Not so Disruptive after All:
How Workplace Digitalization Affects Political Preferences

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CHANGING WORKPLACES

Figure 1: Rapid digitalization at the workplace
% of U.S. adults who say they are enthusiastic or worried about ...

- Future where robots and computers can do many human jobs
  - Worried: 72%
  - Enthusiastic: 33%
- Development of algorithms that can evaluate and hire job candidates
  - Worried: 67
  - Enthusiastic: 22
- Development of driverless vehicles
  - Worried: 54
  - Enthusiastic: 40
- Development of robot caregivers for older adults
  - Worried: 47
  - Enthusiastic: 44

Note: Respondents who did not give an answer are not shown.
“Automation in Everyday Life”

Figure 2: Concerns about automation
% of U.S. workers in each group who say that technology has generally ...

- Made their work more interesting:
  - College grad+: 64%
  - Some college: 54%
  - HS grad or less: 38%

- Increased their opportunities for advancement:
  - College grad+: 53%
  - Some college: 51%
  - HS grad or less: 32%

Note: Based on U.S. adults who are currently employed on a full- or part-time basis.
“Automation in Everyday Life”

PEW RESEARCH CENTER

Figure 3: Technological change also has positive impacts
Digitalization: Economic implications

Extensive attention in economics:

- Technological change produces job polarization and hollowing out of the middle class (Autor, Levy and Murnane, 2003; Autor, Katz and Kerney, 2006; Acemoglu and Autor, 2011; Goos, Maning and Salomons, 2014)

- Robots, employment and wages (Graetz and Michaels 2015; Acemoglu and Restrepo 2017; Dauth et al 2017)
Digitalization: Political implications

Opinion

Robots Can’t Vote, but They Helped Elect Trump

By Thomas B. Edsall

Jan. 11, 2018

Robotic welders working at the Nissan manufacturing plant in Canton, Miss.
Daniel Acker/Bloomberg

Figure 4: In The New York Times
Very scarce empirical research on political implications:

- More demand for redistribution (Rueda and Thewissen 2018) and vote for the left
- Vote against the incumbent: Blind retrospection (Frey, Berger and Chen 2017)
Very scarce empirical research on political implications:

- More demand for redistribution (Rueda and Thewissen 2018) and vote for the left
- Vote against the incumbent: Blind retrospection (Frey, Berger and Chen 2017)

Limitations:

- Digitalization only measured indirectly
- Identification strategy
- Focus on losers
RESEARCH QUESTION

We ask:

- What are the political implications of digitalization in the workplace for affected workers?
- Are the effects of digitalization heterogeneous depending on individual winner/loser status?
THREE POSSIBILITIES

Key moderator: Education

- **Voter turnout:**
  - Highly educated: More likely to vote
  - Less educated: Withdrawal

- **Support for left- or right-wing parties:**
  - Highly educated: More support for parties that oppose redistribution
  - Less educated: More support for parties that support redistribution

- **Support for the incumbent:**
  - Highly educated: More support for the incumbent
  - Less educated: Less support for the incumbent
SURVEY DATA

Individual level data from the British Household Panel Study and the Understanding Society surveys:

- more than 500,000 respondents
- 1991 to 2015
- Detailed information about industry and occupation
POLITICAL OUTCOMES

- **Voter turnout**: Did they vote in the last general election
- **Support for the Conservative Party**: Closeness or intention to vote
- **Support for the Labour Party**: Closeness or intention to vote
- **Support for the incumbent**: Closeness or intention to vote
DATA USED

- 1997-2015
- 18-64 years old
- Report industry (mostly in employment)
- Report income
- Non-missing data on key variables
- Over 200,000
INDUSTRY-BASED APPROACH

EU-KLEMS database

- Input-output tables
- 40 industries
- Capital inputs and stocks for ICT and non-ICT assets
ICT INTENSITY TO EMPLOYEES

ICT capital stock normalized by employees in an industry

\[ D_{j,t} = \frac{(\text{ICT capital stock in thousand GBP}_{j,t})}{(\text{Employees}_{j,t})} \]

Specifically captures ICT intensity relative to labor
Figure 5: ICT capital stock normalized by employees
Fixed effects models

\[ Y_{ijt} = \sum_{s^* = 1}^{6} I[S_{it} = s^*] \delta_{s^*} + \sum_{s^* = 1}^{6} I[S_{it} = s^*] \theta_{s^*} \times D_{jt} + \gamma' C_{it} + \eta_{ij} + \mu_t + \epsilon_{ijt} \]  

\( Y_{ijt} \) Political behavior of individual \( i \) in industry \( j \) at time \( t \)

\( D_{jt} \): Digitalization at the industry level, time-varying

\( S_{ijt} \): Education in six categories

\( C_{ijt} \): Age and age squared

\( \eta_{ij} \): Individual x industry fixed effects

\( \mu_t \): Year fixed effects
ECONOMIC OUTCOMES

Figure 6: Marginal effects of digitalization on economic outcomes by education
POLITICAL OUTCOMES

Figure 7: Marginal effects of digitalization on political outcomes by education.
**EDUCATION VS RTI**

**Figure 8:** Results by education and high vs low RTI
**BY PERIOD: BEFORE AND AFTER GOVERNMENT CHANGE IN MAY 2010**

<table>
<thead>
<tr>
<th></th>
<th>Vote for Labour</th>
<th></th>
<th>Vote for Conservatives</th>
<th></th>
<th>Incumebent</th>
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<tr>
<td></td>
<td>(1) Pre May 2010</td>
<td>(2) Post May 2010</td>
<td>(3) Overall</td>
<td>(4) Pre May 2010</td>
<td>(5) Post May 2010</td>
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<td>Degree × ICT</td>
<td>0.315</td>
<td>-0.700*</td>
<td>-0.292</td>
<td>0.198</td>
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<td>(0.237)</td>
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<td>(0.204)</td>
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<td>0.0101</td>
<td>-0.0930</td>
<td>-0.341</td>
<td>0.331</td>
<td>1.185**</td>
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<td></td>
<td>(0.317)</td>
<td>(0.421)</td>
<td>(0.215)</td>
<td>(0.324)</td>
<td>(0.448)</td>
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<td>A-Level etc × ICT</td>
<td>0.000339</td>
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<td>1.040**</td>
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<td>(0.230)</td>
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<td>(0.186)</td>
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<td>GCSE etc × ICT</td>
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<td>(0.178)</td>
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<td>Other Qualification × ICT</td>
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<td>(0.413)</td>
<td>(0.819)</td>
<td>(0.382)</td>
<td>(0.304)</td>
<td>(0.664)</td>
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<td>Age</td>
<td>0.247</td>
<td>0.449</td>
<td>0.592</td>
<td>0.0121</td>
<td>0.138</td>
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<td></td>
<td>(0.408)</td>
<td>(0.552)</td>
<td>(0.327)</td>
<td>(0.336)</td>
<td>(0.485)</td>
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<td>Age × Age</td>
<td>0.00507</td>
<td>-0.0128***</td>
<td>-0.00518***</td>
<td>-0.00230</td>
<td>-0.00193</td>
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<td>(0.00263)</td>
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<td>(14.15)</td>
<td>(20.88)</td>
<td>(10.59)</td>
<td>(11.73)</td>
<td>(17.70)</td>
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Individual*Industry FE: X X X X X
Education Group FE: X X X X X
Year FE: X X X X X
Region FE: X X X X X
Observations: 105130 126190 231320 105130 126190 231320 231320
Instrumental Variable

Digitalization in the US

Digitalization in the UK → Political outcomes
### IV Results: Economic Outcomes

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<th>Hourly net wage</th>
<th>Probability to become unemployed</th>
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<td>Degree × ICT</td>
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<td>0.595*** (0.100)</td>
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<td>Other higher degree × ICT</td>
<td>0.226*** (0.0451)</td>
<td>0.582** (0.212)</td>
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<td>A-Level etc × ICT</td>
<td>0.0907*** (0.0284)</td>
<td>0.252* (0.111)</td>
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<td>Other Qualification × ICT</td>
<td>-0.106** (0.0340)</td>
<td>-0.0256 (0.189)</td>
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<td>No Qualification × ICT</td>
<td>-0.163*** (0.0397)</td>
<td>-0.140 (0.124)</td>
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<tr>
<td>Age</td>
<td>0.236*** (0.0383)</td>
<td>0.231*** (0.0392)</td>
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<tr>
<td>Age × Age</td>
<td>-0.00317**** (0.000233)</td>
<td>-0.00315**** (0.000244)</td>
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<td>Constant</td>
<td>0.402 (1.109)</td>
<td>11.01* (4.392)</td>
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<td>Region FE</td>
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<td>First stage F-stat</td>
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## IV Results: Political Outcomes

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<th>Labour</th>
<th>Incumbent</th>
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<td>(1) Main</td>
<td>(2) IV</td>
<td>(3) Main</td>
<td>(4) IV</td>
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<tr>
<td>Degree × ICT</td>
<td>0.641***</td>
<td>1.550***</td>
<td>0.631**</td>
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<td>Other higher degree × ICT</td>
<td>0.464</td>
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<td>A-Level etc × ICT</td>
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<td>Age × Age</td>
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<td>75.74</td>
<td>75.74</td>
<td>76.17</td>
</tr>
</tbody>
</table>

Figure 9: Marginal effect of digitalization in the UK, instrumented by digitalization in the US, on political outcomes.
OTHER ROBUSTNESS

The results are robust to:

▶ Using non-ICT capital as a placebo: Important because it rules out a general good economic times effect
▶ Using lead models
▶ Using simple fixed effects models
▶ Excluding the more rapidly digitalizing industries
▶ Adding region x year fixed effects
▶ Including controls for trade in a sector
Main findings

- We find evidence of heterogeneous political trajectories between more and less educated citizens affected by digitalization
  - Digitalization increases inequality in voter turnout
  - We find some effects on support for parties, which vary by skill level:
    - For individuals with high and middle levels of skills, digitalization is associated with more support for the incumbent party
    - For individuals with low levels of skills digitalization is not associated with support for the incumbent
INTERPRETATION

Two ways to interpret the overall picture:

- Digitalization makes most citizens better off and can be a stabilizing force
- Digitalization is economically and possibly politically polarizing

In any case, the story is more complex than the simple “revolt of the left-behind” narrative