Three Popular Narratives on Inequality and Why They are Wrong

What we do (and don't) know

Thomas S. Coleman

February 28 2020

Notes for Xi Song's class

1. There are social problems in the US, such as falling life expectancy and opioid epidemic, that are probably related to social stratification and "inequality"
   - Get data on life expectancy. Show world-wide history?
   - https://jamanetwork.com/journals/jama/fullarticle/2756187
     - midlife deaths (25-64)
     - declined 3 consecutive years, 2014-2017
     - starting in 1990s, period of "increasing cause-specific mortality" due to drug overdose, alcohol abuse, suicides, and a diverse list of organ system diseases (related to poor health, such as diabetes, obesity)
     - Largest increase in mortality rates in New England (NH, ME, VT) and Ohio Valley (WV, OH, IN, KY)
   - https://www.cnn.com/2019/11/26/health/us-life-expectancy-decline-study/index.html "It is a whole constellation of conditions they have shown impacts life expectancy. It is not just medical conditions, but also the social drivers that appear to be at play, like income inequality and mental distress," Koh said.
   - https://www.businessinsider.com/us-life-expectancy-declined-for-third-year-in-a-row-2019-11 "We are seeing social determinants of health shaping well-being and outcomes," Howard Koh, a professor at the Harvard T.H. Chan School of public health who was not involved in the study, told Business Insider. "Forces like income inequality and unstable employment cause psychological distress and drive conditions by which diseases and deaths occur," he added.
   - https://news.harvard.edu/gazette/story/2020/02/u-s-life-expectancy-goes-up-as-cancer-deaths-go-down/
   - Case & Deaton: https://www.brookings.edu/wp-content/uploads/2017/08/casetextsp17bpea.pdf
2. There are three commonly-accepted narratives about inequality:
   (a) Top 1% are taking everything
   (b) Middle class is stagnating
   (c) Poor are getting poorer
3. All three are wrong - or at least only half-true
   - And that is important - if we have the wrong answers, we will look for the wrong solutions
4. But we all (me included) have an intuition that current social problems are (partly) due to inequality
5. So if our three narratives are wrong, what is right? Here are three new narratives, which I think *are* right:

(a) Inequality has risen throughout the distribution, not just in the top 1%. (The middle has grown, but less than the top.)

- This is sort-of the same as our "Three Narratives" above – the top is not rising as much as we thought ("it's not all at the top") and the middle and bottom are growing (just not as fast as the top)
- explanations pinning rising inequality on accumulation of capital by the rich (e.g. Piketty's *Capital*) are not consistent with these observations – such explanations don't work for rising inequality across the distribution. The explanation of supply and demand for skills (discussed next) works better. [Murphy and Topel(2016)] p S104: "The patterns in figure 2 undermine theories that attribute rising inequality to an outbreak of self-dealing conspiracies or rent-seeking among the very rich while wage growth for everyone else languished."

(b) Skills and the supply and demand for skills are central to understanding the past 30 years, and in fact the 20th century overall. There are good data and theory that argue the rise in skills and education – shifts in the supply curve for skills – accounts for much of the "great compression" in the first part of the 20th century, while a slow-down in skill and education growth accounts for much of the resurgence over the past 30 years.

- Education and Discussion of Bernie "Free College"

(c) The centrality of skills pushes us to focus on early childhood environment and investment, and the role of the family. This points to a set of policy responses focused on childhood and education - policies that are important but do not necessarily provide quick or easy solutions.

- Take this discussion from the "Ahamed" notes
- Another (possibly important) issue: Male / female differences?

6. The fact we don't understand is exactly why this course and these students are so important - they need to be part of the solution

Additional items to research and discuss

- Panel evidence from [Auten and Gee(2009), Auten et al.(2013)Auten, Gee, and Turner]
- Progressivity of taxes – evidence and debate for Zucman vs Auten & Splinter

Why Do We Care About Inequality?
We all have an intuition inequality is important
And indeed there are problems in the US. For example, life expectancy down

- midlife deaths (25-64), life expectancy declined 3 consecutive years, 2014-2017
- starting 1990s, "increasing cause-specific mortality" due to drug overdose, alcohol abuse, suicides
- Largest increase in mortality rates in New England (NH, ME, VT) and Ohio Valley (WV, OH, IN, KY)

This is a big deal – and intuition tells us related to social conditions

> It is a whole constellation of conditions they have shown impacts life expectancy. It is not just medical conditions, but also the social drivers that appear to be at play, like income inequality and mental distress (from Howard Koh, Harvard public health)

So it's important we understand the how and why of unemployment

- If we don't know the facts, we will make wrong decisions

Three Narratives, and What We Know
Three popular (and wrong) populist narratives:

1. Top 1% takes all the earnings
    - Piketty & Saez (and associated): the top 1% of earners take 20% of earnings, versus 10% in the 1960s
2. Middle has stagnated
    - Real earnings have not grown since 1979
3. Bottom (the poorest) has gone down

All three are wrong (or less true than we thought)
So, what *do* we know? Three alternative narratives:

1. Inequality has grown throughout the distribution, not just the top
2. Education, human capital, and the demand / supply for skills are central
    - For understanding both the rise of past 40 years, and the "great compression" of the mid-20th c
3. If skills are the question, early childhood and family are the answer
    - Meaning policies that do not provide quick or easy solutions

Outline

Contents

1 Three Popular Narratives – All Wrong **4**
1.1 Top 1% Take Everything . . . 4
1.2 Middle Has Stagnated . . . 5
1.3 Bottom Has Gone Down . . . 6
2 Critically Examining the "Three Popular Narratives" **6**
2.1 Framework for Comparing Inequality Measurement . . . 6
2.2 Comparing Top Income Shares . . . 7
2.3 Comparing Median Studies . . . 12
2.4 Growth at Bottom of the Distribution . . . 18
2.5 Some Additional Puzzles . . . 18
3 Three New Narratives **19**
3.1 Inequality Throughout the Distribution . . . 19
3.2 Education, Human Capital, and the Demand vs Supply of Skills . . . 20
3.3 Early Childhood and Family . . . 24
4 Conclusion **25**

Who Am I?
Education

- BA physics Harvard
- PhD economics University of Chicago

Main Career

- Over 20 years in the finance industry
- Trading derivatives, building trading systems, running a hedge fund
- I came back to Chicago in 2012 – it has been an unexpected pleasure and opportunity

The practical experience is important – value in combining

- Deep knowledge of market practice
- Theory and quantitative tools

1 Three Popular Narratives – All Wrong

1.1 Top 1% Take Everything

Top 1% Take Everything
Based on work by Piketty & Saez (2003; plus later work, additional authors)

- Using tax return data, to measure incomes of top earners in a way that had not been done previously

Their evidence shows:

- Earnings of the top 1% (as a share of total earnings) has gone from 10% in 1979 to 22% in 2014.
- The top 1% took most of the total growth (increase in earnings) – roughly 60% from 1979 to 2014

	Total	Top 1%	% share
1979	$47,639.30	$4,782.52	***10.0%***
2014	$62,901.10	$13,812.07	***22.0%***
Change	$15,261.80	$9,029.55	***59.2%***

But this evidence is flawed – the top has grown – but less. Three primary factors:

- P&S miss many sources of income – particularly transfers – and taxes. Both increase share of lower 99%
- Tax law changes: *reporting* of income changed but not *actual* income
- Changes in marriage and family increase share of lower 99% and missed by tax returns

See [Piketty and Saez(2003), Saez(2016)] for the data on top 1% earnings. See [Piketty et al.(2018)Piketty, Saez, and Zucm for more recent work that attempts to include wider measures of income.

The numbers above are from the appendix datasheet to [Piketty et al.(2018)Piketty, Saez, and Zucman]. http://gabriel-zucman.eu/files/PSZ2017AppendixTablesII(Distrib).xlsx

- Share of Total Earnings: Table TD2b directly or calculated from Table TD3
- Proportion of growth (increase in earnings):
  - Table TD3 has "average earnings" for "bottom 90%", "top 10%" and "top 1%"
    - Avg Total = 0.90*Avg Bottom 90% + 0.10*Avg Top 10%

– From this one can calculate the total income and thus the change in income for all and top 1%:

	Total	Top 1%	% share
1979	$47,639.30	$4,782.52	10.0%
2014	$62,901.10	$13,812.07	22.0%
Change	$15,261.80	$9,029.55	59.2%

But note that, as [Auten and Splinter(2018)] point out (in notes to their Table IV) that the "share of growth" computations "do not produce meaningful results because there are different adults in income groups every year ...". Or, as they say on p. 23: "It is important to note that such cross-sectional computations of the distribution of economic growth have the implicit assumption that it is the same people at the top of the income distribution over time. The beneficiaries of economic growth cannot be determined by comparing two cross-sections because the composition of income groups changes over time." They refer to work by [Auten et al.(2013)Auten, Gee, and Turner] that follow a panel of individuals.

1.2 Middle Has Stagnated

Middle Has Stagnated
Evidence seems to show no growth for the middle – "the middle class has stagnated"

Evidence to support this:

- Median real earnings grew 0.6% from 1979 to 2014 (that is 0.6% for the whole period, not 0.6% per year)
  - Official, published by BLS
- Median household income grew 7.1% from 1979 to 2014
  - Official, published by Bureau of the Census

In fact middle *has* grown. Three primary factors:

- Changes in marriage and household size *really* matter
  - What "unit" we look at – tax returns versus households versus individuals
- Measuring inflation – CPI overstates inflation & understates growth
- Government transfers and taxes matter

- Real earnings are LEU0252881600A
  - Deflated by CPI-U. Converting to CPI-U-RS would give 7.7%
  - From CPS ORG files. This series is Full-Time, 16+. For breakdown by education look at 25+
- Real median Household earnings are from US Census REPORT NUMBER P60-252 at https://www.census.gov/library/p 252.html FRED series MEHOINUSA672N
  - Deflated by CPI-U-RS
  - FRED only goes back to 1984 (I don't know why) but the web-site has earlier numbers
  - Comes from CPS March / ASEC file.

1.3 Bottom Has Gone Down

Bottom Has Gone Down
If the top has grown substantially and the middle has not changed, then the bottom must be doing poorly

Evidence to support this:

- Earnings for the bottom 50% fell by 19% from 1979 to 2014
  - From tax data. Piketty & Saez (2003), updated by Piketty, Saez, Zucman (2018)

In fact the bottom *has* grown, with changes in government transfers and taxes being primary factors

- "Bottom 50%" from [Piketty et al.(2018)Piketty, Saez, and Zucman] appendix (http://gabriel-zucman.eu/files/PSZ2017 Table TD7, column "Tax Units"
  - Bottom 90% grew by –0.4% (over the 35 years). Table TD6

2 Critically Examining the "Three Popular Narratives"

2.1 Framework for Comparing Inequality Measurement

Contents

Framework for Comparing Inequality Measurement
Variable Measured

- Growth & Central Tendency (Median); Distribution / Tails (Gini, Quintiles, Top 1%); Poverty Rate

Data Type

- Labor Income (weekly earnings, annual earnings, or hourly wages); Market Income (Labor + self-employed + non-labor); Market + Cash Transfers; Market + All (including in-kind) transfers; Before Tax vs After Tax

Data Source

- Survey (e.g. CPS, PSID); Administrative (e.g. IRS, Social Security Administration)

Methodology

- Tax Unit vs. Individual; Personal (individual) Income vs Size-Adjusted Household; Deflator (CPI-U overstates inflation, understates real growth; CPI-U-RS better; PCE better yet because chain-linked rather than Laspeyres)

2.2 Comparing Top Income Shares

Contents

Summary of Results for Top Income Shares

- Focus on upper tail rather than middle
- Percent of total income captured by top 1% of earners

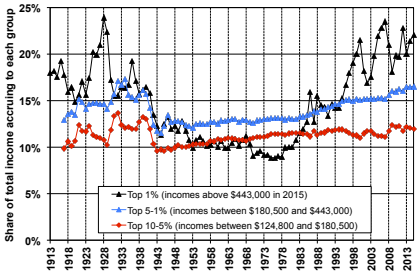
Questions that arise:

- Measuring "tax units" vs people? (Answer – we want people – and it matters a lot)
- What income? (Answer – we should include wide measure – potentially including transfers)
- What is reported on tax forms? (Answer – not necessarily the "income" we care about)

Top 1% income share has grown, but much less than commonly thought

- Originally Piketty & Saez said from 10% to 20% – big increase
- More recent results say *much* less – roughly 8% to 10%

Piketty & Saez vs Auten & Splinter



The Top 1% Income Share, 1913-2015. Income is defined as market income (and excludes government transfers). Figure 2 from Saez 2016

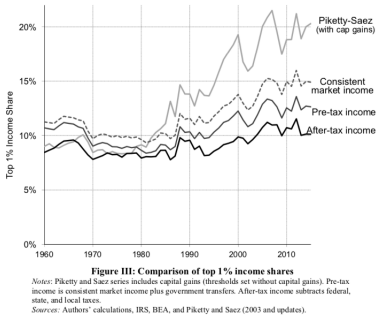


Figure III from Auten & Splinter 2018. Piketty and Saez series includes capital gains (thresholds set without capital gains). Pre-tax income is consistent market income plus government transfers. After-tax income subtracts federal, state, and local taxes.

Saez figure from [Saez(2016)]. Auten & Splinter figure III from [Auten and Splinter(2018)]

Summary of Results for Top Income Shares - 1979-2014
Piketty & Saez:

- Earnings of top 1% from 10% to 22%
- The top 1% took roughly 60% of the growth in earnings

Auten & Splinter

- Earnings of top 1% from 7% to 9%
- The top 1% took roughly 10% of the growth in earnings

	Piketty & Saez (Average, $2018)			Auten & Splinter (Total, mn $2012)		
	Total	Top 1%	% share	Total	Top 1%	% share
1979	$47,639	$4,783	10.0%	$6,035,148	$435,374	7.2%
2014	$62,901	$13,812	22.0%	$14,727,252	$1,272,161	8.6%
Change	$15,262	$9,030	59.2%	$8,692,104	$836,787	9.6%

Two particularly important issues in Auten & Splinter (vs Piketty & Saez)

- Changes in marriage rates: Marriages down at bottom of distribution, so more single tax returns, automatically lowers bottom-share income
- Changes in tax law: Particularly Tax Reform Act 1986 reduced incentive to report personal income as corporate income
  - After 1986, more income reported as "personal income"
  - But probably no actual change – just reporting

Repeating from above:

- The Piketty & Saez numbers are from the appendix datasheet to [Piketty et al.(2018)Piketty, Saez, and Zucman]. http://gabriel-zucman.eu/files/PSZ2017AppendixTablesII(Distrib).xlsx Table TD2b or TD3 (calculated)
- Auten & Splinter numbers are from http://davidsplinter.com, http://davidsplinter.com/AutenSplinter-IncomeIneq.xlsx, Table "C-3 Average Incomes" - average for "bottom 90%" Table

x

- Share of Total Earnings: Table TD2b directly or calculated from Table TD3
- Proportion of growth (increase in earnings):
  - Table TD3 has "average earnings" for "bottom 90%", "top 10%" and "top 1%"
    - Avg Total = 0.90*Avg Bottom 90% + 0.10*Avg Top 10%
  - From this one can calculate the total income and thus the change in income for all and top 1%:

	Piketty & Saez (Average, $2018)			Auten & Splinter (Total, mn $2012)		
	Total	Top 1%	% share	Total	Top 1%	% share
1979	$47,639	$4,783	10.0%	$6,035,148	$435,374	7.2%
2014	$62,901	$13,812	22.0%	$14,727,252	$1,272,161	8.6%
Change	$15,262	$9,030	59.2%	$8,692,104	$836,787	9.6%

  - Auten & Splinter numbers are their nominal numbers deflated by PCE

But note that, as [Auten and Splinter(2018)] point out (in notes to their Table IV) that the "share of growth" computations "do not produce meaningful results because there are different adults in income groups every year ...". Or, as they say on p. 23: "It is important to note that such cross-sectional computations of the distribution of economic growth have the implicit assumption that it is the same people at the top of the

income distribution over time. The beneficiaries of economic growth cannot be determined by comparing two cross-sections because the composition of income groups changes over time." They refer to work by [Auten et al.(2013)Auten, Gee, and Turner] that follow a panel of individuals.

Tax Units & Falling Marriage Rates – Pushes People Up

Piketty & Saez: tax returns or "tax units", which may be one person or two

Marriage rates have declined, except at the top:

	1960	2015
Top 1%	90%	86%
Everyone	69%	39%

As marriage ↓ at lower end, more tax returns at bottom, pushes income up

Early Period, High Marriage at Lower and Upper End – Tax Units & Individuals Same

20+20 Tax Units		40+40 Individuals	
Below	Above	Below	Above
20 units, **40 people**	20 units, **40 people**	20 units, **40 people**	20 units, **40 people**
20x$10k or 40x$5k = $200k	20x$20k or 40x$10k = $400k	20x$10k or 40x$5k = $200k	20x$20k or 40x$10k = $400k
33.3%	66.7%	33.3%	66.7%

Late Period, No Marriage at Lower, High Marriage at Upper – Tax Units Push Individuals Up

40+20 Tax Units, push *people* into high		40+40 Individuals	
Below	Above	Below	Above
30 units, **30 people**	10+20 units, **50 people**	40 units, **40 people**	20 units, **40 people**
30x$5k = $150k	10x$5k + 40x$10k = $450k	20x$10k or 40x$5k = $200k	20x$20k or 40x$10k = $400k
25%	75%	33.3%	66.7%

> Marriage rates among tax filers have fallen consistently over the past five decades from 69% in 1960 to 39% in 2015 (after removing filers younger than 20 years old, dependent filers, and non-residents). However, marriage rates among the top one percent have remained consistently high: 90% in 1960 and 86% in 2015. Holding all else constant, declining marriage rates below the top of the income distribution increases tax unit based top income shares. ([Auten and Splinter(2018)] p 11)

> Declining marriage rates outside the top of the distribution also explain part of the increase in measured top income shares. This is because, holding all else equal, as the marriage rate in the bottom of the distribution decreases, the total number of tax units increases. ([Auten and Splinter(2018)] p 7)

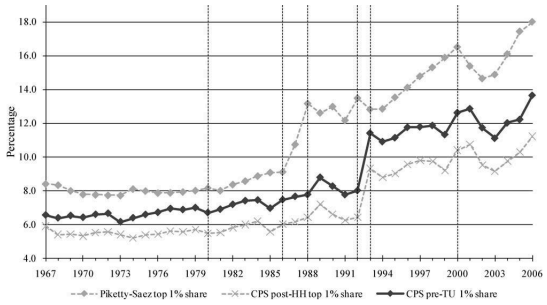
Changing Definition of "Tax Income"

Tax rates and definition of "Taxable Income" has changed

- Biggest change was 1986 TRA (Tax Reform Act)
- Before 1986: big incentive to keep income in C corporation (lower tax rate)
- After 1986: incentive to set up S corporation (LLC) and pass-through income to individual
- Big change in *reported* income, but not in *actual* income – just how reported on tax forms
- Important for high earners

Note the big jump in 1996 for "Piketty-Saez"

- Ignore the other two
- Change in survey question – Burkhauser et al. adjust
- Piketty & Saez do not adjust for 1986 TRA



Summary of Results for Top Income Shares - 1979-2014

Study	Top 1% 1979	Top 1% 2014	Change (pctg pts)	Income Concept	Adjust for Size	Unit of analysis, 2014	Note	From
Piketty and Saez (2003)	10.0%	22.0%	11.9%	Gross income as reported on tax forms without government transfers	No	165 million tax filers		PSZ appendix, calc Coleman
Piketty, Saez, and Zucman (2018)	11.5%	19.9%	8.4%	All national income including homeownership and government services	No	234 million adults age 20 and older	Partially corrects P&S for income in addition to taxes, but not after-tax, not tax units	PSZ appendix, calc Coleman
Auten & Splinter	8.1%	18.4%	10.3%	Piketty-Saez income replication (no capital gains, by tax units)	No	Tax Units	Replicates P&S	A&S appendix, calc Coleman
Auten & Splinter	9.5%	14.3%	4.8%	Pre-tax national income (by number of individuals)	No?	Persons	Consistency - changes in tax definition, marriage rates	A&S appendix, calc Coleman
Auten & Splinter	8.7%	12.4%	3.7%	Pre-tax after-transfer national income (by no of indivs.)	No?	Persons		A&S appendix, calc Coleman
Auten & Splinter	7.2%	8.6%	1.4%	After-tax national income (by number of individuals)	No?	Persons		A&S appendix, calc Coleman
	95-99th% 1979	**95-99th% 2006**						
Piketty and Saez (2003)	12.8%	15.4%	2.6%	Gross income as reported on tax forms without government transfers	No	Tax Units	Estimated from Figure 2	Burkhauser et al.
	12.9%	15.4%	2.5%	CPS-Pre-TU: CPS March surve, pre-transfer income for imputed tax units	No	Tax Units	Estimated from Figure 2	"Recent Trends in Top Income ..."
Auten & Splinter	10.8%	12.7%	1.9%	CPS-Post-HH: CPS March survey, post-cash-transfer income for individuals, HH income size-adjusted	Yes	Houshold	Estimated from Figure 2	May 2012

- Start with Piketty & Saez: 10.0 to 22.0
- Auten & Splinter rough match: 8.1 to 18.4
- Adjust for various income, persons vs tax units: 9.5 to 14.3
- Add in transfers: 8.7 to 12.4
- Taxes: 7.2 to 8.6

Auten & Splinter (*AEA Papers*) does careful decomposition
Larrimore et al. discuss top shares and find results in accord with Auten & Splinter

Figure 1: Summary of Top 1% Studies

Study	**Top 1% 1979**	**Top 1% 2014**	Change (pctg pts)	Income Concept	Adjust for Size	Unit of analysis, 2014	Note	From
Piketty and Saez (2003)	10.0%	22.0%	11.9%	Gross income as reported on tax forms without government transfers	No	165 million tax filers		PSZ appendix, calc Coleman
Piketty, Saez, and Zucman (2018)	11.5%	19.9%	8.4%	All national income including homeownership and government services	No	234 million adults age 20 and older	Partially corrects P&S for income in addition to taxes, but not after-tax, not tax units	PSZ appendix, calc Coleman
Auten & Splinter	8.1%	18.4%	10.3%	Piketty-Saez income replication (no capital gains, by tax units)	No	Tax Units	Replicates P&S	A&S appendix, calc Coleman
Auten & Splinter	9.5%	14.3%	4.8%	Pre-tax national income (by number of individuals)	No?	Persons	Consistency - changes in tax definition, marriage rates	A&S appendix, calc Coleman
Auten & Splinter	8.7%	12.4%	3.7%	Pre-tax after-transfer national income (by no of indivs.)	No?	Persons		A&S appendix, calc Coleman
Auten & Splinter	7.2%	8.6%	1.4%	After-tax national income (by number of individuals)	No?	Persons		A&S appendix, calc Coleman
	95-99th% 1979	**95-99th% 2006**						
Piketty and Saez (2003)	12.8%	15.4%	2.6%	Gross income as reported on tax forms without government transfers	No	Tax Units	Estimated from Figure 2	Burkhauser et al.
	12.9%	15.4%	2.5%	CPS-Pre-TU: CPS March surve, pre-transfer income for imputed tax units	No	Tax Units	Estimated from Figure 2	"Recent Trends in Top Income …"
Auten & Splinter	10.8%	12.7%	1.9%	CPS-Post-HH: CPS March survey, post-cash-transfer income for individuals, HH income size-adjusted	Yes	Houshold	Estimated from Figure 2	May 2012

[Auten and Splinter(2019)] have a careful and detailed decomposition of the differences from

TABLE 2—TOP 1 PERCENT PRETAX INCOME SHARES, 2014: MOVING FROM FISCAL INCOME TO EXPANDED INCOME DEFINITIONS

	CBO		Auten-Splinter	
	1979	2014	1979	2014
Panel A. Summary of changes				
Fiscal income with cap. gains	9.9	21.8	9.9	21.8
Total changes (see panel B)	–0.9	–5.1	–0.4	–8.7
Expanded income definitions	9.0	16.7	9.5	13.1
Panel B. Changes from fiscal income				
Unit of observation and sample	–0.9	–2.8	–0.9	–2.2
+ social insurance benefits	–0.6	–2.0	–0.7	–2.4
+ employer-sponsored insur.	–0.3	–0.6	–0.3	–1.0
+ corporate income taxes	0.8	0.9	0.4	0.2
+ payroll and other taxes	–0.2	–0.5	–0.4	–0.9
+ private retirement income	b	–0.2	–0.1	–0.1
+ income corrections	0.3	0.1	1.0	a
+ underreported income	b	b	0.8	–0.3
+ imputed rent	b	b	–0.1	–0.1
– realized capital gains	b	b	–1.3	–2.4
+ corporate retained earnings	b	b	1.2	0.5

Note: In this table, "a"denotes changes less than 0.05 percentage points, and "b" denotes no adjustment made.

Source: Authors' calculations using tax return data

See also [Larrimore et al.(2016)Larrimore, Burkhauser, Auten, and Armour] which I have not fully digested but find broadly the same results as Auten & Splinter – much less growth in top 1% income share.

2.3 Comparing Median Studies

Contents

Summary of Results for Growth & Median
Median *has* grown when we account for:

- What income is measured
  - We want a broad measure of income – beyond labor income to full market and transfers
- Size Adjusting and What "Unit" we look at
  - For Household Income *must* adjust by size – we care about income of people not houses
  - Also rank & distribute over Individuals (persons) and not "tax units" or "households".
- Measuring inflation
  - A large effect when we look at periods of 30 years or more.
  - The common CPI measure is flawed – overstates inflation & understates growth
- Government transfers and taxes
  - Very important – substantial changes over the past 20-50 years

Rose (2018) is a very useful study. Table on following slide extends Rose's Table 1, and the following slides expand

[Rose(2018)]

Recap – Summary of Results for Growth & Median

	Study	Change in Median	Price Deflator	PCE	Income Concept	Adjust for Size	Unit of analysis, 2014	Note	From
	Tax Units & "Tax form income"								
1	Piketty and Saez (2003)	-8	National Income Deflator	-6%	Gross income as reported on tax forms without government transfers	No	165 million tax filers		Rose
2	Auten & Splinter	?	PCE	#VALUE!	Piketty-Saez inocme replication (no capital gains, by tax units)	No	Tax Units	Replicates P&S	A&S appendix, calc Coleman
3	Elwell, Corinth, Burkhauser (2019)	-16	CPI-U-RS	-7%	Market Income (Labor + Non-Labor) of Tax Units	No	Tax Units		Elwell, mod Coleman
	Household Income, Persons, plus transfers, pre-tax								
4	Elwell, Corinth, Burkhauser (2019)	9	CPI-U-RS	20%	Market Income (Labor + Non-Labor)	Yes	Persons	Better correction for P&S income, and corrects for tax units vs people	Elwell, mod Coleman
5	CPS Household Income (published)	7	CPI-U-RS	18%	Pretax, postcash transfers and no employer benefits	No	123 million households	Does not adjust for HH size	Rose
6	Rose (2016)	30	PCE	30%	Pretax, postcash transfers and no employer benefits	Yes	186 million independent adults	Corrects for HH size and uses independent adults (instead of HH)	Rose
7	Elwell, Corinth, Burkhauser (2019)	15.5	CPI-U-RS	27%	HH Size-Adj Pre-Tax Market + Cash Transfer	Yes	Persons		Elwell, mod Coleman
8	Auten & Splinter	?	PCE	#VALUE!	Pre-tax national income (by number of individuals)	No	Persons	Better correction for P&S income, and corrects for tax units vs people	
9	Auten & Splinter	?	PCE	#VALUE!	Pre-tax after-transfer national income (by number of indivs.)	No	Persons		
10	Piketty, Saez, and Zucman (2018)	33	National Income Deflator	36%	All national income including homeownership and government services	No?	234 million adults age 20 and older	Partially corrects P&S for income in addition to taxes, but not after-tax, not tax units vs persons	Rose
	Post-Tax & Transfers								
11	Elwell, Corinth, Burkhauser (2019)	20	CPI-U-RS	32%	HH Size-Adj Post-Tax Market + Cash&Non-cash Transfers	Yes	Persons		Elwell, mod Coleman
12	Burkhauser, Larrimore, and Simon (2011)b	37	CPI-U-RS	51%	Posttax, posttransfer income with health benefits	Yes	117 million households	Includes health	Rose
13	CBO (2018)	51	PCE	51%	Posttax and post- and noncash transfers and employer benefits	Yes	310 million people	Includes health	Rose
14	Elwell, Corinth, Burkhauser (2019)	33	CPI-U-RS	47%	HH Size Adj Post-Tax Market + Cash & Non-cash + Medicare + Medicaid + ESI	Yes	Persons		Elwell, mod Coleman
15	Auten & Splinter	?	PCE	#VALUE!	After-tax national income (by number of individuals)	No	Persons		

Figure 2: Comparison of Median Growth Across Studies

	Study	Change in Median	Price Deflator	PCE	Income Concept	Adjust for Size	Unit of analysis, 2014	Note	From
	Tax Units & "Tax form income"								
1	Piketty and Saez (2003)	-8	National Income Deflator	-6%	Gross income as reported on tax forms without government transfers	No	165 million tax filers		Rose
2	Auten & Splinter	?	PCE	#VALUE!	Piketty-Saez income replication (no capital gains, by tax units)	No	Tax Units	Replicates P&S	A&S appendix, calc Coleman
3	Elwell, Corinth, Burkhauser (2019)	-16	CPI-U-RS	-7%	Market Income (Labor + Non-Labor) of Tax Units	No	Tax Units		Elwell, mod Coleman
	Household Income, Persons, plus transfers, pre-tax								
4	Elwell, Corinth, Burkhauser (2019)	9	CPI-U-RS	20%	Market Income (Labor + Non-Labor)	Yes	Persons	Better correction for P&S income, and corrects for tax units vs people	Elwell, mod Coleman
5	CPS Household Income (published)	7	CPI-U-RS	18%	Pretax, postcash transfers and no employer benefits	No	123 million households	Does not adjust for HH size	Rose
6	Rose (2016)	30	PCE	30%	Pretax, postcash transfers and no employer benefits	Yes	186 million independent adults	Corrects for HH size and uses independent adults (instead of HH)	Rose
7	Elwell, Corinth, Burkhauser (2019)	15.5	CPI-U-RS	27%	HH Size-Adj Pre-Tax Market + Cash Transfer	Yes	Persons		Elwell, mod Coleman
8	Auten & Splinter	?	PCE	#VALUE!	Pre-tax national income (by number of individuals)	No	Persons	Better correction for P&S income, and corrects for tax units vs people	
9	Auten & Splinter	?	PCE	#VALUE!	Pre-tax after-transfer national income (by number of indivs.)	No	Persons		
10	Piketty, Saez, and Zucman (2018)	33	National Income Deflator	36%	All national income including homeownership and government services	No?	234 million adults age 20 and older	Partially corrects P&S for income in addition to taxes, but not after-tax, not tax units vs persons	Rose
	Post-Tax & Transfers								
11	Elwell, Corinth, Burkhauser (2019)	20	CPI-U-RS	32%	HH Size-Adj Post-Tax Market + Cash&Non-cash Transfers	Yes	Persons		Elwell, mod Coleman
12	Burkhauser, Larrimore, and Simon (2011)b	37	CPI-U-RS	51%	Posttax, posttransfer income with health benefits	Yes	117 million households	Includes health	Rose
13	CBO (2018)	51	PCE	51%	Posttax and post- and noncash transfers and employer benefits	Yes	310 million people	Includes health	Rose
14	Elwell, Corinth, Burkhauser (2019)	33	CPI-U-RS	47%	HH Size Adj Post-Tax Market + Cash & Non-cash + Medicare + Medicaid + ESI	Yes	Persons		Elwell, mod Coleman
15	Auten & Splinter	?	PCE	#VALUE!	After-tax national income (by number of individuals)	No	Persons		

Road-Map Through Results for Median Growth – Inflation

First Consideration: Inflation & Deflator Choice

- Standard CPI (CPI-U) used for "Real Median Earnings" shows too much inflation – overestimates by maybe 0.5% per year
- CPI is a (modified) Laspeyres Index that uses fixed weights – overstates inflation because consumers can switch to cheaper alternatives (in Consumer Theory, the issue of Marshallian vs Hicksian income effects, and the concept of Equivalent versus Compensating Variation)

	1979-2014
CPI-U	226.2%
CPI-U-RS	204.7%
PCE	176.1%
NID	181.3%

- CPI-U-RS better
- PCE (Personal Consumption Expenditure) is probably best – "chained index"
  - Lowest inflation, implies highest growth
  - But also the most defensible (from economic perspective)

Table converts all measures to PCE

Issues to discuss:

- Unit of measurement (tax unit vs HH vs persons)
  - Auten & Splinter – re-read section on unit of measurement
  - What does this mean?
    - Income sharing: HH Income vs Personal Income
    - Persons vs HH:
    - Size adjustment
- Income Type
  - Labor Income, Market Income, + Transfers, Before Tax vs After Tax
- Deflator

"Tax Income" Measures for Median Growth – Rows 1, 2, 3

Starting with Piketty & Saez results for "Fiscal Income" (basically tax returns).
Very low (negative) growth, but two basic problems mean results not very useful

- Misses important parts of income: Includes only "tax return income" – misses things like appreciation of assets (houses, stock market) and non-taxable income (Social Security)
- Reports income by tax return – may be single or married. Important biases discussed below because marriage rates change

Benefit: good data on top incomes. (Matters less for median)
Other authors replicate Piketty & Saez results

- Auten & Splinter? (waiting for their median results)
- Elwell, Corinth, Burkhauser (2019) – interpolated from graph

Discussion next (expansions of income type and changes in methodology – persons vs tax units) show that these results are not what we want

- Miss important components of income
- Biases that change over time make median growth unreliable

Household Income Measures – Rows 4-10

- First, we have to move from tax units to individuals, and adjust by HH size:
  - Rows 3 & 4 – Ellwell et al. – isolate that change. Big effect (too big?)
- Next we turn to broader measures of "market" income – all income received whether taxed or not, both cash (Social Security payments) and potentially non-cash (such as Section 8 housing vouchers or food stamps)

Start with published "Household Income" – money income before taxes
Important for three reasons:

- The most widely-used and widely-quoted "inequality" statistic in the US, published by the US Census Bureau
- Demonstrates very clearly the effect and importance of "adjusting for HH size" and measuring "units" versus individuals
- Highlights the effects of "sharing" across individuals within units and the difference between household and personal income

Household Income 1979-2014 by Household & Persons, CPS March Survey, deflated CPI-U-RS

	Households		Persons	Avg Size
	No Adj	SqRt(N)	SqRt(N)	
% grth Median	7.1%	14.9%	16.0%	
1979 90/10	3.88	2.62	2.23	2.74
2014 90/10	6.58	4.72	4.36	2.49

The difference between Elwell et al. measures 2 & 4 ("market income" by "tax unit" vs "size-adjusted HH") seem to be larger than I would expect. For the CPS (by my own calculations and for Rose) the effect of adjusting HH by size takes median growth up by factor of 1.08 (from 7.1% to 16.0% when deflated by CPI-U-RS, or from 18.2% to 28% deflated by PCE). [Elwell et al.(2019)Elwell, Corinth, and Burkhauser] reference [Burkhauser et al.(2012)Burkhauser, Larrimore, and Simon]:

> [Burkhauser et al.(2012)Burkhauser, Larrimore, and Simon] "first showed that because the number of tax units within households has grown over time, while the number of people in those households has fallen, these demographic characteristics will tend to increase this measure of

median income over time relative to a tax unit–based measure of labor earnings.

where they find a factor of about 1.166 going from "Tax Unit" to "Size-Adjusted HH" (for 1979-2007). (And factor of 1.073 going from HH to size-adjusted HH – roughly matches my factor for 1979-2014.)

Census Report P50-252, at https://www.census.gov/library/publications/2015/demo/p60-252.html FRED series name MEHOINUSA672N

Table produced from CEPR March (ASEC) extracts, using my STATA code in *cps_ compHH1979_ 2014_ 1.do* under directory CEPR/projects/memostoPresident/essays1/prgs1

Income is wide-definition "money income":

> Data on income collected in the ASEC by the Census Bureau cover money income received (exclusive of certain money receipts such as capital gains) before payments for personal income taxes, social security, union dues, Medicare deductions, etc. Therefore, money income does not reflect the fact that some families receive non- cash benefits, such as Supplemental Nutrition Assistance/food stamps, health benefits, subsidized housing, and goods produced and consumed on the farm. In addition, money income does not reflect the fact that noncash benefits are also received by some nonfarm residents, which often take the form of the use of business transportation and facilities, full or partial payments by business for retirement programs, medical and educational expenses, etc [https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-252.pdf]

Adjusting for Household Size – Absolutely Crucial

Household Income 1979-2014 by Household & Persons, CPS March Survey, deflated CPI-U-RS

	Households		Persons	Avg Size
	No Adj	SqRt(N)	SqRt(N)	
% grth Median	7.1%	14.9%	16.0%	
1979 90/10	3.88	2.62	2.23	2.74
2014 90/10	6.58	4.72	4.36	2.49

Calculated 7.1% Real Median HH Income growth from public use CPS dataset (matches published 7.1%)

BUT: It's Wrong – measures *houses* not *people*

- Table shows avg HH size by income quintile
- Large HH have high income – because they are large

Avg HH size	1st Quint	5th Quint
1980	1.87	3.49
2015	1.84	3.11

Need to share income across HH members – measure income of HH members (rather than income of house)

- Dividing by n (avg) too much – each member of 2-person \$100k HH "richer" than single \$50k HH – economies of scale in HH
- Divide by n: no economies; divide by 1: perfect economies
- Rough approximation: divide by $\sqrt{n}$: some but not perfect economies

Result: Growth goes from 7.1% to (more correct) 14.9%

- Household size by income quintile – distribution of HH income not adjusted by HH size
  - Running CPS March files with cps_compHH1979_2014_1.do under directory CEPR/projects/memostoPresident/
  - Household size went down from 1980 to 2015, but much more at the upper quintiles than the lower

	All	1st Quintile	5th Quintile
1980	2.74	1.87	3.49
2015	2.49	1.84	3.11

- Divide by $\sqrt{n}$,: top income ↓, pushes median ↓ (since top HHs larger)

- BUT: 1979 top quintile even larger (was 3.49 people/HH) – 1979 ↓ more, pushes growth ↑
- Household size but this time quintiles calculated for HH income adjusted by sqrt(HH size)
  - Running CPS March files with cps_compHH1979_2014_1.do under directory CEPR/projects/memostoPresident/
  - Household size went down from 1980 to 2015, but much more at the upper quintiles than the lower

	All	1st Quintile	5th Quintile
1980	2.74	2.42	2.68
2015	2.49	2.35	2.49

Measuring Persons Instead of Households

Household Income 1979-2014 by Household & Persons, CPS March Survey, deflated CPI-U-RS

	Households		Persons	Avg Size
	No Adj	SqRt(N)	SqRt(N)	
% grth Median	7.1%	14.9%	16.0%	
1979 90/10	3.88	2.62	2.23	2.74
2014 90/10	6.58	4.72	4.36	2.49

We're not finished. We want to count a household of 5 people as 5 people, not one unit. "One person, one vote" (regarding inequality)

Think of it this way:

- Calculate "size-adjusted HH income" by dividing by $\sqrt{n}$
- We then assign that income to each member of the HH
- In measuring distributions and inequality: count each person as a person

This can make a difference when the HH size is different at top & bottom

- With many people per HH at the top (as here), this "pushes income down"
- For US HH income, more of a push down in 1979 (top quintile size 3.49) than in 2014 (top quintile 3.11)

Here it makes a small difference: 14.9% to 16.0%

Summary for Household Income – Rows 4-10

Include wide measure of money income and adjust for HH size

- Shown above for CPI-U-RS. Rose and Elwell at al. in table
- Roughly 30% growth

Auten & Splinter

- They include wide measure of income, seem to do careful job trying to allocate different sources and match total national income
- Results not available (yet)

Piketty, Saez, Zucman

- Wide measure of income, but I have questions about their allocation
- Find 30%+ growth in median

Taxes – Rows 11-15

Including effects of taxes – growth in median up to about 50+ (over 1979-2014)

2.4 Growth at Bottom of the Distribution

Contents

Summary of Results for Bottom

We know what to expect now:

- Narrow measures of income, using tax units: low growth
- Wide measures of income, including transfers, including taxes: higher growth

But results from Elwell, Corinth, Burkhauser show surprisingly high growth

- Average for 5 quintiles

Table 1. Income Growth for 1959-2016 and 1959-2007 using Alternative Measures of Income by Quintiles

					Household Size-Adjusted Post-Transfer		
	Labor Income of Tax Units (1)	Market Income of Tax Units (2)	Household Size-Adjusted Labor Income of Persons (3)	Household Size-Adjusted Market Income of Persons (4)	Pre-Tax Income of Persons (5)	Post-Tax Income + In-Kind Income of Persons (6)	Post-Tax Income + In-Kind Income + Medicare + Medicaid + ESI of Persons (7)
Panel A:							
Median	6.4%	23.0%	75.1%	91.3%	103.1%	130.4%	153.7%
Q1	-52.7%	-75.5%	-61.3%	18.0%	109.0%	183.8%	262.0%
Q2	-4.7%	20.7%	35.5%	63.3%	88.5%	119.7%	157.6%
Q3	8.6%	24.3%	75.7%	91.9%	103.8%	130.4%	154.5%
Q4	41.6%	54.0%	103.4%	116.2%	120.4%	145.1%	162.2%
Q5	110.6%	121.2%	149.8%	160.4%	157.2%	164.7%	175.7%
Top 5%	146.7%	155.0%	190.6%	193.4%	184.9%	179.3%	186.8%

[Elwell et al.(2019)Elwell, Corinth, and Burkhauser] Table 1

2.5 Some Additional Puzzles

Contents

Personal Income versus Earnings & HH Income

Why has Personal Income grown so strongly? (And shown *decreasing* inequality)

- Earnings have not
- HH Income has not

Likely explanation: differences between Men & Women

- Women: median has grown robustly
- Men: median has fallen

"Personal Income" shows effect of women moving into labor force and income growing

- HH income, the effect is washed out by combining growing women and faltering men

Household and Personal Income, from March CPS files, comparing 1979 versus 2014 income

	All		Men		Women	
	HH Inc	Pers Inc	HH Inc	Pers Inc	HH Inc	Pers Inc
% grth Median	16.00%	45.08%	14.91%	-3.20%	15.87%	90.99%
1979 90/50	1.08	4.81	1.04	2.60	1.13	4.92
2014 90/50	1.63	4.00	1.59	3.53	1.70	4.14

"HH Income" spreads income across all members of a household, by "square root" rule

"Personal Income" is the income (earned + unearned) reported for that person

3 Three New Narratives

3.1 Inequality Throughout the Distribution

Contents

Is Inequality Concentrated or Throughout the Distribution?

Well-known increase in wage and earnings inequality, beginning 1970s (for US)

- Not restricted to any part of the distribution – not just top or bottom
- Figure 1 (Murphy & Topel) shows spread-out everywhere

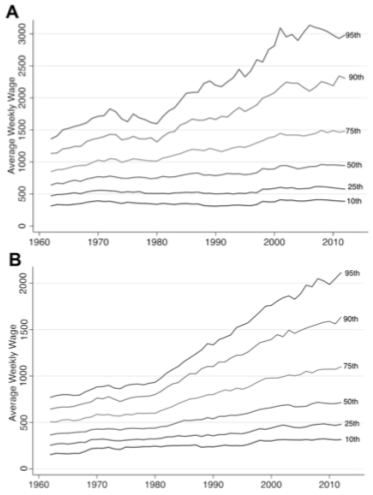


FIG. 1.—Average weekly wages, selected percentiles of the wage distribution, 1962–2012 (2012 dollars): *A*, men's; *B*, women's. Authors' calculations from March Current Population Surveys, 1963–2013. Samples are individuals aged 18–64 who worked more than 30 weeks and more than 30 hours per week during the indicated calendar years.

[Murphy and Topel(2016)]

Growth Higher at Top, but Also Across the Distribution

Growth from 1970-72 to 2010-12, showing growth across the distribution, higher growth at top (again, Murphy & Topel)

- Argues against Piketty's "it's all capital, and all at the top"

> The patterns in figure 2 undermine theories that attribute rising inequality to an outbreak of self-dealing conspiracies or rent-seeking among the very rich while wage growth for everyone else languished.

FIG. 2.—Growth in men's and women's log weekly wages by percentiles of the wage distribution, 1970–72 through 2010–12. Authors' calculations from March Current Population Surveys, 1970–2013. Samples are individuals aged 18–64 who worked more than 30 weeks and more than 30 hours per week during the indicated calendar years.

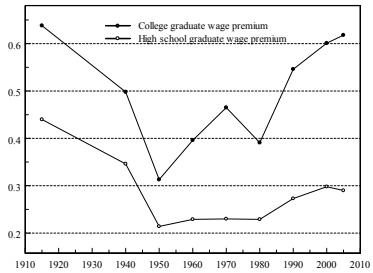
Why Does It Matter?
Policy actions different:

- If it's all rapacious billionaires, then wealth tax might work
- If it's across the distribution, and related to education (as we see next) then wealth tax just doesn't solve our problems

3.2 Education, Human Capital, and the Demand vs Supply of Skills

Contents

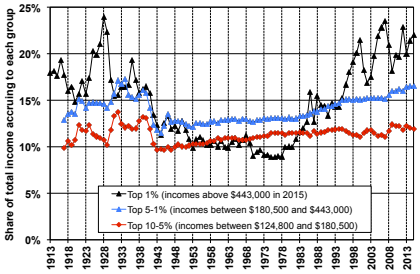
Long Sweep of Inequality: Education



Education "premium" drives much of inequality

Wage ratio: $W_{college}/W_{HS}$ – measured in logs

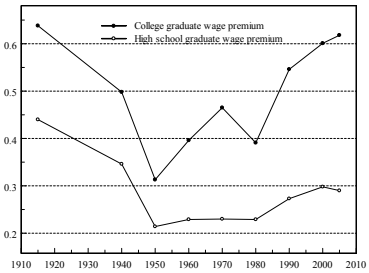
- In 1915, about 1.9 (exp(0.65)) – college earns 90% more
- By 1950, down to 35%
- By 2010, back up to 85%



Look at Piketty & Saez "Top 1%"

- We know it overstates changes, but still more-or-less right in long history
- Same pattern as wage premium
- "Great Compression" in middle of 20th c: Top 1% down

Strong Evidence: Inequality is Education-Related



Education "premium" drives much of inequality

Wage ratio: $W_{college}/W_{HS}$ – measured in logs

- In 1915, about 1.9 (exp(1.65)) – college earns 90% more
- By 1950, down to 35%
- By 2010, back up to 85%

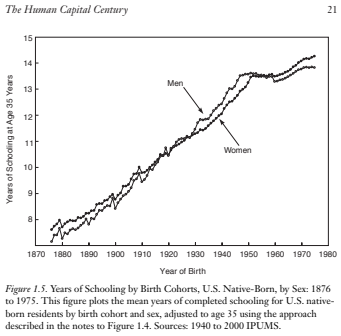


Figure 1.5. Years of Schooling by Birth Cohorts, U.S. Native-Born, by Sex: 1876 to 1975. This figure plots the mean years of completed schooling for U.S. native-born residents by birth cohort and sex, adjusted to age 35 using the approach described in the notes to Figure 1.4. Sources: 1940 to 2000 IPUMS.

First half of 20th c: education grew strongly

- Technology was growing, increasing demand for skilled workers
- But supply of workers increased so much, pushed down wage
- "Great Compression" in middle of 20th c
- Until birth cohort 1955: flat

[Goldin and Katz(2010), Goldin and Katz(2007)]

Recent Evidence Inequality is Education-Related

Wage premiums and education moved hand-in-hand

- Education (men particularly) stagnated from 1980
- Wage premium (men particularly) has grown substantially
- Figure 4 (Murphy & Topel)

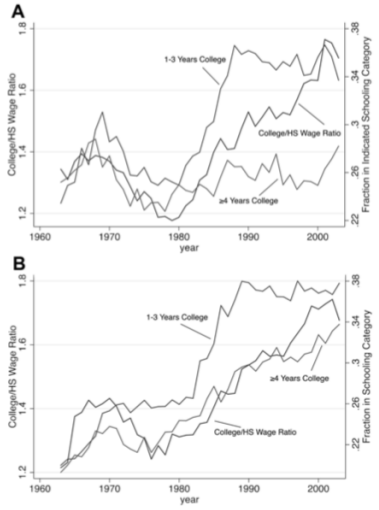


FIG. 4.—College/high school wage ratio and years of completed college of male and female high school graduates by cohort (age 18), 1963–2003: *A*, male; *B*, female.

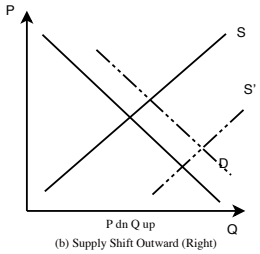
A Simple Supply & Demand Story

Increasing Supply of Skills

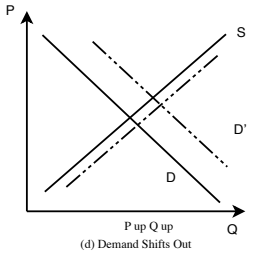
- IF supply shifts out, pushes wage down
- Presumably happened 1900-1960

Increasing Demand for Skills

- Technological change → increased demand for skilled workers
- Pushes college wage up (if no change in supply)
- Presumably happening now (since 1980)



(b) Supply Shift Outward (Right)



(d) Demand Shifts Out

Good News / Bad News

Good News: It's education

- This can be solved

Bad News: It's education

- It's not easy to solve

3.3 Early Childhood and Family

Contents

If It Is Education, Then It Is Children & Families
James Heckman (at Chicago) has been working on this for many years

> the shortfalls in achievement in the twenty-first century among all groups stem from shortfalls in education and on-the-job training as well as cognitive and personality traits – not in the rewards accorded those skills
>
> American society is divided into affluent haves and under-privileged have-nots, with differences in skills accounting for most of the disparity

Three issues he emphasizes:

1. Soft skills matter
2. Skill formation in early childhood is critical
3. Families matter

Connection between early childhood environment and family, and later life outcomes, is very strong.

- Early investments are self-reinforcing, so that a small investment early can have a large and lasting effect later in life
- Remediating poor early childhood environment (lack of early investment) becomes costly later (say in middle school or high school)

4 Conclusion

Contents

Conclusion – What we Know and Don't
I fear I have left you knowing less than when we started

- Those Three Popular Narratives ("Top 1%", "Middle Stagnation", "Bottom Falling") are wrong, or at least not important in the way people tell us
- But inequality has grown throughout the distribtuion
- Educations seems to be key. And Children & Family

But I don't have simple answers – and even more questions
Taxes – it seems they are more progressive than we think

- Effective rates for the rich are steady or up slightly (since about 1960)
- For the poor, have gone down slightly – from 19% to 15%

Income and social mobility

- How easily do children move up (or down) the income distribution from parents?
- How much do people change over their lives?

Consumption

- We are all "richer" today, in terms of houses, TVs, etc.
- How much does this change any stories?

References

[Auten and Gee(2009)] Gerald Auten and Geoffrey Gee. Income Mobility in the United States: New Evidence from Income Tax Data. *National Tax Journal*, 62 (2):301–328, June 2009. ISSN 00280283. doi: 10.17310/ntj.2009.2.05. URL http://www.ntanet.org/NTJ/62/2/ntj-v62n02p301-28-income-mobility-united-states.html.

[Auten and Splinter(2018)] Gerald Auten and David Splinter. Income Inequality in the United States: Using Tax Data to Measure Long-Term Trends. Technical report, February 2018. URL http://davidsplinter.com/AutenSplinter-Tax$_D$ata$_a$nd$_I$nequality.pdf.

[Auten and Splinter(2019)] Gerald Auten and David Splinter. Top 1 Percent Income Shares: Comparing Estimates Using Tax Data. *AEA Papers and Proceedings*, 109:307–311, May 2019. ISSN 2574-0768. doi: 10.1257/pandp.20191038. URL http://www.aeaweb.org/articles?id=10.1257/pandp.20191038.

[Auten et al.(2013)Auten, Gee, and Turner] Gerald Auten, Geoffrey Gee, and Nicholas Turner. New Perspectives on Income Mobility and Inequality. *National Tax Journal*, 66 (4):893–912, December 2013. ISSN 00280283. doi: 10.17310/ntj.2013.4.06. URL http://www.ntanet.org/NTJ/66/4/ntj-v66n04p893-912-new-perpectives-income-mobility.html.

[Burkhauser et al.(2012)Burkhauser, Larrimore, and Simon] Richard V. Burkhauser, Jeff Larrimore, and Kosali I. Simon. A "Second Opinion" on the Economic Health of the American Middle Class. *National Tax Journal*, 65(1):7–32, 2012. ISSN 0028-0283. URL https://www.jstor.org/stable/41791111.

[Elwell et al.(2019)Elwell, Corinth, and Burkhauser] James Elwell, Kevin Corinth, and Richard V Burkhauser. Income Growth and its Distribution from Eisenhower to Obama: The Growing Impor-

tance of In-Kind Transfers (1959-2016). Working Paper 26439, National Bureau of Economic Research, November 2019. URL http://www.nber.org/papers/w26439.

[Goldin and Katz(2007)] Claudia Goldin and Lawrence F. Katz. The Race between Education and Technology: The Evolution of U.S. Educational Wage Differentials, 1890 to 2005. Working Paper 12984, National Bureau of Economic Research, March 2007. URL http://www.nber.org/papers/w12984.

[Goldin and Katz(2010)] Claudia Goldin and Lawrence F. Katz. *The Race between Education and Technology*. Belknap Press, Cambridge, Mass., 2/28/10 edition edition, March 2010. ISBN 978-0-674-03530-0.

[Larrimore et al.(2016)Larrimore, Burkhauser, Auten, and Armour] Jeff Larrimore, Richard V Burkhauser, Gerald Auten, and Philip Armour. Recent Trends in U.S. Top Income Shares in Tax Record Data Using More Comprehensive Measures of Income Including Accrued Capital Gains. Working Paper 23007, National Bureau of Economic Research, December 2016. URL http://www.nber.org/papers/w23007.

[Murphy and Topel(2016)] Kevin M. Murphy and Robert H. Topel. Human Capital Investment, Inequality, and Economic Growth. *Journal of Labor Economics*, 34(S2):S99–S127, February 2016. ISSN 0734-306X. doi: 10.1086/683779. URL https://www.journals.uchicago.edu/doi/abs/10.1086/683779.

[Piketty and Saez(2003)] Thomas Piketty and Emmanuel Saez. Income Inequality in the United States, 1913-1998. *The Quarterly Journal of Economics*, 118(1):1–41, February 2003. ISSN 0033-5533, 1531-4650. doi: 10.1162/00335530360535135. URL http://qje.oxfordjournals.org/content/118/1/1.

[Piketty et al.(2018)Piketty, Saez, and Zucman] Thomas Piketty, Emmanuel Saez, and Gabriel Zucman. Distributional National Accounts: Methods and Estimates for the United States. *Quarterly Journal of Economics*, 133(2):553–609, May 2018. ISSN 00335533. doi: 10.1093/qje/qjx043. URL http://gabriel-zucman.eu/usdina/.

[Rose(2018)] Stephen Rose. How Different Studies Measure Income Inequality, December 2018. URL https://www.urban.org/research/publication/how-different-studies-measure-income-inequality.

[Saez(2016)] Emmanuel Saez. Striking it Richer: The Evolution of Top Incomes in the United States (Updated with 2015 preliminary estimates). June 2016. URL http://eml.berkeley.edu/ saez/.