

Technical change and inequality: a view toward the future

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Is technical change bad for the working class?

- Historically, technical change has always been protested by some categories of workers:
 - Luddites
 - Containers
- Yet, over the long run, general standards of living have increased considerably
- And growth accounting suggests that technical change is the driving force behind this

Technical change harms some workers...

- ...but everybody else wins
- The assembly line destroyed the jobs of craftsmen in the automobile industry
- But it made cars affordable for millions of consumers
- And high productivity in those industries allowed them to pay higher wages for those types of workers (Cf Henry Ford)

Societies that discourage innovation fail

- In the 30s, the Soviet Union was growing faster than the West
- Many analysts expected it to eventually take over
- Yet growth eventually stalled, and miserable consumer living standards led to the collapse of communism
- The growth model was based on huge capital accumulation, but incentives to innovate were zero

Innovation continues

- Innovations in information and communication technologies, with applications to many sectors
- Innovation in the energy sector: shale gas, nuclear plants, etc
- Horizontal innovation (product variety): food, entertainment, etc.
- Do we expect the same virtuous dynamics to prevail?

Some worrying signs

- Upward trend in inequality over recent decades
- In a number of countries, the median wage is stagnating and real incomes are falling at the bottom
- Progress in ICT is often blamed:
 - Skill-biased
 - Superstars

Will things become rosy again?

- Workers benefit from innovation as consumers
- ICTs will eventually hit the skilled, and unskilled wages will rise again
- ICTs will also make complementary capital inputs to unskilled labor more productive and user friendly
- The unskilled themselves will become more skilled, thanks to education and the « Flinn effect »

However, the scenario could become
gloomier

The role of robots

- Robots literally replace people
- Robots will be built as long as their annuity value is lower than the wage
- The availability of robots therefore drives the wage down to the rental price of robots
- What are the consequences of this for growth and accumulation?

Wages are tied to the production cost of robots

- The cheaper the cost of a robot, the lower its rental price
- The lower its rental price, the lower the wage

Wages are tied to the cost of capital

- The lower the cost of capital, the lower the rental rate of robots
- The lower the rental rate of robots, the lower the wages
- Wages are higher, the less the economy saves (the less abundant capital)
- This is exactly the opposite in traditional economic analysis

The economy may grow indefinitely even absent technical progress

- Without robots, GDP per capital eventually stops growing, due to the law of decreasing returns
- Total GDP would grow at the same rate as population, with no growth in per capita GDP
- With robots, accumulating robots without limits raises GDP per capita (but not per robot)

But the proceeds are not equally shared!

- Since wages do not grow, growth is appropriated by the « capitalists », i.e. robot owner
- Workers are better-off only insofar as they save and accumulate more robots
- The wage bill becomes a negligible share of GDP over time

The demise of the educational system?

- Education redistributes while making its beneficiaries autonomous (as opposed to pure monetary redistribution)
- The poor have « more human capital » → they are more productive → higher wages and living standards
- But what if the wage of human capital becomes very low?
- Investment in human capital becomes wasteful!

What, then, instead of education?

- Instead of giving education to the people, just given them robots
- Society will replicate an ancient, slave-owner societies
- Humans live off the labor of slaves
- Slaves are replaced by non-human robots
- Each individual could be endowed with a minimum number of robots at birth