 Zentrum für Europäische  
Wirtschaftsforschung GmbH [www.zew.de](http://www.zew.de) - [www.zew.eu](http://www.zew.eu)

## **Digitalisation and the Future of Work:**

### **Macroeconomic consequences for tomorrow's employment, unemployment and wages**

JProf. Dr. Melanie Arntz      Dr. Terry Gregory      Dr. Ulrich Zierahn  
Centre for European Economic Research (ZEW) Mannheim

Vienna, October 21 2016

 Zentrum für Europäische  
Wirtschaftsforschung GmbH [www.zew.de](http://www.zew.de) - [www.zew.eu](http://www.zew.eu)

## Agenda

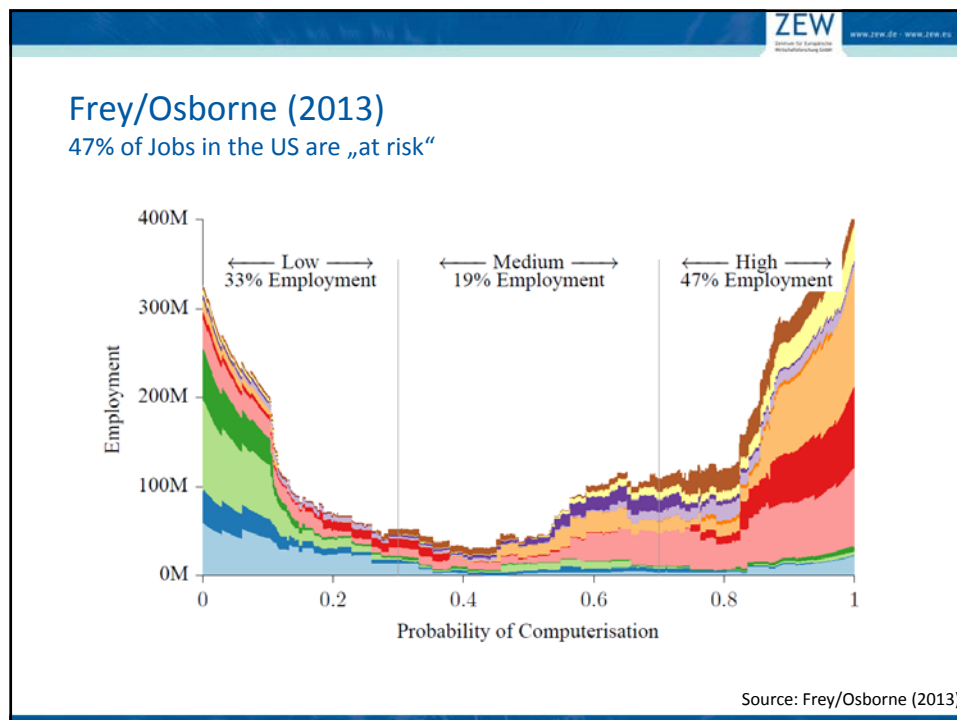
- 1. The (New) Fear of Automation**
2. Automation Potentials
3. Consequences for the Labor Market?

ZEW  
Zentrum für Europäische  
Wirtschaftsforschung  
www.zew.de - www.zew.eu

## The Internet of Things

When machines communicate

Source: „Die Zeit“, Nr. 5/23.01.2014



## Jobless Future?



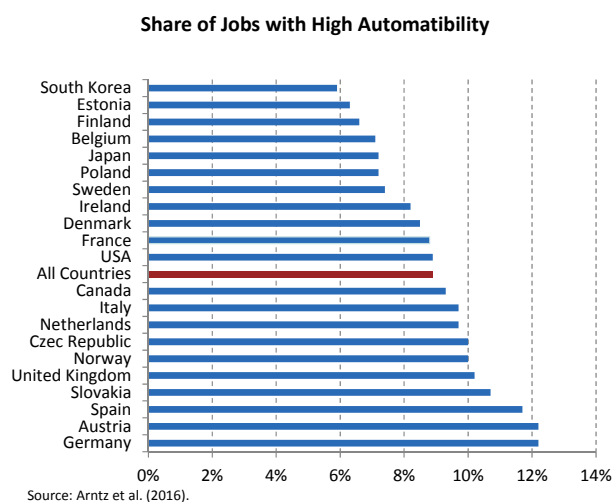
## Agenda

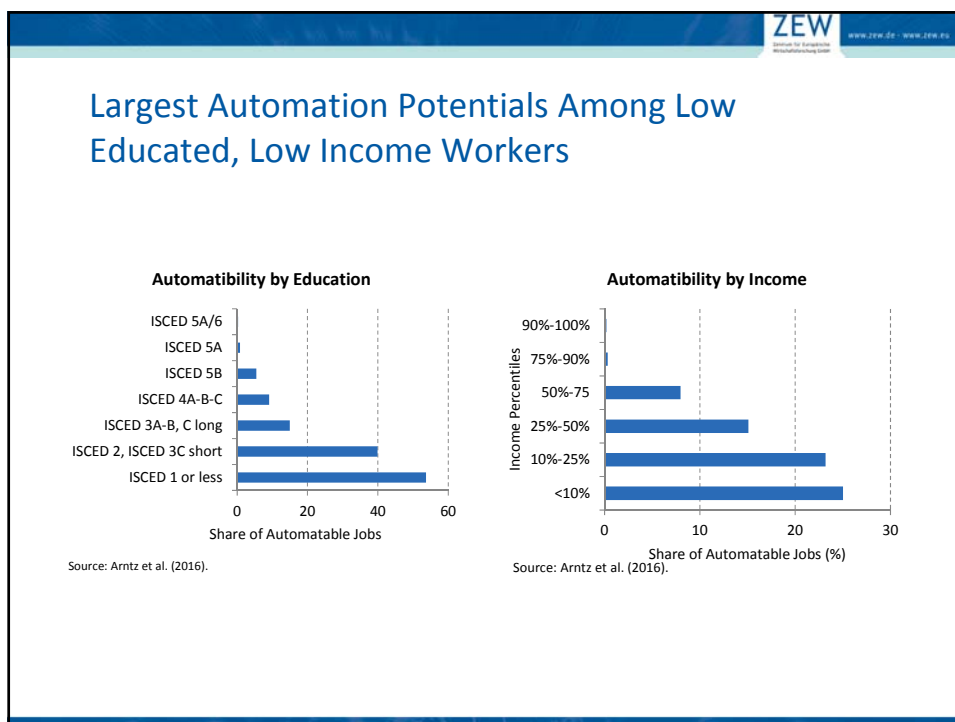
1. The (new) Fear of Automation
2. Automation Potentials
3. Consequences for the Labor Market?

## Tasks Matter

- Overestimation of Automation Potentials by Frey/Osborne
  - New technologies replace workers in specific tasks and only seldom in whole occupations
  - Employees in jobs that Frey/Osborne classify as “high risk” often perform hard-to-automate tasks
- OECD-Study by Arntz, Gregory and Zierahn
  - Focus on tasks at the individual job
  - Automation potentials are significantly lower when taking into account actual job-level tasks

## Automation Potentials in OECD Countries





**ZEW**  
Zentrum für Europäische  
Wirtschaftsforschung GmbH  
www.zew.de · www.zew.eu

## Agenda

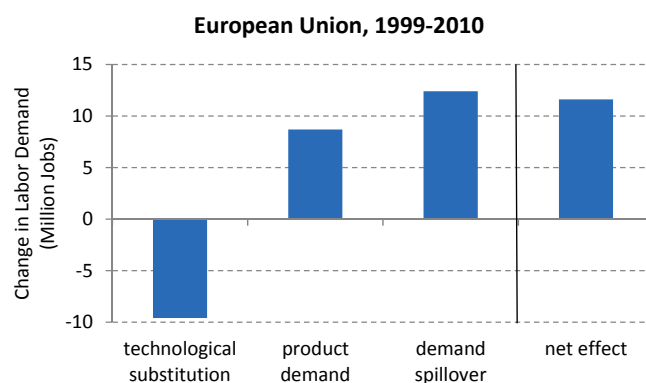
1. The (new) Fear of Automation
2. Automation Potentials
3. Consequences for the Labor Market?

## How Threatened are These Jobs?

Automation potentials must not be mixed up with potential employment effects

1. Slow diffusion of new technologies
  - due to economic, societal and regulatory hurdles
2. Flexibility of workers
  - Changing jobs rather than disappearing jobs
3. Creation of new jobs
  - New technologies also create new jobs

## Positive Net Effect in Recent Past



Source: Gregory et al. (2016).

## Conclusions

„Not a jobless future, but changing world of work.“

„Not a revolution, but an evolution.“

What should be done?

- Ensure, that workers attain the skill requirements of tomorrow's world of work
- ... in particular for low educated, low income workers who will likely bear the brunt of adjustment costs

## Contact

Dr. Ulrich Zierahn  
Senior Researcher

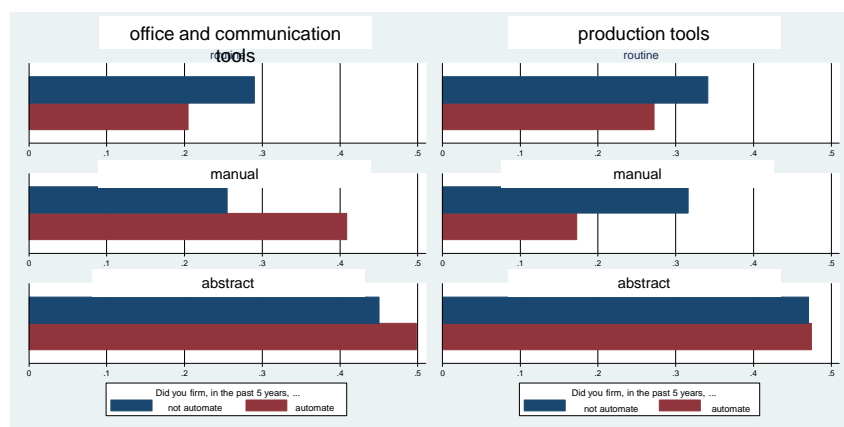
Labour Markets, Human Resources and Social Policy  
Centre for European Economic Research (ZEW)  
L7, 1  
68161 Mannheim  
Tel.: +49 621 1235-306  
Fax: +49 621 1235-225  
E-Mail: [zierahn@zew.de](mailto:zierahn@zew.de)

## Appendix

### How does the world of work change?

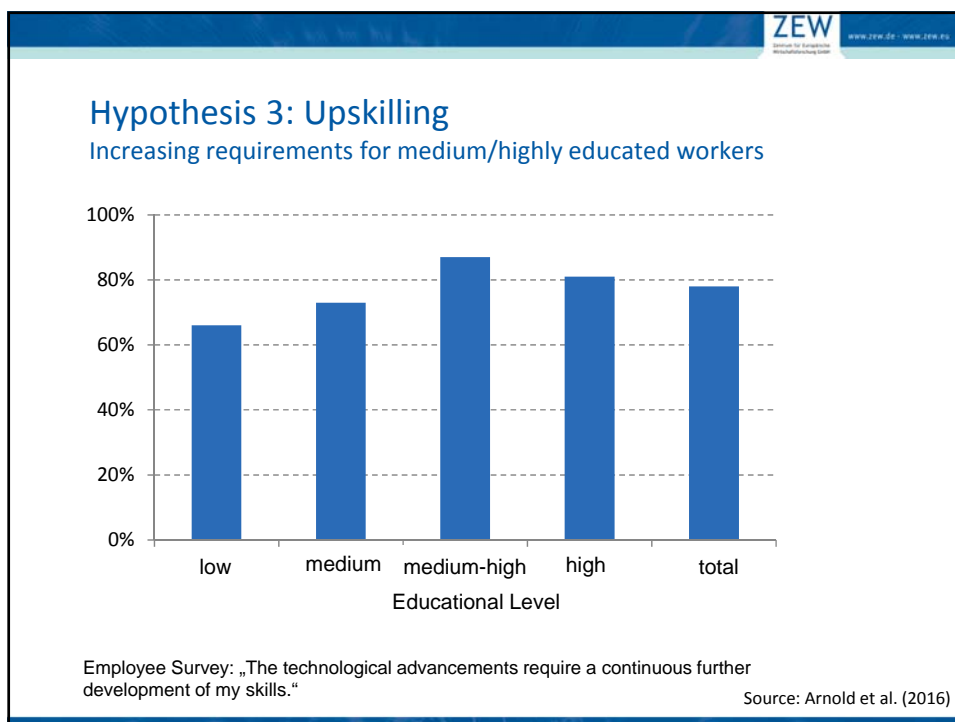
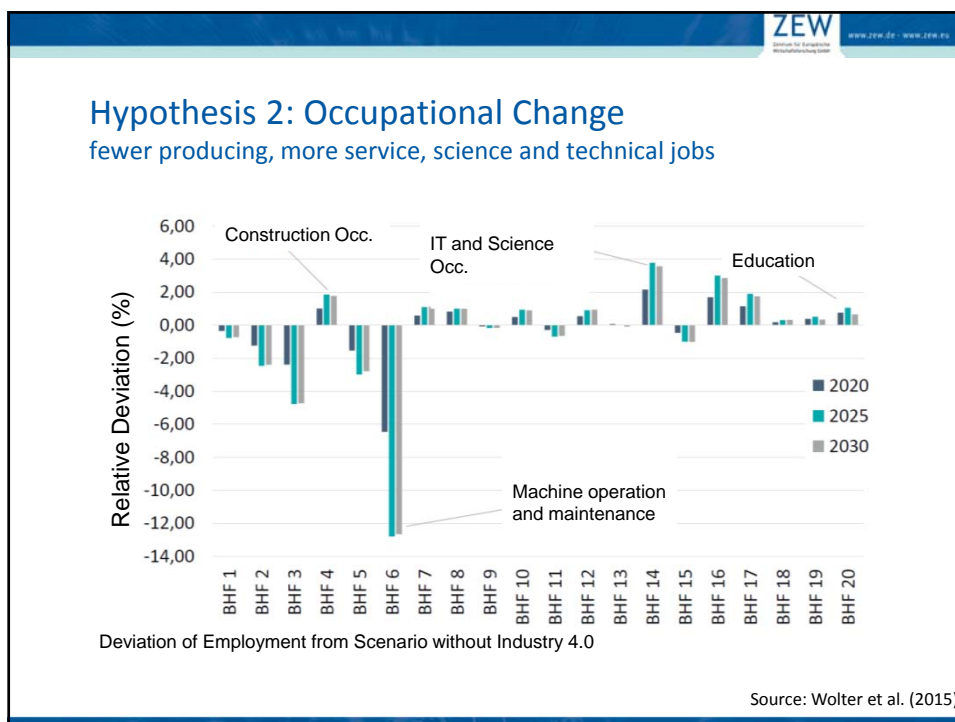
## Hypothesis 1: Task Change

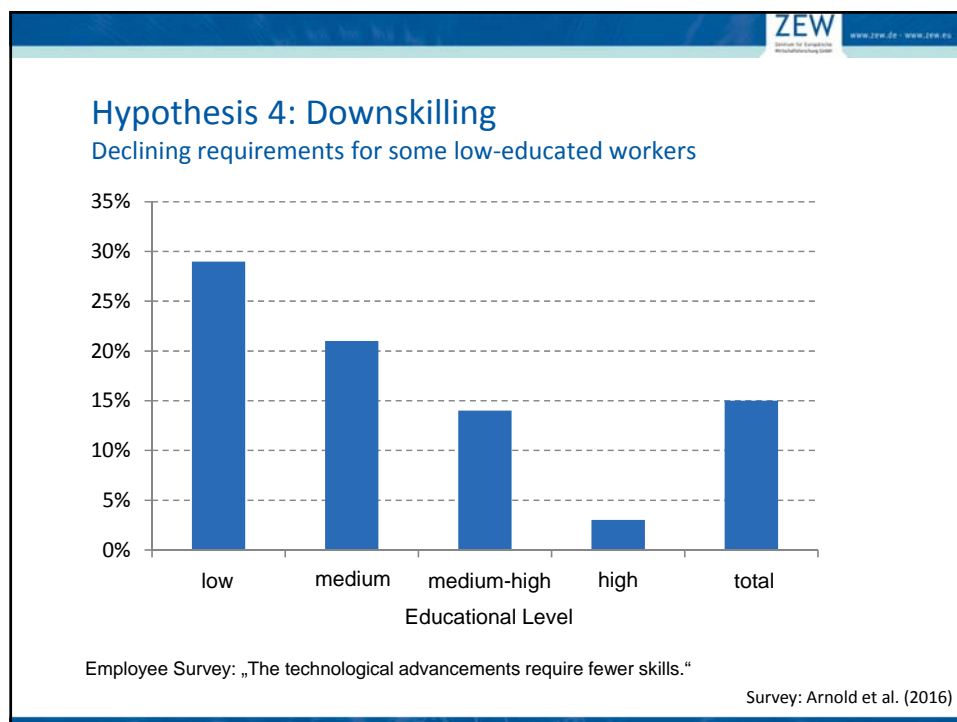
less routine, more abstract tasks



Source: results based on the IAB-ZEW Arbeitswelt 4.0 Establishment Survey







## References

- Arnold, D., Butschek, S., Steffes, S., & Müller, D. (2016). Monitor: Digitalisierung am Arbeitsplatz. Aktuelle Ergebnisse einer Betriebs- und Beschäftigtenbefragung. Bundesministerium für Arbeit und Soziales, Best.-Nr. A875.
- Arntz, M., Gregory, T., & Zierahn, U. (2016). The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. OECD Social, Employment and Migration Working Papers, No. 189.
- Frey, C. B., & Osborne, M. A. (2013). The Future of Employment: How Susceptible are Jobs to Computerization? Oxford University.
- Gregory, T., Salomons, A., & Zierahn, U. (2016). Racing With or Against the Machine? Evidence from Europe. Centre for European Economic Research, Discussion Paper No. 16-053.
- Wolter, M. I., Mönnig, A., Hummel, M., Schneemann, C., Weber, E., Zika, G., ... Neuber-Pohl, C. (2015). Industrie 4.0 und die Folgen für Arbeitsmarkt und Wirtschaft. IAB Forschungsbericht 8/2015.