Cultural Diversity and Local Labour Markets

International Workshop, University of Waikato

12 April 2012

Uwe Blien (IAB, U. Bamberg)
Jens Südekum (U Duisburg-Essen)
Katja Wolf (IAB)
Motivation for research on the relationship between culture and the economy

- The labour market (or the economy in general) cannot be understood in full without the study of culture, since it reflects influences on preferences.
- New methods are available which open up new space for research.
What is “culture”? 

Culture is an amorphous category which means (among others):

- Systems of human knowledge, belief, and behaviour which depends upon the capacity for symbolic thought and social learning
- Patterns of shared norms, attitudes, values, goals, and practices that characterizes an institution, organization or group
- A level of refined behaviour
- The creation of objects and artworks available in literature, music, and fine arts
- All human behaviour and its results not completely defined by genetic influences
Possible channels of influence between economy/ labour market and culture

- Influences of preferences, formed by culture, on the motivation to work and to compete
- Creation of new economic systems influenced by cultural factors (Weber)
- Influences of informal institutions on the economy
- Effects of the economy on the systems of belief and of arts
- Distortions of traditional culture under economic pressure (Habermas)
New methods available to do research about the interaction of culture and the economy

- Mass data available which are appropriate to study specific groups in populations.
- Experimental approaches facilitate a new approach to reality.
- Traditional research on culture (related to „fine arts“) is substituted by formal models and statistical methods.
Research in the context of the NORFACE Programme

- Special project: Midi-Redie
- Project teams in five countries co-operate:
  - Netherlands (Nijkamp, Poot)
  - Germany (Südekum, Haas, Blien)
  - Great Britain (Longhi)
  - Estonia (Paas)
  - Finland (Kauhanen)
Motivation

Share of foreign workers in total employment, Western Germany 1995-2006
Motivation

- **Basic issue:** Effects of foreign workers on native workers
  - Debates about immigration laws, EU enlargement, „Blue Card“

- **Special focus:**
  - Labour market effects associated with the degree of cultural (national) diversity of the group of foreigners on the labour market performance of native German workers
Motivation: Shares of students in German grammar schools

- Germans: 29 %
- Vietnamese: 40 %
- Turks: 9 %

Source: German „Bildungsbericht“ 2010

- 160 US-metropolitan areas (MSAs)
- Diversification index, culture measured by language spoken at home
- Results: Diversity index raises native wages and land rents/employment → Positive productivity effects
Our contribution

- Similar empirical analysis for Western Germany (completely different with respect to the history and policy of immigration)

- Effects of (the diversity of) skilled foreign workers vs. low-skilled foreign workers → not included in Ottaviano/Peri, highly policy relevant

- Methodological: Spatial econometric techniques to address spatial autocorrelation, IV estimation to address endogeneity
Basic hypotheses

- Cultural diversity may affect regional productivity
  - Positive impact: Complementarity of culture-specific skills, experiences, problem-solving abilities, increase in creativity
  - Negative impact: Transaction costs for intercultural communication, conflicts between different groups (“Babel Effect“)

- Trade-off modelled, e.g., in Berliant/Fujita (IER 2008)
Basic hypotheses

- Cultural diversity may affect regional well-being
  - Positive impact: Cultural diversity creates multicultural atmosphere, consumption variety of ethnic goods
  - Negative impact: Social conflicts, „ghettoization“

- See Alesina/La Ferrara (2005), Florida (2002), Lazear (1999)
Theoretical background
Theoretical background:
Spatial equilibrium model (Roback 1982)

- Country consists of \( r=1, \ldots, N \) location/cities
- Two goods: \( Y \) (consumption good, CRS), \( R \) (land)
- Firms use labour \( L \) and land, perfectly mobile across space
- Workers consume \( Y \) and \( R \), homothetic utility, perfectly mobile across space
- Each location offers a productive amenity \( (A_{P,r}) \) and a consumption amenity \( (A_{C,r}) \)
Spatial equilibrium model

Utility for a worker in $r$: $U_r = U_r \cdot w_r, L_r, R_r, A_r^C$

Profits for a firm in $r$: $\pi_r = \pi_r \cdot w_r, L_r, R_r, A_r^P$

Definition 1: Spatial equilibrium
A spatial equilibrium is a sequence of prices $\{w_1, ..., w_N\}$, $\{p_1, ..., p_N\}$ and an allocation of workers $\{L_1, ..., L_N\}$, such that, given the local supplies of land $\{R_1, ..., R_N\}$ and the values of the amenities $\{A_1^C, ..., A_N^C\}$ and $\{A_1^P, ..., A_N^P\}$:

1.) Utility levels are equalized across space $U_k(\cdot) = U_\ell(\cdot) = \bar{U}$ $\forall k, \ell \in [1, ..., N]$

2.) Profit levels are equalized across space $\pi_k(\cdot) = \pi_\ell(\cdot) = \bar{\pi}$ $\forall k, \ell \in [1, ..., N]$

3.) All markets clear.
Illustration of spatial equilibrium

\[ L \]

\[ w \]

\[ w_{1} \]

\[ w_{1}^{\prime} \]

\[ w_{1}^{\prime\prime} \]

\[ A_{r}^{P} \uparrow \]

\[ A_{r}^{C} \uparrow \]

\[ L_{1} \]

\[ L_{1}^{\prime} \]

\[ L^{D} \]

\[ L^{S} \]
Estimation framework and data
Estimation framework

- Panel model with regional and time period fixed effects

\[ \ln \text{wage}_{r,t} = \alpha_r^{\text{wage}} + \alpha_t^{\text{wage}} + \beta^{\text{wage}} \cdot \text{div}_{r,t} + \gamma^{\text{wage}} \cdot X_{r,t} + \varepsilon_{r,t}^{\text{wage}} \]

\[ \ln \text{emp}_{r,t} = \alpha_r^{\text{emp}} + \alpha_t^{\text{emp}} + \beta^{\text{emp}} \cdot \text{div}_{r,t} + \gamma^{\text{emp}} \cdot X_{r,t} + \varepsilon_{r,t}^{\text{emp}} \]

- \( \beta^{\text{wage}} > 0, \beta^{\text{emp}} > 0 \) → positive production amenity
- \( \beta^{\text{wage}} < 0, \beta^{\text{emp}} < 0 \) → negative production amenity
- \( \beta^{\text{wage}} < 0, \beta^{\text{emp}} > 0 \) → positive consumption amenity
- \( \beta^{\text{wage}} > 0, \beta^{\text{emp}} < 0 \) → negative consumption amenity
Estimation issues

- FE model: Identification comes from changes in $\text{div}_{r,t}$ → reduces concerns of reverse causality (non-random selection of foreigners across German regions)

- IV approach to address further endogeneity problems

- Control variables to avoid OV bias e.g., regional industry composition as proxy for occupational heterogeneity

- Accounting for spatial correlation
Employment statistics (BA, IAB)

- 326 western German NUTS III regions, 1995-2006
- For each district:
  - Average daily wage per native employee (in 1995 Euro)
  - Total employment level, employment density (native Germans, ~ 180 other nationalities)
  - Some further characteristics (qualification, industry structure, firm size)
  - Housing supply (# housing units)
Measuring diversity

- Share of foreign workers in total employment in region \( r \)
- Diversity index (Herfindahl) for the group of foreigners

\[
hh_{rt} = 1 - \sum_{k=1}^{K} \left( \frac{\text{Foreigners}_{krt}}{\text{Foreigners}_{rt}} \right)^2 \in [0, 1]
\]

- Size vs. composition of foreign workers (\( \rho = 0.2 \))
- Alternative diversity index (entropy) as robustness check
Measuring diversity

- Skilled versus unskilled foreign workers
  - Share of (un-)skilled foreign workers in total (un-)skilled employment
  - Diversity index (Herfindahl) for the group of (un-)skilled foreigners

- Data issues
  - Employment subject to social security, not population
  - „Nationality“ as proxy for culture
  - Administrative regional classification
Descriptives
### Descriptives I: Largest foreign nationalities

<table>
<thead>
<tr>
<th>Rank</th>
<th>1995</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turkey</td>
<td>Turkey</td>
</tr>
<tr>
<td>2</td>
<td>frm. Yugoslavia</td>
<td>frm. Yugoslavia</td>
</tr>
<tr>
<td>3</td>
<td>Italy</td>
<td>Italy</td>
</tr>
<tr>
<td>4</td>
<td>Greece</td>
<td>Greece</td>
</tr>
<tr>
<td>5</td>
<td>Austria</td>
<td>frm. Soviet Un.</td>
</tr>
<tr>
<td>6</td>
<td>France</td>
<td>Poland</td>
</tr>
<tr>
<td>7</td>
<td>Poland</td>
<td>France</td>
</tr>
<tr>
<td>8</td>
<td>Portugal</td>
<td>Austria</td>
</tr>
<tr>
<td>9</td>
<td>Spain</td>
<td>Portugal</td>
</tr>
<tr>
<td>10</td>
<td>Netherlands</td>
<td>Spain</td>
</tr>
</tbody>
</table>

**Descriptives I:** Percentage of foreign nationals in Germany calculated as a share of the total working-age population.
## Descriptives II: Foreign employees selected cities

<table>
<thead>
<tr>
<th>City</th>
<th>Total employment (native + foreign)</th>
<th>Total share of foreign workers (%)</th>
<th>Diversity index, foreign employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>all</td>
<td>high-skilled</td>
<td>all</td>
</tr>
<tr>
<td>Year 2006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hamburg</td>
<td>633,311</td>
<td>7.24</td>
<td>0.9160</td>
</tr>
<tr>
<td>Munich</td>
<td>563,931</td>
<td>14.53</td>
<td>0.8913</td>
</tr>
<tr>
<td>Frankfurt</td>
<td>396,702</td>
<td>13.85</td>
<td>0.9140</td>
</tr>
<tr>
<td>Cologne</td>
<td>369,060</td>
<td>10.21</td>
<td>0.8243</td>
</tr>
<tr>
<td>Hannover</td>
<td>335,503</td>
<td>6.24</td>
<td>0.8781</td>
</tr>
<tr>
<td>Düsseldorf</td>
<td>293,208</td>
<td>9.65</td>
<td>0.9137</td>
</tr>
<tr>
<td>Stuttgart</td>
<td>286,546</td>
<td>13.49</td>
<td>0.8685</td>
</tr>
<tr>
<td>Ø WESTERN GERMANY</td>
<td>6.56</td>
<td>4.21</td>
<td>0.8370</td>
</tr>
</tbody>
</table>
Results
## Results (I)

<table>
<thead>
<tr>
<th></th>
<th>Wage (1)</th>
<th>Wage (2)</th>
<th>Wage (3)</th>
<th>Employment (4)</th>
<th>Employment (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Share of foreign workers</strong></td>
<td>-0.290*** (.041)</td>
<td>-0.238*** (.039)</td>
<td>0.033 (.032)</td>
<td>-0.449*** (.121)</td>
<td>-0.682*** (.093)</td>
</tr>
<tr>
<td><strong>Diversity index foreign workers</strong></td>
<td>0.033** (.012)</td>
<td>0.056*** (.010)</td>
<td>0.018*** (.009)</td>
<td>0.073*** (.034)</td>
<td>0.053** (.025)</td>
</tr>
<tr>
<td><strong>Index of industrial diversity</strong></td>
<td>--</td>
<td>0.436*** (.041)</td>
<td>0.354*** (.034)</td>
<td>--</td>
<td>0.290*** (.098)</td>
</tr>
<tr>
<td><strong>Number of flats (log)</strong></td>
<td>-0.199*** (.015)</td>
<td>-0.224*** (.014)</td>
<td>-0.112*** (.013)</td>
<td>1.237*** (.043)</td>
<td>1.030*** (.038)</td>
</tr>
<tr>
<td><strong>Further control variables</strong></td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Area fixed effects</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Year fixed effects</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>
Results (I)

- Total share of foreign workers has negative wage and employment effects.
- For a given total share: Diversity of foreign population has positive wage and employment effects → Positive production amenity.
- Next: Effects of skilled versus non-skilled foreign workers.
### Results (II)

<table>
<thead>
<tr>
<th></th>
<th>Wage</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Skilled</td>
<td>Low-skilled</td>
</tr>
<tr>
<td><strong>Share</strong></td>
<td>0.066*** (.025)</td>
<td>-0.048*** (.013)</td>
</tr>
<tr>
<td><strong>Herfindahl index</strong></td>
<td>0.010** (.005)</td>
<td>0.024*** (.006)</td>
</tr>
<tr>
<td>OTHER CONTROLS</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>FIXED EFFECTS</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>
Results (II)

- Share of low-skilled foreign workers has negative wage and employment effects
- Share of skilled foreign workers has positive wage and employment effects
- For a given share of low-skilled or skilled workers, positive wage and employment effects of their diversity → Positive production amenity
Robustness checks

- **Endogeneity**
  - Fixed Effects IV estimation

- **Functional labour markets**
  - 204 labour market areas (*Arbeitsmarktregionen*) instead of NUTS III
  - Results remain stable (not shown)

- **Spatial autocorrelation**
Extension

Spatial autocorrelation in the error term:

GMM-estimator by Kapoor, Kelejian and Prucha (2007) for random effects in a panel model. Specification of the error term:

\[ \varepsilon_{rt} = \rho \cdot \sum_{p=1}^{N} w_{pr} \varepsilon_{pt} + \nu_{rt} \]

where \( \sum_{p=1}^{N} w_{pr} \varepsilon_{pt} \) is the spatial autoregressive parameter and \( \nu_{rt} \) denotes an i.i.d. error term with zero expectation and variance \( \sigma_{v}^{2} \).

\( \rho \) is the spatial autoregressive parameter.
Extension (II)

Stacking the error term gives:

$$\varepsilon_t = \rho W \varepsilon_t + \nu_t$$

$W$ is the Matrix of weights $w$, a simple contiguity (row-normalized) matrix was used.

Kapoor, Kelejian and Prucha‘s (2007) estimator was changed by Mutl, Pfaffermayr (2008) for fixed effects. This estimator is applied.
## Results (spatial autocorrelation)

<table>
<thead>
<tr>
<th>Skill group</th>
<th>Skilled</th>
<th>Unskilled</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wages</strong></td>
<td>(1)</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>0.085***</td>
<td>-0.045***</td>
<td>0.0082*</td>
<td>0.019***</td>
</tr>
<tr>
<td>Unskilled</td>
<td>0.199***</td>
<td>-0.013</td>
<td>0.014</td>
<td>0.019***</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td>(2)</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>0.199***</td>
<td>-0.013</td>
<td>0.014</td>
<td>0.019***</td>
</tr>
<tr>
<td>Unskilled</td>
<td>-0.045***</td>
<td>0.019***</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td><strong>Share of (un-)skilled foreign workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>0.085***</td>
<td>-0.045***</td>
<td>0.0082*</td>
<td>0.019***</td>
</tr>
<tr>
<td>Unskilled</td>
<td>0.199***</td>
<td>-0.013</td>
<td>0.014</td>
<td>0.019***</td>
</tr>
<tr>
<td><strong>Herfindahl index, (un-)skilled foreign workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>0.085***</td>
<td>-0.045***</td>
<td>0.0082*</td>
<td>0.019***</td>
</tr>
<tr>
<td>Unskilled</td>
<td>0.199***</td>
<td>-0.013</td>
<td>0.014</td>
<td>0.019***</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>FIXED EFFECTS</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

*Indicates significance: **p<0.001, *p<0.05*
Instrumental variables

- Two endogenous variables → at least two instruments
- Correlated with share/diversity of foreigners, but not with current wages for natives
- Varying across regions and time
- Selection based on
  - Validity test (Sargan test)
  - Test for weak instruments (Cragg-Donald statistic – see Stock and Yogo 2005)
## Results (IV): Wages

<table>
<thead>
<tr>
<th></th>
<th>Skilled (1)</th>
<th>Skilled (2)</th>
<th>Low-Skilled (1)</th>
<th>Low-Skilled (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Share</strong></td>
<td>0.063** (.026)</td>
<td>0.175*** (.041)</td>
<td>-0.047** (.013)</td>
<td>-0.072*** (.018)</td>
</tr>
<tr>
<td><strong>Herfindahl index</strong></td>
<td>0.010** (.005)</td>
<td>0.032*** (.005)</td>
<td>0.021*** (.006)</td>
<td>0.042** (.011)</td>
</tr>
<tr>
<td>INSTRUMENTS</td>
<td>None</td>
<td>Yes</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>OTHER CONTROLS</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>FIXED EFFECTS</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Instruments: Time lag diversity variables shift-share & distance to border or airport
## Results (IV): Employment

<table>
<thead>
<tr>
<th></th>
<th>Skilled</th>
<th>Low-Skilled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td><strong>Share</strong></td>
<td>0.439** (.071)</td>
<td>0.589*** (.114)</td>
</tr>
<tr>
<td><strong>Herfindahl index</strong></td>
<td>0.032** (.014)</td>
<td>0.056* (.031)</td>
</tr>
<tr>
<td>INSTRUMENTS</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>OTHER CONTROLS</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>FIXED EFFECTS</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Instruments: Time lag diversity variables shift-share & distance to border or airport
Summary and Implications
Summary

- Total share and diversity of skilled foreign workers: Positive wage and employment effects → POSITIVE PRODUCTION AMENITY

- Total share of low-skilled foreign workers: Negative wage and employment effects → NEGATIVE PRODUCTION AMENITY

- For given shares: Positive wage and employment effects associated with the diversity of the low-skilled foreigners → POSITIVE PRODUCTION AMENITY
Implications

- Cultural diversity is an asset for a region!
- Benefits the native workers, because it enhances regional productivity
- True for skilled and for low-skilled foreign workers
- Productivity effects may be understated if diversity also has a consumption value