**Motivation**

- Existing literature on the aggregate decline of manual-routine occupations due to substitution by automation capital (e.g., Autor and Dorn, 2003; Goos et al., 2014).
- But: Evidence on how individuals working in these occupations fare after (technology-induced) displacement and on the sources of adjustment costs is lacking.
- Occupation- and task-specific human capital (e.g., Gibbons and Waldman, 2004; Gathmann and Schönböck, 2010) and changes in the occupational structure may be a major reason why manual-routine workers might face particular difficulties to adjust to labor market shocks.

**Empirical Strategy**

**Exploit exogenous job losses due to plant closures**

- Plant closures as job separations arguably exogenous to worker characteristics and productivity (e.g., Jacobson et al., 1993; Schmieder et al., 2022).

**Matching on pre-displacement characteristics and wages**

- Match displaced workers to non-displaced workers on pre-displacement outcomes and a large number of worker characteristics ("statistical twins").
- Accounts for remaining concerns of treatment selection at the establishment level.

**Summary Statistics of Unmatched and Matched Samples**

<table>
<thead>
<tr>
<th></th>
<th>Unmatched</th>
<th>Matched</th>
<th>Matched</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Male</td>
<td>59.58</td>
<td>43.31</td>
<td>43.31</td>
<td>-3.67</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>11.20</td>
<td>11.20</td>
<td>11.20</td>
<td>0.00</td>
</tr>
<tr>
<td>% College degree</td>
<td>18.10</td>
<td>18.10</td>
<td>18.10</td>
<td>0.00</td>
</tr>
<tr>
<td>Age</td>
<td>41.35</td>
<td>39.56</td>
<td>39.56</td>
<td>-1.79</td>
</tr>
<tr>
<td>Real daily wage</td>
<td>15.50</td>
<td>13.20</td>
<td>13.20</td>
<td>-2.30</td>
</tr>
<tr>
<td>Days worked per year</td>
<td>280.00</td>
<td>280.00</td>
<td>280.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Data and Variables**

**Employee Panel: Sample of Integrated Labor Market Biographies (SIAB)**

- Administrative German labor market data.
- 2% random sample from the universe of employees in Germany subject to social security contributions from 1975—2019.
- Complete labor market biographies of workers exact to the day:
  - Employment, wage, establishment, and occupational histories.
  - Information about worker demographics (e.g., age, gender, and education), and establishment characteristics (e.g., industry, size, and location).
  - Wages: During unemployment, individuals are assigned their social security benefits as wage income.
  - Task distance: Change in the share of the main pre-displacement task in the post-displacement occupation conditional on switching; main pre-displacement task is the task that was performed most often in the last job before displacement.

**Establishment Panel: Betriebs-Historik-Panel (BHP)**

- Administrative German firm level panel, universe of establishments in Germany from 1975—2019.
- Plant closure: Establishment ceases to exist from one year to another, no more than 30% of the plant’s original employees re-employed in the same plant in the subsequent year (e.g., Hetherly-Maier and Schmieder, 2013).

**Occupational Task Composition: BERUFENET**

- German dictionary of occupational titles (BERUFENET), similar to US-O*NET.
- 144 occupations at the 3-digit level.
- Share of (1) manual-routine tasks, (2) manual non-routine tasks, (3) cognitive routine tasks, (4) analytical non-routine tasks, (5) interactive non-routine tasks.
- Manual-routine workers: Above-medium share of manual-routine tasks; all other workers are classified as non-manual-routine (e.g., Dengler and Matthes, 2015).

**Research Question**

Do workers initially employed in manual-routine occupations face more difficult transitions after job displacement than other displaced workers and, if so, why?

**Further Results and Robustness**

**Further Results**

- Larger displacement-induced wages losses for manual-routine workers result from both extensive margin (52% higher propensity of being unemployed).
- Intensive margin (41% larger wage losses conditional on being employed).
- Compared to non-manual-routine workers, manual-routine workers are:
  - 33% more likely to switch (4-digit) occupations directly after displacement (conditional on re-employment).
  - 11% less likely to change district of workplace directly after displacement (conditional on re-employment).

**Entropy Balancing**

- Manual-routine and non-manual-routine workers differ along various dimensions (e.g., education, age, gender, industry).
- Reweight manual-routine workers to obtain covariate balance between manual-routine and non-manual-routine workers (e.g., Hainmueller, 2012; Illing et al., 2021).

**Conclusions**

More difficult transitions after labor market shocks for workers who are initially employed in manual-routine occupations:

- Larger wages losses for manual-routine workers, which stem from both a higher propensity of being unemployed and larger wage losses conditional on finding re-employment.
- Switch to more distant occupations than non-manual-routine workers.
- Patterns are consistent with declining re-employment opportunities in (skill-related) manual-routine occupations.