

Employment Effects of Offshoring and FDI

Comparing Measures and Methods

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³* 21.12.1968 †07.03.2011

FDZ/IAB User Conference 2011

Motivation

- Feenstra & Hanson (1996): "*Ignoring outsourcing misses an important channel through which trade affects the demand for labor [...].*"
- Mankiw & Swagel (2006): "*[...] outsourcing became synonymous in the public debate with job loss [...].*"
- no consensus of empirical studies about the employment effects offshoring/FDI at the micro-level
- full range of results from positive to negative, even if we look just at micro-level studies
- differences in research design: measures, methods and selection variables/covariates → no well established framework at the micro-level

Literature

Offshoring/FDI at Plant-Level

Employment effects

- positive: Becker & Muendler (2008), Moser et al. (2009)
- neutral: Barba Navaretti & Castellani (2004), Wagner (2009), Mattes (2010)
- negative: Biscourp & Kramarz (2007), Moser et al. (2009)

Employed measures offshoring/FDI

- expansion of employment in foreign affiliates: Becker & Muendler (2008)
- new investments abroad: Barba Navaretti & Castellani (2004), Mattes (2010)
- increase in intermediate input purchases from abroad (plus domestic restructuring): Biscourp & Kramarz (2007), Moser et al. (2009)
- relocation: Wagner (2009)

Econometric methods

- OLS regressions: Biscourp & Kramarz (2007), Becker & Muendler (2008), Moser et al. (2009), Mattes (2010)
- dynamic panel data: Mattes (2010)
- propensity score matching: Barba Navaretti & Castellani (2004), Becker & Muendler (2008), Moser et al. (2009), Wagner (2009)
- differences in selection variables through all studies

This Work's Contribution I

Comparison of

- Treatment variables
 - FDI
 - market seeking FDI
 - cost saving FDI
 - low wage region FDI
 - relocation
- Methods
 - OLS Difference-in-Difference and varieties of Difference-in-Difference
 - Matching algorithms
- Selection variables
 - different specifications of FDI and relocation determinants (Moser et al. 2009, Wagner 2009 and own)

This Work's Contribution II

Additionally

- results confirmed by a quasi natural control group
- self reported average aggregate treatment effects
- Data: representative, unified, recent, high quality

Results

- FDI with relocation → strongly negative employment effects
- FDI overall → positive employment effects

Empirical Methodology I

How to Design the Missing Counterfactual

Propensity Score Matching with Difference-in-Difference

- ① estimating the Propensity Score
 - using a binary outcome model (logit) to estimate the conditional probability of offshoring/FDI for every establishment
 - three balancing tests are provided: standardized difference test (Rosenbaum & Rubin (1985)), mean difference test and Hotelling percentile test
- ② matching most similar/equal observations - treatment and control group - and differencing their (differentiated) outcomes
 - using different matching algorithms - kernel (different bandwidths) and (k-)nearest-neighbor (different numbers of neighbors)
- ③ averaging over all differences - average treatment effects on the treated (ATTs)
- ④ estimating the variance
 - bootstrapping and analytical solution (Abadie & Imbens (2008))
- ⑤ additionally: Heckman and Hotz (1989) pre-program test

Empirical Methodology II

Propensity Score Estimation

Logit baseline specification FDI measures

$$\begin{aligned} \text{offshoring}_{i,t} = & \alpha + \beta_1 \log_employment_{i,t-1} + \\ & \beta_2 \log_wage_per_employee_{i,t-1} + \beta_3 \text{high_technology}_{i,t-1} + \\ & \beta_4 \text{high_skilled_share}_{i,t-1} + \beta_5 \text{foreign_ownership} + D_{industry} + D_{regional} + \varepsilon_{i,t} \end{aligned}$$

Logit baseline specification relocation measure

$$\begin{aligned} \text{offshoring}_{i,t} = & \alpha + \beta_1 \log_employment_{i,t-1} + \\ & + \beta_2 \text{high_technology}_{i,t-1} + \beta_3 \text{export_share}_{i,t-1} + \beta_4 \text{affiliate} + \\ & \beta_5 \text{works_council} + D_{industry} + D_{regional} + \varepsilon_{i,t} \end{aligned}$$

Data I

The IAB Establishment Panel

Coverage

- all sectors
- no cut-off
- data period from 2003-2008

Three types of variables

- 1 outcome variable(s)
- 2 treatment variable(s)
- 3 selection variables

Data II

Outcome Variable

Outcome Variable

difference of the logarithm of total employment before and after offshoring/FDI at plant-level - $\Delta \log$ employment

Data III

Treatment Variables I

FDI

87. a) Hat Ihr Unternehmen in den vergangenen beiden Geschäftsjahren (in der Regel 2004 und 2005) im Ausland investiert?

Ja Nein ► *weiter mit Frage 90!*

Low wage region FDI

88. a) In welche der nachfolgenden Regionen flossen diese Auslandsinvestitionen?

Interv.: Liste 17 vorlegen und in Spalte a) alles Zutreffende ankreuzen!

Falls mehrere angekreuzt:

b) Und welche dieser Regionen war bezogen auf die Summe der Auslandsinvestitionen die bedeutendste?

Interv.: Liste 17 vorlegen. In Spalte b) nur eine Nennung möglich!

	a) alle zutreffenden	b) die bedeutendste
In die Länder der Europäischen Währungsunion (ohne Deutschland): Belgien, Finnland, Frankreich, Griechenland, Irland, Italien, Luxemburg, Niederlande, Österreich, Portugal, Spanien	<input type="checkbox"/>	<input type="checkbox"/>
In neue EU-Mitgliedsländer: Estland, Lettland, Litauen, Malta, Polen, Slowakei, Slowenien, Tschechien, Ungarn und Zypern	<input type="checkbox"/>	<input type="checkbox"/>
Nach Russland, Ukraine, Südosteuropa, incl. Türkei	<input type="checkbox"/>	<input type="checkbox"/>
Nach Asien	<input type="checkbox"/>	<input type="checkbox"/>

Data IV

Treatment Variables II

Market-seeking FDI and Cost-saving FDI

89. Wenn Sie an die bedeutendste Ländergruppe denken:
Welche der folgenden Aspekte lagen Ihrer Entscheidung, dort zu investieren, zugrunde?

Interv.: Liste 18 vorlegen und alles Zutreffende ankreuzen!

- A Erschließung neuer bzw. Sicherung bestehender Absatzmärkte
- B Bessere Einkaufs- und Beschaffungsmöglichkeiten für Vorprodukte
- C Niedrigere Kosten, Steuern und Abgaben
- D Niedrigere Arbeitskosten
- E Weniger administrative Regulierungen
- F Möglichkeit der Inanspruchnahme von öffentlicher Förderung
- G Sonstiges

Data V

Treatment Variables III

Relocation

2. **Fanden in Ihrem Betrieb im Zeitraum vom 1. 7. 2006 bis 30. 6. 2007 eine oder mehrere der folgenden Umstrukturierungen statt?**

Interv.: Liste 2 vorlegen und alles Zutreffende ankreuzen!

- A Teile des Betriebs wurden ganz geschlossen
- B Teile des Betriebs wurden in andere Unternehmensteile im Inland ausgegliedert
- C Teile des Betriebs wurden in andere Unternehmensteile ins Ausland ausgegliedert
- D Teile des Betriebs wurden im Inland ausgegründet, d.h. als eigenständige Firma weitergeführt
- E Teile des Betriebs wurden ins Ausland ausgegründet, d.h. als eigenständige Firma weitergeführt

Data VI

Quasi natural control group

- same treatment group: relocation as described

41. a) Gibt es in Ihrem Betrieb derzeit eine zwischen Geschäftsleitung und Belegschaft bzw. deren Interessensvertretung geschlossene Vereinbarung zur Beschäftigungs- oder Standortsicherung? Gemeint sind Vereinbarungen, die Leistungen und Gegenleistungen beider Parteien beinhalten.

50. Im Folgenden nenne ich Ihnen Zusagen, die im Rahmen von Vereinbarungen zur Beschäftigungs- bzw. Standortsicherung von Arbeitgeberseite gegeben werden können. Bitte geben Sie jeweils an, ob diese Zusage in der Vereinbarung Ihres Betriebs/Ihrer Dienststelle enthalten ist oder nicht.

Interv.: Angaben vorlesen!

	Ja	Nein
a) Generelle Beschäftigungsgarantie (Ausschluss betriebsbedingter Kündigungen)	<input type="checkbox"/>	<input type="checkbox"/>
b) Beschäftigungsgarantien für Teile der Belegschaft	<input type="checkbox"/>	<input type="checkbox"/>
c) Zusage für den Erhalt der Belegschaftsstärke	<input type="checkbox"/>	<input type="checkbox"/>
d) Übernahme von Auszubildenden	<input type="checkbox"/>	<input type="checkbox"/>
e) Erhalt der Ausbildungskapazität	<input type="checkbox"/>	<input type="checkbox"/>
f) Erhalt des Standortes	<input type="checkbox"/>	<input type="checkbox"/>
g) Investitionen am Standort	<input type="checkbox"/>	<input type="checkbox"/>
h) Verzicht auf Outsourcing-Maßnahmen	<input type="checkbox"/>	<input type="checkbox"/>
i) Garantie von Produktlinien	<input type="checkbox"/>	<input type="checkbox"/>
j) Sonstige Zusagen	<input type="checkbox"/>	<input type="checkbox"/>

Propensity Score Estimation - FDI

	FDI MUW	FDI Wagner	Market seeking FDI MUW	Cost saving FDI MUW	Low wage region FDI MUW
In employment (t-1)	0.724*** (0.065)		0.713*** (0.086)	0.692*** (0.150)	0.715*** (0.081)
In wage per employee (t-1)	0.682*** (0.266)		0.927** (0.368)	-0.132 (0.559)	0.613* (0.350)
high technology (t-1)	0.797*** (0.253)		0.807** (0.355)	0.632 (0.567)	1.073*** (0.351)
high-skilled (t-1)	1.918*** (0.406)		2.479*** (0.544)	0.657 (0.958)	1.954*** (0.523)
foreign ownership	-1.268*** (0.40)		-1.216** (0.523)	-1.379 (1.070)	-1.028** (0.459)
employment (t-1)		7.66e-04*** (1.46e-04)			
employment squared (t-1)		7.42e-08** (2.99e-08)			
employment cubic (t-1)		1.73e-12 1.27e-12			
sales per employee (t-1)		-2.61e-08 (8.14e-08)			
wage per employee (t-1)		2.30e-04*** (4.89e-05)			
export share (t-1)		0.015*** (0.002)			
employment change ((t-2) - (t-1))		-0.811*** (0.299)			
17 industry dummies	yes	yes	yes	yes	yes
16 regional dummies	yes	yes	yes	yes	yes
Pseudo R^2	0.3322	0.3261	0.2791	0.1851	0.3136
Number of Obs.	5759	4972	4364	3018	5121

Average Treatment Effects on the Treated - FDI

	FDI MUW	FDI Wagner	Market seeking MUW	Cost saving MUW	Low wage region MUW
OLS DiD	0.047 (0.029)	0.033 (0.022)	0.067** (0.033)	0.062 (0.042)	0.047* (0.028)
kernel 0.01	0.087*** (0.028)	0.064* (0.033)	0.103** (0.045)	0.054 (0.047)	0.071* (0.036)
kernel 0.03	0.083*** (0.027)	0.047 (0.031)	0.111*** (0.040)	0.059 (0.043)	0.078** (0.034)
kernel 0.05	0.083*** (0.026)	0.047 (0.029)	0.112*** (0.039)	0.062 (0.043)	0.079** (0.032)
NN 1	0.095*** (0.035)	0.087*** (0.042)	0.092** (0.039)	0.035 (0.061)	0.091** (0.041)
NN 2	0.081*** (0.028)	0.062* (0.034)	0.109*** (0.038)	0.047 (0.053)	0.077** (0.034)
NN 3	0.074*** (0.025)	0.065* (0.034)	0.114*** (0.038)	0.076 (0.049)	0.072** (0.030)
treated Obs.	170	148	84	25	99

Propensity Score Estimation - Relocation

	Relocation MSU	Quasi natural control group	Relocation MUW	Relocation Wagner
In employment (t-1)	0.396*** (0.121)	-0.084 (0.210)	0.228** (0.101)	
high technology (t-1)	-0.570* (0.330)	0.333 (0.683)	-0.419 (0.309)	
export share (t-1)	0.023*** (0.006)	0.028** (0.012)		0.009*** (0.003)
affiliate	0.782*** (0.365)	1.522** (0.701)		
works council	-1.049*** (0.460)	-5.299*** (1.120)		
log wage per employee (t-1)			-0.086 (0.335)	
high-skilled (t-1)			0.147 (0.592)	
foreign ownership			0.783 (0.415)	
employment (t-1)				3.87e-04*** (1.47e-04)
employment squared (t-1)				-3.19e-08* 1.81e-08
employment cubic (t-1)				4.81e-13 3.98e-13
sales per employee (t-1)				-1.13e-07 (3.79e-07)
wage per employee (t-1)				2.69e-05 (7.96e-05)
employment change ((t-2) - (t-1))				-0.175 (0.373)
17 industry dummies	yes	yes	yes	yes
16 regional dummies	yes	yes	yes	yes
Pseudo R^2	0.1259	0.4159	0.0819	0.1262
Number of Obs.	6496	214	7347	5271

Average Treatment Effects on the Treated - Relocation

	MSU	Quasi natural control group	MUW	Wagner
OLS DiD/ in (2) mean comparison	-0.148* (0.079)	-0.244*** (0.089)	-0.326* (0.191)	-0.043** (0.020)
kernel 0.01	-0.325* (0.170)	-0.047 (0.416)	-0.310* (0.180)	-0.356 (0.221)
kernel 0.03	-0.328* (0.177)	-0.263 (0.410)	-0.310* (0.179)	-0.346 (0.225)
kernel 0.05	-0.330* (0.178)	-0.477 (0.352)	-0.310* (0.179)	-0.344 (0.223)
NN1	-0.365** (0.146)	-0.459* (0.264)	-0.287 (0.189)	-0.068 (0.168)
NN2	-0.362*** (0.134)	-0.432* (0.259)	-0.265* (0.160)	-0.339 (0.236)
NN3	-0.348 (0.188)	-0.462** (0.232)	-0.307* (0.163)	-0.361 (0.288)
treated Obs.	43	40	48	37

Aggregate employment effects of offshoring/FDI

Treatment	period	cases	ATT kernel 0.01	Δ aggregate employment estimated	Δ aggregate dismissals self reported
relocation IAB	2006-2007	73	-0.325	-63626	N/A
relocation IAB self reporters	2006-2007	43	-0.325	-44691	-12991
FDI closure IAB	2004+2005	47	N/A	N/A	-7737
FDI cost closure IAB	2005+2006	21	N/A	N/A	-4221
FDI IAB	2005+2006	232	0.087	73459	N/A
relocation Wagner (2009)	2001-2003	148	-0.032	-2311	N/A
relocation DeStatis (2008)	2001-2006	3264	N/A	N/A	-188600

Conclusion

- negative employment effects from FDI with relocation
- positive employment effects from FDI overall
- no difference between horizontal and vertical FDI - cost savings always matter
- differences in results driven by treatment variables, not by study design

- Thank you for your comments and attention.

Auxiliary Estimates - FDI I

Balancing Tests I

Covariate	Mean treat- ment group	Mean matched control group	Percent bias	Percent bias re- duction	Mean differ- ence test
log total employment	5.3857	5.4260	-2.5	98.3	-0.22 (0.83)
log wage per employee	7.8654	7.8651	0.1	99.9	0.01 (0.99)
high technology	0.8765	0.9000	-5.8	88.9	-0.69 (0.49)
high-skilled	0.5034	0.5021	0.4	95.6	0.04 (0.96)
foreign ownership	0.0529	.05294	0.0	100.0	0.00 (1.00)

Auxiliary Estimates - FDI II

Balancing Tests II

Quantile	Frequency treatments	Frequency matched controls	T-squared statistics	F-Test statistics	p-value
First	52	48	38.825	0.7924	0.7654
Second	52	48	26.216	0.7511	0.7908
Third	66	33	21.143	0.7530	0.7700

- treatment and matched control group's covariates are balanced after matching

Auxiliary Estimates - FDI III

Heckman and Hotz Pre-Test

Time	OLS for FDI	ATT for FDI
t-1	0.029** (0.012)	0.013 (0.019)

- no significant difference in outcome variable before treatment period
- confirms CIA

Auxiliary Estimates - Relocation I

Balancing Tests I

Covariate	Mean treat- ment group	Mean matched control group	Percent bias	Percent bias re- duction	Mean difference test
log total employment	4.4883	4.4352	2.7	96.0	0.11 (0.915)
exports	30.721	32.349	6.1	92.6	-0.22 (0.823)
affiliate	0.3256	0.3721	-11.0	73.0	-0.45 (0.655)
works council	0.4419	0.4651	-4.9	86.8	-0.21 (0.831)
high technology	0.6047	0.6744	-14.5	8.0	-0.67 (0.506)

Auxiliary Estimates - Relocation II

Balancing Tests II

Quantile	Frequency treatments	Frequency matched controls	T-squared statistics	F-Test statistics	p-value
First	12	23	26.368	0.7990	0.6756
Second	15	15	60.285	0.4485	0.9157
Third	16	16	66.911	0.6505	0.7975

- treatment and matched control group's covariates are balanced after matching

Auxiliary Estimates - Relocation III

Heckman and Hotz Pre-Test

Time	OLS for Relocation	ATT for Relocation
t-1	-0.042 (0.027)	-0.038 (0.058)

- no significant difference in outcome variable before treatment period
- confirms CIA