A global view on the future of work

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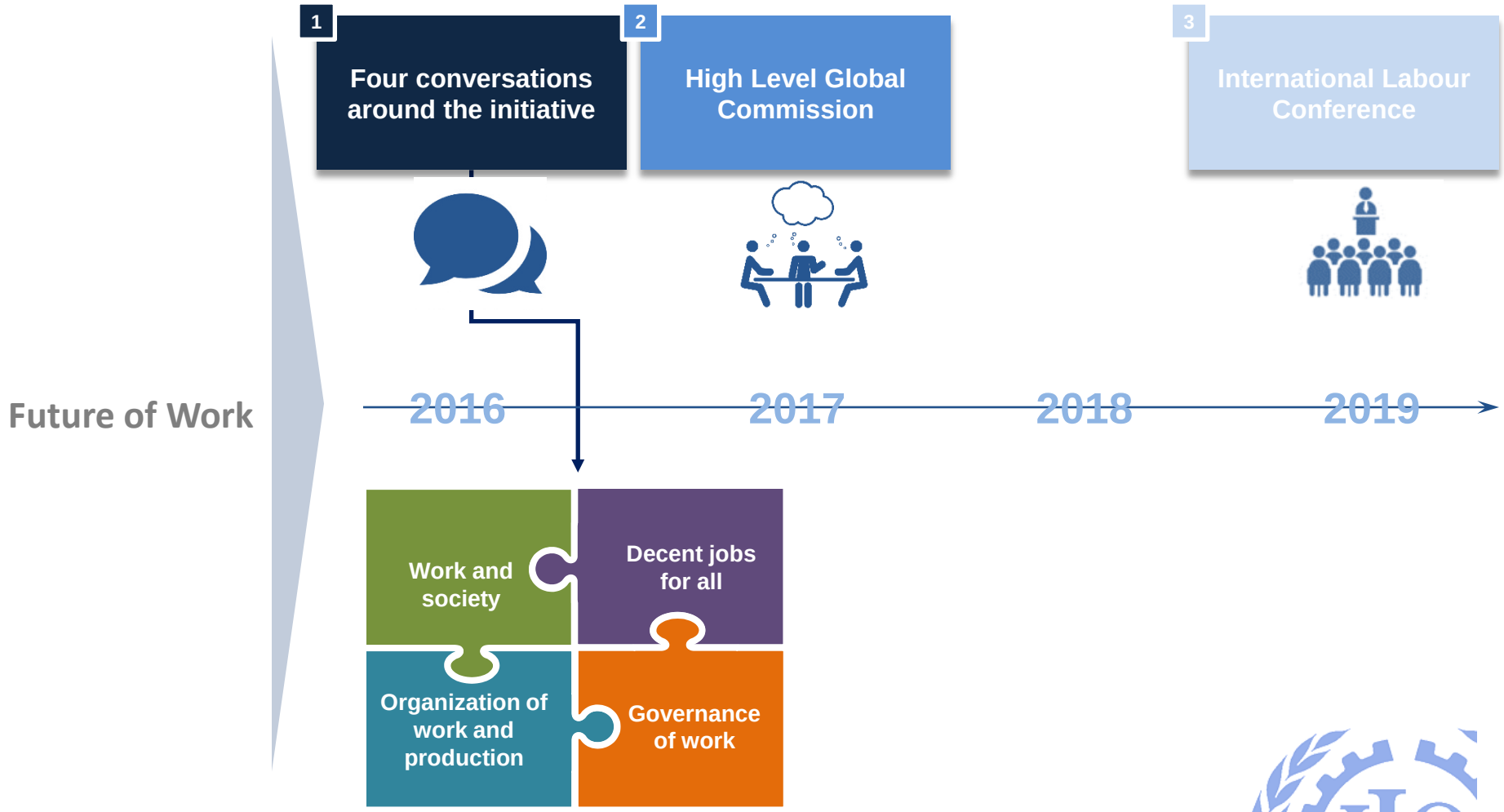
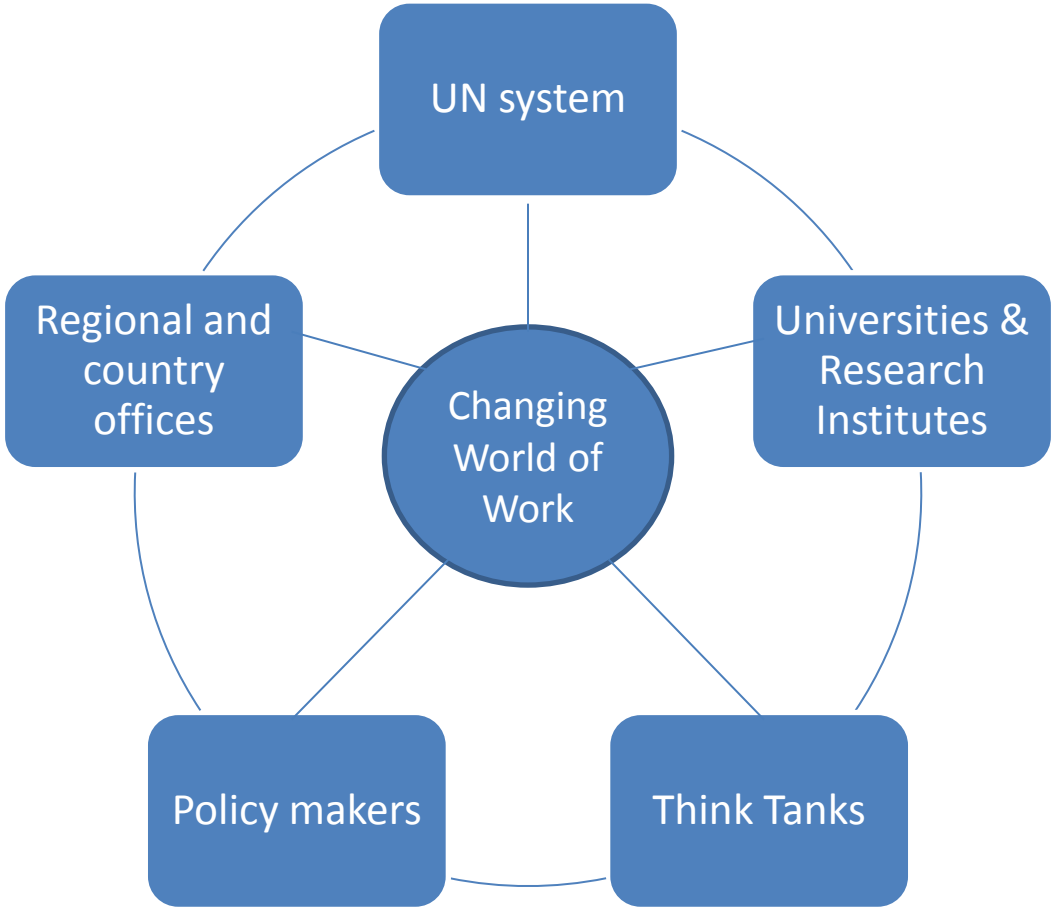
ILO initiative on the future of work
Centenary Project



Worldwide Research Network



- University of Witwatersrand, South Africa
- IPEA, Brazil
- Harvard & MIT, USA
- CASS, China
- IHD, India
- IAB, Germany
- Oxford, UK

Outline of presentation

I. Mega **trends** that impact on the future of work

- climate change
- Demographic dynamics
- Technological change

II. A **dynamic** framework

- job destruction,
- job creation
- capabilities

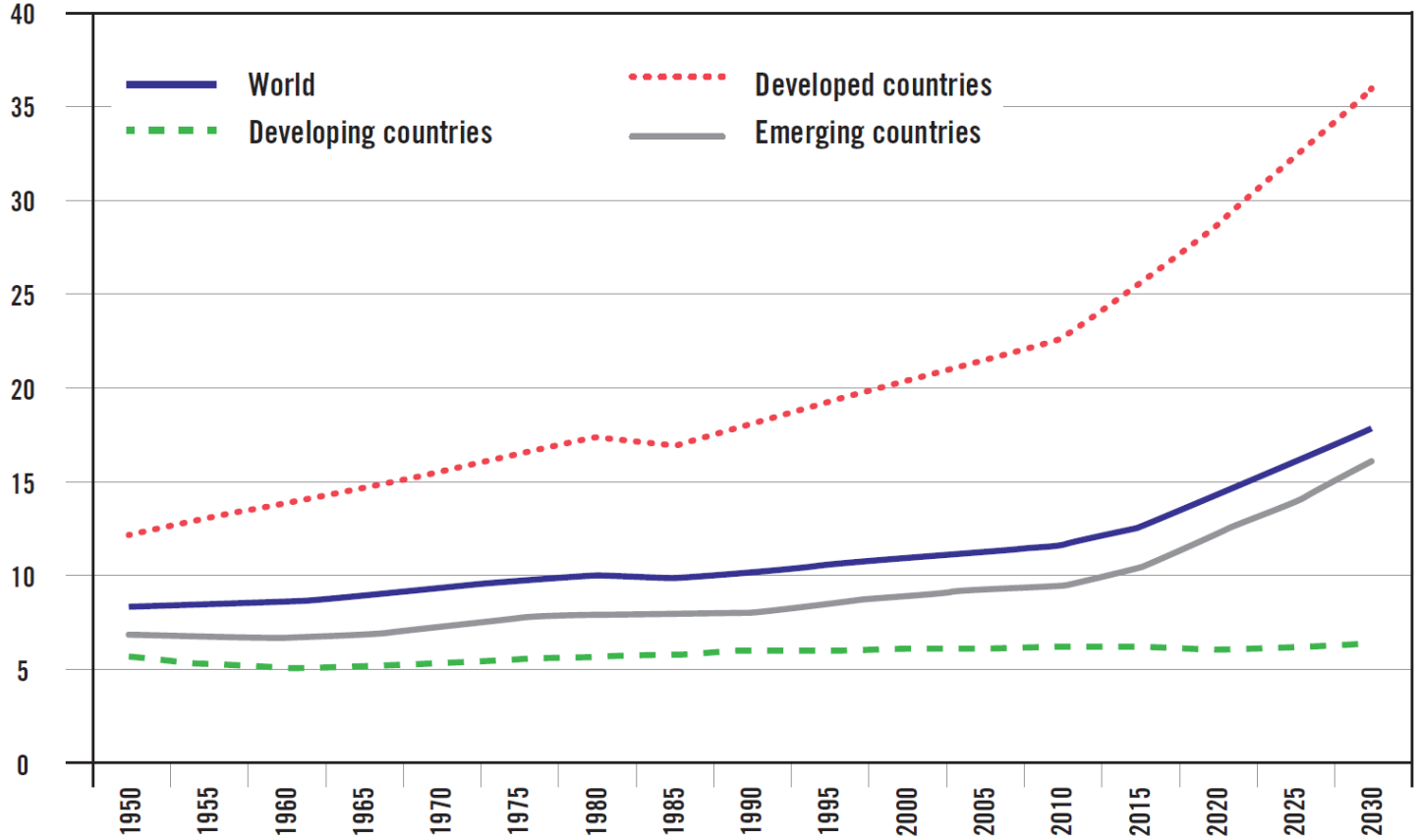
III. The role of the **education** systems

- Human capital
- Collective capabilities
- R&D, national innovation system

I. Mega trends (1): Demography

Economic old-age dependency ratio

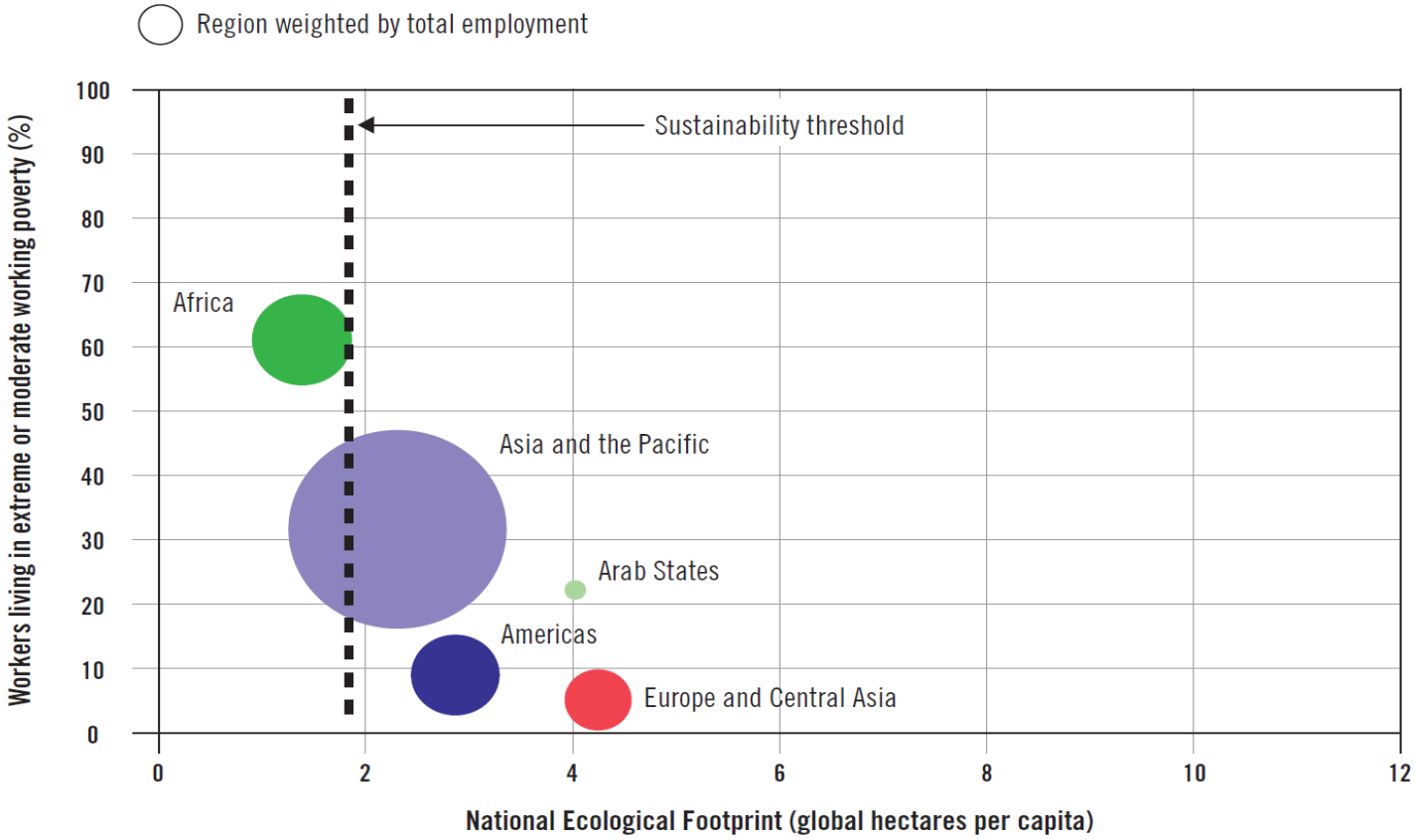
(ratio of the population aged 65+ to the working-age population aged 15–64)



Source: ILO calculations based on United Nations World Population Prospects, 2017 revision.

I. Mega trends (2): Climate change

National ecological footprint and working poverty, 2012



Source: ILOSTAT and Global Footprint Network's 2016 National Footprint Accounts.

I. Mega trends (3): Technological changes

Since the Industrial Revolution in 18th century market forces drive labour-saving technological change.

- **Industrialisation: shifting production from workshops to factories, and production of goods and services for particular clients to standardised products for the market.**
- **Firms compete in prices and quality rather than in individual design and problem solutions.**
- **Competitive pressures drive search for new technologies to enhance productivity.**

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The Future of Jobs in industries

Two long-term trends of productivity enhancing technological change in industrial production mode:

1. Mechanisation / Automation / Robotisation / artificial intelligence / Cobots / Smart production systems (industry, agriculture)

2. Fragmentation of production process / Division of labour / Specialisation / Global Value Chains / New Business models / Sourcing

- Replacing jobs (non-routine, cognitive), Augmenting tasks
- Off-shoring (service jobs), In-shoring (manufacturing jobs), crowd sourcing (IT-enabled services),
- Increasing complexity of jobs

The Future of Jobs in industries

- Replacing jobs (non-routine, cognitive),
- Augmenting tasks

- Off-shoring (remote service jobs, R&D, design),
- In-shoring (manufacturing jobs),
- Crowd sourcing (IT-enabled services),

- Increasing complexity of jobs at high level occupations (machine human interface; management, hybrid occupations, inter-cultural communication)

II. A dynamic framework: Shifting techno-economic paradigms

Evolutionary Economics:

Technological change: a complex, non-linear process of creative destruction

Techno-economic paradigms (Dosi, Perez, Freeman)

Current paradigm: digitalization, robots, internet

Developing of micro-processor beginning of 1970s

Different phases:

Process innovation – the disruptive phase

automation, fragmentation of production processes - Rising productivity, jobs loss in existing industries, rising inequality, financial bubbles, institutions

Product innovation – creative phase, structural transformation

II. A dynamic framework: job creation phase

Product innovation – creative phase, structural transformation

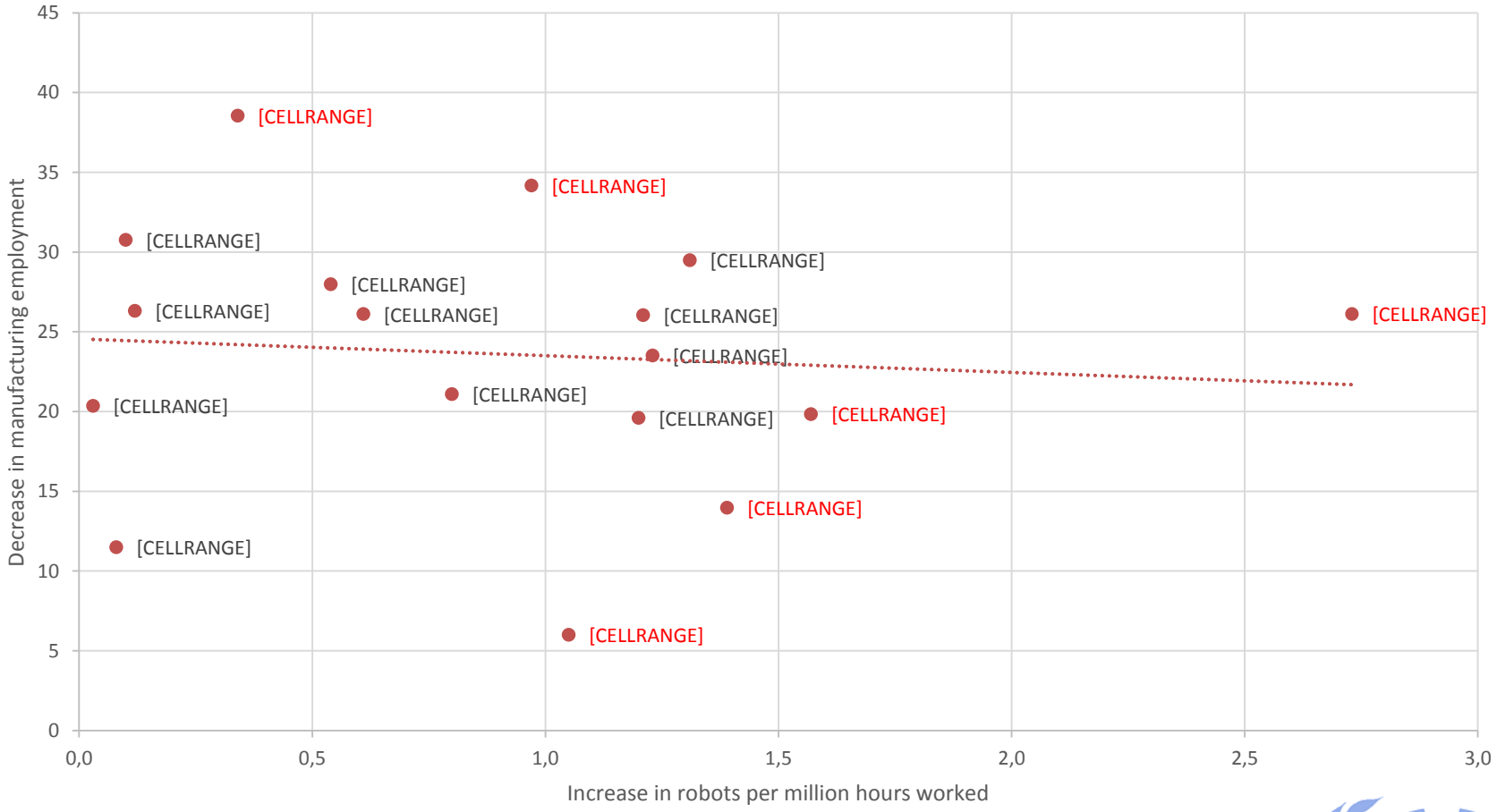
transformative changes in consumption and production structure, new institutions emerge, new industries emerge

Most new jobs are not created in the sectors where jobs are destroyed.

- New capital goods industries – tech-industry, robots, software
- leisure industry, travel, sports, and games
- R&D
- New business model (e.g. Big Data, Internet of Things)

- **But: Wide differences across countries in making the transition**

Growth in robot density (changes in number of robots per million hours worked) and decrease in manufacturing employment as share of total employment (in percentage) 1993-2007



Capabilities for Innovation and Job creation

Social capabilities shape dynamics of product innovation and structural transformation

Capabilities to innovate are

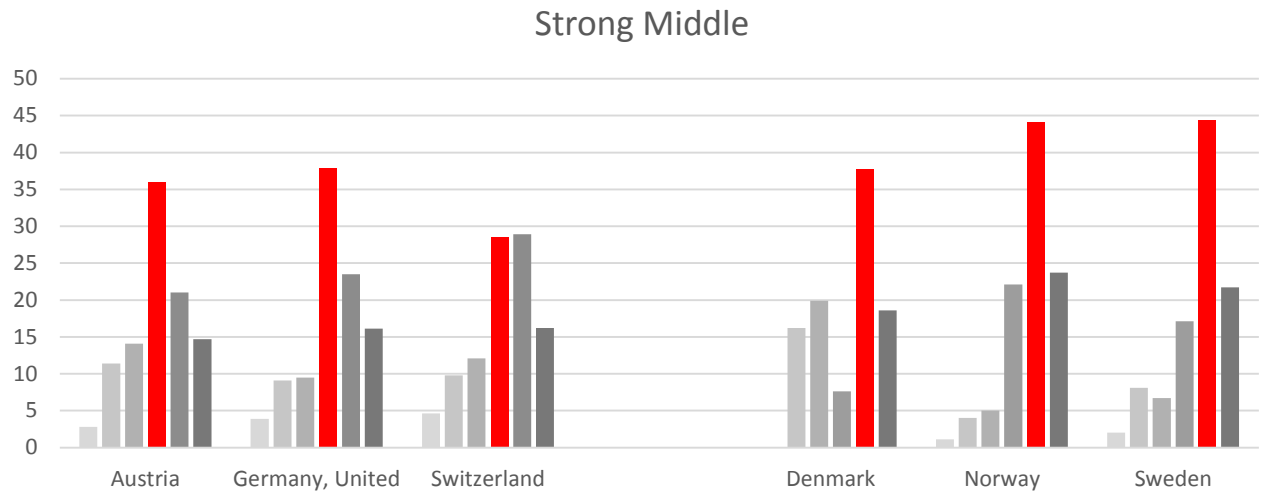
a. embodied in the **knowledge** base of a society (not in physical sphere)

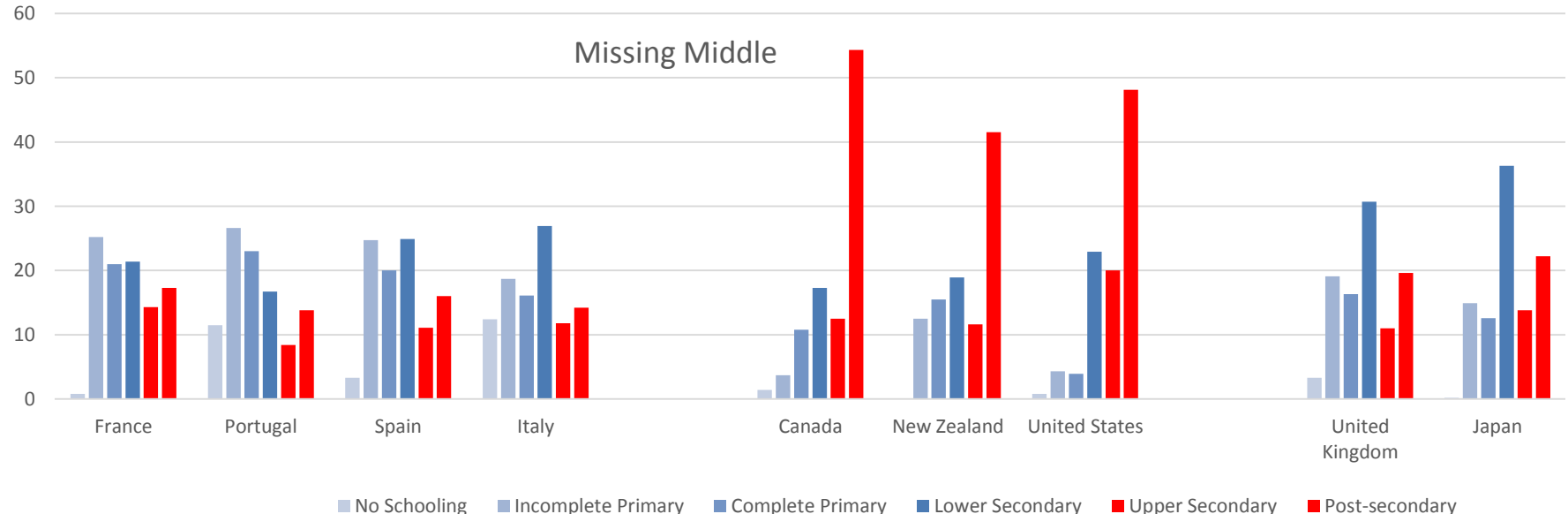
b. exist in **collective** forms of knowledge (not in skills of individuals)

- composition of skills and knowledge
  - (diversity, complexity, specificity) – range of feasible new products that can potentially be produced
- Commonly shared belief systems
  - (culture, ideologies, religion) – choices, attitudes, values
- Specific competences "inherited" in non-genetic way from past generation
  - (e.g. precision, design)
- Rules and procedures embodied in institutions, routines
  - Restrict and guide behavior of social group, provide incentives,
  - Determine competences of societies to manage the process of change

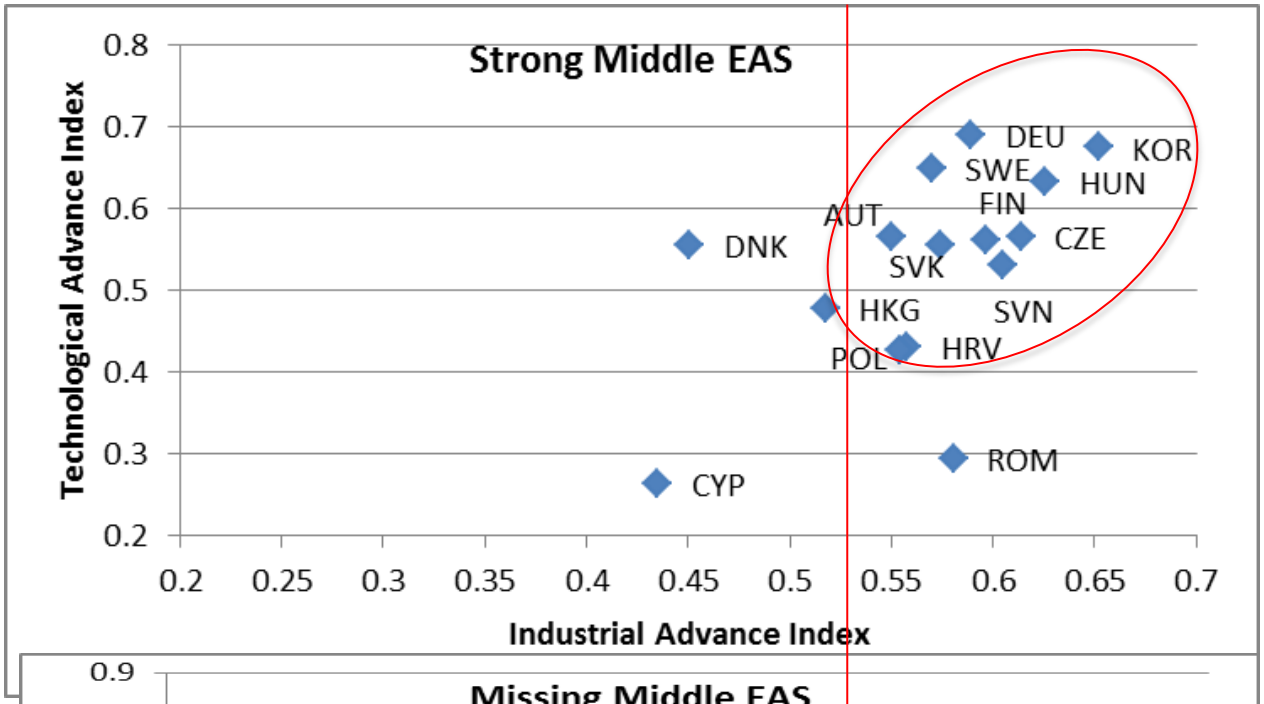
c. accumulated in **societal learning process,**

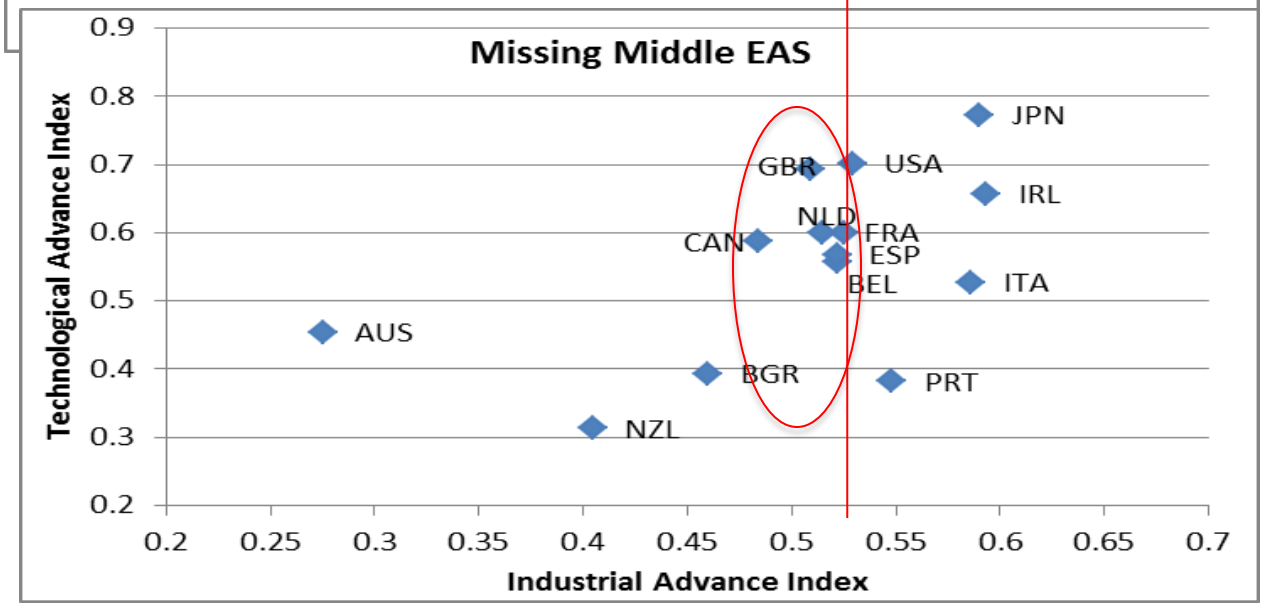
Educational attainment structures shaping knowledge base of society





EAS shaping industrial structure : Developed countries





Evidence from developing countries: Capabilities to New technologies and c, GVCs and learning to leapfrog

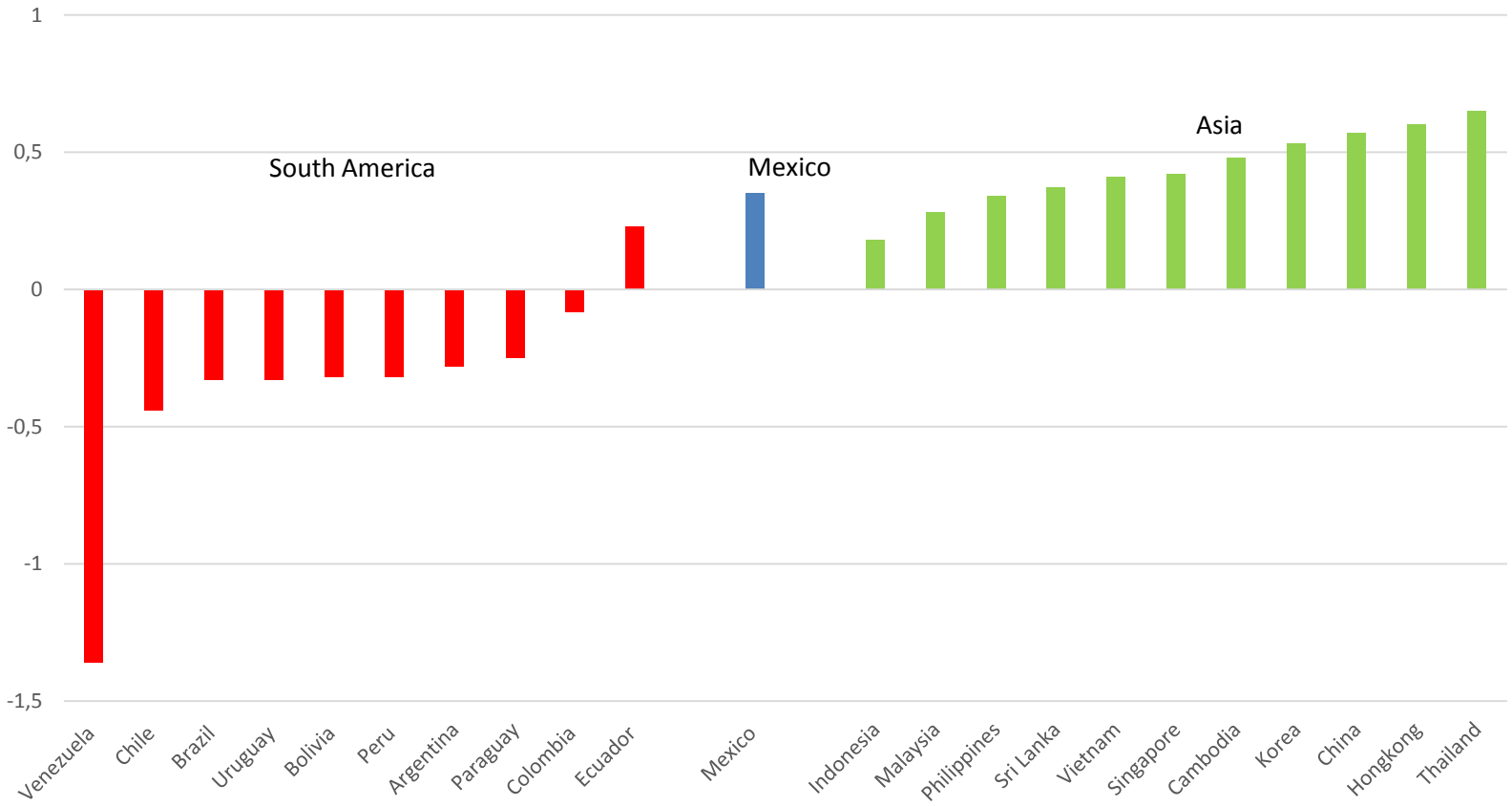
- New technologies create opportunities for developing countries to leapfrog
- Empirical evidence:

Countries with the right set of capabilities will be able to exploit these opportunities

Robotisation and jobs creation : Comparing South America and South East Asia

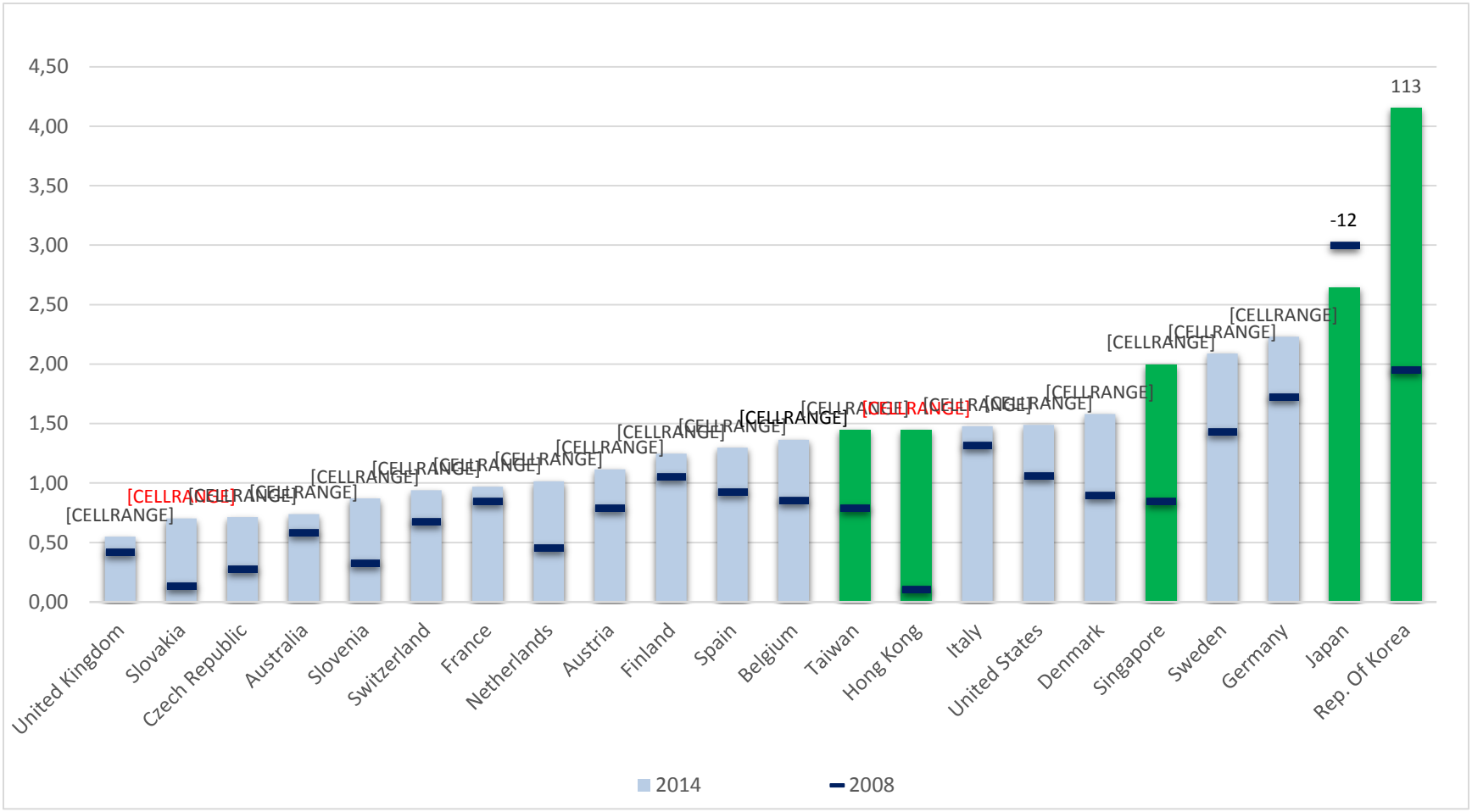
- **The narrative:** 1990- 2014
  - South East Asian countries:
    - entered emerging GVCs with manufacturing intermediates (diversification)
    - increased economic complexity
    - accumulated capabilities to innovate
    - Diversified into two robot-intensive industries and learned to compete – transport and electronic
    - Creating productive jobs
  - South American countries:
    - supplied largely natural resources to GVCs
    - decreased economic complexity and de-industrialised.
    - Limited opportunities to develop capabilities to innovate and catch up in manufacturing
    - Developed only one robot-intensive industry- transport
    - Loosing productive jobs

Change in economic complexity in Latin American and Asian countries, 1998-2008.



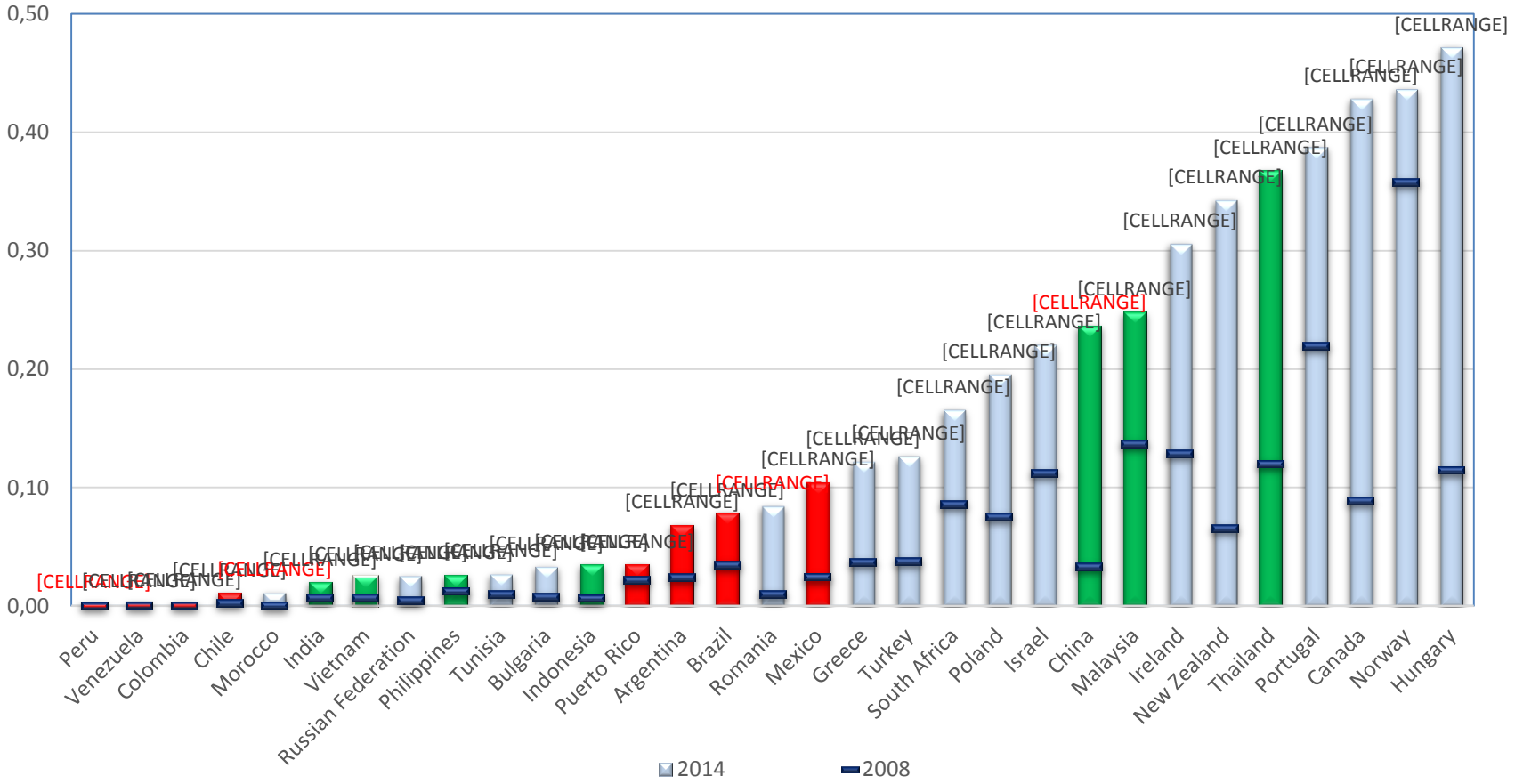
Source: The Economic Observatory (2017), MIT Harvard University

Robot Density across Countries in 2008 and 2014, High Density Countries (>0.5 in 2014)



Source: International Federation of Robots, 2016

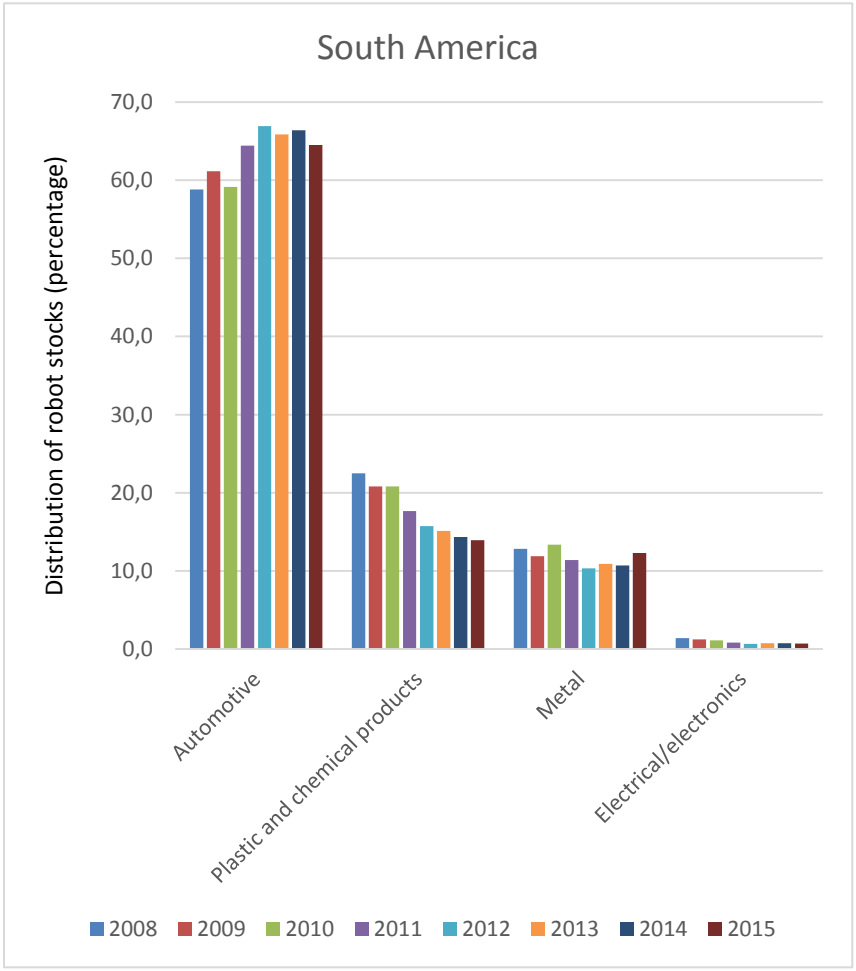
Robot Density across Countries in 2008 and 2014, Low Density Countries (<0.5 in 2014)

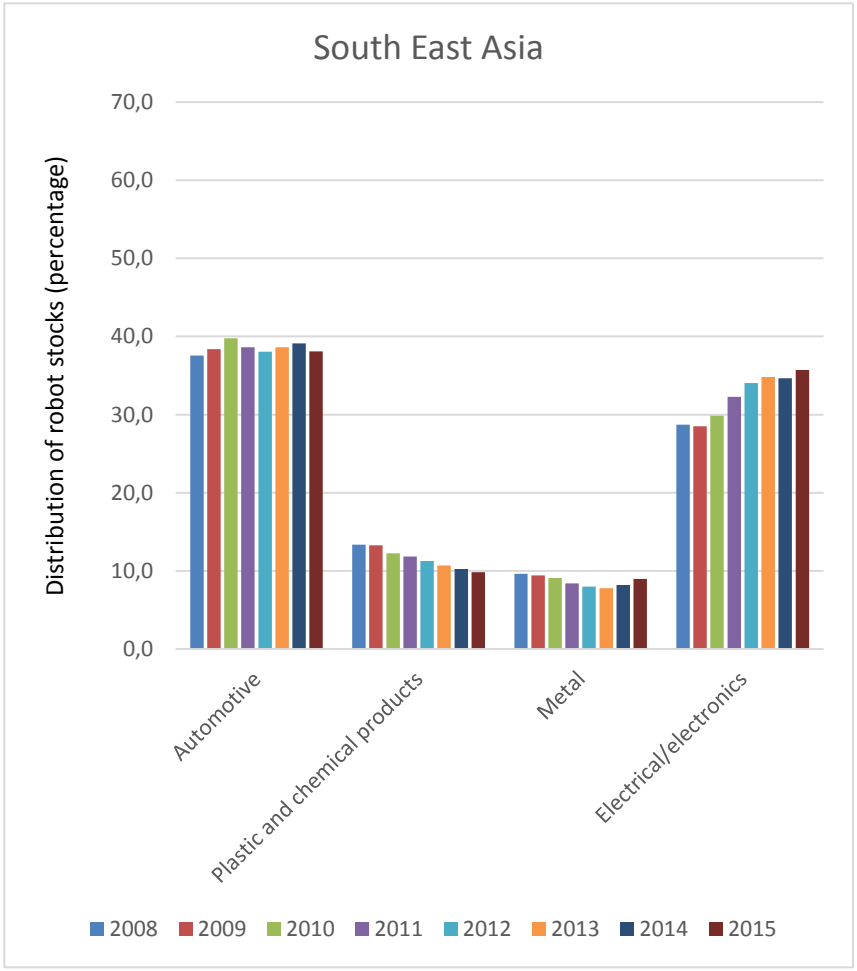


Source: International Federation of Robots, 2016

Distribution of robot stocks across the robot-intensive industries in South America and South East Asia, 2008-2015

(percentage)

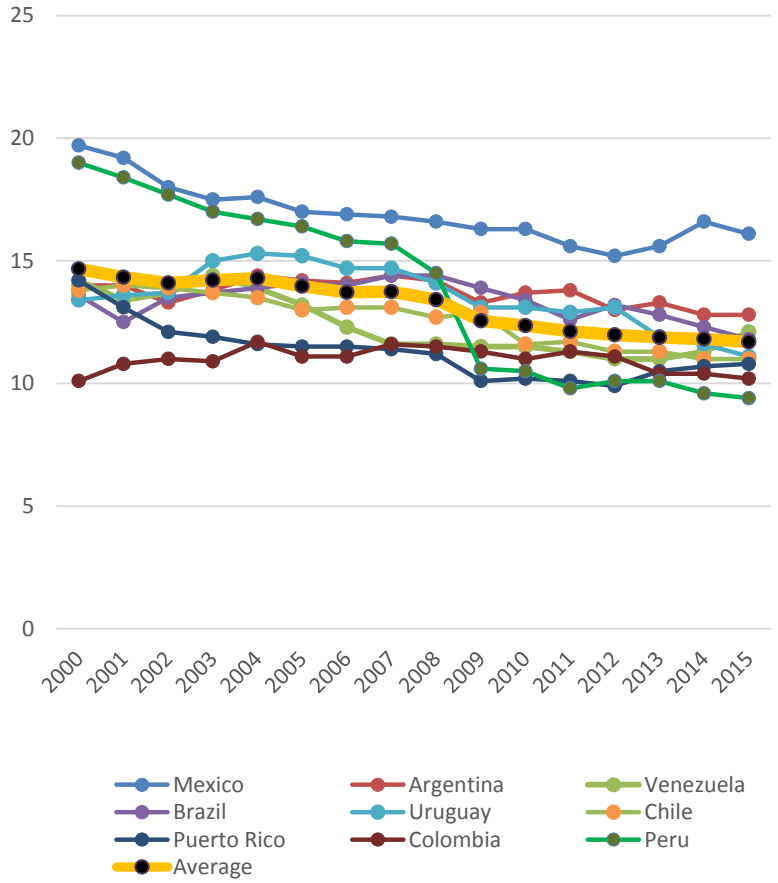




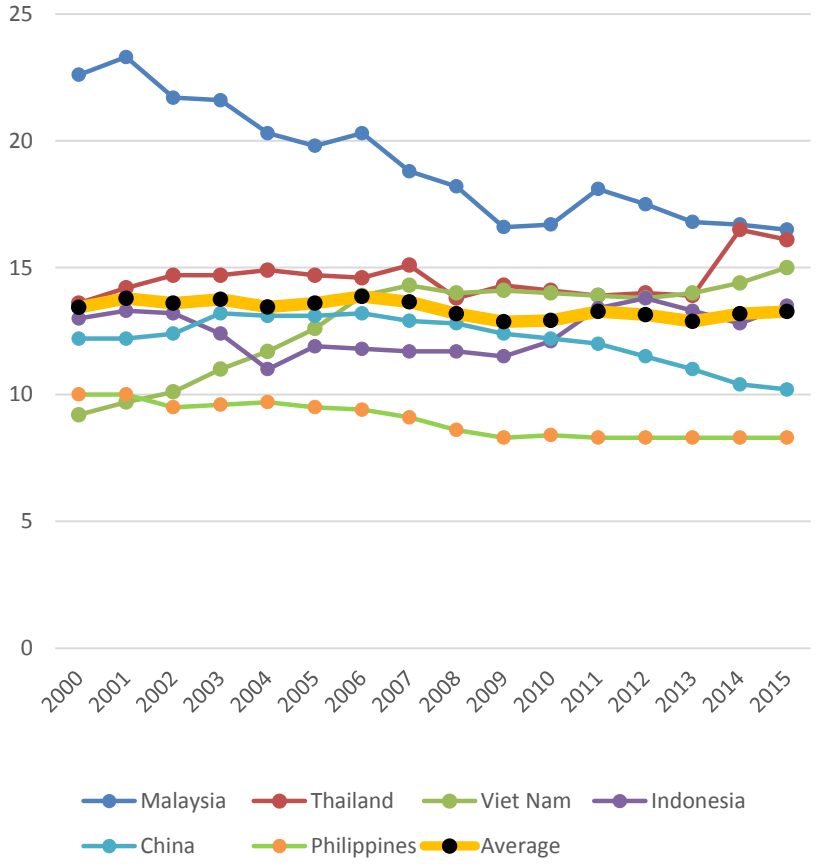
Source: International Federation of Robotics, 2016

Change in manufacturing employment as a share of total employment, 2000-2015

Latin America (14.7 to 11.7)



Asia (13.4 to 13.3)



Source: Trends Econometric Model database, ILO November 2016

III. The challenges for education systems

- Governments and societies need to develop strategies of how to translate the new wave of technological change into a future of work we want.

- Major challenge:
  - develop a vision and a consensus of society on the way forward
  - develop capabilities that enable countries to innovate, create new products and industries and thereby creating new and better jobs.

III. The role of education system

- **Supply the skills and competences needed in the economy to (high productivity and competitiveness, and workers to be employable in existing jobs.**
  - **Technical skills matching demand**
  - **Core competences**

- **Develop capabilities to innovate**

  - **Ensure teaching in a wide diversity of competences**
  - **Curriculum, teaching methodologies and technologies to develop core competences of current techno-economic paradigm – IT skills, design skills, coding; discipline, resilience, creativity, curiosity, persistence**
  - **Support belief systems, attitudes and mind-sets that support openness, change and innovation**
  - **Develop craftsmanship and entrepreneurship – the mindset to perform at high level, and deep understanding and broad mastery of competencies**
  - **Collaborate with regional business community and enterprises to develop skills ecosystems, establish R&D collaboration**
  - **Develop institutions that align education and training policies with industrial, trade and innovation polices and share high productivity gains arising from new technologies with education system**

Thank you

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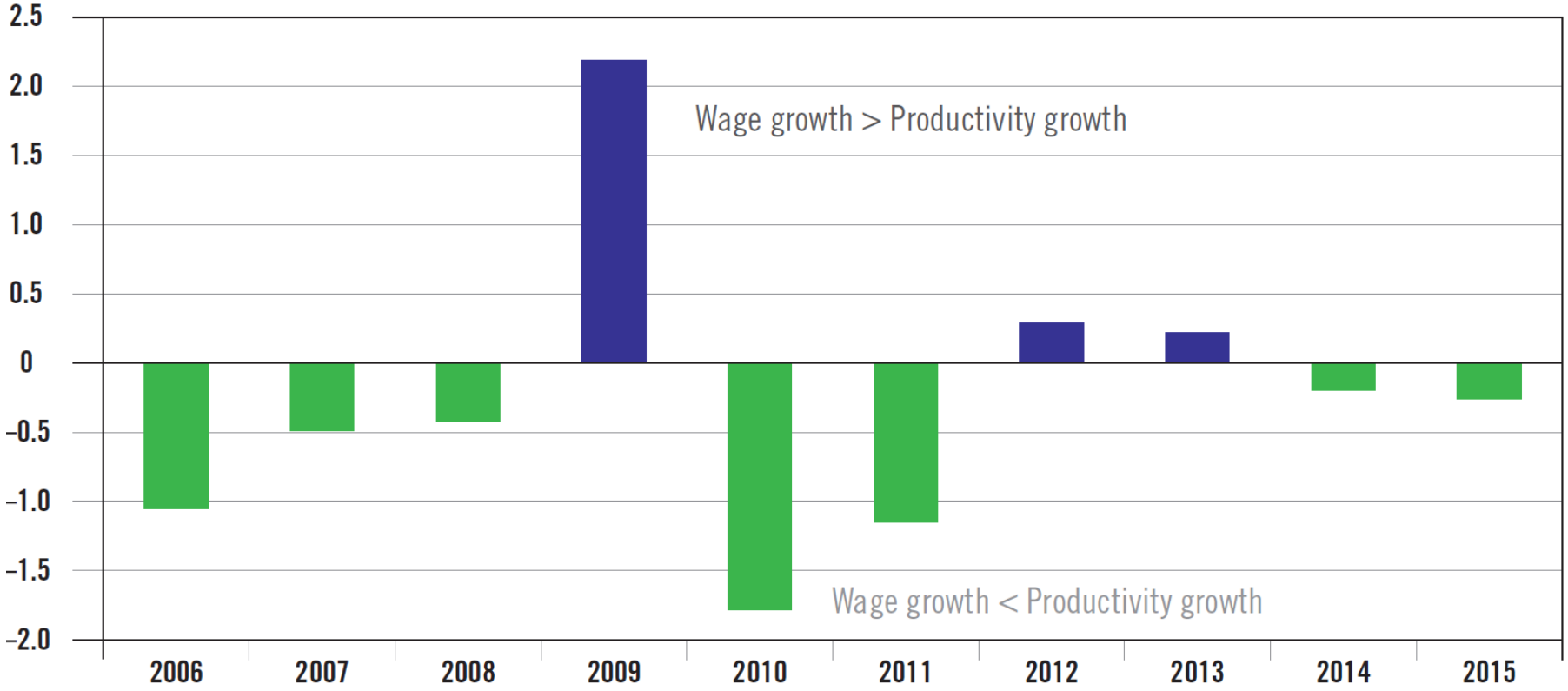
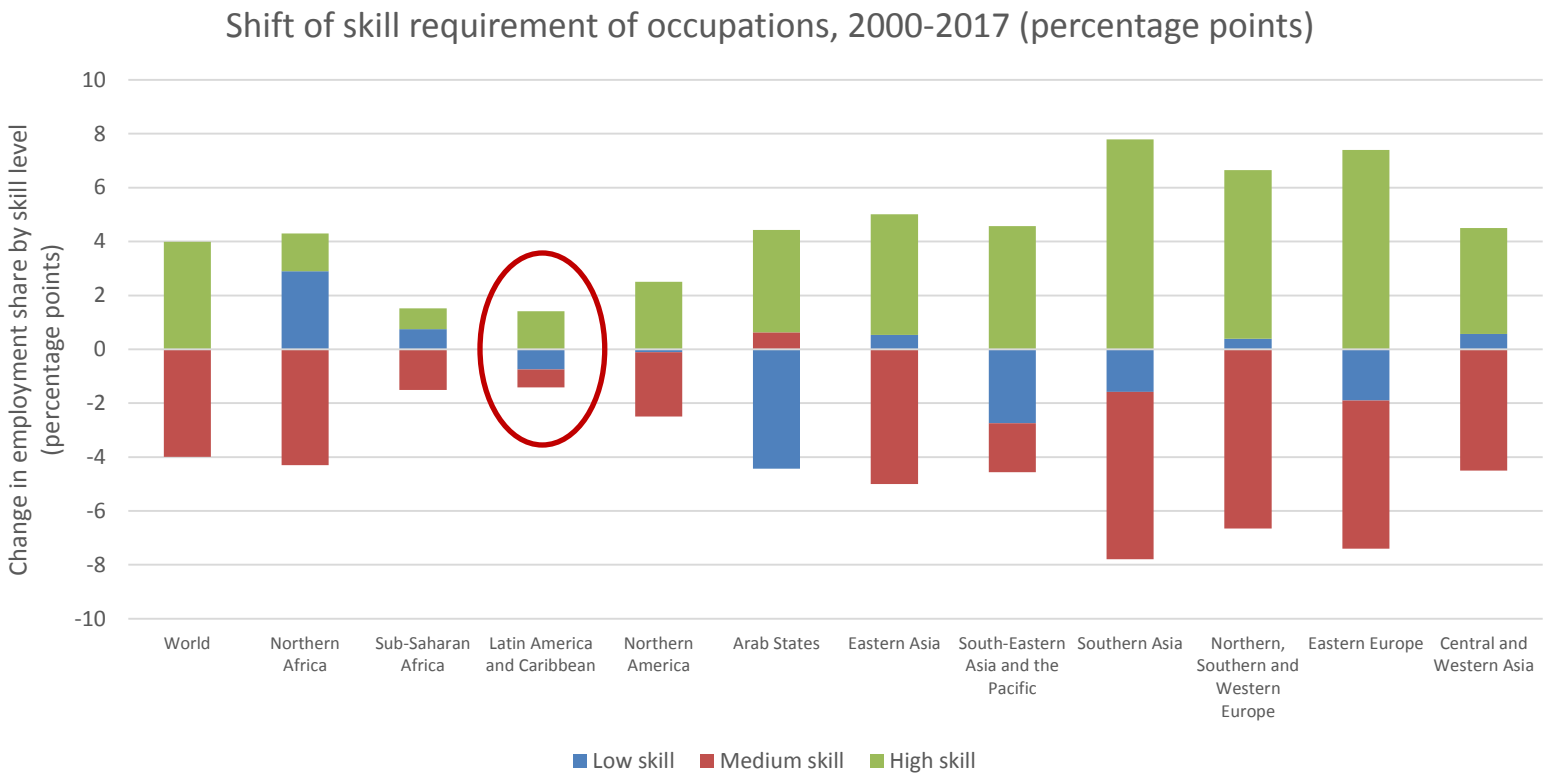
I. Trends in the world of work (2): Productivity-wage gaps and inequality

Gap between labour productivity and wage growth (percentage points)



Source: ILOSTAT

Trends in the World of Work (3) shift of skill requirement



Source: ILO Trends Econometric Models, November 2016

The Future of Jobs in crafts production mode

Crafts mode of production:

pre-industrial organisation of production

Increasing demand for crafts products

- **Artisanal production (competing with mass production – tailor, baker, carpenter)**
- **Customised, tailor-made production (repair, health, beauty,)**
- **Individual solutions for industries (installation, construction)**

Crafts people compete mainly in craftsmanship (design, creativity, solutions)

New technologies and innovation: to augment craftsmanship and to reduce price

Jobs profile increasingly complex, broad range of manual and cognitive tasks,

Vocational training system to develop craftsmanship