

# Digitalisation: Consequences on the Macro and Firm Level

The 50th Jubilee of the Institute for  
Employment Research

April 5, 2017, Berlin

Prof. Dr. Enzo Weber

IAB and University of  
Regensburg

## Digitalisation...



# Labour & (digital) technology: ambivalent relationship



- Productivity rises, jobs are substituted
- Investments take place
- New products are created
- New services are needed
- Prices react, demand expands
- Income arises
- Tasks change, education develops

# A comprehensive Economy-4.0-scenario

## Equipment investments

- 1 Additional investments
- 2 Conversion of capital stock sensor technology
- 3 Conversion of capital stock IT services

## Building investments

- 4 Capital expenditure “high-speed Internet”
- 5 Distribution on industries
- 6 Balanced Government budget

## Cost and profit structures

- 7 Continuing education
  - 8 Consulting services
  - 9 Digitisation
- 
- 10 Decrease in raw materials, consumables and supplies as well as purchased services
  - 11 Decrease in the cost of logistics
  - 12 Increasing labour productivity

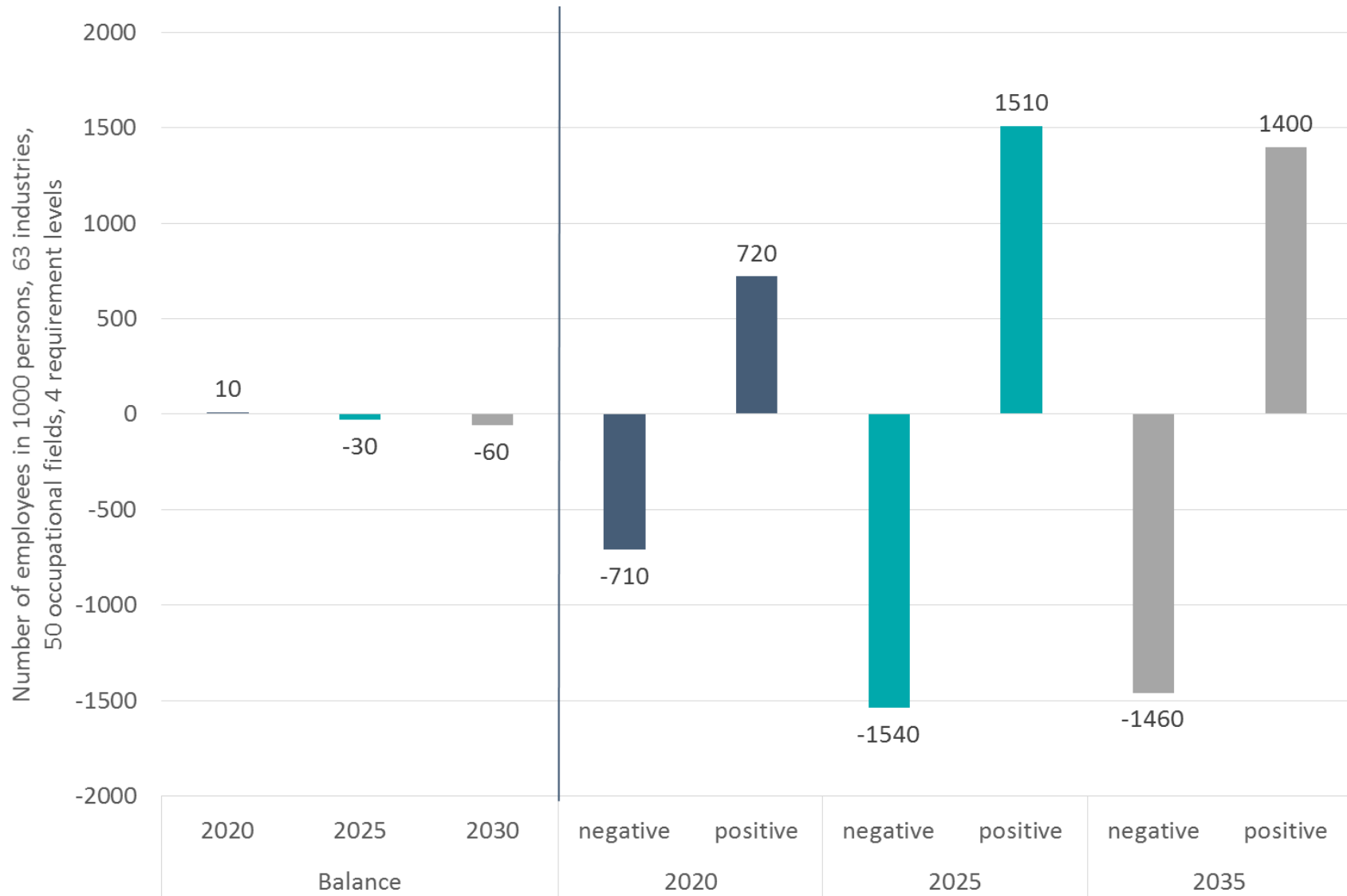
## Change in the structures of occupational fields and requirements

- 13 Adjustment in occupational structure with industrial sectors considering routine
- 14 Adjustment in labour productivity

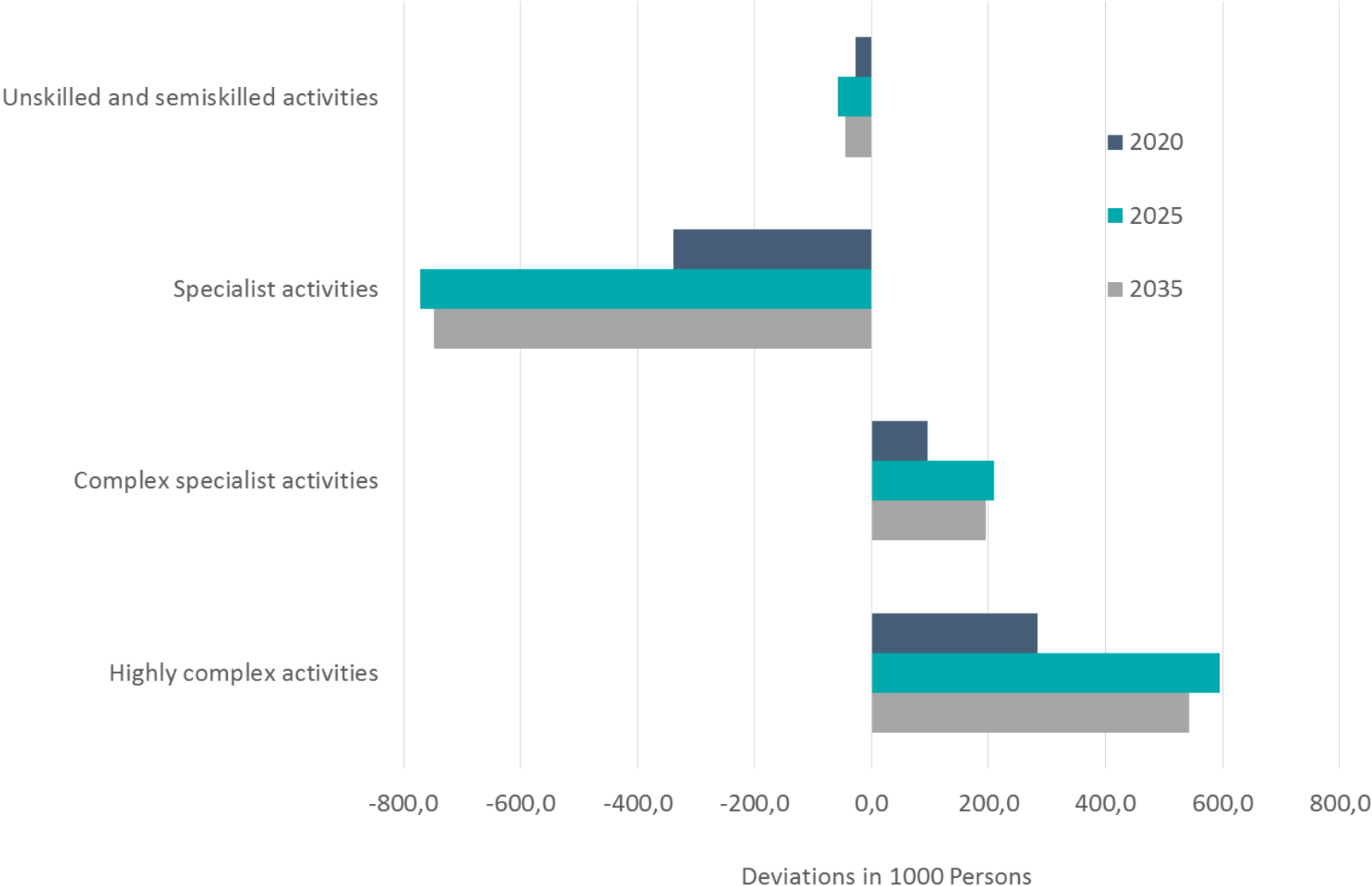
## Increases in demand

- 15 Higher government spending on security
- 16 Additional demand from private households
- 17 Higher willingness to pay
- 18 Increases in export

# Lost and newly created jobs compared to the baseline projection



# Employees by requirement levels compared to the baseline projection



# The firm level



# Digitalisation in the IAB Job Vacancy Survey

## Digital work environment

38. Looking **back five years**, what developments do hold true for your establishment/administration?

	strong trend	weak trend	no change	not relevant
digital interconnection of the internal production or service chain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
digital interconnection with suppliers or customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
use of learning systems (also regarding human - machine - interactions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

39. Looking about **five years into the future**, what developments do you expect for your establishment/administration?

	strong trend	weak trend	no change	not relevant
digital interconnection of the internal production- or service chain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
digital interconnection with suppliers or customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
use of learning systems (also regarding human - machine - interactions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

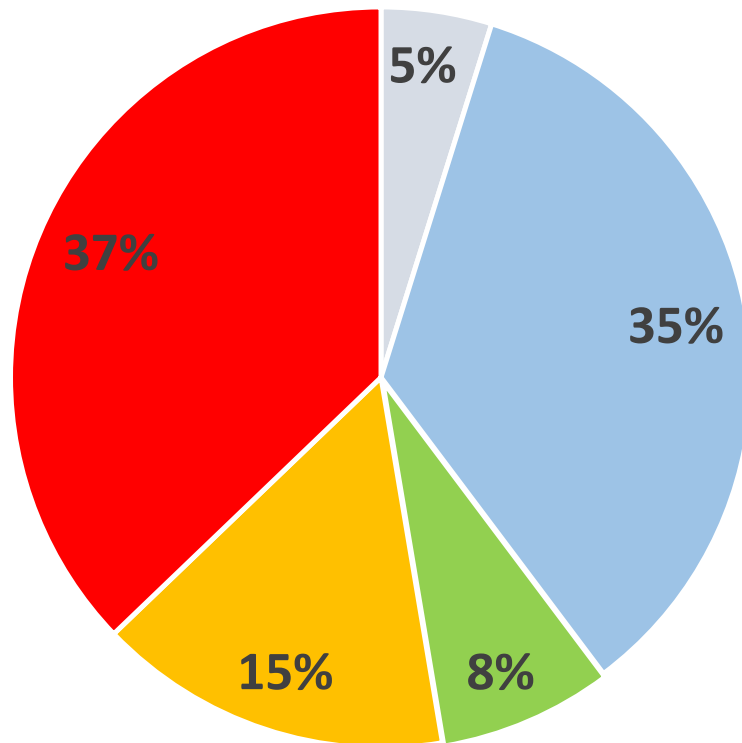
⇒ Categories:

1. Starting digitalisation
2. Weak further digitalisation
3. Strong further digitalisation



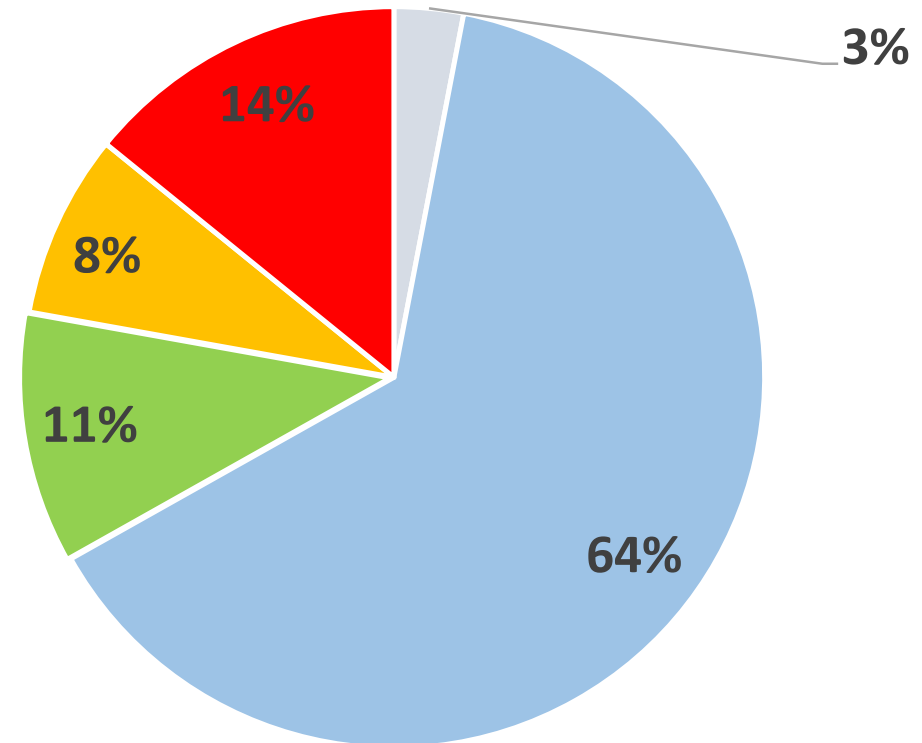
# Digitalisation trends: strong differences among firms

## Internal digitalisation



- digitalisation not relevant anymore
- starting digitalisation
- strong further digitalisation

## Use of learning systems



- no digitalisation
- weak further digitalisation

# No downward employment dynamics

	Hires per 100 employees	Leavings per 100 employees	Share of terminated search processes	Open job vacancies by 100 employees
<b>Digitalisation - internal</b>				
starting digitalisation	-1,45	-0,99	2,82 ***	1,74 ***
weak further digitalisation	0,59	0,87	1,41 *	1,77 ***
strong further digitalisation	-1,13	-1,09	2,32 ***	1,54 ***
<b>Digitalisation - external</b>				
starting digitalisation	1,45	1,75	-0,06	-0,14
weak further digitalisation	1,58	0,97	-0,43	-1,44 ***
strong further digitalisation	3,20 *	1,18	0,53	0,16
<b>Digitalisation - Use of learning systems</b>				
starting digitalisation	2,41	0,93	-0,63	-0,21
weak further digitalisation	-0,93	-0,41	-1,71 **	0,48
strong further digitalisation	4,30 **	3,07 **	-0,86	-0,39
Total average weighted	13,2	11,8	12,2%	2,6

# Digitalisation changes working conditions for new hires

	Deadline pressure	Overtime	Changing working times	Changing working contents
<b>Digitalisation - internal</b>				
starting digitalisation	0,86	1,93	-0,37	5,38 **
weak further digitalisation	0,65	2,75 *	-0,95	3,94 **
strong further digitalisation	2,70	3,40 **	-0,60	3,70 **
<b>Digitalisation - external</b>				
starting digitalisation	4,93 *	1,86	2,96 *	2,60
weak further digitalisation	2,73	-1,84	1,39	3,75 **
strong further digitalisation	6,97 ***	-0,76	4,10 ***	5,69 ***
<b>Digitalisation - Use of learning systems</b>				
starting digitalisation	4,05 **	0,73	1,91	0,95
weak further digitalisation	1,47	-2,19	-1,10	-2,55 *
strong further digitalisation	2,00	-0,10	0,80	-0,70
Total share of new hires requiring this skill in all new hires, weighted	55%	21%	19%	22%

# Special skill requirements for new hires

	Long-term experience	Further training	Intercultural competence	Social competence, communication- and teamwork- competence	Leadership qualities
<b>Digitalisation - internal</b>					
starting digitalisation	3,69	-0,85	-3,27 ***	1,44	-2,46
weak further digitalisation	2,13	4,04 **	-0,33	3,20 *	-0,30
strong further digitalisation	1,26	3,61 **	0,54	3,31 *	-2,01
<b>Digitalisation - external</b>					
starting digitalisation	2,37	2,01	3,16 **	7,27 ***	2,11
weak further digitalisation	-0,13	-0,95	1,11	0,01	-1,01
strong further digitalisation	3,37 *	0,91	0,62	2,72	1,69
<b>Digitalisation - Use of learning systems</b>					
starting digitalisation	0,42	1,33	1,15	1,88	1,24
weak further digitalisation	0,69	2,42 *	0,40	2,68 *	2,91 **
strong further digitalisation	0,38	2,97 **	1,41 *	4,14 ***	1,66 *
Total share of new hires with this working condition in all new hires, weighted	27%	20%	9%	33%	8%

# Policy conclusions

- Work will not disappear
- But requirements and conditions will change
- Existing strengths can be challenged
- Develop education, design further training policy
- New coordination of flexibility

# *Thank you*

Wolter, M.I.; Mönnig, A.; Hummel, M.; Weber, E.; Zika, G.; Helmrich, R.; Maier, T.; Neuber-Pohl, C. (2016): Economy 4.0 and its labour market and economic impacts. Scenario calculations in line with the BIBB-IAB qualification and occupational field projections. [IAB-Research Report 13/2016](#).

Weber, E. (2016): Industrie 4.0: Wirkungen auf den Arbeitsmarkt und politische Herausforderungen. [Zeitschrift für Wirtschaftspolitik](#), 65, 66-74

Warning, A., Weber, E. (2017): Wirtschaft 4.0: Digitalisierung verändert die betriebliche Personalpolitik. IAB-Kurzbericht, im Erscheinen.