Measurement Challenges in Advanced Economies

Learning from Income and Consumption Trends in the United States

Remarks by

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Measurement: a foundation of social science

Measurements enable the economy's study by simplifying it.

- "…the Cartographers Guilds struck a Map of the Empire whose size was that of the Empire, and which coincided point for point with it. The following Generations, who were not so fond of the Study of Cartography as their Forebears had been, saw that that vast map was Useless." – Jorge Luis Borges, *Del rigor en la ciencia* (1946)

Measurements are inputs into all analyses and attempts at causal inference.

- Errors in measurement constrain what social scientists can study and know.
- Example: the trajectory of the literature on policy uncertainty.
- Cognitive and even political biases can have a large impact on our choices of things to measure.
- Measurements that are consistent with Bayesian priors tend to be accepted by economists too readily

Measuring income: traditional economics approaches

The macroeconomist's preferred approach to income measurement, national income accounts, does not escape measurement error.

- U.S. Bureau of Economic Analysis released the results of its annual review last week.
- BEA revised estimates of real personal disposable income up by $40.5 billion, or 0.3 percentage point, for 2018:Q1.

The microeconomist's preferred approach to income measurement, the survey of the household or the individual, also comes with measurement error.

- Well-known reporting biases at the tails of the distribution.
- Non-random responses to surveys a problem – and a growing one.
  - Non-response trend in the U.S. is the same for surveys of consumption as well as income.

Measuring income: new approaches

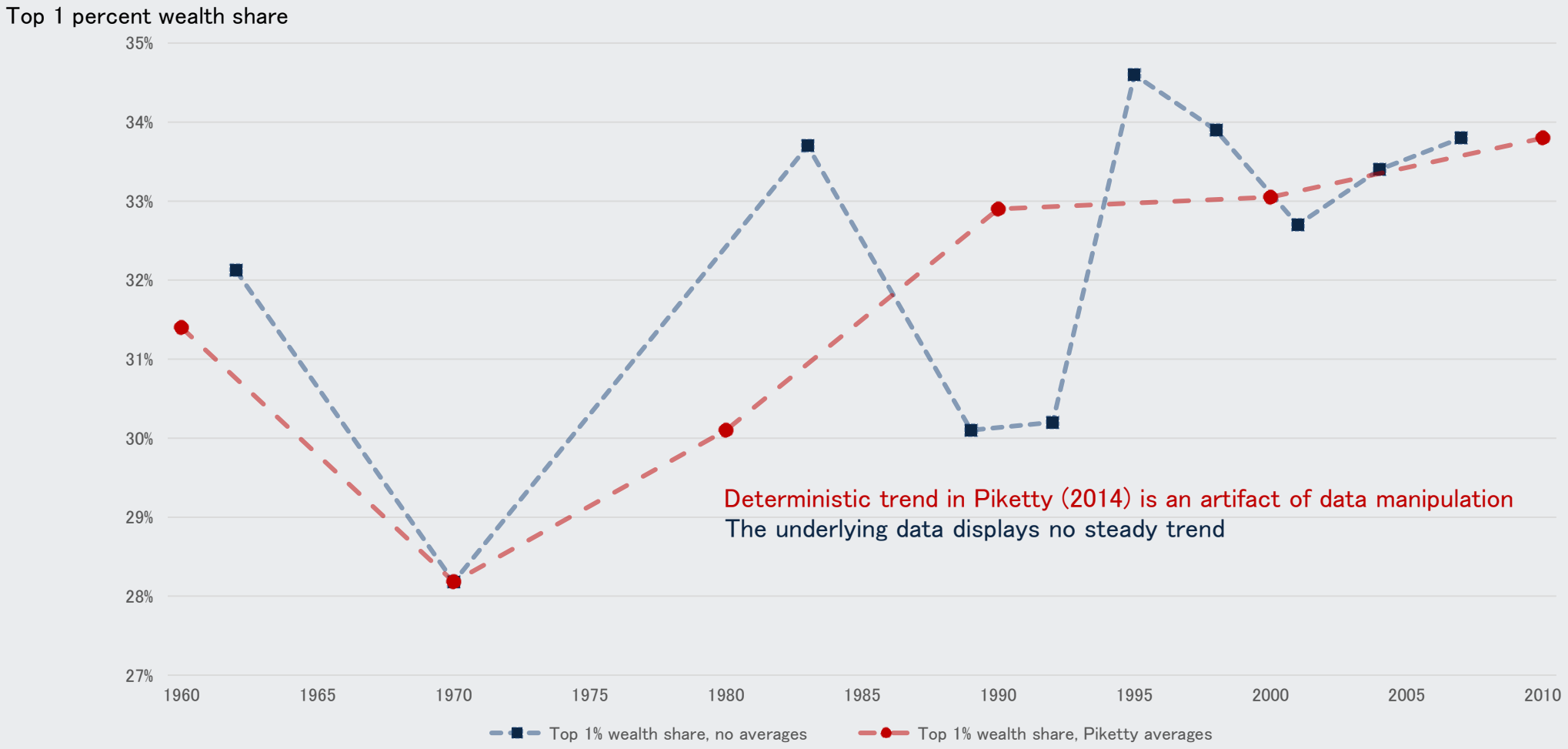
Piketty and Saez (2003) measure pre-tax market income using tax records.

- Measurement improves for top 1% share of income distribution (Larrimore et al. 2018).
- Methodology captures only pre-tax market income and includes taxable *realized* capital gains.

Larrimore et al. (2018) address shortcomings of Piketty and Saez (2003): Statistically matches CPS (non-taxable income) and SCF (accrued capital gains) to IRS data.

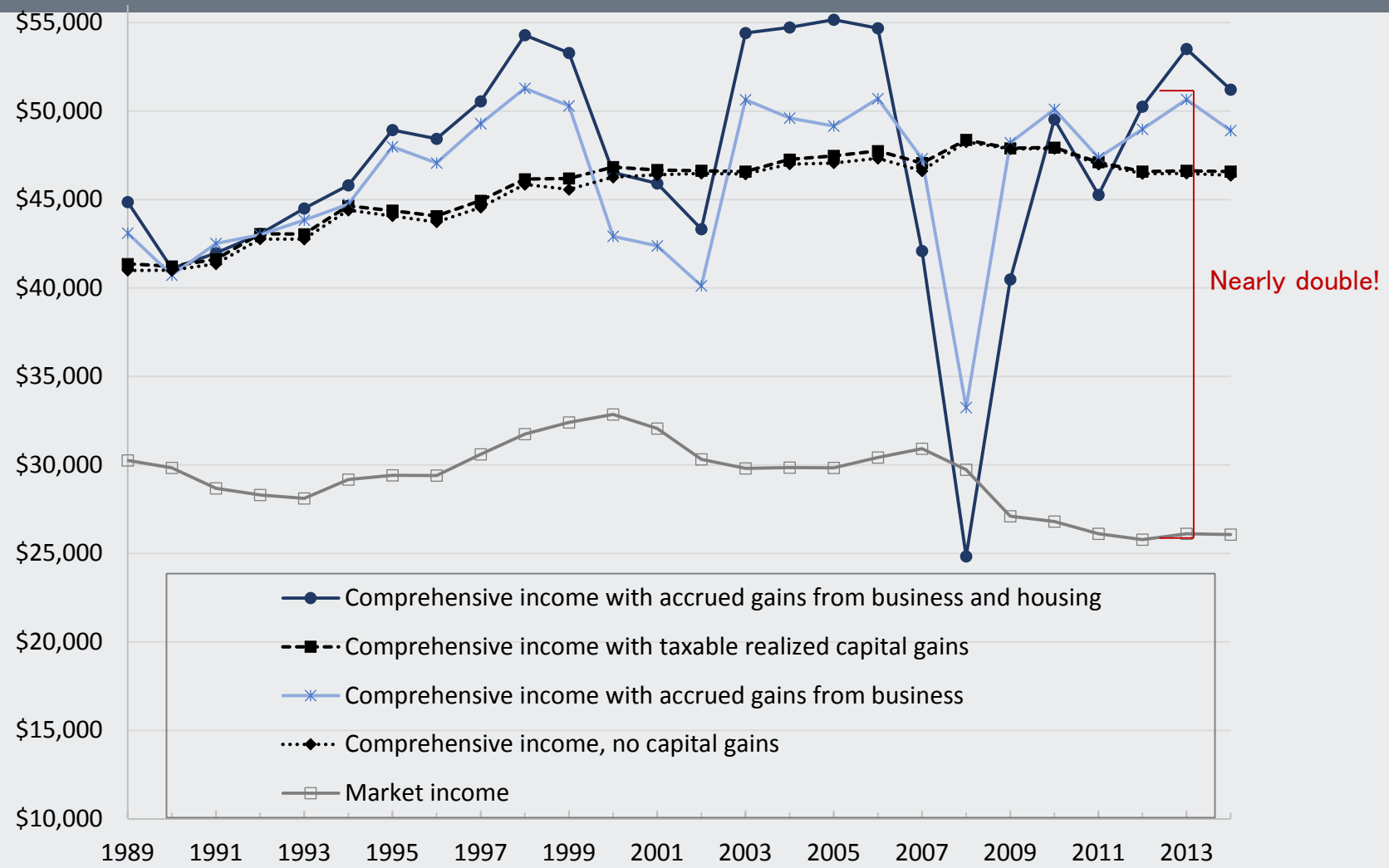
- Divide the IRS data Piketty and Saez (2003) use into *centiles* of tax units (i.e., units of 1 percentile).
- Divide CPS into tax unit centiles. Assign average values for demographic groups to matching IRS centiles.
  - Statistically match non-taxable income and transfers to taxable income reported to the IRS.
- Divide SCF into tax unit centiles. Assign average asset holdings as above to matching IRS centiles.
  - Statistically match publically traded and private business investments data. Impute accrual value for each asset class—e.g., S&P 500, implied rate of return on non-corporate business equity (Integrated Macro Accounts).
  - Impute housing accrual based on observed property taxes in IRS data and average within-county housing value changes. (Using ratio of mean home market value to mean property tax in each county.)

Figure 3. Revisiting the U.S. data in Piketty (2014)



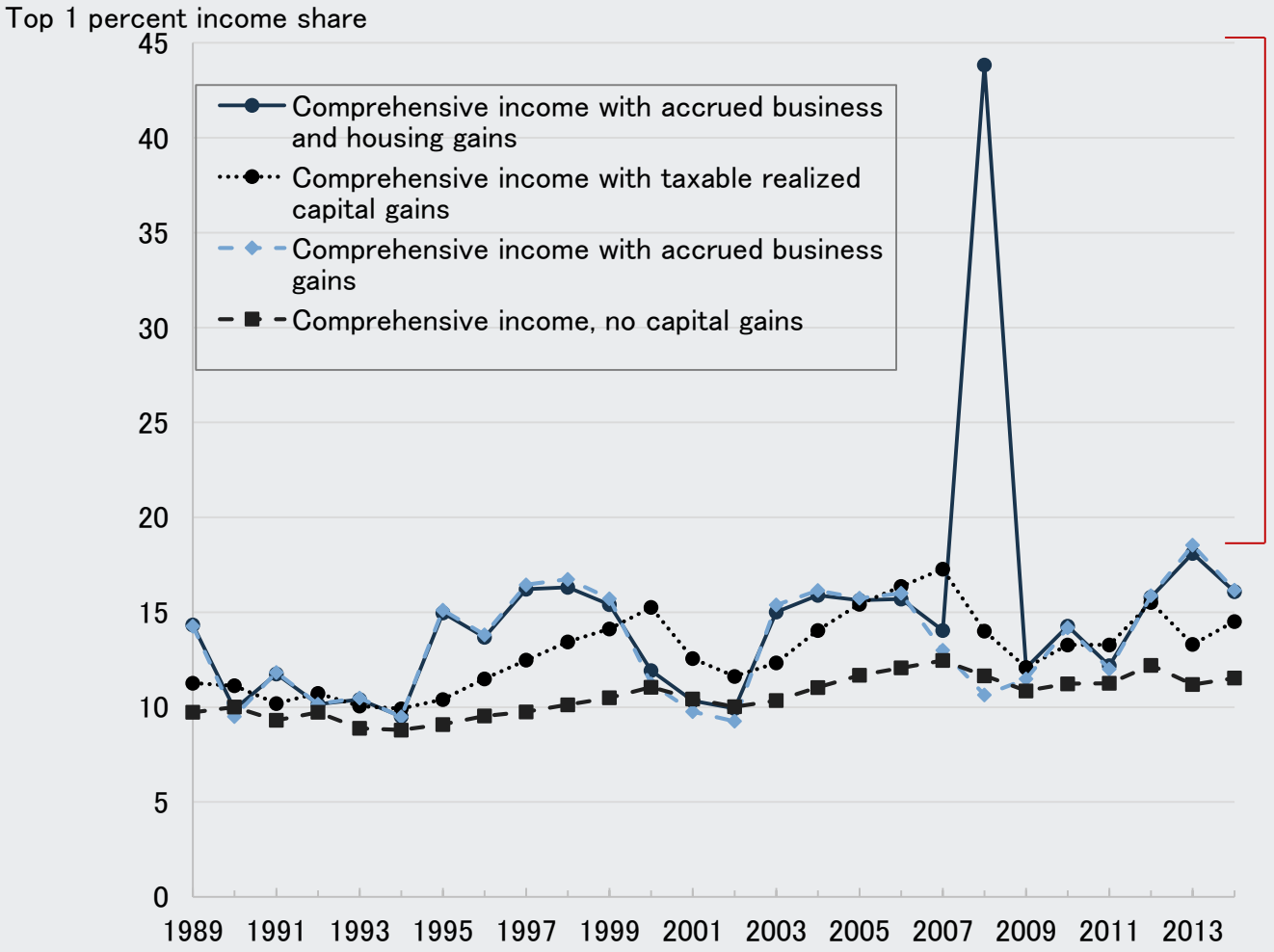
Source: Reproduced from Auerbach and Hassett (2015), part of which reproduces part of Piketty (2014).

Figure 1. Measurements of median tax-unit income



Source: Larrimore et. al. (2018)

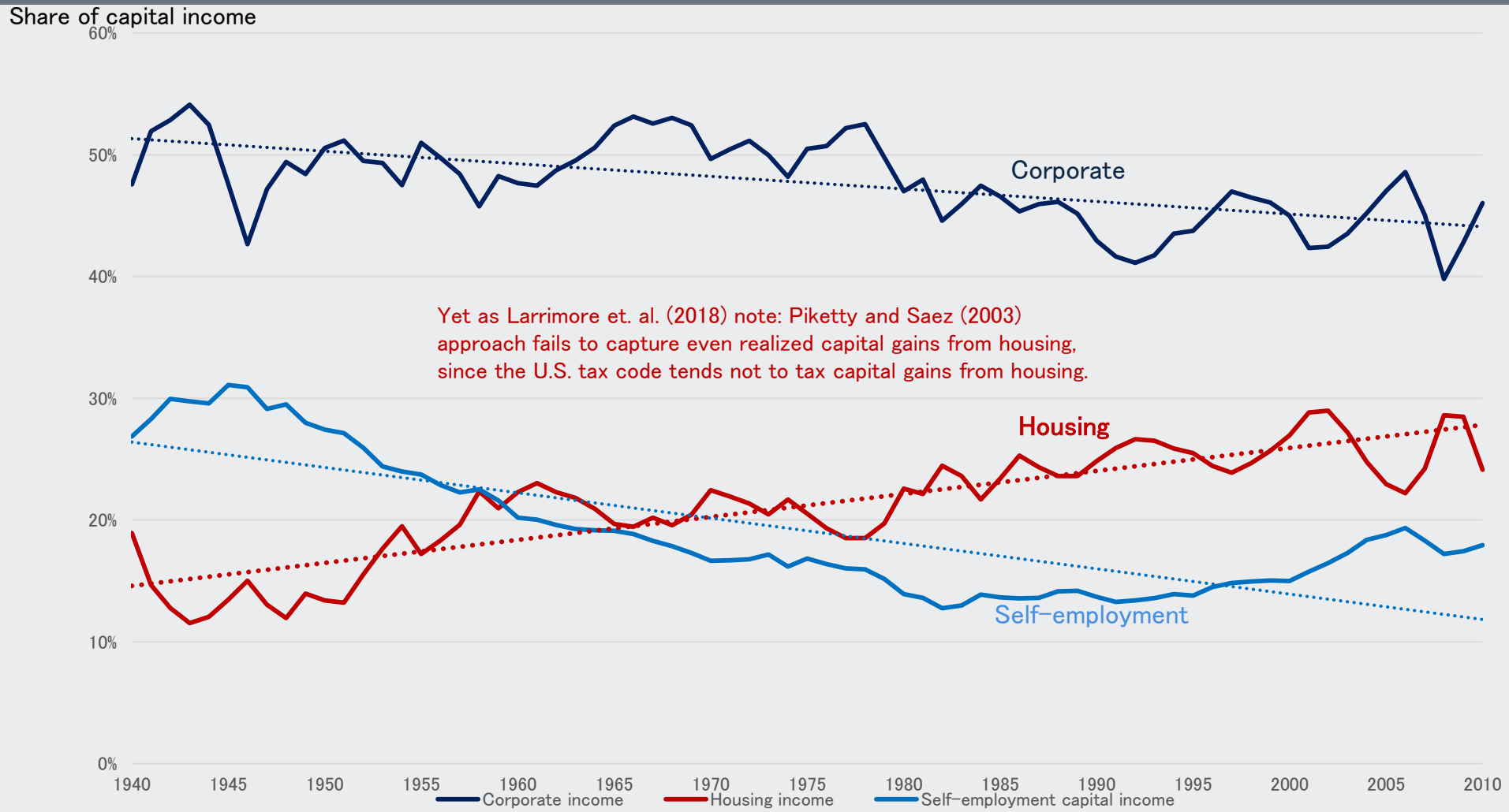
Figure 2. Measuring the top 1 percent's income share



Top 1 percent share surges due to importance of 2008 housing wealth shock to bottom 99 percent

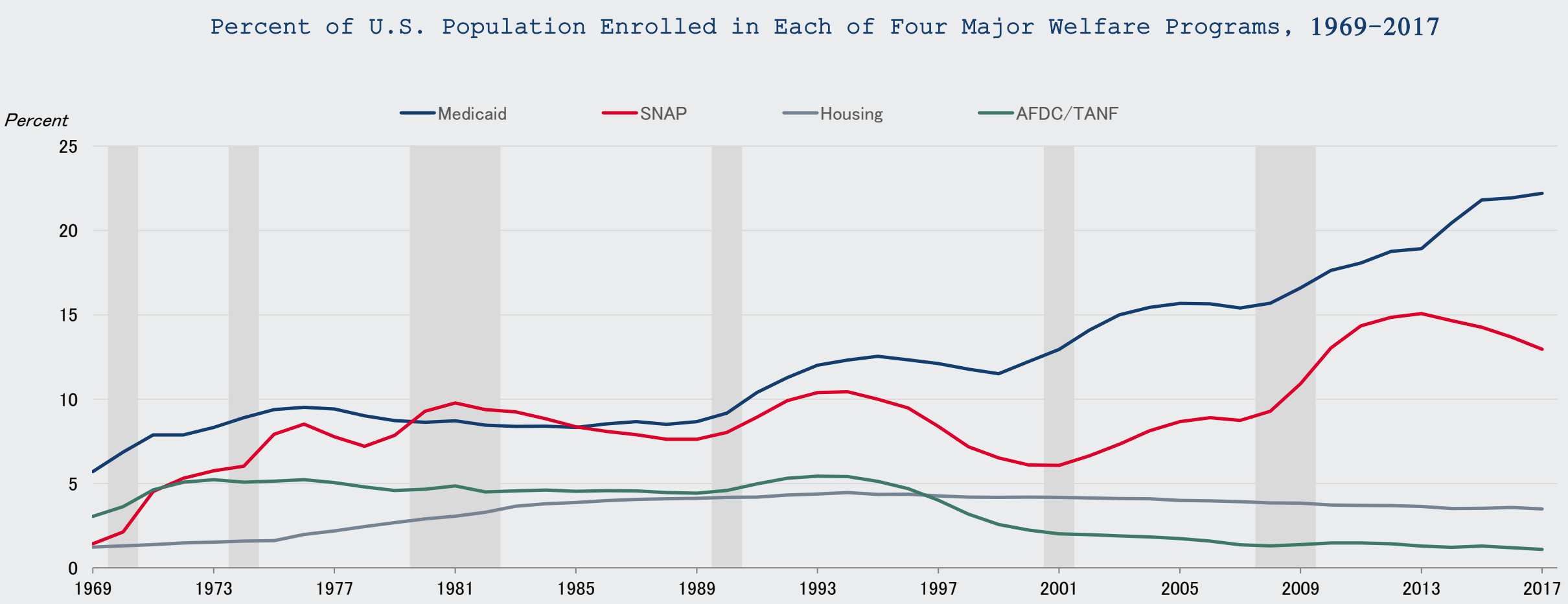
Source: Larrimore et. al. (2018)

Figure 4. Capital income by type of capital in the U.S.



Source: Reproduced from Auerbach and Hassett (2015).

Figure 6. U.S. population uptake of welfare programs



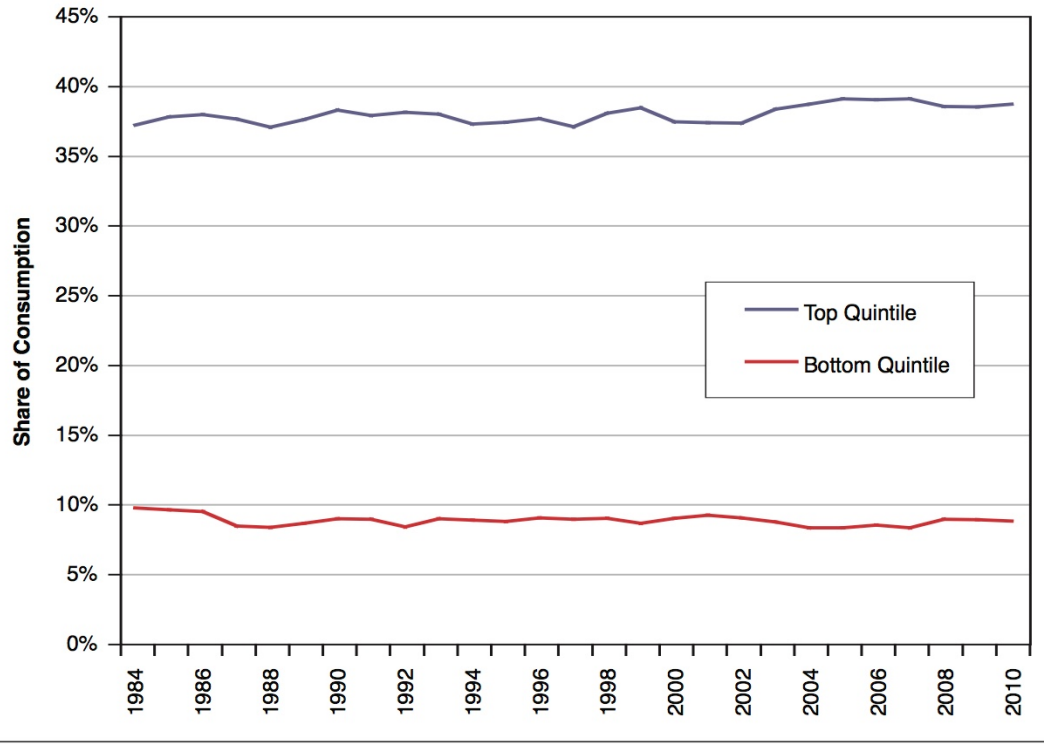
Household technology and individual welfare

- **Even a perfect measure of income may not necessarily capture the level, or even the trend in, household or individual welfare.**
- **Consumption may be the easiest way to estimate welfare because is a potentially sufficient statistic for permanent income.**
- **Even then, an improvement in home technology does not necessarily result in an increase in consumption expenditure.**
  - Consider the quality improvements in cell phones relative to their price, or the vast increase in music consumption associated with Spotify

Hassett and Mathur (2012) Consumption Shares

FIGURE 1

HOUSEHOLD SHARE OF TOTAL EXPENDITURES

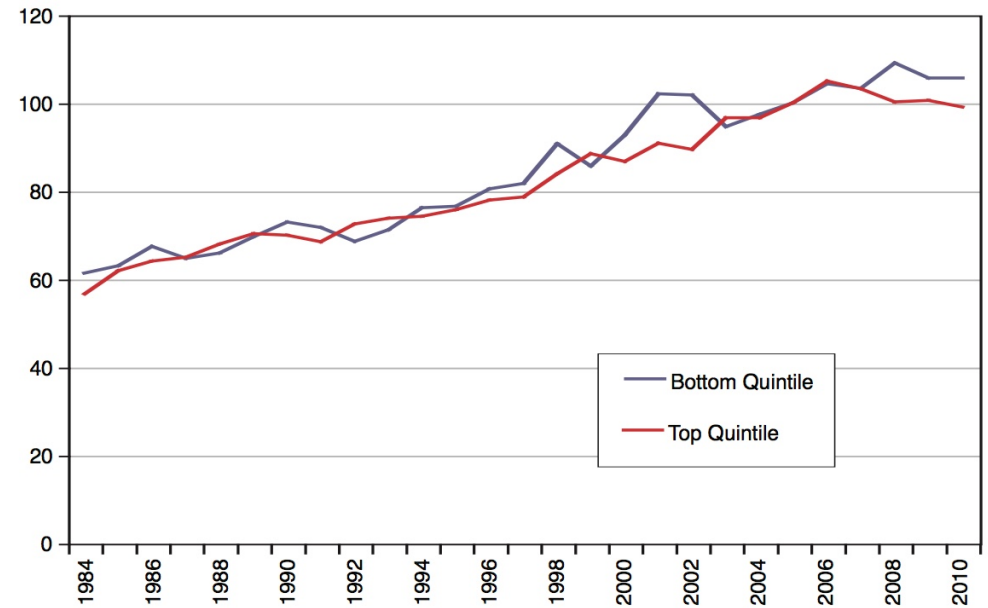


SOURCE: Authors' calculations using the Consumption Expenditure Survey.

Hassett and Mathur (2012) Expenditure Growth

FIGURE 3

CONSUMPTION EXPENDITURES PER CAPITA FOR TOP AND BOTTOM QUINTILES (2005=100)

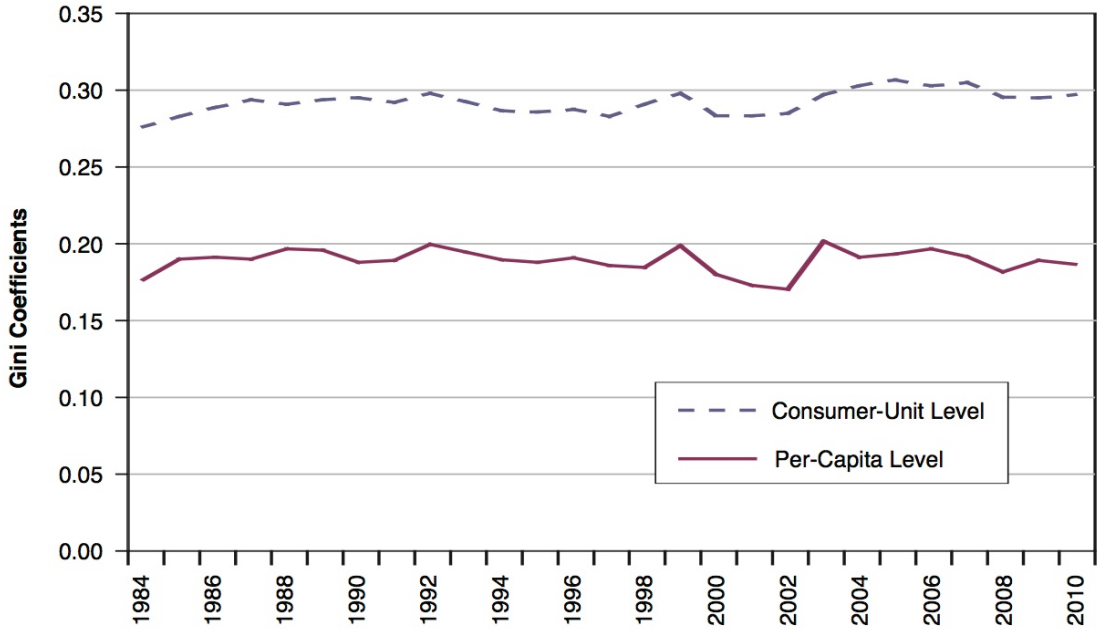


SOURCE: Authors' calculations based on data from the Bureau of Labor Statistics's Current Employment Statistics, Bureau of Economic Analysis's NIPA tables, and International Monetary Fund's US population statistics.

Hassett and Mathur (2012) Gini Estimates

FIGURE 4

GINI COEFFICIENTS OF CONSUMPTION INEQUALITY (1984–2010)



SOURCE: Authors' calculations using the Consumer Expenditure Survey.

Residential Energy Consumption Survey (RECS)

RECS offers data on housing and the use of consumer durables, like air-conditioners and dishwashers, as well as on home technology, like color televisions, computers, and Internet access.

- The survey also asks respondents for some demographic information.

Through RECS, then, you can also look at how technology use has changed within specific cohorts (e.g., the low-income population) in ways that have plausibly enhanced quality of life within that cohort.

RECS: A time-series analysis of consumer durables

	1987	1990	1993	1997	2001	2005	2009	2015
Total Low-Income Households (millions)	21.1	21.6	23.5	23.6	18.7	26.7	23.7	22.9
Low-Income Home Technology								
Homes with No Color Televisions (%)	17.7	9.5	6.2	2.9	3.2	2.2	2.1	3.9
Homes with No Computers (%)	–	95.2	93.0	89.3	80.2	64.0	52.3	61.1
Homes with No Printers (%)	–	–	98.3	97.3	67.9	73.4	70.0	71.2
Homes with No Internet Access (%)	–	–	–	–	85.0	73.0	59.5	36.7
Low-Income Household Characteristics								
Households with 4 Rooms in House (excluding bathrooms) (%)	29.4	26.6	29.5	25.4	28.3	25.1	22.8	23.1
Households with 5 Rooms in House (excluding bathrooms) (%)	22.7	25.7	24.1	23.6	21.4	26.6	21.5	19.7
Households with 6 or More Rooms in House (excluding bathrooms) (%)	21.4	25.1	24.2	24.5	21.9	24.7	30.0	33.6
Low-Income Household Appliances								
Households with No Air-Conditioning Equipment (%)	–	44.1	39.8	38.5	34.2	19.9	16.5	19.2
Households That Do Not Use a Dishwasher (%)	86.1	83.7	83.4	78.9	82.4	73.0	69.2	62.9
Households That Do Not Use a Clothes Washer (%)	45.2	41.6	42.5	43.3	42.8	35.6	37.6	38.0
Households That Do Not Use a Clothes Dryer (%)	66.6	64.0	62.9	56.5	55.1	43.8	43.5	43.2
Households That Do Not Use a Microwave Oven (%)	64.4	40.0	32.0	32.9	25.1	18.0	7.6	7.0

Source: Updated based on Hassett and Mathur (2012) using data from the Energy Information Agency, Residential Energy Consumption Survey.

Measuring poverty based on consumption

The U.S. Census Bureau uses a "pre-tax post-cash" income poverty measure.

- This type of measure may not capture changes in wellbeing that arise from improvements in household technology, like those documented in the RECS and in Bynjolffson (2018).
- Nor would it capture recipients' tax credit or non-cash transfer benefits.

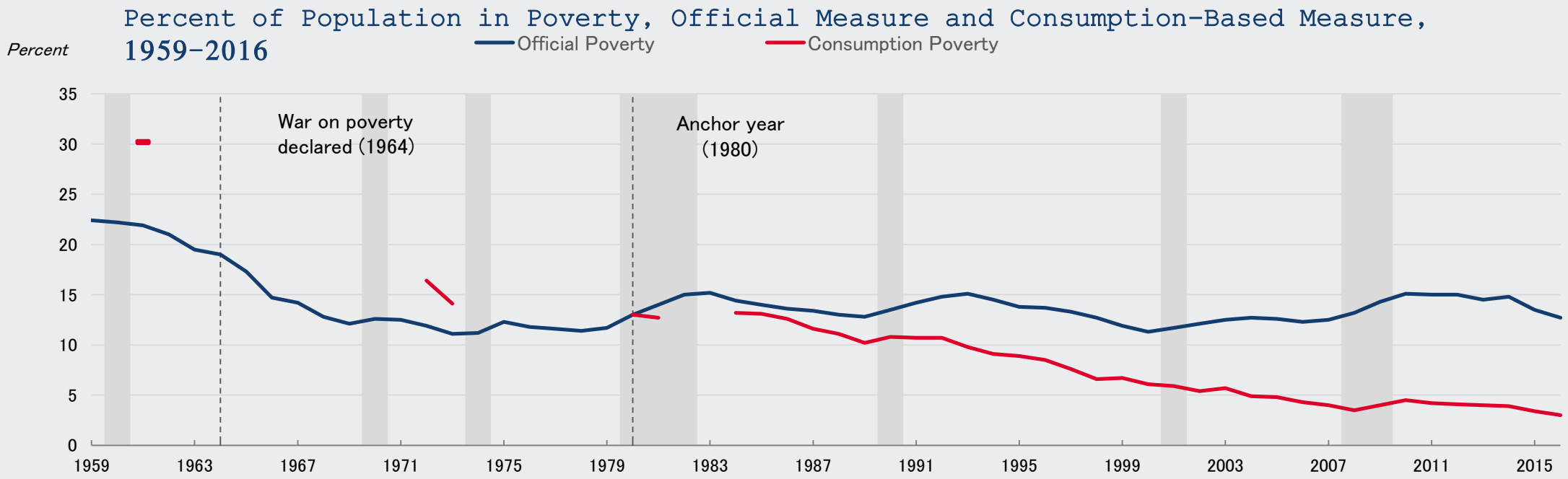
Meyer and Sullivan (2017) provide a consumption-based poverty measure.

- Captures transfers from SNAP (food assistance), housing, and AFDC/TANF (cash assistance).
- But it excludes spending on or receipt of health insurance and education.

Consumption-based poverty declines from 30% in 1960 (before the "War on Poverty") to 3% in 2015 using 1980 as its anchor-point.

- Even as measurement based on household survey remains imperfect, the trend is clear.

Figure 7. Consumption-based measures of poverty



Sources: CEA (2018) calculations based off of Meyer and Sullivan (2017) and the National Bureau of Economic Research.
Note: Meyer and Sullivan (2017) anchor their consumption poverty measure at 1980 insuring that the percent of the population falling below the consumption-based poverty threshold is equal to the percent of the population falling below the official poverty threshold in that year. Grey shaded regions denote a recession for at least four months of a

Digital goods and welfare mismeasurement: We need to move toward a consumer surplus measure of well being

In many sectors, consumers seem to substitute zero-price online services (e.g., Wikipedia) for goods with a positive price.

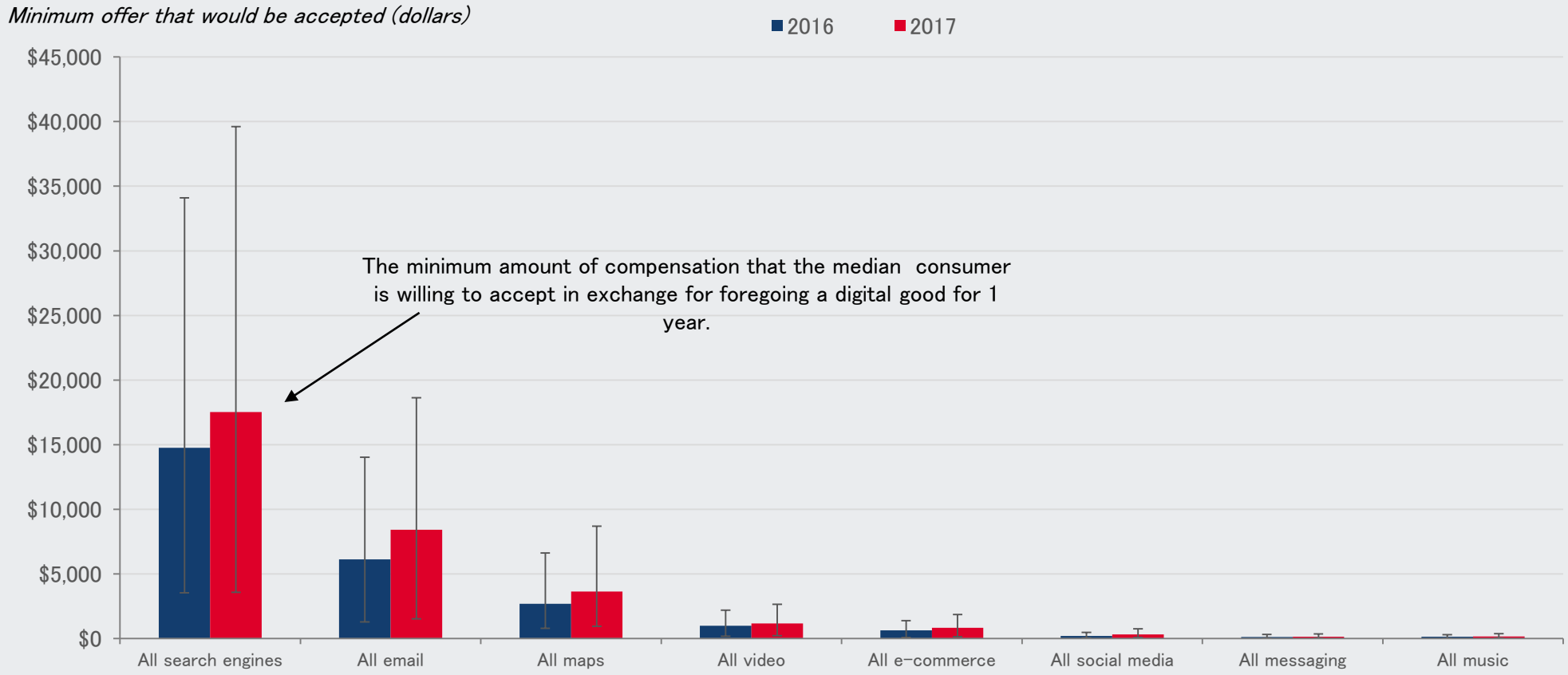
- Consumer welfare increases, yet measured expenditures and contributions of these sectors to GDP may fall.

According to the experiment-based estimates in Brynjolfsson et al. (2018), the consumer welfare gains from technology are large – and seem to be increasing over time.

- The methodology relies on a massive online open choice experiment.
- Participants indicate their minimum "willingness to accept" monetary compensation in order to forego a given digital good

Figure 5. Valuing online goods by “willingness to forego”

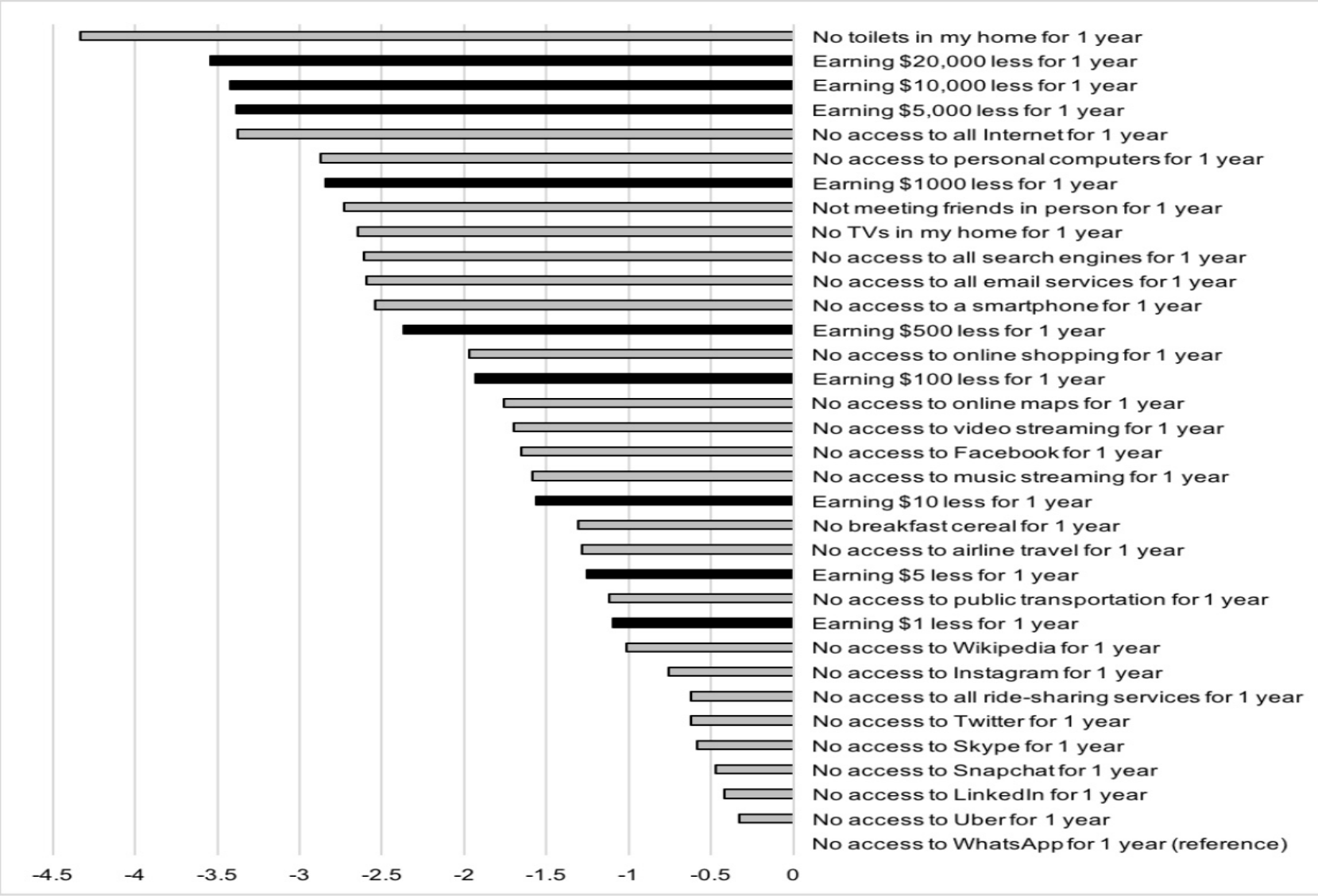
How much money would the median consumer need to be offered in order to forego a digital good for one year?



Note: Bars show 95 percent confidence level based on data in Brynjolffson (2018).
Source: Figure produced using authors’ calculations based off of data in Brynjolffson (2018).

RECS REVISTED: Brynjolfson (2018) and Consumers

Figure 14: (Dis-)Utility according to best-worst scaling



Conclusions

Society delivers welfare to citizens, and an effective society does so equitably

Our ability to assess this effectiveness may be about to take a revolutionary leap forward given the effectiveness of new approaches to estimating consumer surplus

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