

Robotics, AI, and the Macro-Economy

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Beneficial AI 2017
Asilomar, California

Three Great Trends of Modern Economic Growth:

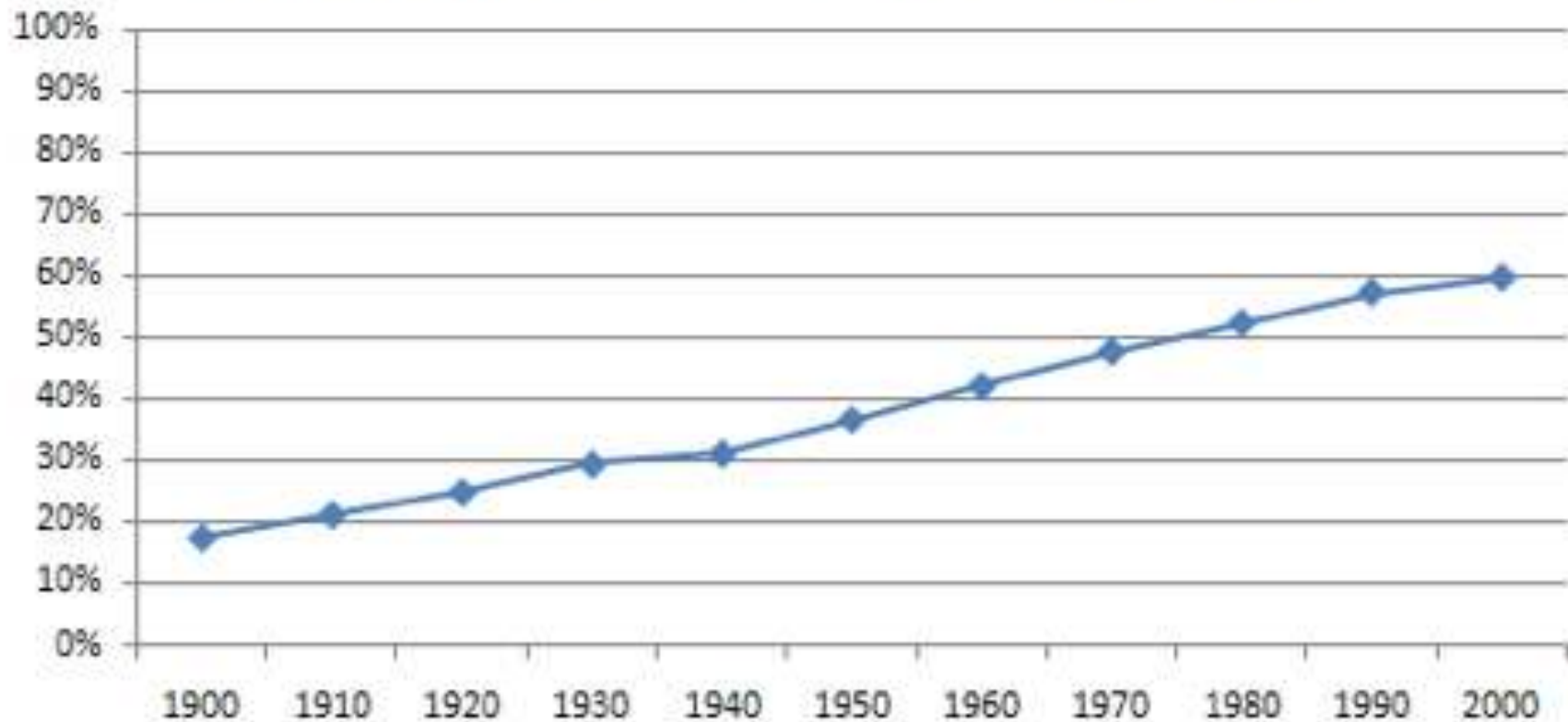
- (1) Capital (Human and Physical) Replacing Labor
(Labor Share from $\approx 50\%$ to $\approx 30\%$)

- (2) Steeply Declining Work Time
(Roughly 3 hours 10 minutes per 15yr+ pop)

- (2) Sharply Falling Manual Labor
(From around 70% to $\approx 10\%$ of the Labor Force)

Manual work has declined from
around 70% of the population as
of 1900 to around 10% today

White Collar, as % of total US Workforce



Source: "Current Statistics on White Collar Employees, 2003, AFL-CIO

On any given day, 3 hours 10 min work

42% of Adult Americans are at work,
averaging 7 hours 34 min at work

The rest are in leisure, caregiving,
retirement, school, unemployment,
incarceration, etc.

Average Work is probably down > 50%

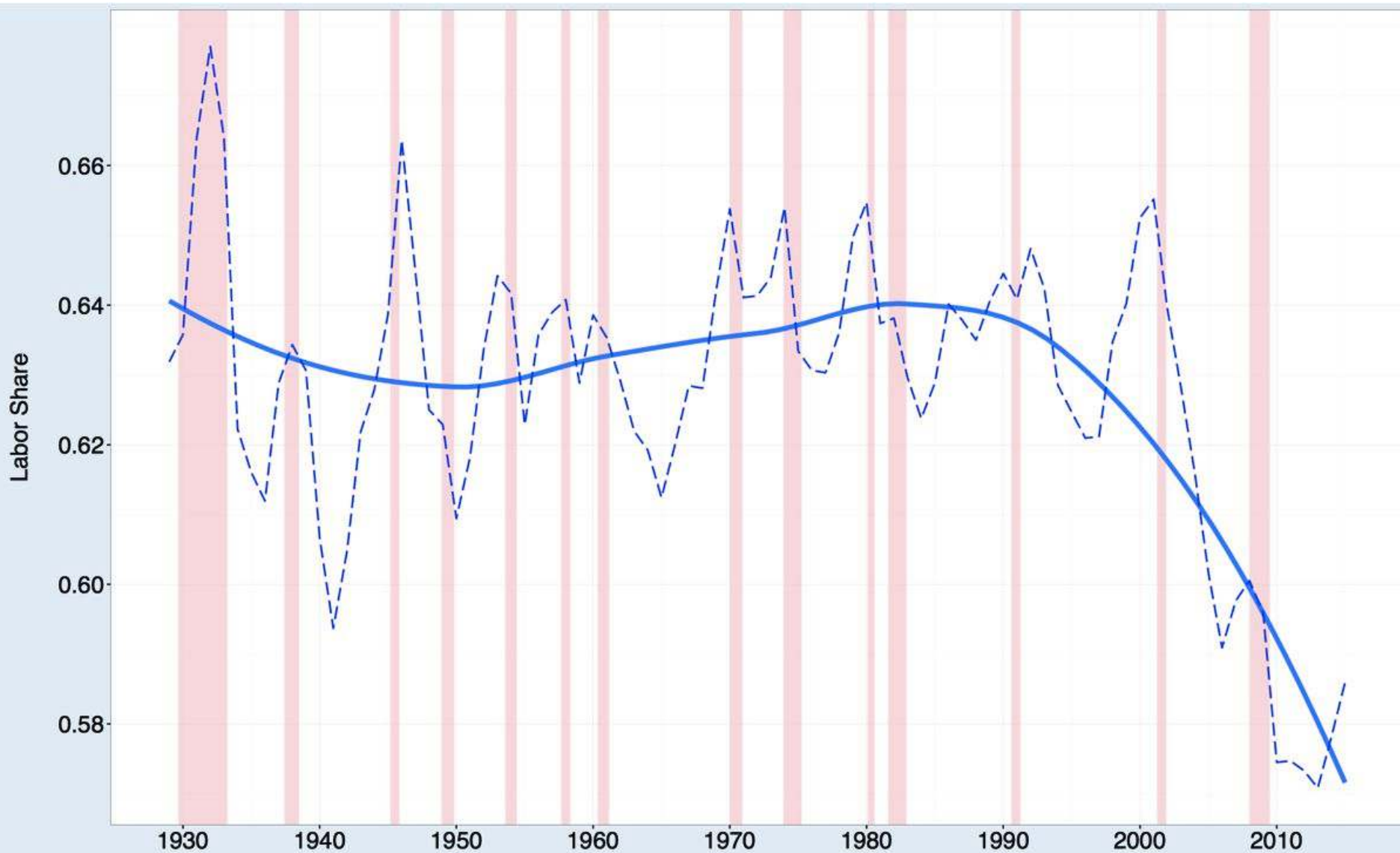
In general, these are major gains to life quality ... BUT

Unemployment of low-skilled workers

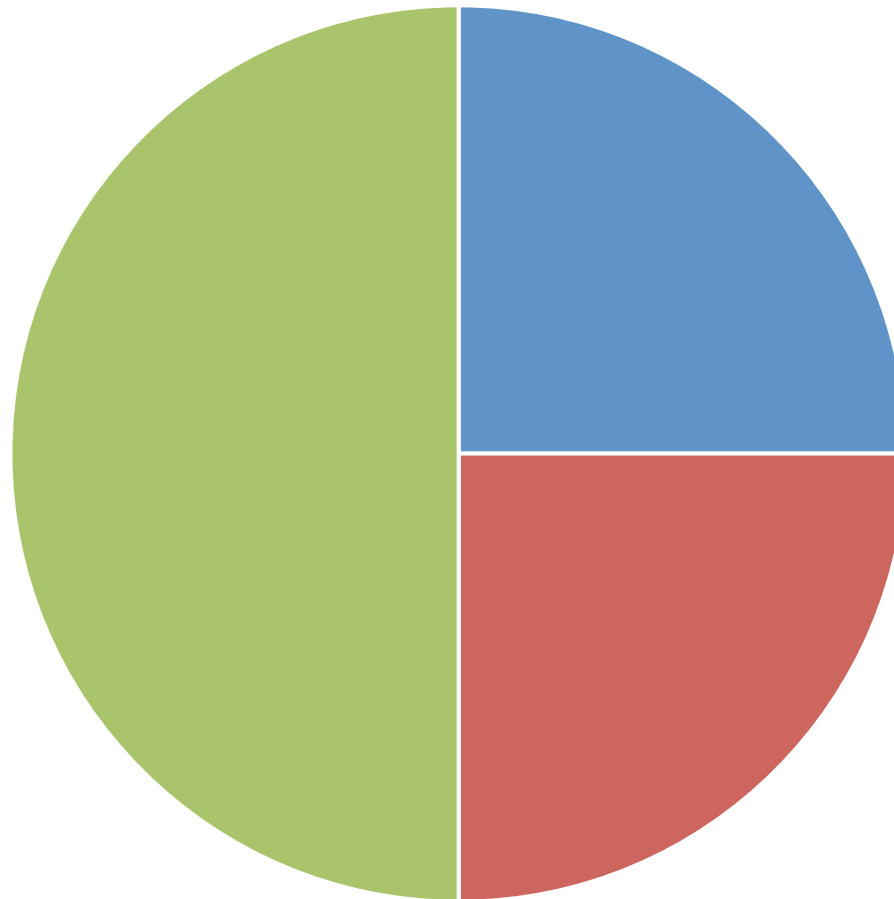
Rising income inequality

Side effects (e.g. obesity epidemic)

DECLINING LABOR SHARE: CONVENTIONALLY MEASURED



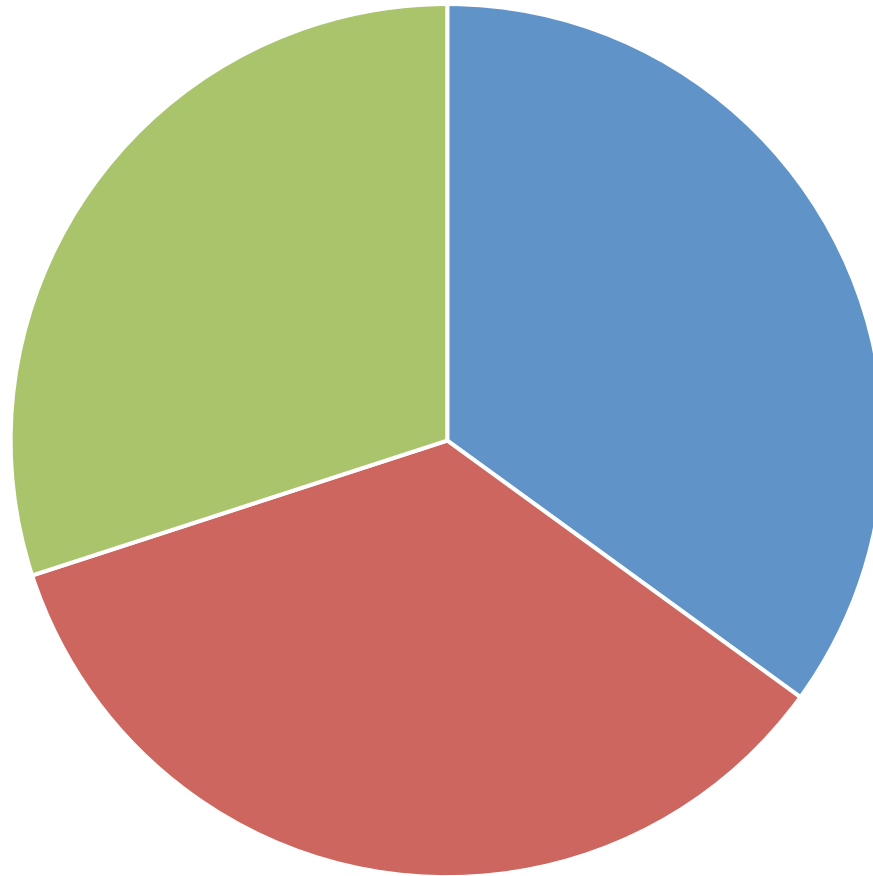
1900



■ Human Capital ■ Physical Capital ■ Labor

Rough estimates for 1900, 2017, 2050

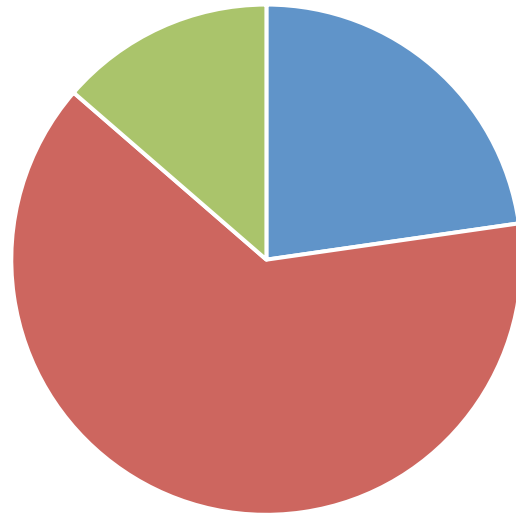
2017



■ Human Capital ■ Physical Capital ■ Labor

ONE REALISTIC POSSIBILITY IS A DECISIVE SHIFT AGAINST BOTH LABOR & HUMAN CAPITAL

2050?

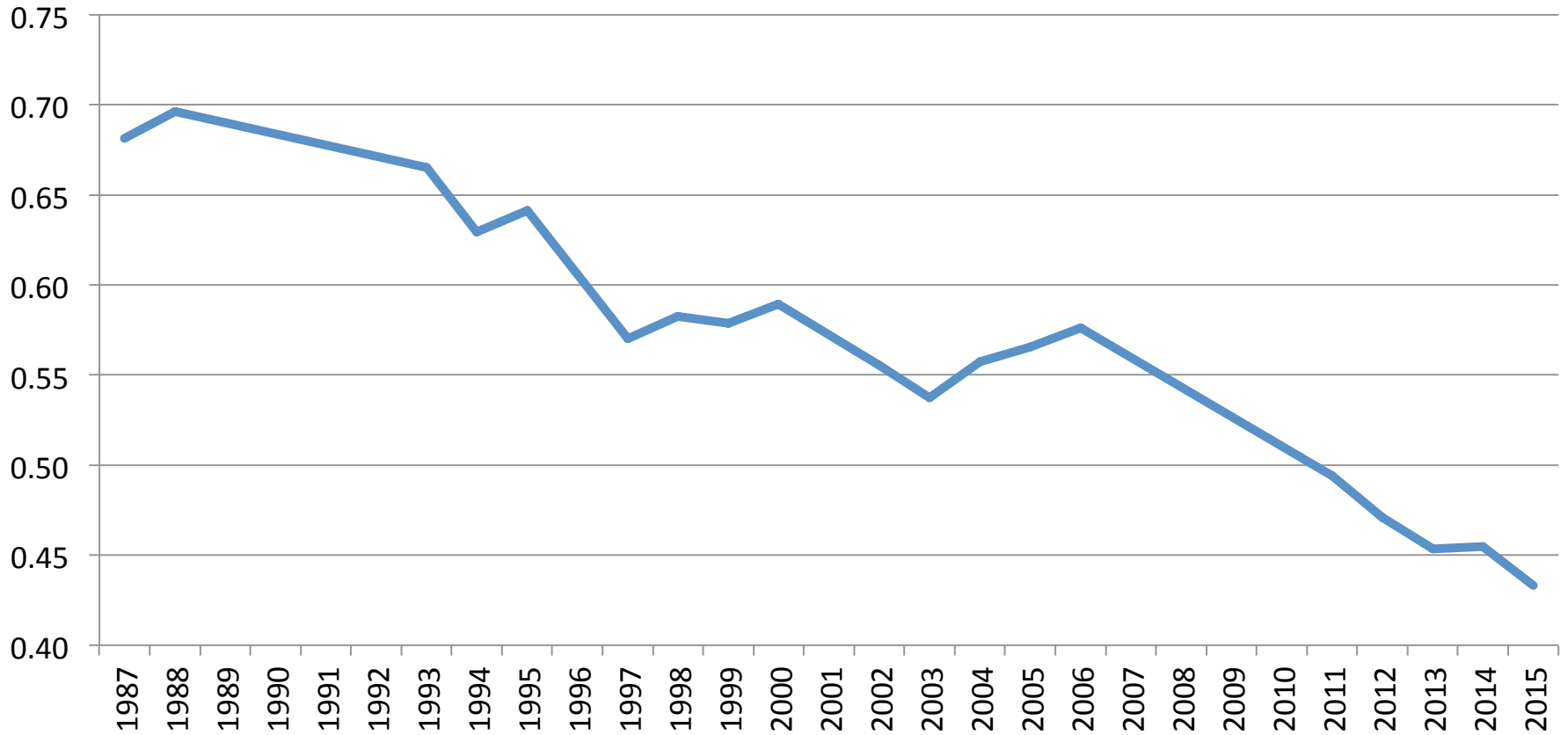


■ Human Capital ■ Physical Capital ■ Labor

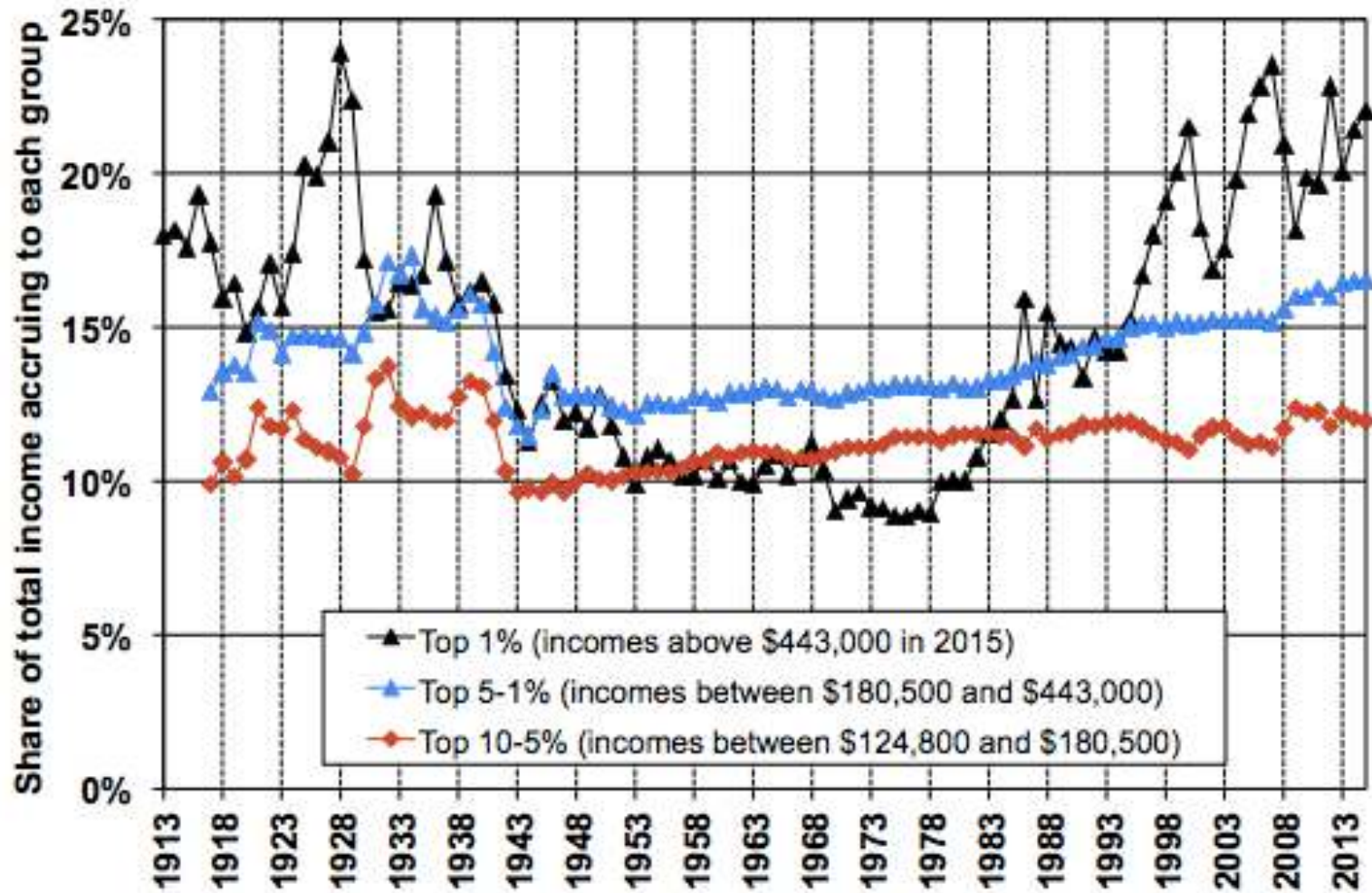
AUTOMOBILE ASSEMBLY LINE



LABOR SHARE OF VALUE IN MOTOR VEHICLE PRODUCTION (SMOOTHED OVER PEAK YEARS)



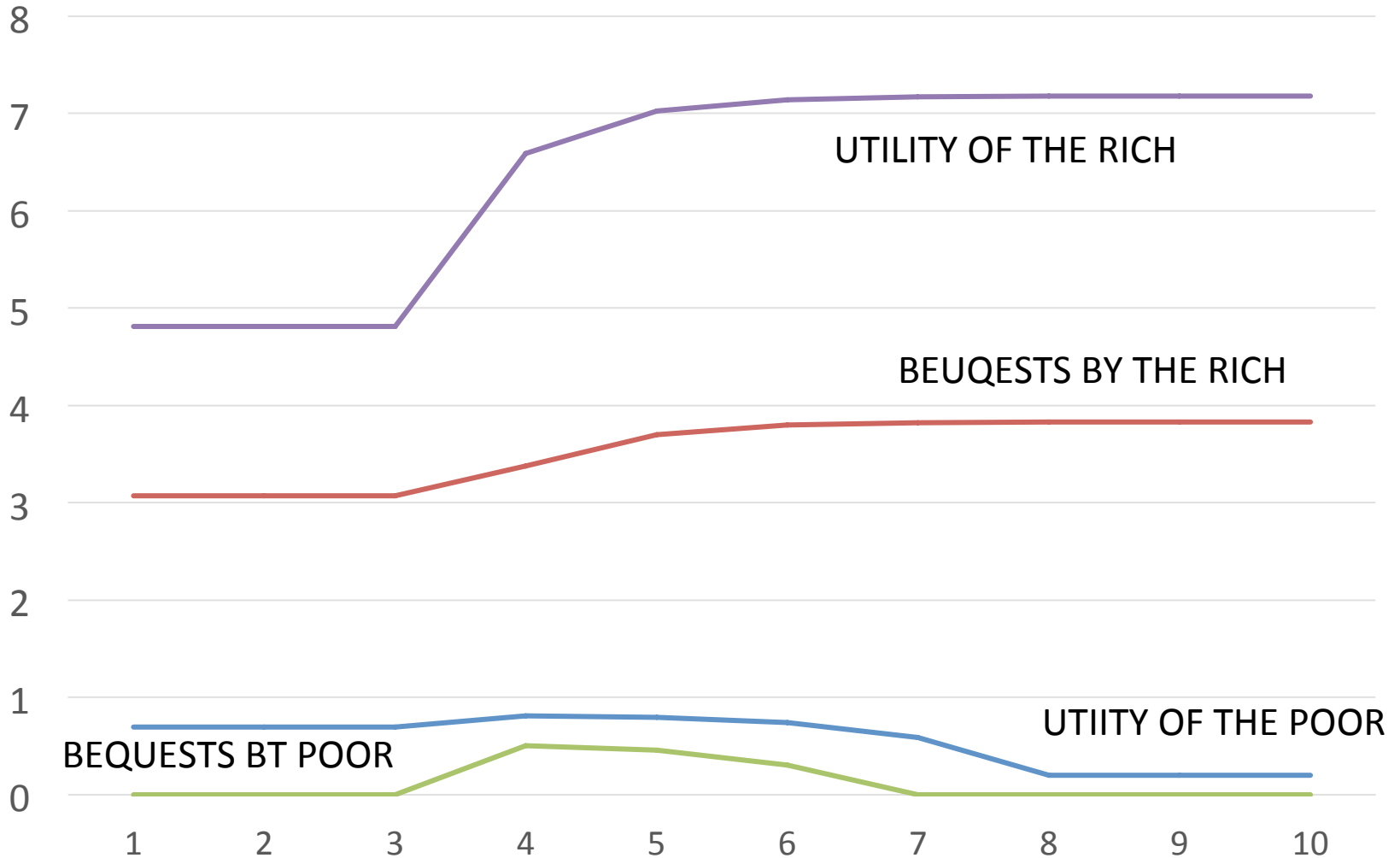
SOARING SHARE OF THE TOP 1%



As AI/Robotics Technology Advances:

- (1) The returns to (human and physical) capital rise
- (2) The returns to (raw) labor diminish
- (3) The overall economy grows with disproportionate gains by capital owners and their children (via bequests)
- (4) The big losers are the children of the poor and of the working class

ROBOT/AI REVOLUTION & INEQUALITY



In order for all parts of society to benefit from the advancing technologies:

Tax the capital owners and redistribute the earnings to the young through free tuition for skill training and tax credits for lower-wage workers

Without such transfers, income inequality will rise and large parts of the society will be immiserized