THE AI CHALLENGE TO MIDDLE SKILL JOBS

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DEFINING MIDDLE SKILL JOBS

- Require education beyond high school, but less than a college degree
- 49% of all new jobs in the US between 2012-2022
- Jobs requiring vocational training = more than half of the top thirty growth jobs
  - Manufacturing = 8%
  - Marketing/sales/service = 9%
  - Transportation/distribution/logistics = 9%
  - Business/management/administration= 13%
  - Hospitality/tourism = 16%

MANUFACTURING & THE GROWTH OF MIDDLE SKILLED JOBS

- Manufacturing ranked 6th in growth industries in the US

- More than 500K jobs added between 2010-2016
  - -- Machine operators, industrial mechanics, electricians, computer-controlled machine tool operators
  - -- Engineering technicians, expert drafters, electrical and electronics engineering technicians

- Among the highest paid jobs that do NOT require a college degree
- 600K jobs unfilled (5% of all US manufacturing positions)

SERVICES, TRADES & THE GROWTH OF MIDDLE SKILLED JOBS

- Fastest projected growth 2010-2020
  - Medical fields: Personal care, home health aides, dental hygienists, respiratory therapists
  - Police officers, paralegals
  - Skilled construction trades: carpenters, brick masons, stonemasons, pipe layers, steamfitters
  - Web developers, computer network support specialists,

ARTIFICIAL INTELLIGENCE & AUTOMATION

- How does AI change human work? [see Frank Levy (2018)]
  - Computers automate part of a job, not the whole job
  - People process information on the job; computers process information by executing instructions.
    - Automation requires that instructions have to specify an action for every contingency
    - This is not easy; many tasks cannot be simplified to this extent
    - We still have "customer service agents" because many tasks cannot be defined down to this level and because predictive models are, by definition, not right all the time.
    - Cases fall outside the boundaries of the data used to develop predictive models (for autonomous vehicles, legal cases).
    - "Computers cannot participate in sustained, unstructured, human interaction."

SLOW POLARIZATION OF LABOR MARKETS

- Artificial intelligence will create a lot of high skilled jobs while it slowly eliminates low skilled jobs.
- Some kinds of automation produce demands for new jobs.
  - Networks, robotics creates jobs for equipment installation and maintenance
  - Demand for rapid delivery of goods creates jobs for drivers.
- But middle skilled jobs that involve a large % of routine transactions will disappear -- at variable speeds.
  - Bank tellers >> ATM machines. Lowered the cost of running branch banks. # of banks grew, so tellers remained constant.
  - 2008-2016, tellers started to decline: 100,000 jobs losses. But enough of the job is unstructured and involves human interaction to slow job loss.
  - Medical transcriptionists (for radiology reports) may disappear completely. No human interaction required.

AI AND SERVICE WORK

- Jobs that require unstructured conversation and extensive physical movement will not succumb to AI.
  - Janitors
  - Home health aides
- Jobs that require repetitive movement and no interaction, will disappear.
  - Assembly line robotics
- Jobs that are a mixture of the two will see the repetitive or rule driven part disappear and the rest remain (upskilling)
  - Lawyers: document review will devolve to automated "predictive coding" (13% of a lawyers' time)
  - But high skilled end (developing arguments, plotting strategy) will remain

AI RELATED JOB LOSSES

- Levy estimates that AI job losses will be disproportionately blue collar, clerical and other mid skill jobs
- Estimates that 1.7 million mid skill jobs were lost between 2000-2016
- Roughly the same number of lower wage jobs increased in domains like food preparation and serving, maintenance.
- Concludes AI will not cause mass unemployment, but will cause occupational polarization.
- Going forward: long distance trucking will be replaced by autonomous long distance trucks starting 5 years from now; automated customer response will replace customer services reps (wiping out projected job growth); and industrial robots will replace assembly line workers (loss of 216,000 projected jobs).

AI RELATED JOB GROWTH

- Acemoglu and Restrepo (2018) predict that AI will create new labor intensive tasks.
  - Increases labor share to counterbalance the impact of automation
    - AI increases productivity and leads to increasing demand in non-automated tasks.
    - Growth may be in the same sector or in an unrelated sector
    - Capital accumulation arising from increasing productivity raises the demand for labor.
    - Some forms of automation create productivity effects without displacing labor.
  - But the pace of displacement and reinstatement is not balanced.
  - It is likely to create aggregate demand for labor that doesn't necessarily helped those who have been displaced.
  - New matching processes between workers and jobs will be needed.
  - Retraining will be critical
    - Both for workers displaced
    - And for the most impactful deployment of new technologies.
    - Skills mismatch is likely to last for some time.

REMEDIES FOR JOB POLARIZATION

- Building job ladders that create escalators from the bottom to the mid-skill jobs that remain in abundance.
- Develop continuous upskilling platforms for incumbent workers through "bespoke" on line education.
- Education becomes a life long enterprise, not confined to one period of the life course.
- Complement classroom learning (general skills) with shop floor experience (firm specific skills) through apprenticeship.
- Enlist experienced workers as master teachers (German "meister" system)
- Create nationally recognized certification systems that are rigorous, exam based.
- Investment in education of all forms will be crucial to address skills mismatch

BARRIERS TO IMPLEMENTATION

- Employers complain about difficulty finding skilled workers, ,but unwilling to pay for the costs of training.
- Free rider problem inhibits investment in US (but not in Germany, Austria, Switzerland).
- Financial aid systems poorly adapted to adult learner needs.
- Stigma of mid-skill jobs can dissuade young people from entering career and technical training.
- Lure of "college for all" even when it doesn't pay off
- Time binds and finances inhibits incumbent workers from seeking continuous education, leading to vulnerability to late life unemployment

ORGANIZATIONAL ADAPTATION TO SKILLS MATCHING

- German/Swiss/Austrian dual education system
- United Kingdom apprenticeship system
- American community college system
- On line upskilling, "badges"
- Problems:
  - Financing
  - Free rider dilemmas in the US
  - Stigma
  - Need for credential recognition by employers
  - Demanding, rigorous fusion of technical education for general skills and apprenticeship for firm specific skills