Technology, Trade and Structural Change: Lessons from Germany

JENS SUEDEKUM
DÜSSELDORF INSTITUTE FOR COMPETITION ECONOMICS (DICE) & CEPR

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I. TRADE AND JOBS IN THE USA
II. GERMANY
III. POLICY IMPLICATIONS
Decline of manufacturing jobs in the USA

Decreasing manufacturing employment since 1960, but constant share in real output

→ Main driver of job losses: **Technological progress**

Since 1990: The „**Rise of China**“

- Market openings
- Productivity growth
- Exchange rate policy
- Improved market access, e.g. WTO accession (2001)

→ Game changer for American manufacturing?
The „China-Schock“ and the US labor market: Autor, Dorn & Hanson

- Rising Chinese imports, especially since 2001
- 5m fewer manufacturing jobs in 2014 than in 2000
- 1m due to rising Chinese import penetration (Acemoglu, Autor, Dorn, Hanson, 2016; Krugman 2016)
- Job losses concentrated in local labor markets with specialization in import-competing industries → mainly the „Rust Belt“
Trade deficit and manufacturing jobs

US current account (in % of GDP)

CA deficit 2015: **462 billion $**
Aggregate trade deficit: 750 billion,
trade deficit with China: 350 billion
Trade deficit and manufacturing jobs: A simple model

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Current account deficit:

• More consumption than production (point B)
Trade deficit and manufacturing jobs: A simple model

Current account deficit:

• More consumption than production (point B)
• Domestic production of non-tradeables (point C)
Trade deficit and manufacturing jobs: A simple model

**Current account deficit:**
- More consumption than production (point B)
- Domestic production of non-tradeables (point C)

„China-shock“ (Move A → C)
- Not necessarily fewer jobs overall
- But fewer manufacturing jobs („tradeables“)
- Moreover: US imports more labor-intensive than exports
I. TRADE AND JOBS IN THE USA
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„The Rise of the East and the Far East“ : Dauth, Findeisen & Südekum

- Strong increase of German imports from China, but also exports to China
- Even stronger increases with respect to Eastern Europe after the fall of the iron curtain
- Aggregate trade surplus, also slight surplus with respect to „the East“
German trade with the East

<table>
<thead>
<tr>
<th>TOP-10 EXPORT INDUSTRIES</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>341 motor vehicles</td>
<td>0.58</td>
<td>4.99</td>
<td>18.49</td>
</tr>
<tr>
<td>343 parts and accessories for motor vehicles</td>
<td>0.37</td>
<td>4.51</td>
<td>13.22</td>
</tr>
<tr>
<td>295 other special purpose machinery</td>
<td>2.29</td>
<td>4.68</td>
<td>10.00</td>
</tr>
<tr>
<td>291 mach. for the prod. and use of mech. power</td>
<td>0.54</td>
<td>2.61</td>
<td>8.96</td>
</tr>
<tr>
<td>241 basic chemicals</td>
<td>1.10</td>
<td>2.76</td>
<td>7.19</td>
</tr>
<tr>
<td>312 electricity distribution and control apparatus</td>
<td>0.22</td>
<td>2.54</td>
<td>6.80</td>
</tr>
<tr>
<td>292 other general purpose machinery</td>
<td>0.82</td>
<td>2.38</td>
<td>6.25</td>
</tr>
<tr>
<td>252 plastic products</td>
<td>0.21</td>
<td>2.85</td>
<td>5.70</td>
</tr>
<tr>
<td>294 machine-tools</td>
<td>1.36</td>
<td>2.09</td>
<td>5.61</td>
</tr>
<tr>
<td>244 pharmaceuticals</td>
<td>0.33</td>
<td>1.41</td>
<td>5.16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOP-10 IMPORT INDUSTRIES</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 office machinery and computers</td>
<td>0.05</td>
<td>3.71</td>
<td>13.61</td>
</tr>
<tr>
<td>341 motor vehicles</td>
<td>0.21</td>
<td>7.62</td>
<td>8.89</td>
</tr>
<tr>
<td>343 parts and accessories for motor vehicles</td>
<td>0.04</td>
<td>2.80</td>
<td>8.64</td>
</tr>
<tr>
<td>321 electronic valves and other components</td>
<td>0.02</td>
<td>0.82</td>
<td>8.25</td>
</tr>
<tr>
<td>182 other wearing apparel and accessories</td>
<td>2.57</td>
<td>6.52</td>
<td>7.86</td>
</tr>
<tr>
<td>323 television and radio receivers, recording app.</td>
<td>0.53</td>
<td>2.12</td>
<td>7.04</td>
</tr>
<tr>
<td>274 basic precious and non-ferrous metals</td>
<td>1.03</td>
<td>3.40</td>
<td>5.57</td>
</tr>
<tr>
<td>361 furniture</td>
<td>0.53</td>
<td>3.09</td>
<td>5.29</td>
</tr>
<tr>
<td>351 Building and repairing of ships and boats</td>
<td>0.01</td>
<td>0.27</td>
<td>5.14</td>
</tr>
<tr>
<td>316 electrical equipment n.e.c.</td>
<td>0.11</td>
<td>2.75</td>
<td>4.87</td>
</tr>
</tbody>
</table>

German export- and import volumes with China and Eastern Europe (in billion 2010-€)
Globalization and the German labor market: Theory

- Theory predicts different impact of globalization on the German than the American labor market
- More manufacturing jobs due to trade surplus
- Possibly overlaid by technology trend
The German labor market: Empirical evidence (1993-2014)

- Aggregate sectoral trend similar as in the USA: decreasing manufacturing, rising service employment
- Notable shifts inside manufacturing sector
- Strong decrease of jobs in import-manuf (increase net imports from China/Eastern Europe above industry-median)
- Stable employment (~ 5m jobs) in export-manuf

Full and part-time jobs (without mini-jobs), 1993=1
Globalization and the German labor market: Back to theory

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**Adjustment costs**
- Transitions of workers from import- to export-manufacturing or services may involve frictions
- Common feature of US and German labor market
Transitions behind aggregate trends

<table>
<thead>
<tr>
<th>Origin in (t-1)</th>
<th>Service</th>
<th>Exp-manuf</th>
<th>Imp-manuf</th>
<th>Other jobs</th>
<th>Non-empl</th>
<th>Total Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>10,870</td>
<td>135</td>
<td>62</td>
<td>102</td>
<td>1,579</td>
<td>12,747</td>
</tr>
<tr>
<td>orig %</td>
<td>85.3</td>
<td>1.1</td>
<td>0.5</td>
<td>0.8</td>
<td>12.4</td>
<td>[43.6 %]</td>
</tr>
<tr>
<td>dest %</td>
<td>84.8</td>
<td>2.8</td>
<td>3.2</td>
<td>1.5</td>
<td>54.6</td>
<td>[46.4 %]</td>
</tr>
<tr>
<td>Exp-manuf</td>
<td>117</td>
<td>4,341</td>
<td>28</td>
<td>18</td>
<td>383</td>
<td>4,888</td>
</tr>
<tr>
<td>orig %</td>
<td>2.4</td>
<td>88.8</td>
<td>0.6</td>
<td>0.4</td>
<td>7.8</td>
<td>[16.7 %]</td>
</tr>
<tr>
<td>dest %</td>
<td>0.9</td>
<td>89.5</td>
<td>1.5</td>
<td>0.3</td>
<td>13.2</td>
<td>[17.5 %]</td>
</tr>
<tr>
<td>Imp-manuf</td>
<td>62</td>
<td>30</td>
<td>1,670</td>
<td>9</td>
<td>184</td>
<td>1,956</td>
</tr>
<tr>
<td>orig %</td>
<td>3.2</td>
<td>1.5</td>
<td>85.4</td>
<td>0.5</td>
<td>9.4</td>
<td>[6.7 %]</td>
</tr>
<tr>
<td>dest %</td>
<td>0.5</td>
<td>0.6</td>
<td>87.3</td>
<td>0.1</td>
<td>6.4</td>
<td>[6.4 %]</td>
</tr>
<tr>
<td>Other jobs</td>
<td>112</td>
<td>18</td>
<td>8</td>
<td>5,828</td>
<td>748</td>
<td>6,712</td>
</tr>
<tr>
<td>orig %</td>
<td>1.7</td>
<td>0.3</td>
<td>0.1</td>
<td>86.8</td>
<td>11.1</td>
<td>[23.0 %]</td>
</tr>
<tr>
<td>dest %</td>
<td>0.9</td>
<td>0.4</td>
<td>0.4</td>
<td>86.3</td>
<td>25.8</td>
<td>[25.8 %]</td>
</tr>
<tr>
<td>New entry</td>
<td>428</td>
<td>97</td>
<td>41</td>
<td>228</td>
<td></td>
<td>793</td>
</tr>
<tr>
<td>orig %</td>
<td>54.0</td>
<td>12.2</td>
<td>5.1</td>
<td>28.7</td>
<td>[2.7 %]</td>
<td></td>
</tr>
<tr>
<td>dest %</td>
<td>3.3</td>
<td>2.0</td>
<td>2.1</td>
<td>3.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returnees</td>
<td>1,223</td>
<td>230</td>
<td>101</td>
<td>567</td>
<td></td>
<td>2,124</td>
</tr>
<tr>
<td>orig %</td>
<td>57.6</td>
<td>10.8</td>
<td>4.9</td>
<td>26.7</td>
<td>[7.3 %]</td>
<td></td>
</tr>
<tr>
<td>dest %</td>
<td>9.5</td>
<td>4.7</td>
<td>5.5</td>
<td>8.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total dest</td>
<td>12,811</td>
<td>4,850</td>
<td>1,913</td>
<td>1,686</td>
<td>2,895</td>
<td>29,220</td>
</tr>
<tr>
<td>[share total]</td>
<td>[43.9 %]</td>
<td>[16.6 %]</td>
<td>[6.6 %]</td>
<td>[23.1 %]</td>
<td>[9.9 %]</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the transitions between different economic sectors, highlighting the origins and destinations of employment changes. The graph depicts the trend in employment, with lines representing different categories of employment changes.
Micro-anatomy of structural change
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- Direct annual net flow of workers from import- to export-manufacturing or towards services are small.
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- Much larger flows into non-employment
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- Expansion of services and stable export-manufacturing driven by entrants and returnees, not direct switchers
Micro-anatomy of structural change

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- Much larger flows into non-employment.
- Expansion of services and stable export-manufacturing driven by entrants and returnees, not direct switchers.

→ Manufacturing workers do not smoothly adjust, but indeed seem to face substantial frictions.
Causal effect of trade on individual workers

### Research design

- Detailed German employer-employee microdata
- Follow single manufacturing workers over time
- Study impact of rising import-/export-exposure to worker’s initial industry on subsequent career
- Keep track of on-the-job earnings changes, all possible job switches
  - different firm, same industry
  - different manufacturing industry
  - jobs outside manufacturing
  - unemployment spells
- Cumulate earnings over ten years
Earnings profiles in import- and export-manufacturing

**Strongly import-exposed worker** (e.g., “radio & TV sets”)

- Higher risk of involuntary unemployment
- Not pulled into a new job in own industry, or in export-manufacturing
- Typically leaves manufacturing towards services
- No catching-up to previous wage level
- Lower earnings than a comparable “industry stayer”
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- Lower earnings than a comparable “industry stayer”

**Strongly export-exposed worker** (e.g., “automobile”)
- Lower displacement risk, on-the-job earnings gains
- Intra-industry moves towards better firms
- If displaced: Quicker comeback & recovery
- No loss of industry-specific human capital
Regional impact across German regions

**Highly import-exposed regions**
- Ruhr area → Coal & steel
- Südwestpfalz → Textiles and shoes
- Oberfranken → Toys, consumer electronics

**Highly export-oriented regions**
- Lower Bavaria, Stuttgart, Allgäu → Cars & car parts
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**Eastern Germany**
- Much smaller manufacturing sector overall  
  →  smaller impacts of trade, lower geographical variation
Aggregate effect 1990-2010

- 541.522 imports (mainly in red)
+ 985.054 exports (mainly in blue)
+ 443.532 full-time manufacturing jobs

- Manufacturing jobs/population decreased from 16% to 12%
- Without „rise of the East“, it would have decreased to 10.3%
- Overall, trade retained manufacturing jobs in Germany
- But additional jobs in blue not necessarily filled with those workers who lost their jobs in red
I. TRADE AND JOBS IN THE USA
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Two problems of globalization

- Trade enlarges the overall pie, but shrinks some individual slices [even in a perfectly competitive environment, see Stolper & Samuelson, 1941]
- Protectionism is the wrong answer!
- **Instead**: Compensation of the losers [Kaldor 1939; Hicks 1939; Dixit & Normann 1980]

→ Inspired the recent joint report by IMF / World Bank / WTO (2017):

"Making Trade an Engine of Growth for All – The Case for Trade and for Policies to Facilitate Adjustment"
Two problems of globalization

1. Long-run effects on factor prices and incomes
   → Even in a hypothetical world with perfectly smooth labor markets
   → Redistribution of globalization gains via tax or social security system

2. Adjustment costs
   → Frictional individual adjustment to trade-induced structural change
   → *Trade adjustment assistance*: tailored labor market & education policies
Trade Adjustment Assistance (TAA)

**Tailored labor market policies after trade-induced job losses**
- Qualification and training
- Insurance of earnings losses
- **Goal**: Faster comeback into better jobs
- Low volumes, some overlap with „standard“ policies
  ($300-$500m p.a. in USA. 560m€ requested funds at EGF, 2007-2013)
Trade Adjustment Assistance (TAA)

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($300-$500m p.a. in USA. 560m€ requested funds at EGF, 2007-2013)

**Regional dimension is key!**
- Some locations more adversely affected than others
- Labor market reintegration difficult without adequate jobs on-site
- Only fostering mobility (“moving to opportunity”) may be problematic
- Case for efficiently designed structural funds and regional policy
THANK YOU FOR YOUR ATTENTION!

SUEDEKUM@DICE.HHU.DE