Do foreign workers reduce trade barriers?
Microeconomic evidence

Martyn Andrews\textsuperscript{1}  Thorsten Schank\textsuperscript{2}  Richard Upward\textsuperscript{3}

\textsuperscript{1}University of Manchester
\textsuperscript{2}Johannes Gutenberg Universität Mainz
\textsuperscript{3}University of Nottingham

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Introduction

- Importance of informal trade barriers
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  - Information, business contacts, language, contract enforcement, preferences (Anderson & van Wincoop 2004)
  - We estimate the relationship between firm exporting behaviour and the nationality of the workforce
  - Stronger tests of the hypothesis:
    1. Workers' occupations
    2. Destination-specific effects
    3. Strength of ties to home country
    4. Strength of effect for manufactured goods and services

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- Exports are recorded as the proportion of sales in the previous calendar year
### Plant-level descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Zero exports</th>
<th>Exports &lt;10%</th>
<th>Exports 10–50%</th>
<th>Exports &gt;50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of establishment-years</td>
<td>56,845</td>
<td>9,210</td>
<td>13,393</td>
<td>6,263</td>
</tr>
<tr>
<td>Average sales (€m)</td>
<td>2.4</td>
<td>6.9</td>
<td>13.6</td>
<td>26.0</td>
</tr>
<tr>
<td>% of sales exported</td>
<td>0.0</td>
<td>5.6</td>
<td>28.7</td>
<td>76.3</td>
</tr>
<tr>
<td>Average employment</td>
<td>8.0</td>
<td>22.3</td>
<td>47.7</td>
<td>76.3</td>
</tr>
<tr>
<td>% Foreign-owned</td>
<td>1.5</td>
<td>3.8</td>
<td>7.8</td>
<td>16.0</td>
</tr>
<tr>
<td>% with “good” profits</td>
<td>29.7</td>
<td>29.8</td>
<td>33.6</td>
<td>41.2</td>
</tr>
<tr>
<td>% in manufacturing</td>
<td>19.8</td>
<td>33.7</td>
<td>41.2</td>
<td>39.7</td>
</tr>
</tbody>
</table>
Worker-level data

- **Beschäftigtenstatistik**: employment statistics register of the German Federal Office of Labour

  Covers all workers and trainees registered by the social insurance system

  Establishment identifier which can be used to link to the plant-level data

  Our sample comprises all workers who are employed by the surveyed plants on 30th June, excluding apprentices and part-time workers

  We use worker-level information from two years before the plant interview date (in the year before export information is recorded)

  Nationality of workers
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- Nationality of workers
Most common nationalities working in sample plants

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<thead>
<tr>
<th>Nationality</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>92.03</td>
</tr>
<tr>
<td>Turkey</td>
<td>2.57</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>1.20</td>
</tr>
<tr>
<td>Italy</td>
<td>0.84</td>
</tr>
<tr>
<td>Greece</td>
<td>0.49</td>
</tr>
<tr>
<td>France</td>
<td>0.35</td>
</tr>
<tr>
<td>Austria</td>
<td>0.30</td>
</tr>
<tr>
<td>Poland</td>
<td>0.24</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.21</td>
</tr>
<tr>
<td>Spain</td>
<td>0.19</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.13</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.12</td>
</tr>
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</table>
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<th>&gt;50%</th>
</tr>
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<tbody>
<tr>
<td>Average daily wage (€)</td>
<td>90.0</td>
<td>116.5</td>
<td>114.3</td>
<td>116.9</td>
<td></td>
</tr>
<tr>
<td>% No apprenticeship or Abitur</td>
<td>8.3</td>
<td>11.5</td>
<td>13.8</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>% Apprenticeship or Abitur</td>
<td>86.7</td>
<td>81.3</td>
<td>76.2</td>
<td>74.5</td>
<td></td>
</tr>
<tr>
<td>% University degree</td>
<td>5.0</td>
<td>7.1</td>
<td>10.0</td>
<td>12.6</td>
<td></td>
</tr>
<tr>
<td>% Foreign nationals:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>4.0</td>
<td>4.8</td>
<td>6.7</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>Basic manual</td>
<td>8.5</td>
<td>11.2</td>
<td>13.3</td>
<td>17.9</td>
<td></td>
</tr>
<tr>
<td>Qualified manual</td>
<td>4.4</td>
<td>5.1</td>
<td>5.7</td>
<td>6.1</td>
<td></td>
</tr>
<tr>
<td>Engineers and technicians</td>
<td>2.8</td>
<td>2.6</td>
<td>2.7</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>Basic service</td>
<td>6.8</td>
<td>8.8</td>
<td>8.2</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>Qualified service</td>
<td>4.7</td>
<td>4.2</td>
<td>1.4</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>Semi-professional</td>
<td>3.1</td>
<td>5.5</td>
<td>7.1</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>1.9</td>
<td>2.5</td>
<td>2.8</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Basic business</td>
<td>3.1</td>
<td>3.1</td>
<td>2.2</td>
<td>6.1</td>
<td></td>
</tr>
<tr>
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<td>1.8</td>
<td>1.4</td>
<td>3.9</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Manager</td>
<td>1.4</td>
<td>2.4</td>
<td>3.8</td>
<td>8.3</td>
<td></td>
</tr>
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Methods

- The proportion of foreign workers in a plant may not be exogenous with respect to exporting propensity.
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  - Factors which are correlated with transaction costs and hiring decisions (e.g. location)
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  - Reverse causality

\[ \Pr(\text{exporter}_{jt}) = \beta_0 + \beta_{\bar{F}_{jt}} - 1 + \beta_x x_{jt} + u_{jt} \]  
where \( \bar{F}_{jt} - 1 \) is the proportion of foreign workers in firm \( j \) at time \( t - 1 \)
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  - Factors which are correlated with transaction costs and hiring decisions (e.g. location)
  - Reverse causality
  - Non-random hiring of foreign workers w.r.t. transaction costs
- We can control for observable factors (like location) using simple linear model:

\[
Pr(\text{exporter}_{jt}) = \beta_0 + \beta_F \bar{F}_{jt-1} + \beta_x x_{jt} + u_{jt}
\] (1)

where \( \bar{F}_{jt-1} \) is the proportion of foreign workers in firm \( j \) at time \( t - 1 \)
Methods (cont’d)

▶ What about correlation between unobservable export propensity $u_{jt}$ and $\bar{F}_{j,t-1}$?
Methods (cont’d)

- What about correlation between unobservable export propensity \( u_{jt} \) and \( \bar{F}_{j,t-1} \)?
- Fixed effects estimation
Methods (cont’d)

- What about correlation between unobservable export propensity $u_{jt}$ and $\bar{F}_{j,t-1}$?
- Fixed effects estimation
- Proposed instrumental variable: the proportion of foreign workers in the local labour market

$$z_{jt} = \frac{\left( \sum_{j} J_{r} \sum_{i=1}^{N_{jt}} F_{i} \right) - \sum_{i=1}^{N_{jt}} F_{i}}{\left( \sum_{j} J_{r} N_{jt} \right) - N_{jt}}$$  \hspace{1cm} (2)

$J_{r}$ is the number of firms in region $r$
More specific hypotheses

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(1) Basic OLS results: estimates of export propensity

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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of foreign workers ($\bar{F}_{jt}$)</td>
<td>0.619</td>
<td>0.088</td>
<td>0.085</td>
<td>0.091</td>
<td>0.045</td>
</tr>
<tr>
<td></td>
<td>(0.043)</td>
<td>(0.027)</td>
<td>(0.026)</td>
<td>(0.027)</td>
<td>(0.029)</td>
</tr>
<tr>
<td>Foreign-owned plant</td>
<td>0.136</td>
<td>0.133</td>
<td>0.133</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.011)</td>
<td>(0.011)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Border distance (in 100 km)</td>
<td>—0.018</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Border Kreis</td>
<td>0.055</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>East Germany</td>
<td>—0.118</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Region</td>
<td>16</td>
<td>443</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Year (1993–2008)</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Urbanisation</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Industry</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Employment size cat.</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Skill cat.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Occupation cat.</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Plant</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>19,648</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.020</td>
<td>0.354</td>
<td>0.377</td>
<td>0.353</td>
<td>0.183</td>
</tr>
</tbody>
</table>

79,815 observations; 19,648 plants. Standard errors are clustered at the plant level.
(2) The effect is larger for managers

<table>
<thead>
<tr>
<th></th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{F}_{jt}$ (All workers)</td>
<td>0.078</td>
<td>0.083</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>$\bar{F}_{jt}$ (Managers)</td>
<td>0.149</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td></td>
</tr>
<tr>
<td>Dummy: any foreign manager</td>
<td>0.044</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>Foreign-owned plant</td>
<td>0.130</td>
<td>0.129</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Border distance (100 km)</td>
<td>$-0.018$</td>
<td>$-0.018$</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Border <em>Kreis</em></td>
<td>0.055</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>East Germany</td>
<td>$-0.118$</td>
<td>$-0.117$</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.353</td>
<td>0.353</td>
</tr>
</tbody>
</table>

79,815 observations; 19,648 plants. Standard errors are clustered at the plant level. Regressions also include control variables for year, urbanisation, industry, employment size, skill and occupation.
(3) The effect is larger for the relevant export region

<table>
<thead>
<tr>
<th></th>
<th>(8) Exports to all destinations</th>
<th>(9) Exports to EMU destinations</th>
<th>(10) Exports to all destinations</th>
<th>(11) Exports to NMS destinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{F}_{jt}$ (All countries)</td>
<td>0.082 (0.027)</td>
<td>0.009 (0.031)</td>
<td>0.067 (0.036)</td>
<td>$-0.051$ (0.030)</td>
</tr>
<tr>
<td>$\bar{F}_{jt}$ (EMU countries)</td>
<td></td>
<td>0.233 (0.061)</td>
<td></td>
<td>0.017 (0.047)</td>
</tr>
<tr>
<td>$\bar{F}_{jt}$ (NMS countries)</td>
<td></td>
<td>$-0.042$ (0.081)</td>
<td></td>
<td>0.104 (0.070)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.343</td>
<td>0.333</td>
<td>0.338</td>
<td>0.236</td>
</tr>
<tr>
<td>Number of observations</td>
<td>65,313</td>
<td>65,313</td>
<td>28,737</td>
<td>28,737</td>
</tr>
<tr>
<td>Number of plants</td>
<td>17,920</td>
<td>17,920</td>
<td>11,190</td>
<td>11,190</td>
</tr>
</tbody>
</table>

Standard errors clustered at the plant level. Regressions also include the border distance (in 100km) as well as dummy variables for foreign plant ownership, border Kreis, Eastern Germany, year, urbanisation, industry, employment size, skill and occupation.
(4) Strength of ties is not so clear-cut

<table>
<thead>
<tr>
<th></th>
<th>(4) Base model</th>
<th>(12) Non-gastarbeiter</th>
<th>(13) West Germany</th>
<th>(14) East Germany</th>
<th>(15) Length of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_{jt}$</td>
<td>0.091</td>
<td>0.014</td>
<td>0.089</td>
<td>0.075</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.031)</td>
<td>(0.028)</td>
<td>(0.080)</td>
<td></td>
</tr>
<tr>
<td>$F_{jt}$ (Non-gastarbeiter)</td>
<td>0.188</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.055)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{jt}$ (&lt; 5 years)</td>
<td>0.052</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{jt}$ (6–10 years)</td>
<td>0.052</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.043)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{jt}$ (11–15 years)</td>
<td>0.037</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_{jt}$ (&gt; 15 years)</td>
<td>0.182</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.050)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

79,815 observations; 19,648 plants. Standard errors clustered at the plant level. Regressions also include the border distance (in 100km) as well as dummy variables for foreign plant ownership, border Kreis, Eastern Germany, year, urbanisation, industry, employment size, skill and occupation.
**Effect is larger for non-manufactured exports**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{F}_{jt}$</td>
<td>$-0.029$</td>
<td>$0.108$</td>
</tr>
<tr>
<td></td>
<td>$(0.049)$</td>
<td>$(0.029)$</td>
</tr>
<tr>
<td>$R^2$</td>
<td>$0.387$</td>
<td>$0.118$</td>
</tr>
<tr>
<td>Number of obs.</td>
<td>$36,967$</td>
<td>$42,848$</td>
</tr>
<tr>
<td>Number of plants</td>
<td>$8,289$</td>
<td>$11,359$</td>
</tr>
</tbody>
</table>

Standard errors clustered at the plant level. Regressions also include the border distance (in 100km) as well as dummy variables for foreign plant ownership, border Kreis, Eastern Germany, year, urbanisation, industry, employment size, skill and occupation.
2SLS estimates are larger

<table>
<thead>
<tr>
<th>First stage</th>
<th></th>
<th>Exporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \bar{F}_{jt} )</td>
<td>0.809</td>
<td>0.455</td>
</tr>
<tr>
<td>Share of foreign workers in the region ( z_{jt} )</td>
<td>(0.017)</td>
<td>(0.132)</td>
</tr>
<tr>
<td>Share of foreign workers in the plant ( F_{jt} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.252</td>
<td>0.347</td>
</tr>
<tr>
<td>Number of observations</td>
<td>79,815</td>
<td></td>
</tr>
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<td>19,648</td>
<td></td>
</tr>
</tbody>
</table>

Regressions also include the border distance (in 100km) as well as dummy variables for foreign plant ownership, border Kreis, Eastern Germany, year, urbanisation, industry, employment size, skill and occupation.
Summary

- There is a strong correlation between exporting behaviour and worker nationality.
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- This is partly due to the foreign ownership of a plant as well as the industrial, occupational and geographical location of foreign workers.

- Fixed-effects estimates are still significant, but smaller.
- IV estimates are larger (local treatment effect)
- Informal trade barriers matter!
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  - workers from non-Gastarbeiter countries
  - exports to regions from which foreign workers originate
  - non-manufactured exports.
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Future work

- Specification of $f(F_{jt})$
Future work

- Specification of $f(F_{jt})$
- Measurement error in nationality variable
Future work

- Specification of $f(F_{jt})$
- Measurement error in nationality variable
- Panel data analysis with lagged dependent variable
Future work

- Specification of $f(F_{jt})$
- Measurement error in nationality variable
- Panel data analysis with lagged dependent variable
- Hires of foreign workers and a clean experiment
<table>
<thead>
<tr>
<th>Occupation group</th>
<th>Most common occupational titles</th>
</tr>
</thead>
</table>
| Basic manual occupations | Chemical plant operatives (9%)  
Metal workers (9%)  
Assistants (8%)  
Goods examiners, sorters (6%)  
Electrical parts assemblers (6%)  
Packagers, goods receivers, dispatchers (5%)  
Other assemblers (5%)  
Plastics processors (4%) |
| Qualified manual occupations | Electrical fitters, mechanics (13%)  
Engine fitters (12%)  
Plant fitters (10%)  
Turners (7%)  
Toolmakers (6%)  
Motor vehicle repairers (5%) |
| Engineers and technicians | Other technicians (18%)  
Mechanical engineers (13%)  
Electrical engineers (11%)  
Foremen, master mechanics (10%) |
| Basic service occupations | Stores and transport workers (25%)  
Motor vehicle drivers (20%)  
Warehouse managers, warehousemen (19%) |
| Qualified service occupations | Railway drivers (28%)  
Railway controllers and conductors (21%)  
Firefighters (18%)  
Hairdressers (9%) |
| Associate professional | Journalists (41%)  
Librarians, archivists (14%)  
Technical and vocational instructors (11%)  
Other teachers (9%) |
| Professional | Social scientists, statisticians (41%)  
Visual and commercial artists (14%)  
Legal representatives and advisors (11%)  
Interior designers (10%)  
Pharmacists (5%) |
| Basic business occupations | Salespersons (37%)  
Commercial agents (22%)  
Typists (22%)  
Office auxiliary workers (10%) |
| Qualified business occupations | Office specialists (67%)  
Data processing specialists (13%)  
Wholesale and retail trade buyers (12%)  
Accountants (4%) |
| Managers | Entrepreneurs, managing directors, divisional managers (67%)  
Management consultants, organisers (16%)  
Chartered accountants (9%) |
Figure: German *Landkreise*