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An analysis of the relationship between Acemoglu's theory of technological polarization, activation policies, and the skills mismatch to reduce the social exclusion of the workforce

Espanet 2024, session 15

Napoli, 4 september - 2024

Enabling and Replacing

- Two different types of technologies with — very different — labor market implications:
    1. *Enabling:* they complement and increase the productivity of certai types of skills (e.g., CAD for design workers, laptops for manager and workers specializing in problem-solving, scanners for cashier
    2. *Replacing:* they take over **tasks** previously performed by labor (e.g., assembly tasks, switchboard operation, mail sorting, packing, stock trading, dispensing cash, operating machines, etc.).

Computers, Robots and AI

- **Robots** interact with the physical world — "automatically controlled, reprogrammable and multipurpose" (International Federation of Robotics).
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  In this presentation, I use **AI** to refer to the broad cluster of technologies focused on problem solving based on learning and continuous self-improvement.

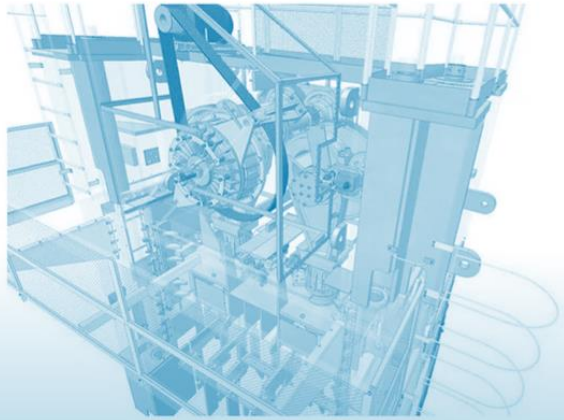
    - Modern AI eschews its earlier ambitions of replicating human understanding and thinking process; rather, based on statistical techniques applied to **unstructured data**, it strives to achieve good decision-making performance.

Modern Examples of Enabling Technologies

- Industrial robots

Example of replace technologies

Modern Examples of Enabling Technolo

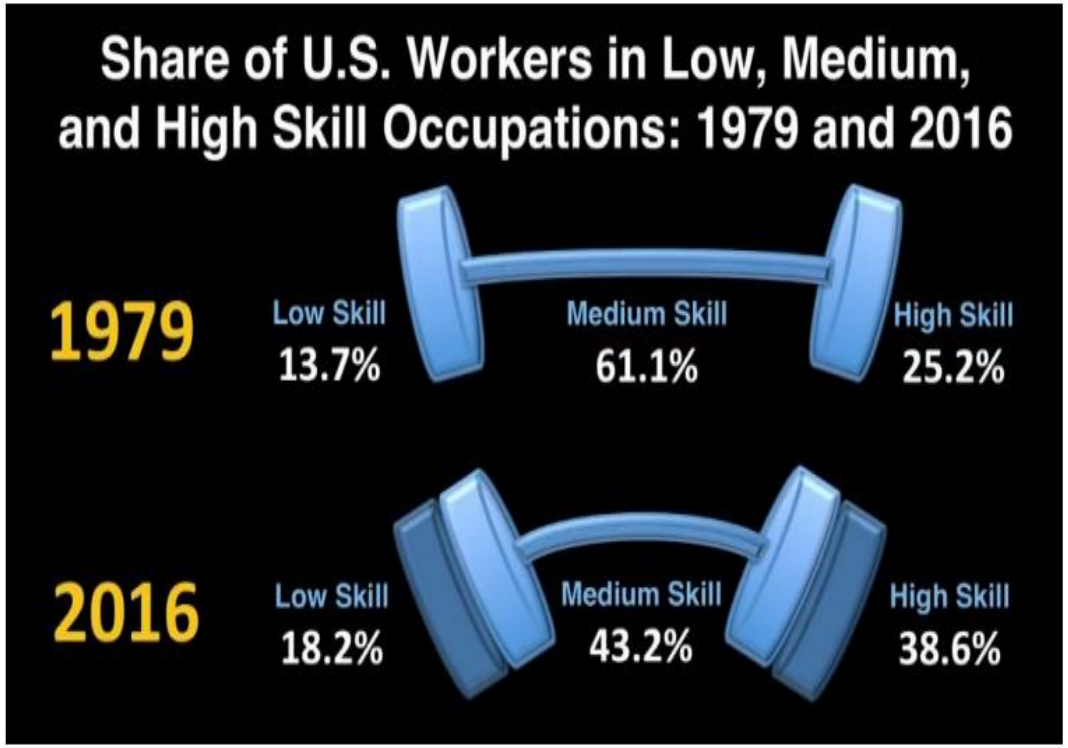


- Computer-assisted de

Enabling Versus Replacing Technologies

- The main contrast: implications for the labor market.
- Enabling technologies, because they complement workers and enable them to be more productive, increase wages and labor demand.
- Replacing technologies, on the other hand, have the capacity to reduce wages, labor demand and employment overall, and almost always displace some subset of workers.

Figure 2. Percentage of workers in low, medium and high occupational skills in the United States 1979 – 2016



Source: image elaborated by Autor (Ted Talk conference 2017)

- There are three types of skills associated with occupations: low, medium and high. Middle-skilled occupations are considered 'middle-skilled jobs' and include sales, administrative support, production, craft and manual occupations.
- These occupations tend to be routine and can be easily automated. the core job tasks of these occupations follow well-understood procedures, they can be codified in computer software and performed by machines
- The automation of middle-skill occupations like consequence of the falling price of machine substitutes for these tasks is likely to be the main cause of the decline in job opportunities in these sectors
- On the other hand, there are two main categories of non-routine tasks:

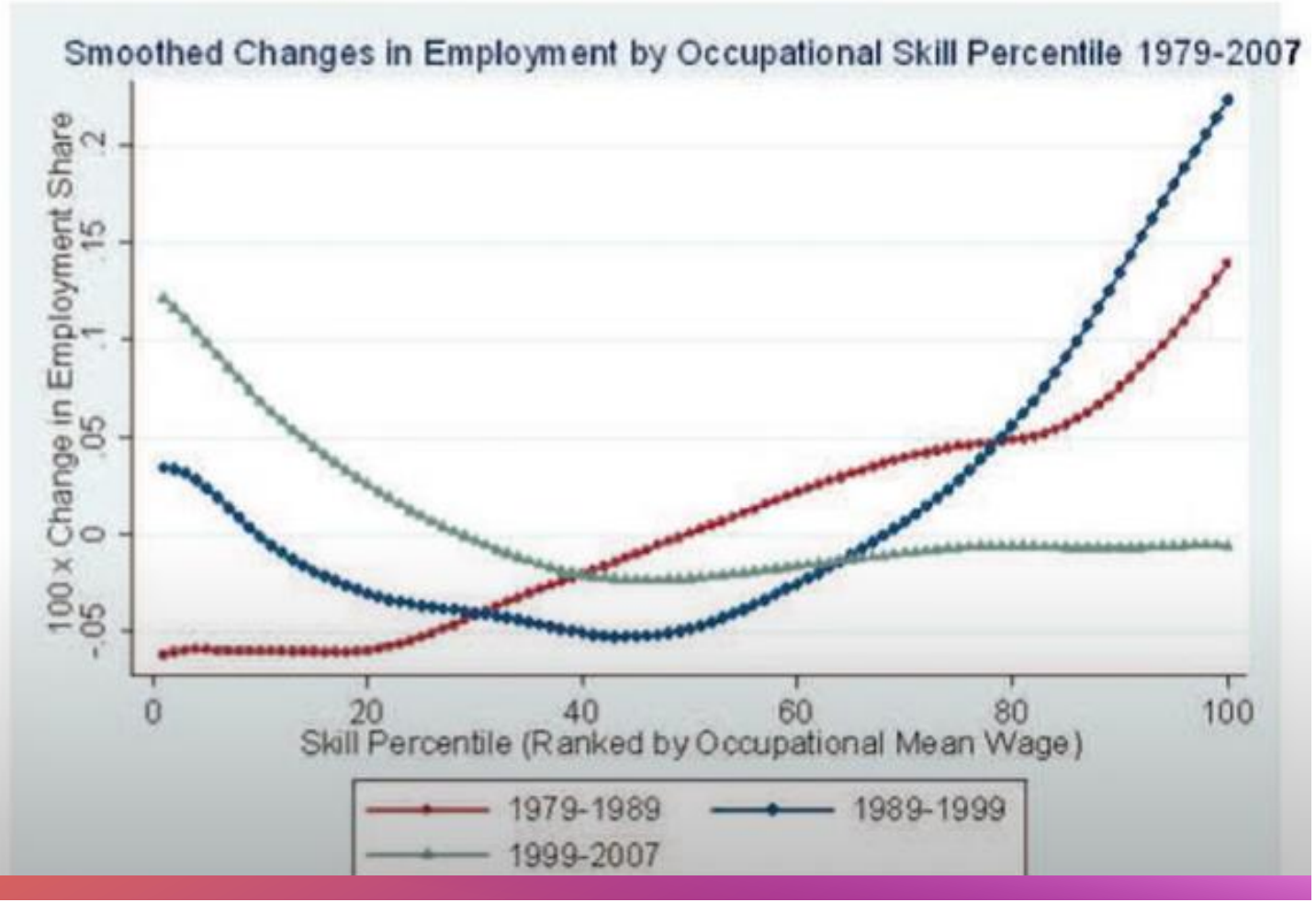
✓ abstract tasks that require problem solving, creativity and intuition

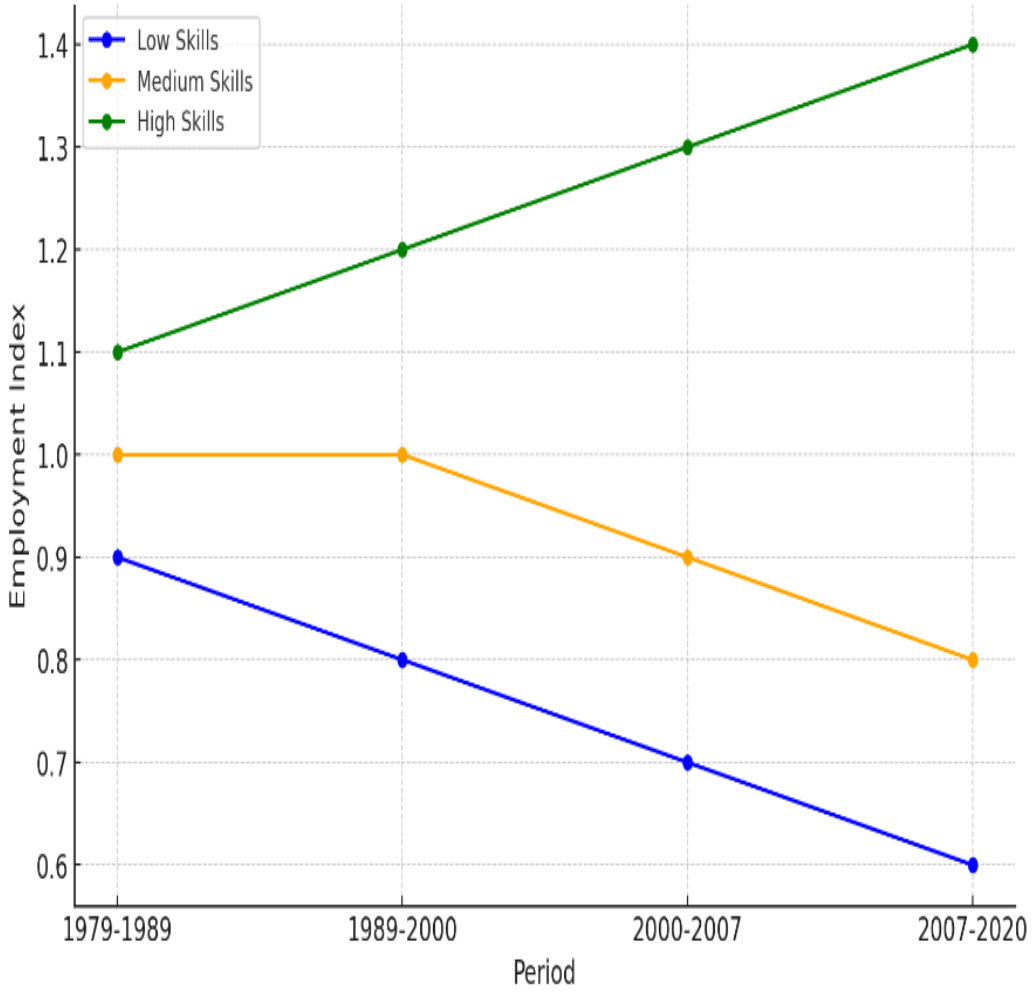
✓ manual tasks that require adaptability, visual perception and personal interaction. These tasks are difficult to automate because they require skills beyond the capabilities of current machines.

- Occupational polarization is a phenomenon that reflects a change in the distribution of skills in the labour market.

Employment Trends

- It doesn't look like uniformly growing demand for high-wage workers, especially after the 1980s.





Source: Author's elaboration

The data presented here are drawn from Eurostat, which provides detailed information on the relationship between employment and levels of education and skills.

Those with low levels of skill: Includes individuals with a primary education or less.

The category of medium skills encompasses individuals who have attained qualifications at the level of upper secondary education. Includes individuals who have completed upper secondary education.

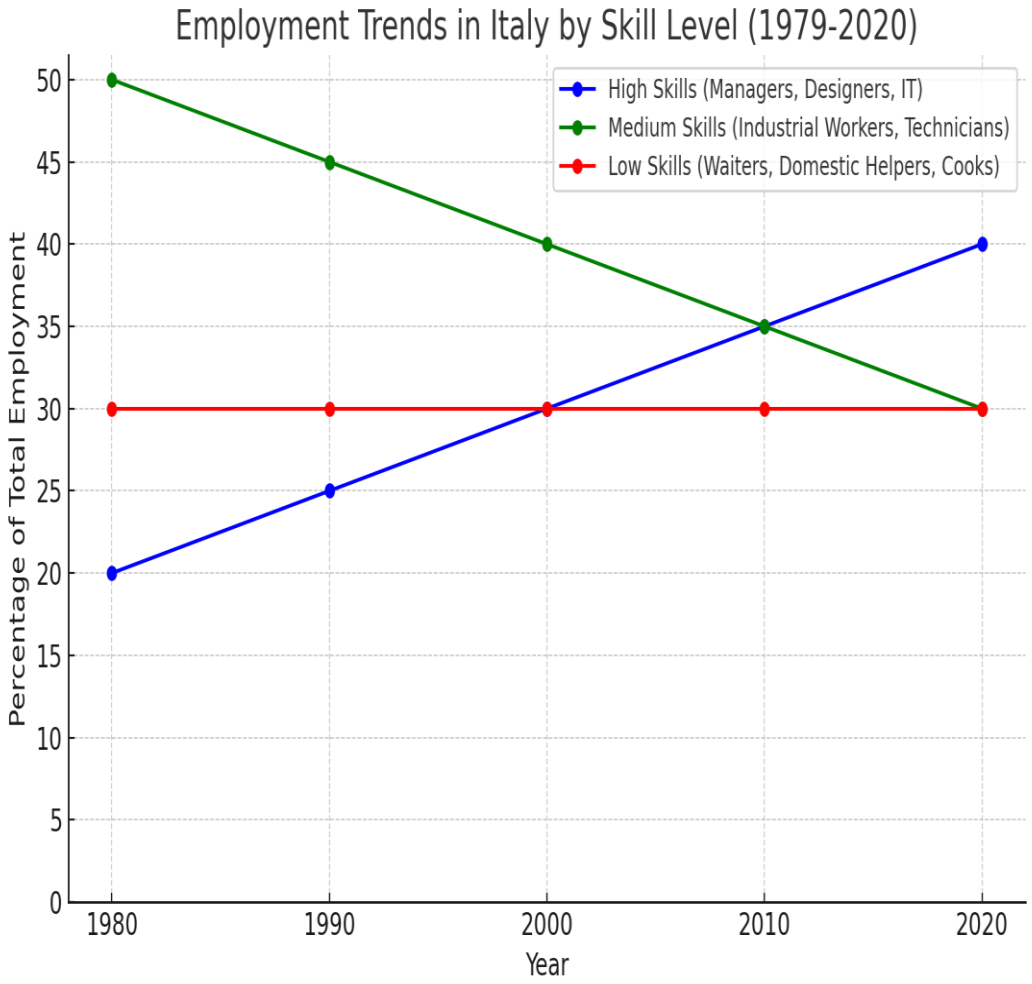
Those with high skills are defined as follows: Includes individuals with tertiary education (university or equivalent).

The general trends that emerge from the Eurostat data are as follows: The period between 1979 and 1989 saw: The proportion of employment accounted for by low and medium skills was considerable, with a slight increase in the proportion of high skills towards the end of the period.

1989-2000: There was a gradual transition towards higher employment for those with high skills, which reflected an increasing demand for skilled workers.

The period between 2000 and 2007 saw a notable expansion in the number of individuals employed in high-skill occupations, while those in low-skill roles experienced a decline due to the impact of automation and offshoring.

Between 2007 and 2020, high-skill employment continued to grow, while medium-skill employment saw a further decline. Low-skill employment continued to decline



Source: Author's elaboration

To create a graph that shows the employment trends in Italy across different skill levels linked to different task embedded in different jobs (high, medium, and low skills) from 1979 to 2020, I used the following classifications and data sources:

High-Skill Occupations: Includes roles such as managers, designers, and IT professionals. These professions are associated with high levels of creativity and generally come with high salaries.

Medium-Skill Occupations: Comprises industrial workers and technicians. These are typically blue-collar jobs that require technical skills but not necessarily a university degree.

Low-Skill Occupations: Includes jobs like waiters, domestic helpers, cooks, and delivery couriers. These roles typically require minimal formal education.

The data was sourced primarily from ISTAT, which provides longitudinal data on employment and wages by profession across various time periods.

High-Skill Occupations (e.g., Managers, Designers, IT professionals) show an increasing trend in employment share over the years.

Medium-Skill Occupations (e.g., Industrial Workers, Technicians) show a decreasing trend in employment share.

Low-Skill Occupations (e.g., Waiters, Domestic Helpers, Cooks) have a stable trend with minimal changes in employment share over the years.

This visualization captures how employment distribution has shifted over time, with a noticeable rise in high-skill occupations and a decline in medium-skill occupations.

The impact of platform effects on the process of professional change

The utilization of digital technology, exemplified by robots, has led to the displacement of average workers with medium skill sets. The algorithmic digitisation of lean platforms has resulted in a shift in the compensation process, with a proportion of these workers being absorbed by the platforms themselves

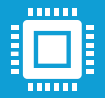
This phenomenon is referred to as the digital reinstatement effect which has the potential to increase the labour share. In this case, we observe a negative digital reinstatement effect.

With a digital shift from medium to Low Jobs through AI

The influence of lean platforms on the competencies required for professions classified as either high, medium, or low-skilled/tasks is a topic worthy of further investigation

In the context of platformed labor, even low-skilled occupations are subject to codification and routinization

Algorithmic management organizes tasks related to these skills in scientific terms, with processes that are both codified and repeatable



As observed in high-level professions, complementary skills facilitate the use of digital technologies in ways that complement human work

In platforms across both low and high-skilled professions, material or cognitive human labor is an ancillary aspect of algorithmic intelligence

IS THE IMPACT OF DIGITAL AUTOMATION ON THE LABOUR MARKET EXOGENOUS OR ENDOGENOUS?

THE ISSUE IS PRODUCTIVITY AND ACTIVE POLICIES TO MAKE IT MORE ENDOGENOUS

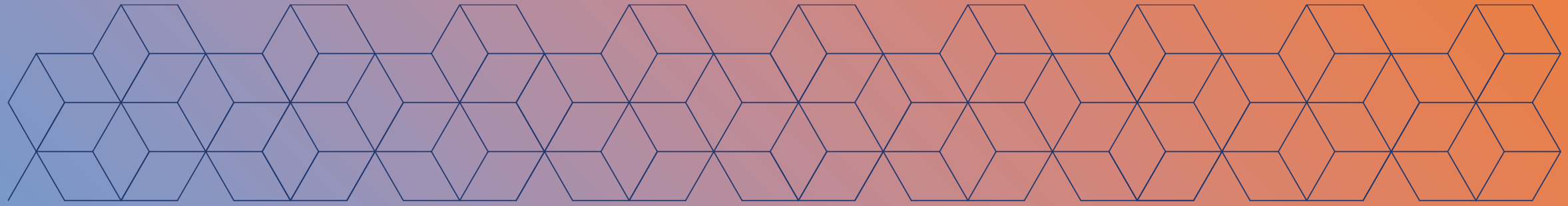
REPLACEMENT OF WORKERS AND SHIFTING TO LOW TASKS, NOT DECREASING PRODUCT PRICES AND WITH LOW PRODUCTIVITY: DISASTER SCENARIO

ACTIVE POLICIES THAT INCREASE COMPLEMENTARY SKILLS, REPLACEMENT DIGITAL AUTOMATION EFFECTS THAT INCREASE PRODUCTIVITY, WAGES, AND A REDUCTION IN PRODUCT COSTS: POSITIVE OUTCOME

TECHNOLOGICAL IMPACT IS UNPREDICTABLE BUT COULD BE INFLUENCED

Conclusion

- No doubt that new technologies, based on the silicon chip, have revolutionized the labor market as well as our society. This process is ongoing with robots and AI.
- Though we still have much to understand about what is happening (and what has happened in the past), the basic lesson is also a clear one:
    - Great potential gains from robotics and AI.
    - But this potential can only be realized if we make a range of complementary investments.
    - This necessitates identifying and investing in complement skills, and cognition and adaptation of organizations for the arrival of AI.
    - A much more flexible, adaptable education system to prepare workers for the new turbulent labor market, and a much better safety net.



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