Modern Technologies and the Labour Market: Early Lessons for South Africa

USAF National Higher Education Conference: The Engaged University
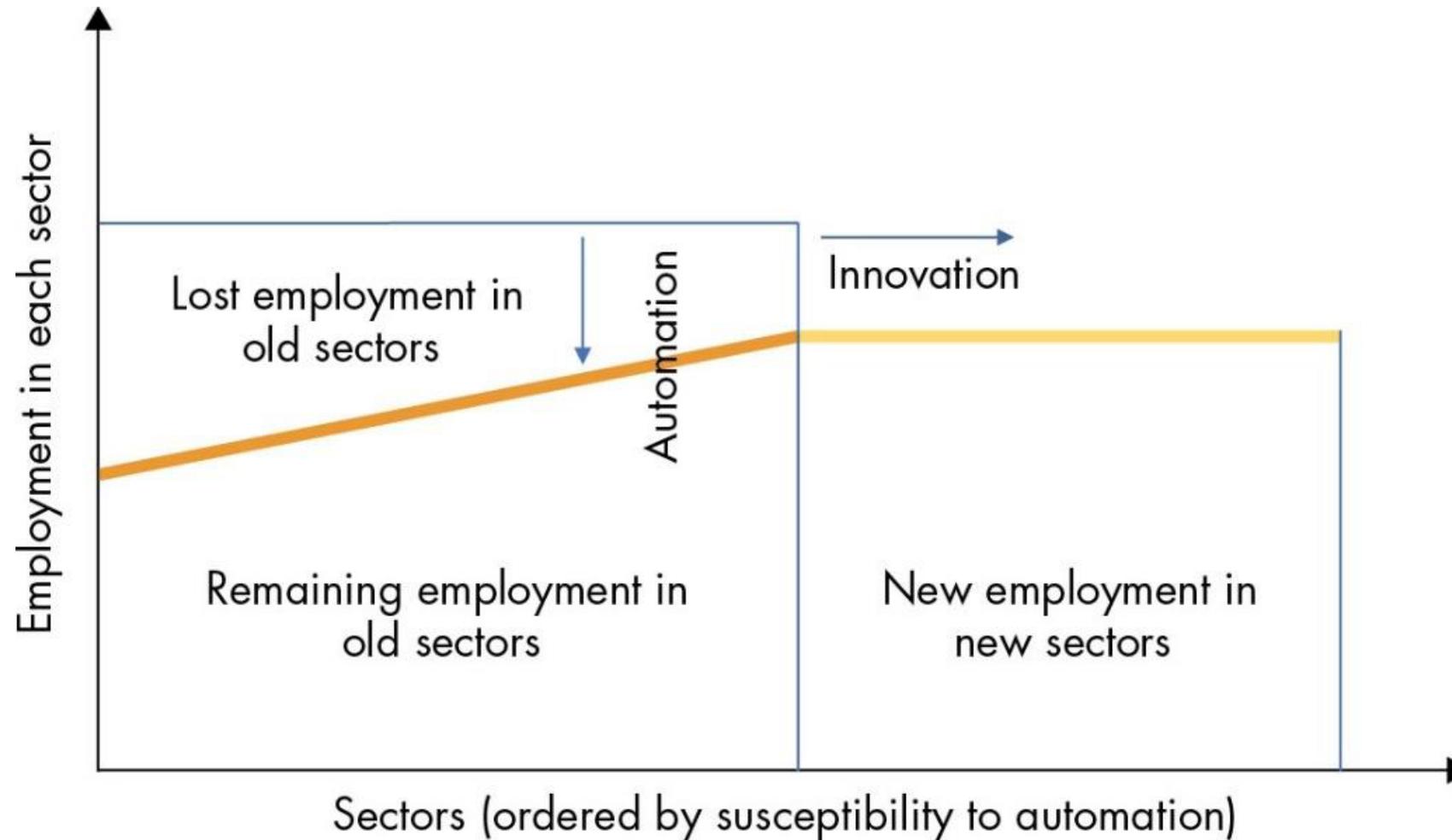
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Defining the 4th Industrial Revolution

- The Fourth Industrial Revolution (4IR) refers to rapid technological advancement launched by the 1970s microelectronics revolution and the ICT advances which ensued.
- These new technologies significantly impacted on sectors and workplaces, fundamentally altering the world of work.
- Examples:
  - Computerised algorithms in industrial and service applications;
  - Cloud services;
  - The Internet of Things;
  - Big data analytics and immersive communications;
  - Artificial intelligence.
- Currently 2.7million robots in operation globally – at an historical average growth rate of 13% p.a. over the period 2014-2020.
- There can be no question that 4IR is and will fundamentally alter labour markets around the world – and with this – poses significant concerns for poverty and inequality outcomes in developing and developed countries.

The 4IR: Early Global Debates and Results

Source: World Bank (2018) World Development Report, 2019

The 4IR: Winners and Losers in the Labour Market

Winners
- Increased demand for "knowledge" workers.
  - Those workers with a high degree of social intelligence, technical ability and creative intelligence.
- Typical occupations include professionals, managers, IT programmers and scientists.
- Some reprieve for those in 'lousy' jobs that are not easily automated.

Losers
- Middle skill occupations performing routine tasks (blue collar workers in sectors such as manufacturing) have been most effected by increasing use of technology in the production process.
- Technological advances mean that workers performing non-routine tasks (majority of those in services sectors such as accommodation and retail) will face the same threat.

Outcome Observed in US and Europe from 4IR: Wage Polarisation

The 4th Industrial Revolution:
A Task-Based Approach to Measuring Labour Market Impact

DPRU
DEVELOPMENT POLICY
RESEARCH UNIT

High Probability of Automation	Medium Probability of Automation	Low Probability of Automation

Routine, Cognitive

Example Occupations:
Sales workers, insurance brokers, personal secretaries

Non-Routine, Cognitive

Example Occupations:
Management professionals, engineers, creatives

Routine, Manual

Example Occupations:
Construction workers, mechanics

Non-Routine, Manual

Example Occupations:
Waiters, security guards, social workers

Source: Autor et al (2003)

The 4th Industrial Revolution:
A Task-Based Approach to Measuring Labour Market Impact

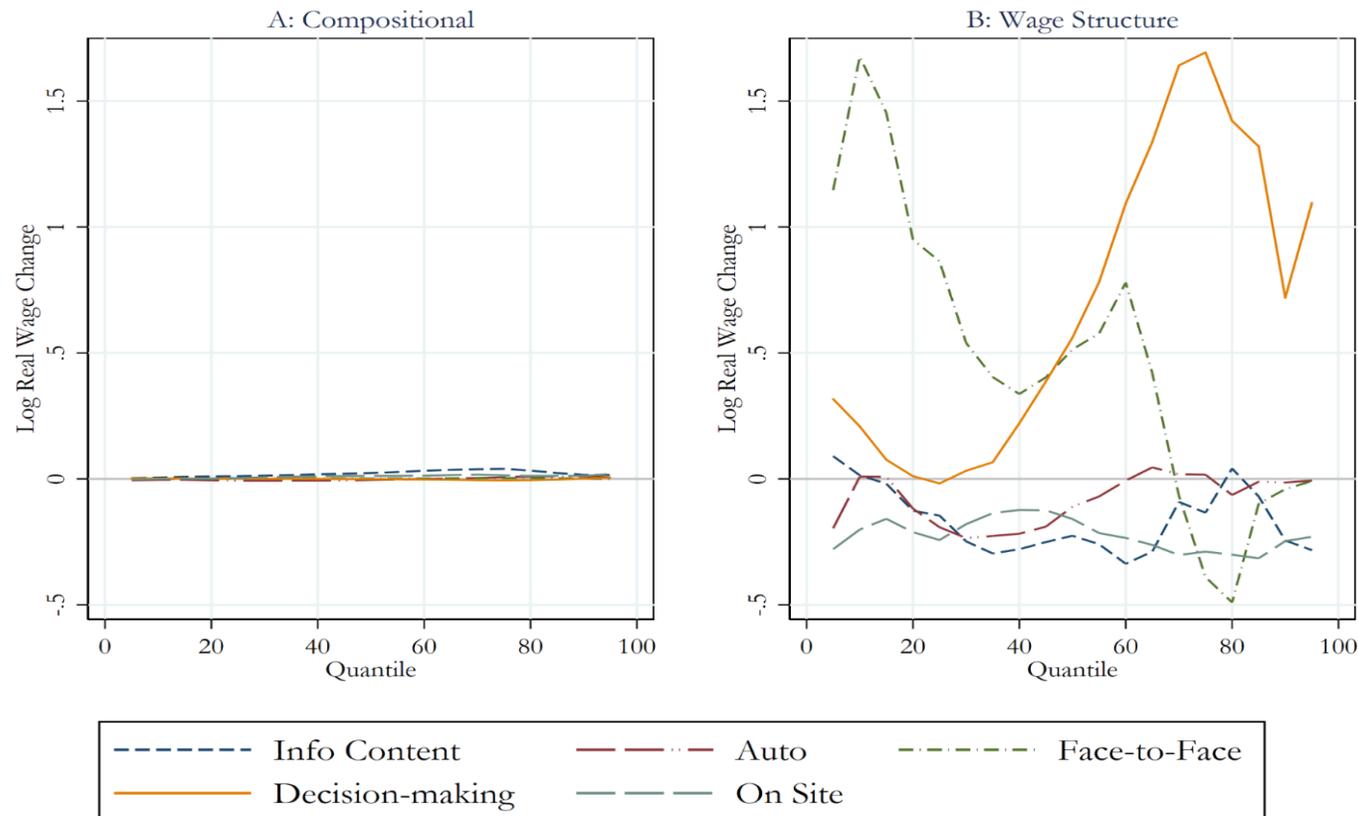| Pathway	Task Content Variable	Example	Description
Increases Substitutability with Technology	Information Content	Typist, programmer, book keeper	How much ICT is used in the job. Complemented or substituted by tech.
	Automation/Routinisation	Assembler, machine operator	Repetitive work easily replaced by machines. Prone to offshoring.
Reduce Offshorability	Face-to-Face Content	Teacher, protective services	Interactive and face-to-face content. Less easily offshorable.
	On-Site Content	Labourer, shop salesperson	Requires presence at place of work. Can complement or substitute by tech.
	Decision-making/Analytic	Artist, professional	Creative thought and problem solving. Complemented by tech.

Source: Firpo et al (2011)

Annual Average Growth Rate of Real Employee Wages in South Africa for the Period 2000-2015
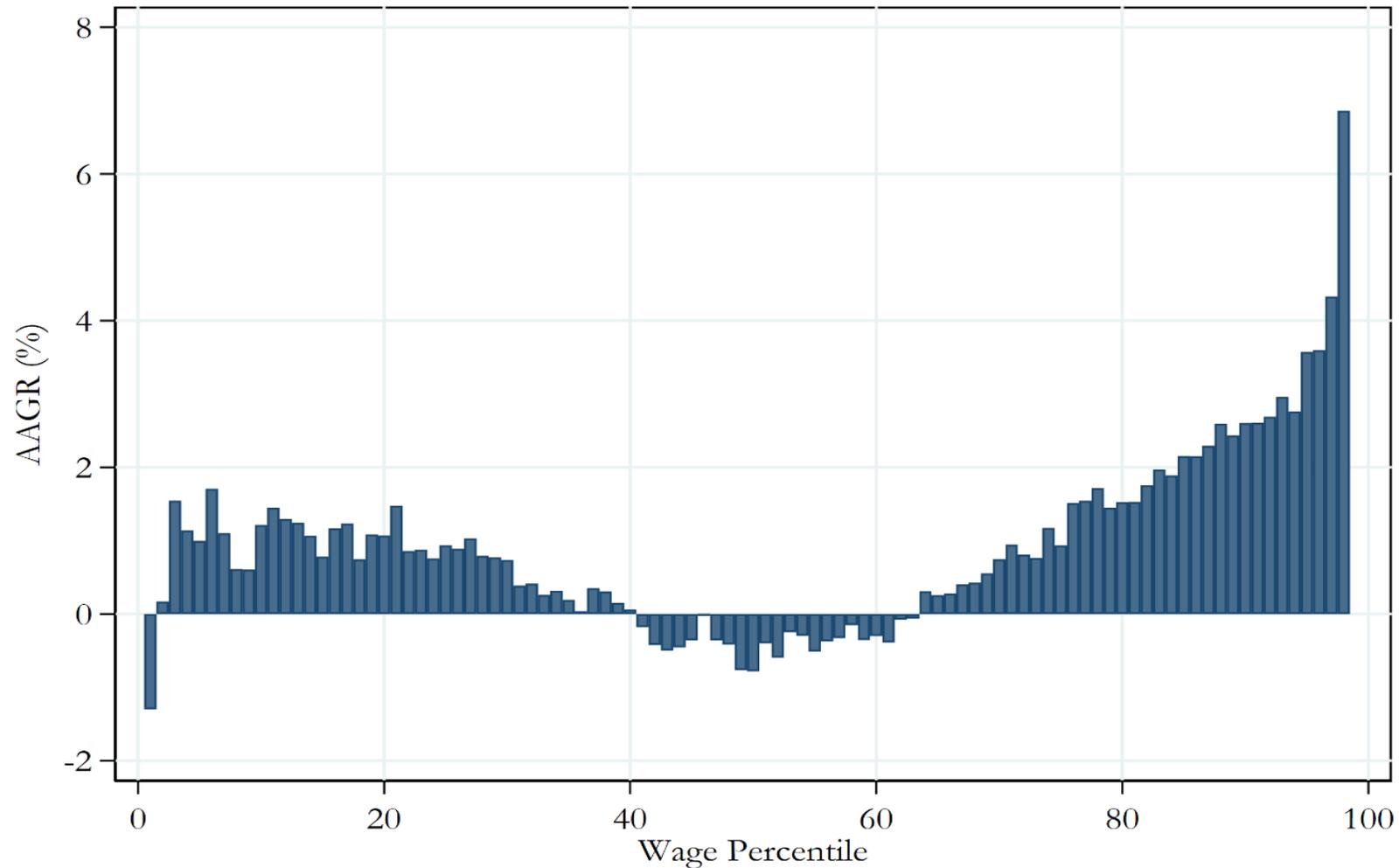
The 4IR & Impact on the SA Labour Market:
Wage Polarisation

Detailed Decomposition of Composition and Wage Structure Effects for Task Content Variables, 2013-5 – 2000-2

Notes: own calculations using PALMS; data weighted using sampling weights; sample consists of all employees of working age with non-missing wage and hours of work data.

Key Results:

- *Bottom-End* increase in returns to face-to-face tasks;
- *Top End* growth in returns to analytic work;
- *Middle Left* comparatively less rewarded and suffering from the worst declines in returns to ICT, on-site and auto work.

Face-to-face and decision-making: hard to offshore.

Low paid service work that expanded over time and which includes a high face-to-face component are personal care, protective services. The latter is minimum wage protected.

- Analytic, decision-making and creative tasks required in high-skilled finance and CSP sectors saw increasing returns at top end of wage distribution.
- Bottom end benefited from value placed on face-to-face interaction in certain jobs (e.g. social and personal care) as well as minimum wage legislation.
- Muted wage growth in middle part of wage distribution due to:
  - Sectors employing 'the middle' collapsing (agriculture, mining, manufacturing)
  - Technology replacing workers due to the routine nature of tasks.
  - Many more similarly educated people competing for the same jobs

- The Fourth IR is here to stay and consequences will be dramatic as they are distinct.
- Shift in debate and analysis from occupations to task-content of occupations and jobs.
- Impact of 4IR not uniform across the wage and occupational distribution.
- Repetitive, easily automatable jobs at most risk of attrition from the 4IR.
- Can policy-makers respond in terms of altering the schooling and higher education curriculum to match fast-expanding needs to the 4IR?