Framing the Future of Work – The Perspective of Technology

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• Digital technologies (robots, ICT, 3-D printing, artificial intelligence) are rapidly reshaping our societies.

**US 1995-2015: number of robots /million hours worked tripled**

![Graph showing automation in the U.S.A. from 1995 to 2015.](Image)
Points of Departure

• And, while the attention has been on developed countries, it is affecting both developed and developing countries

Interest in reshoring among U.S.-based manufacturing executives

• They affect the nature and location of production and thus the future of work.

Source: BCG Manufacturing Survey
Points of Departure

• Digital technologies provide **opportunities**, by
  • increasing labor productivity,
  • lowering transaction costs,
  • reducing barriers to market entry.
  ➔ faster **innovation** ➔ virtuous circle of growth & prosperity.

• They also pose a **threat** as they cause disruption, by changing
  • the type of skills demanded,
  • the relationships between employer and employed,
  • trade flows between countries
  ➔ richer countries and better connected within countries benefit most ➔ risk of rising **inequality**.
Points of Departure

Rising global inequality?

Global Inequality, 1988-2013

What does the future hold?
Points of Departure

• To fully harness the potential of technology, and minimize the risks, one will need to:
  1) Support individuals and firms in technology adoption
  2) Build the skills of the workforce of the future
  3) Rethink social security systems in light of newly emerging modes of work

• For countries, the relative importance of each of these areas in preparing for the new world of work will vary by their income status.
Framing the Future of Work

• Will there be jobs?
• Will there be good jobs
• Who will get the jobs
• What can we do?
Will there be jobs?

Three channels through which digital technologies change the nature and location of the world of work:

- automation, connectivity, and innovation.

Automation affects the cost of labor vs capital:

Direct:
- “Robots are taking our jobs away” vs “Robot assisted surgery”
- Labor market polarization, especially in developed countries
- Within country inequality, also in middle and lower income countries

Indirect:
- Reshoring, prematurely closing the door on labor intensive, export led development as pathway out of poverty
- Automation vs migration (care, agriculture)
- Between country inequality
Will there be jobs?

- **Connectivity** changes the cost of transacting and the potential for the economies of scale and market power:
  - Better access to markets and resources helps firms grow and create jobs or attract work to new markets → especially pertinent for low and middle income countries (e.g. undersea internet cables; Nairobi video-editing services; Hello Tractor Nigeria)
  - Reduce market entry barriers (weaken market power of incumbents – e.g. 3D printing), but also emergence of new monopolies (e.g. web searches, mobile payments, online bookstores) and risk of becoming subject to market power of foreign companies
Will there be jobs?

• Innovation and product development:
  • Reduction of the costs and risks of innovation, and product development, allowing more people to test new objects and ideas, also in developing countries.
  • This can give rise to new industries, firms, and jobs.
  • For example:
    • Computer animation has created 80,000 jobs in India, though it displaced traditional animator jobs.
    • Production of Advanced High Performance Reconnaissance Light Aircraft (AHRLAC), Paramount Group, South Africa (defense industry) (The Economist, Special Report on Leapfrogging, November 2017)
Will there be jobs?

• Overall, these three channels interact in complex ways that affect the economic forces that drive the organization and location of production and work, i.e. the relative price of labor and capital, the cost of transacting, the economies of scale and market competition.

• The effects will differ depending on the
  • specific technology,
  • industry
  • occupation under consideration (routine, cognitive)
  • level of national income which affects wage level and affordability of sophisticated capital equipment
Will there be GOOD jobs?

- Automation can increase productivity and workers’ capabilities (complements, improving wages working conditions. But, also more risks
- And delinking workers from employers (gig economy – freelance, temporary), undermining provision of social security. Developed vs developing countries.
Who will get them?

- **Within countries:** better connected and better skilled
  - OECD: 40% of workers with a lower secondary degree are in jobs with a high risk of job automation, compared with <5% of workers with a tertiary degree are

- Technology can also alter the distribution of jobs across countries, i.e. the geography of jobs
  - Rates of computer ownership and internet subscription follow a strong income gradient
  - Five national markets accounted for 75% of robot sales in 2015 (China, Republic of Korea, Japan, US, and Germany)
Reinforcing and counteracting forces: Developing countries might increasingly lag behind and face rising inequality

Lagging technology adoption

- ICT adoption by individuals
- Adoption of technology by businesses
- Availability of skills

Limited skills

- Average Doing Business ranking*
- Infrastructure: complementary e.g. electricity

Weak enabling environment

- Coverage of social protection programs

High income countries

Middle and low income countries

* Note that this number represents the average rank of countries, hence, a lower number is better.

Notes: Availability of skills: Labor force with tertiary education (% of total); Average Doing Business ranking: Average of rankings (all high income vs all low income countries); ICT adoption by individuals: Internet users (per 100 people); Infrastructure: Access to electricity (% of population); Adoption of technology by businesses: Percent of firms having their own Web site (OECD vs ECA); Coverage of social protection programs: Percentage of unemployed receiving unemployment benefits (Western Europe vs Central & Eastern Europe)
What can we do?

... connect

... build the right skills

... rethink social security
What can we do? **Connect!**

- **Leave no one off-line**
  - Address regulatory and market failures that hold back the provision of affordable and reliable Internet access, access to electronic payment systems, and access to low cost devices
  - Public interventions (PPPs) to extend Internet connectivity into rural areas

- **Invest in analog complements**
  - In developing countries, improving access to electricity, finance and public services will be critical to unlock the full range of benefits from digital development
What can we do? Skill!

• Build strong foundational skills.
  – Worldwide, > 10% of 15-24 years old are functionally illiterate.
  – One of main values of education is ability to adapt to change ➔ emphasize non-cognitive, analytical, and creative skills

• Build basic IT skills and digital literacy
  – In OECD countries, with a span of just 8 years (2006-2014), facility with technology passed from being an important and desirable skill to a skill that almost every occupation requires
  – New generation of ALMPs: retrain workers and connect workers to digital jobs and new entrepreneurship opportunities (incubators)

• Prepare for lifelong learning
  – Learning to learn becomes a core skill
  – Be prepared for constant reskilling
What can we do? Decouple!

• Standard coupling of social security provision to the employer-employee relationship:
  • Challenged through increasing number of independent contractors and more frequent job transitions,
  • while new technologies make this coupling as delivery system less necessary (e.g. identification, cash less societies)
• Rich countries: social security contributions tax labor; shift to co-ownership, and taxation of property and wealth
• Middle-income countries: more opportunities to not to couple
• Lower income countries: higher coverage through targeted cash transfers and consumption taxes
Concluding remarks

• Digital technologies are changing the world of work in developed and developing countries through automation, connectivity and innovation.

• These changes affect the number, quality and distribution of jobs and pose a threat to reach our goal of shared prosperity.

• More thinking and empirical evidence is needed to unravel these channels and reflect on their empirical relevance, especially in developing countries.

• Despite the challenges presented by technological change, more not less technology is likely needed in the developing world to mitigate the risks and take maximum advantage of the opportunities.

• The World Bank stands ready to assist.