Offshoring and its Impact on SMEs in Germany - Examining the Potential Positive and Negative Effects

Second American Academic Research Conference on Global Business, Economics, Finance and Social Sciences, 28-30 April 2017 in New York, USA
Niederrhein Institute for Regional and Structural Research (NIERS),

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Agenda

- Introduction/ Motivation
- Conceptual Evaluation
- Empirical Analysis
- Conclusion
Introduction

- No official definition for offshoring

- **Chosen definition:**
  - **Offshoring outsourcing**: Relocation of production or services to a foreign supplier
  - This study will not differentiate between offshoring and offshore outsourcing
  - Small and medium sized companies employ less than 250 employees
Introduction – Special Role of SMEs in Germany

- SMEs play an important role in Germany
- Account for 60 percent of all employees
- Are responsible for 38 percent sales in Germany
- Employ most of the “Auszubildende” (Apprentices) in Germany

→ But Offshoring of SMEs has not been analyzed (Di Gergoria et al. (2009), Canham and Hamilton (2013) for New Zealand, Mohiuddin und Su (2013) Case Study Canada)
Motivation

- SMEs differ in several ways from MNEs
  - They have to deal with restrictions of various resources (financial, and human capital), these impediments could limit the internationalisation efforts: *lower incentive to offshore*

- However, Offshoring can help overcome some of these barriers: *higher incentive to offshore*

- Advantages from foreign relations could be used without founding expensive foreign facilities

- Costs can be reduced while global talents and partner innovations can be used

Offshoring and its Impact on SMEs
Motivation

Globalisation of Value-Added Processes Change Basic Requirements for Companies, Regions & Nations

“Made in Germany” versus “Made by Germany”?
Conceptual Evaluation

„Productivity isn’t everything, but in the long run it is almost everything” (Krugman, 1990, S. 9)

Competitiveness of a Company is Decisively Determined by its Ability to Innovate

- Continuous innovation in (high-tech and knowledge-based) fields is necessary to survive in highly globalised environments
- Influence of location choice on R&D activities in the domestic market is of particular interest

The choice to relocate is simultaneous with regard to organisational and spatial criteria

Offshoring and its Impact on SMEs
Conceptual Evaluation

Theoretical literature separates static (+) and dynamic (+/-) achievements of „Offshoring“

No clear findings in empirical literature:

- Görg and Hanley (2005), Dachs et al. (2015) detect a positive correlation between offshoring and spending on R&D
- Negative and non-linear effects are found in Cusmano et al. (2010), Karpaty and Gustavsson-Tingvall (2011), Mihalache et al. (2012)
- Studies show ambivalent effects of international relocation on business and/or company success, especially concerning innovation
Empirical Analysis

Sources:

- IAB - Establishment Panel
- Representative survey in Germany ➔ 16,000 firms interviewed every year
- Offshoring firms can be identified in the years 2007, 2008 and 2010
- Panel data from 1999-2014
Data Precision

- All firms which have hived off, spin-off, or shut down parts before 2007 were excluded from the panel.

- Otherwise we could not guarantee that a firm in the treatment or the control group has practiced offshoring in the past years.
Quasi Experimental Approach

- Why natural or quasi-experiment?

- As in natural sciences, economists try to use this combination of methods in order to replicate a lab experiment and...

- ... get an answer to the counterfactual question for real world applications in social sciences:

  What would have happened over time to the observed individuals if everything else was the same, but no offshoring took place?
Quasi Experimental Approach

- Unfortunately, we cannot observe such an alternative world

- This is where the control group comes in:

  As a reference (or in other words: “quasi”) case for this alternative world scenario and to exclude all other influences

Estimation strategy:

- [Conditional] Difference-in-Difference (DiD) Estimator
- Binary und Multiple Treatment Assessment
- Instrumental Variable (IV) Estimator (do be done...)

Offshoring and its Impact on SMEs
Difference in Difference

- Treatment and Control group can differ also in non-observable characteristics
- Time shocks and non observable characteristics could be neutralized or at least reduced with a Difference in Difference approach of the outcome variable
- With the help of the Kernel Algorithm the DID estimator could be designed in a way that it uses the results of the PSM as the basis for the weighting

$$y_{i,d,t} = \alpha + \gamma D + \tau T + \delta (D \times T) + X_{i,d,t} \beta' + \epsilon_{i,d,t}$$

whereby:
- $D$ is the binary variable for the observed group with $d \in (0,1)$
- $T$ is the binary variable for the observed period with $t \in (0,1)$
- Neighbours which are very similar get a higher weight, while neighbours which are quite different get a weight close to zero
- The value of the estimation is higher because the control group is bigger than the treatment group
Data and Methods of Estimation

Product Innovation:

• Have you incorporated a completely new product or service into your assortment in the last fiscal year, for which a new market had to be created?

Process Innovation:

• Have you developed or introduced procedures in the last fiscal year that have significantly improved the production processes or the provision of services?
### Difference in Difference Estimation Results of the Causal Effects of Offshoring

<table>
<thead>
<tr>
<th>SME</th>
<th>Product Innovation</th>
<th>Product Improvement</th>
<th>Process Innovation</th>
<th>Labor Productivity (Levels)</th>
<th>Labor Productivity (Growth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>-0.132***</td>
<td>-0.131**</td>
<td>-0.099*</td>
<td>7.8e+04**</td>
<td>-0.065*</td>
</tr>
<tr>
<td>(S.E.)</td>
<td>(0.066)</td>
<td>(0.066)</td>
<td>(0.056)</td>
<td>(3.4e+04)</td>
<td>(0.036)</td>
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<tr>
<td>Model 2</td>
<td>-0.106***</td>
<td>-0.107***</td>
<td>-0.083***</td>
<td>8.0e+04***</td>
<td>-0.067***</td>
</tr>
<tr>
<td>(S.E.)</td>
<td>(0.015)</td>
<td>(0.015)</td>
<td>(0.017)</td>
<td>(2.4e+04)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Model 3</td>
<td>-0.103***</td>
<td>-0.098***</td>
<td>-0.077***</td>
<td>7.5e+04***</td>
<td>-0.066***</td>
</tr>
<tr>
<td>(S.E.)</td>
<td>(0.016)</td>
<td>(0.016)</td>
<td>(0.018)</td>
<td>(2.4e+04)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>Model 4</td>
<td>-0.109*</td>
<td>-0.108**</td>
<td>-0.078</td>
<td>7.8e+04</td>
<td>-0.068***</td>
</tr>
<tr>
<td>(S.E.)</td>
<td>(0.065)</td>
<td>(0.054)</td>
<td>(0.069)</td>
<td>(1.4e+05)</td>
<td>(0.024)</td>
</tr>
</tbody>
</table>

**Modell I**: DID Schätzung mit Kontrollvariablen.
**Modell II**: CDID Schätzung auf Basis einer Kernel-basierten PS Matching Routine.
**Modell III**: CDID Schätzung auf Basis einer Kernel-basierten PS Matching Routine plus Common Support Restriktion.
**Modell IV**: CDID Schätzung auf Basis einer Kernel-basierten PS Matching Routine plus Common Support Restriktion und bootstrapped S.E.
### Detailed Analysis - Process Innovation

#### Pre-Treatment Period

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Treated</th>
<th>Diff</th>
<th>Comparison</th>
<th>Treated</th>
<th>Diff</th>
<th>Diff-in-Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.260</td>
<td>0.616</td>
<td>0.357***</td>
<td>0.303</td>
<td>0.534</td>
<td>0.245***</td>
<td>-0.099**</td>
</tr>
<tr>
<td>(0.005)</td>
<td>(0.039)</td>
<td>(0.039)</td>
<td>(0.005)</td>
<td>(0.041)</td>
<td>(0.042)</td>
<td>(0.054)</td>
</tr>
</tbody>
</table>

#### Post-Treatment Period

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Treated</th>
<th>Diff</th>
<th>Diff</th>
<th>Diff-in-Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.303</td>
<td>0.534</td>
<td>0.245***</td>
<td>-0.099**</td>
<td></td>
</tr>
<tr>
<td>(0.005)</td>
<td>(0.041)</td>
<td>(0.042)</td>
<td>(0.054)</td>
<td></td>
</tr>
</tbody>
</table>
How significant is the geographical extent of decisions to relocate when considering short- or medium-term innovative success?

- Rarely examined in previous empirical literature
- Methodical expansion through a “multiple treatment” approach
- Application of a “doubly robust” conditional DiD estimator
- Enables more precise statements about the cost-benefit relation

How diverse is the identified effect of relocation decisions on innovative success in regards to companies with different sizes?

- SME’s often confronted with resource-restrictions
- Offshoring as an opportunity but also a risk (for process procedures, among other things)
- Identification of innovative effects on subsamples
### Table 1: Effects of spatial relocation strategies on innovation performance and productivity growth

<table>
<thead>
<tr>
<th>Obs. (Firms)</th>
<th>Domestic Relocation (ATT₁)</th>
<th>Offshoring (ATT₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RA</td>
<td>IPTW</td>
</tr>
<tr>
<td>Product Innovation</td>
<td>52187</td>
<td>0.055*</td>
</tr>
<tr>
<td>(15044)</td>
<td>(0.0322)</td>
<td>(0.0655)</td>
</tr>
<tr>
<td>Product Improvement</td>
<td>52168</td>
<td>0.013</td>
</tr>
<tr>
<td>(15043)</td>
<td>(0.0477)</td>
<td>(0.0571)</td>
</tr>
<tr>
<td>Process Innovation</td>
<td>40254</td>
<td>0.007</td>
</tr>
<tr>
<td>(11552)</td>
<td>(0.0462)</td>
<td>(0.0694)</td>
</tr>
<tr>
<td>Productivity Growth</td>
<td>53925</td>
<td>-0.012</td>
</tr>
<tr>
<td>(12557)</td>
<td>(0.0475)</td>
<td>(0.0352)</td>
</tr>
</tbody>
</table>

Note: ***, **, * = statistical significance at the 1, 5 and 10% level, standard errors are given in brackets. Obs. = Total number of observations; RA = Regression-adjusted Difference-in-Difference (DiD) estimation, IPTW = Inverse probability of treatment weighted, conditional DiD estimation; Doubly Robust = combination of RA and IPTW estimation. Details on included covariates are given in the appendix.
Conclusion

- Results tend to show a pessimistic view on the link between offshoring and innovative success
- Data enables identification of short-to medium-term effects
- Estimated period comprises global economic- and financial crisis

Possible explanations for negative effect:
- Offshoring binds resources (esp. SME), costs for communication
- Loss of creative potential, learning-by-doing, investments in R&D
- Primary starting point for foreign trade- and regional policy
- Targeted support especially for foreign affairs of SMEs
- Position regions in international competition

Open Research Question: What influence do regional location factors have on decisions about business relocation and the resulting economic output (productivity, innovative capacity)?
Thank you for your attention