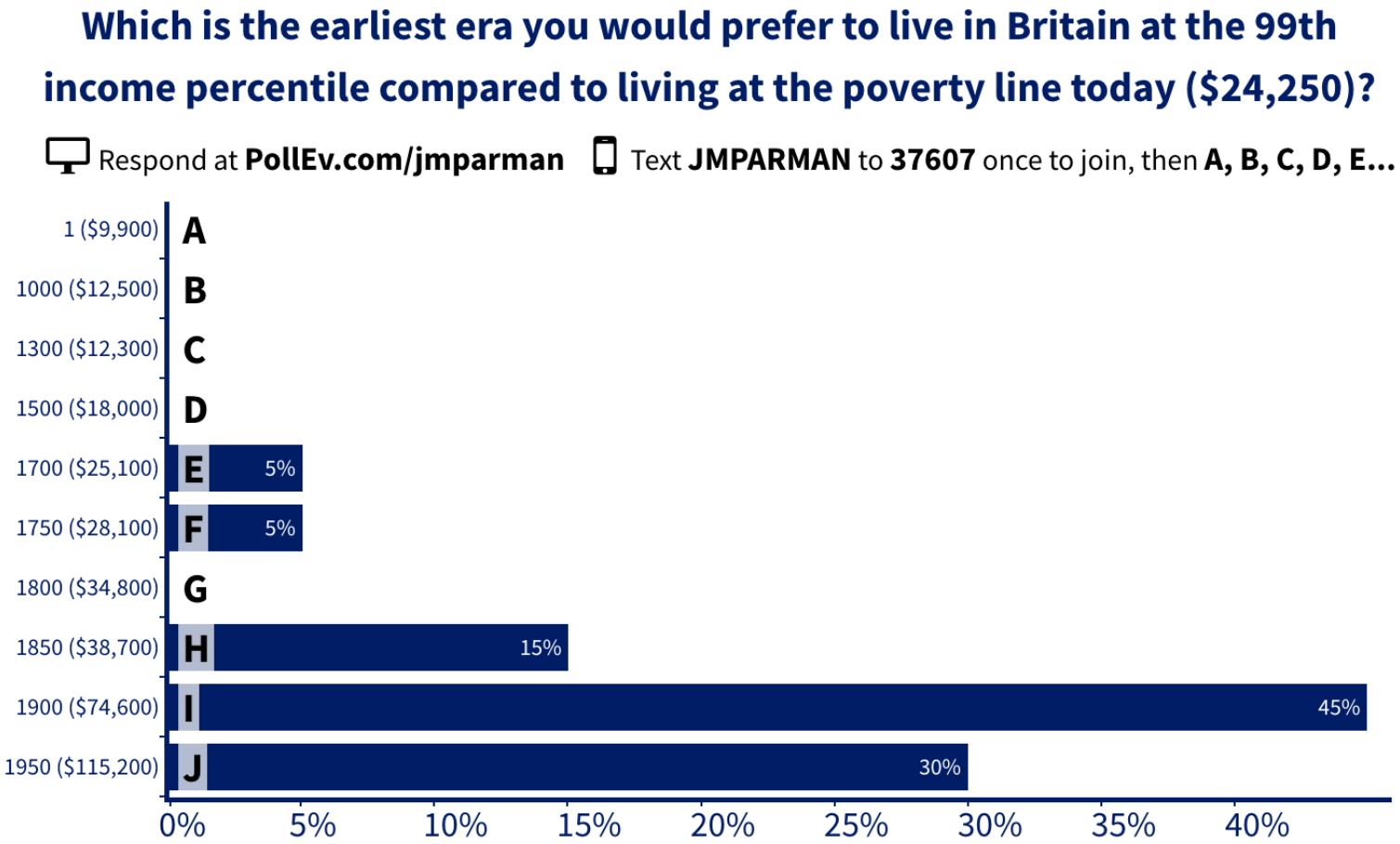
So the world is a happy place because of the Industrial Revolution?



So the world is a happy place because of the Industrial Revolution?



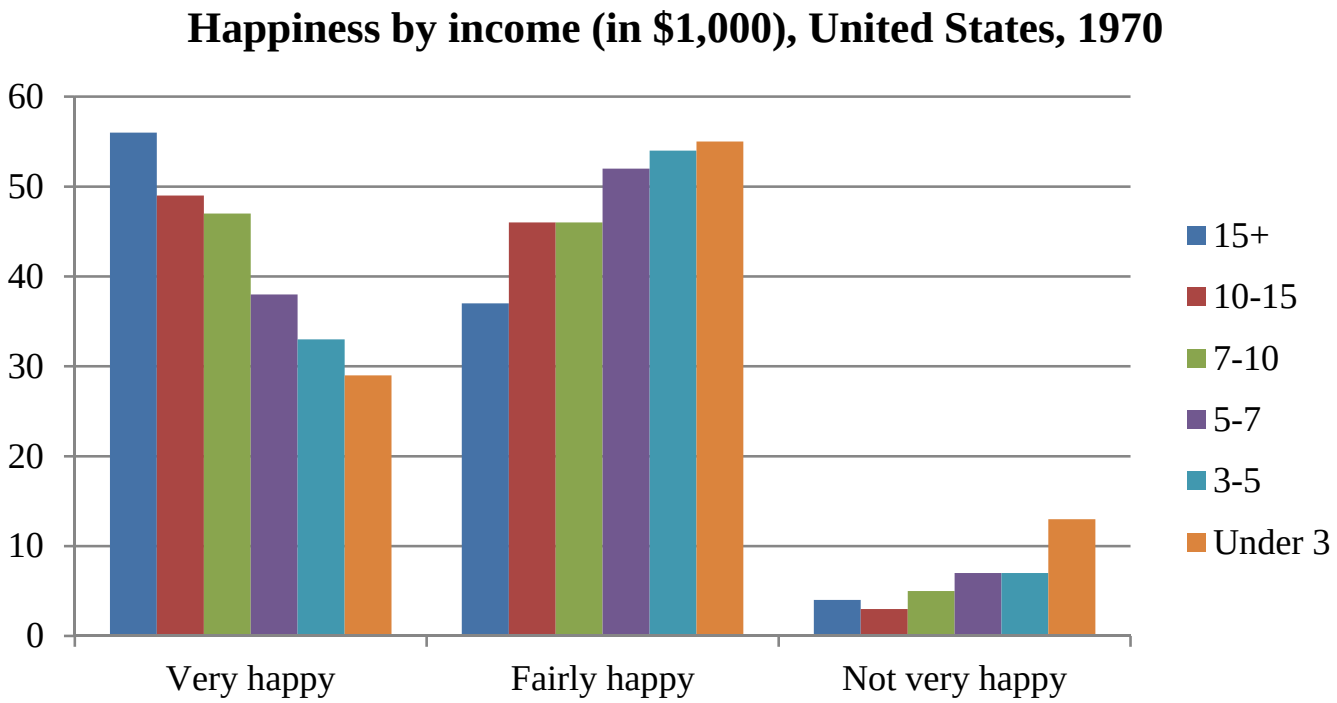
So the world is a happy place because of the Industrial Revolution?



So the world is a happy place because of the Industrial Revolution?

- So judging by income (and your responses), a good chunk of the world is a happy place
- However, there is still the issue of the Great Divergence
- A large set of countries has still been left out of these income gains
- While industrialization may have benefited everyone within countries, it has led to divergence across countries
- There is a second issue with claiming the world is a happy place
- Does more income mean greater happiness?

So the world is a happy place because of the Industrial Revolution?



So the world is a happy place because of the Industrial Revolution?

Percentage not very happy in lowest and highest status groups, 1965

Country	Low status group	High status group
Great Britain	19	4
West Germany	19	7
Thailand	15	6
Philippines	15	5
Malaysia	20	10
France	27	6
Italy	42	10

So the world is a happy place because of the Industrial Revolution?

Personal happiness rating (on a 0 to 10 scale) in lowest and highest status groups, 1960

Country	Lowest status group	Highest status group	Difference
United States	6.0	7.1	1.1
Cuba	6.2	6.7	0.5
Israel	4.0	6.5	2.5
West Germany	4.9	6.2	1.3
Japan	4.3	5.8	1.5
Nigeria	4.7	5.8	1.1
Poland	3.7	4.9	1.2
India	3.0	4.9	1.9
Dominican Republic	1.4	4.3	2.9

So the world is a happy place because of the Industrial Revolution?

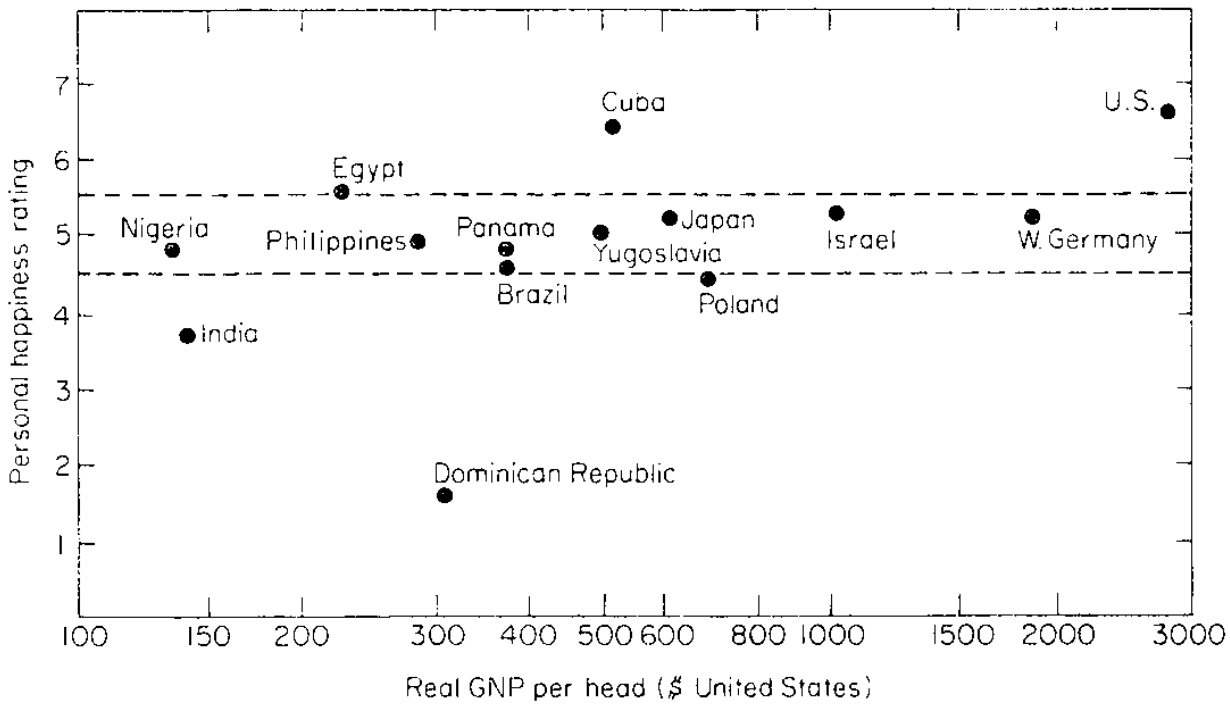
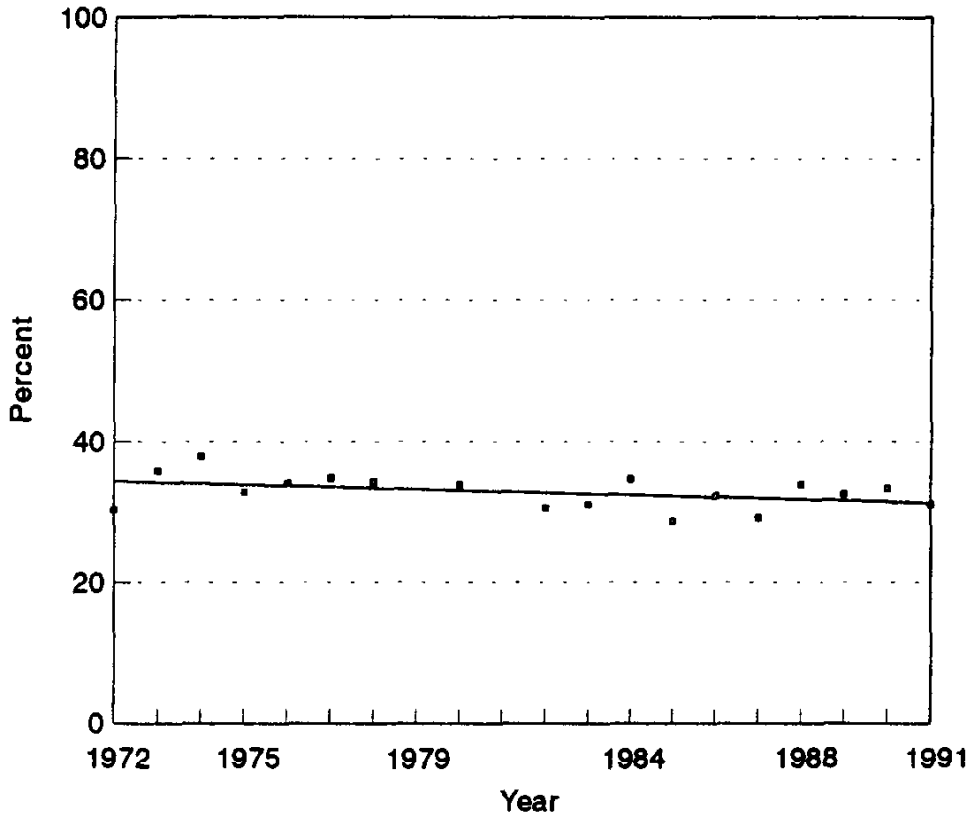


FIG. 1. Personal happiness rating and GNP per head, 14 countries, ca. 1960. (Source: Table 6.)

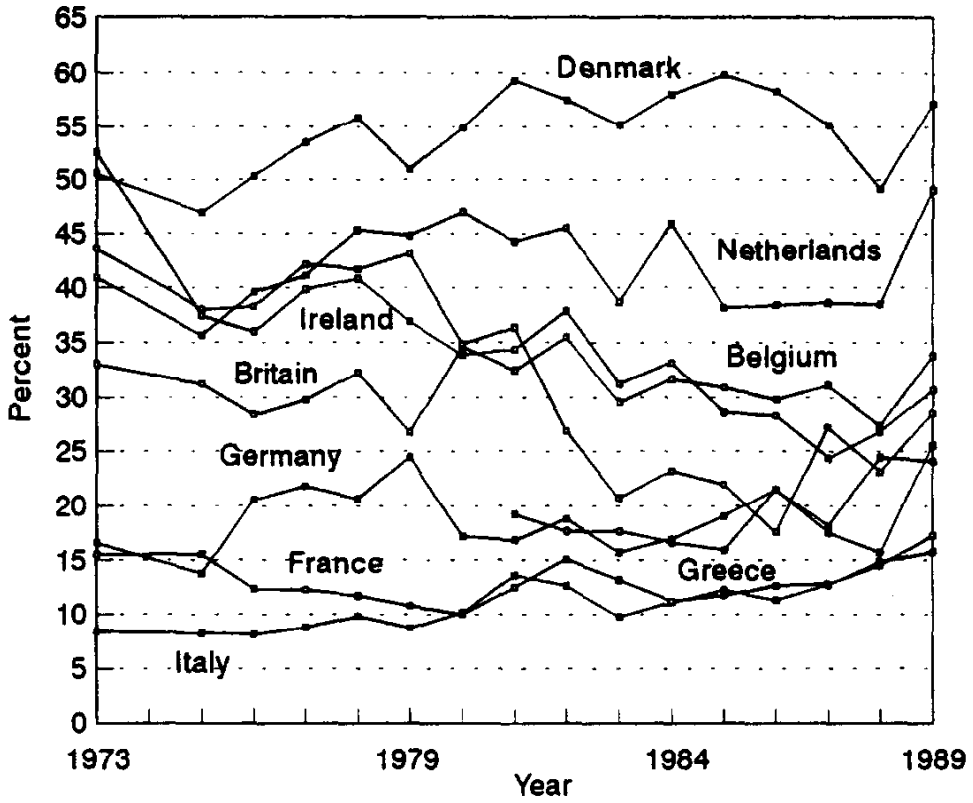
So the world is a happy place because of the Industrial Revolution?



Source and notes: National Opinion Research Center, 1991. The question is, "Taken all together, how would you say things are these days -- would you say that you are very happy, pretty happy, or not too happy?" An ordinary least squares regression line is fitted to the data; the time trend is not statistically significant.

Fig. 1. Percent very happy, United States, 1972–1991.

So the world is a happy place because of the Industrial Revolution?



Source and notes: Inglehart et al. 1992. The question asked is, "Generally speaking, how satisfied are you with your life as a whole? Would you say that you are very satisfied, fairly satisfied, not very satisfied, or not at all satisfied?" Ordinary least squares regressions (not shown) yielded time trends that were not significant for five countries, significant and positive for two, and significant and negative for two.

So the world is a happy place because of the Industrial Revolution?

- The evidence on happiness leaves us with a few things to think about
- Within countries, income is positively correlated with happiness
- Across countries we also see somewhat of a positive correlation
- However, happiness seems relatively constant over time
- This is despite dramatic increases in income over time
- What's going on here?

Interviewer questions for Cantril (1965)

(A) All of us want certain things out of life. When you think about what really matters in your own life, what are you wishes and hopes for the future? In other words, if you imagine your future in the best possible light, what would your life look like then, if you are to be happy? Take you time in answering; such things aren't easy to put into words.

Interviewer questions for Cantril (1965)

PERMISSIBLE PROBES: What are your hopes for the future? What would your life have to be like for you to be completely happy? What is missing for you to be happy? [Use also, if necessary, the words 'dreams' and 'desires.']
OBLIGATORY PROBE: Anything else?

Interviewer questions for Cantril (1965)

(B) Now, taking the other side of the picture, what are your fears and worries about the future? In other words, if you imagine your future in the worst possible light, what would your life look like then? Again, take your time in answering.

Interviewer questions for Cantril (1965)

PERMISSABLE PROBE: What would make you unhappy? [Stress the words 'fears' and 'worries.']
OBLIGATORY PROBE: Anything else?

Interviewer questions for Cantril (1965)

Here is a picture of a ladder. Suppose we say that the top of the ladder (POINTING) represents the best possible life for you and the bottom (POINTING) represents the worst possible life for you. (C) Where on the ladder (MOVING FINGER RAPIDLY UP AND DOWN LADDER) do you feel you personally stand at the present time?

Let's give it a try ourselves

- To see this in action, let's take a quick survey ourselves
- We'll answer a few of the questions from Solnick and Hemenway (1998)
- To the poll...

Set your browser to PollEv.com/jmparman or text JMPARMAN to 37607 to join the poll.

Let's give it a try ourselves

- For each question, Solnick and Hemenway establish a 'positional' case and an 'absolute' case
- The positional case involved having double the societal average, but half of the level in the absolute case
- The absolute case involved having double the level of the positional case, but half of the societal average
- What did Solnick and Hemenway get?
  - 56 percent preferred the positional scenario for income
  - 18 percent preferred the positional scenario for vacation days
  - 33 percent preferred the positional scenario for the supervisor
  - 80 percent preferred the positional scenario for the child's attractiveness

So the world is a happy place because of the Industrial Revolution?

- These happiness surveys are eliciting responses based on individuals' own frame of reference defining the range from unhappy to happy
- When asked about what would make me unhappy, my answer typically isn't "the plague"
- When asked about what would make me happy, my answer isn't "hovercrafts"
- So zero and ten on the scale are relative to the current state of the world
- Economic development keeps shifting the happiness goal posts
- This leaves us with a somewhat complicated answer to how much better off we are