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Düsseldorf Institute for
Competition Economics

Technology, Trade and Structural Change: Lessons from Germany

JENS SUEDEKUM

DÜSSELDORF INSTITUTE FOR COMPETITION ECONOMICS (DICE) & CEPR

WTO Trade Dialogue Lecture Series, Geneva – May 2017



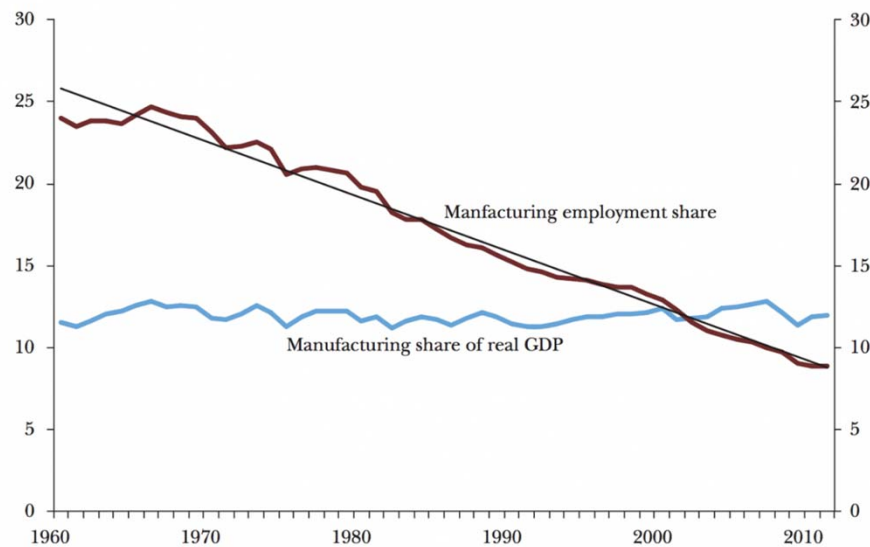
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- I. TRADE AND JOBS IN THE USA
- II. GERMANY
- III. POLICY IMPLICATIONS

Decline of manufacturing jobs in the USA

Manufacturing Value Added and Employment as a Share of the Total US Economy, 1960–2011
(in 2005 prices)



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

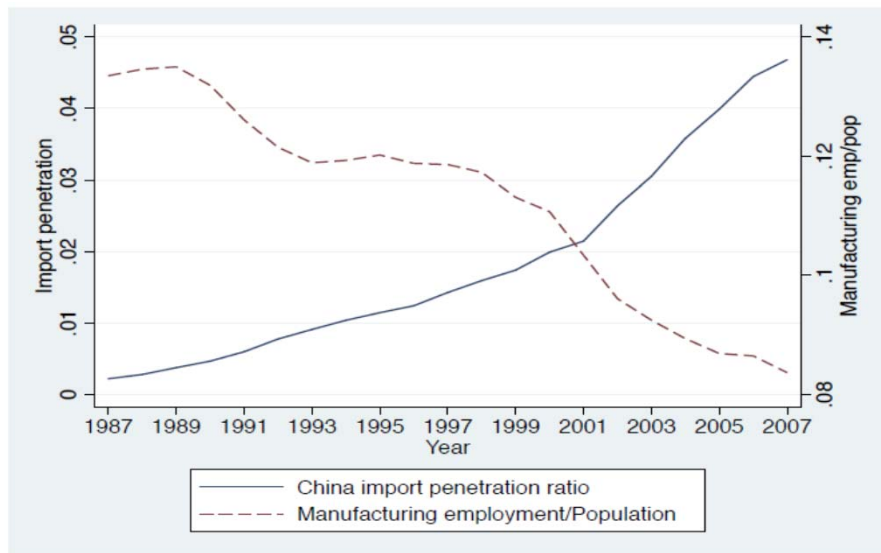
→ Main driver of job losses: **Technological progress**

Since 1990: The „**Rise of China**“

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

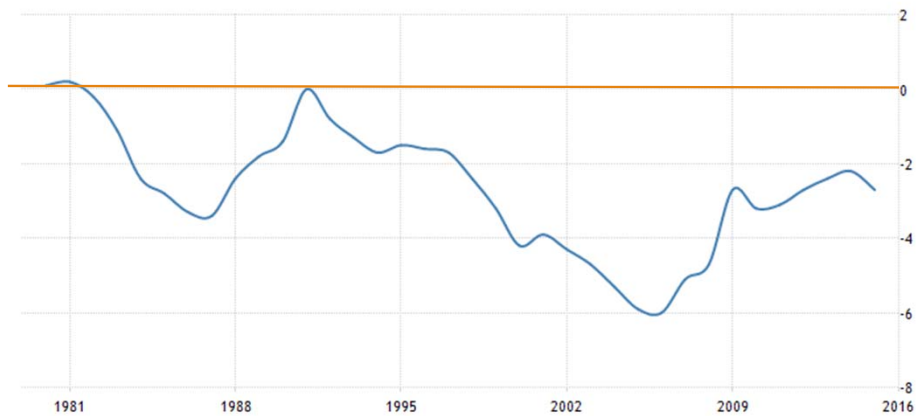
→ Game changer for American manufacturing?

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

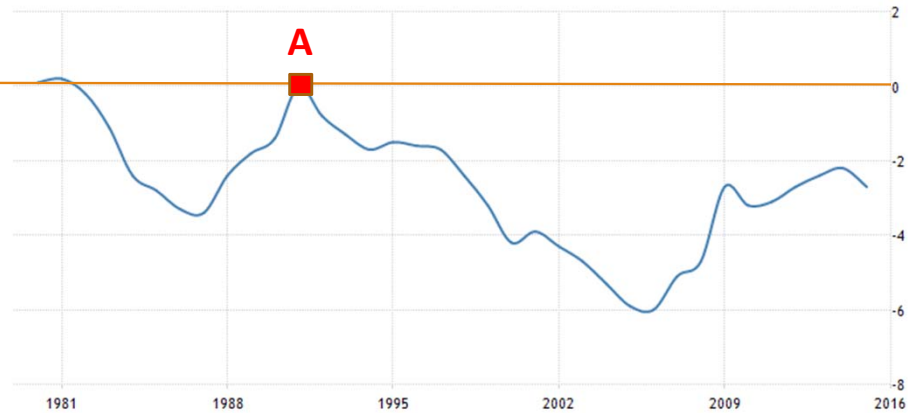


US current account (in % of GDP)

CA deficit 2015: **462 billion \$**

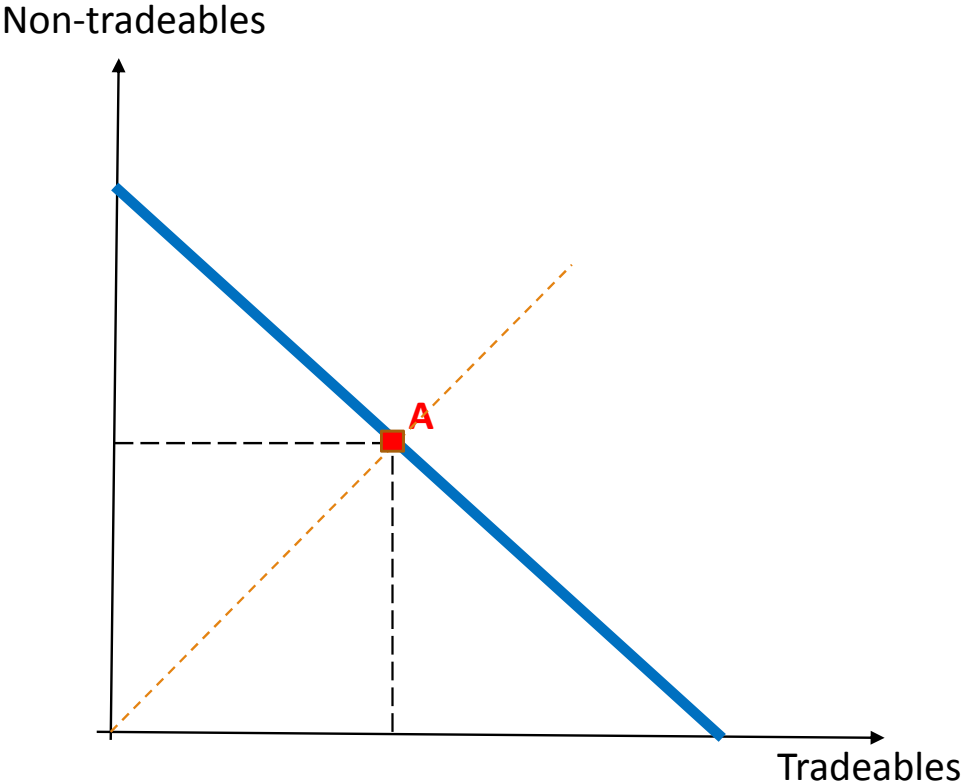
Aggregate trade deficit: 750 billion,
trade deficit with China: 350 billion

Trade deficit and manufacturing jobs: A simple model



US current account (in % of GDP)

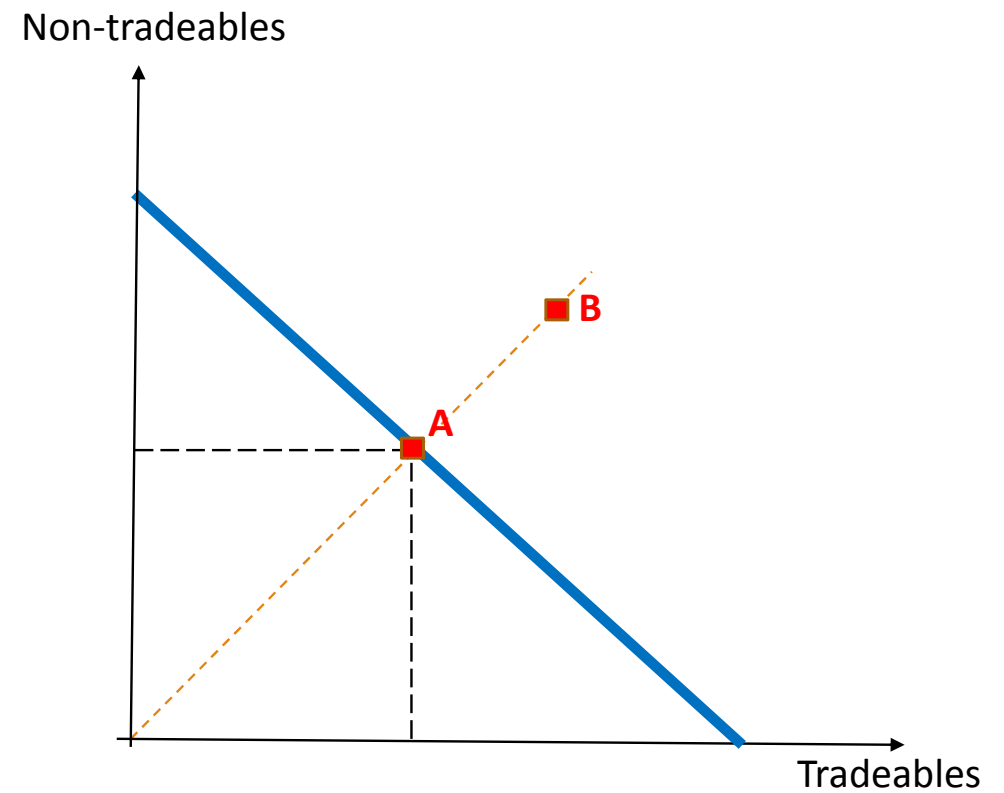
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Current account deficit:

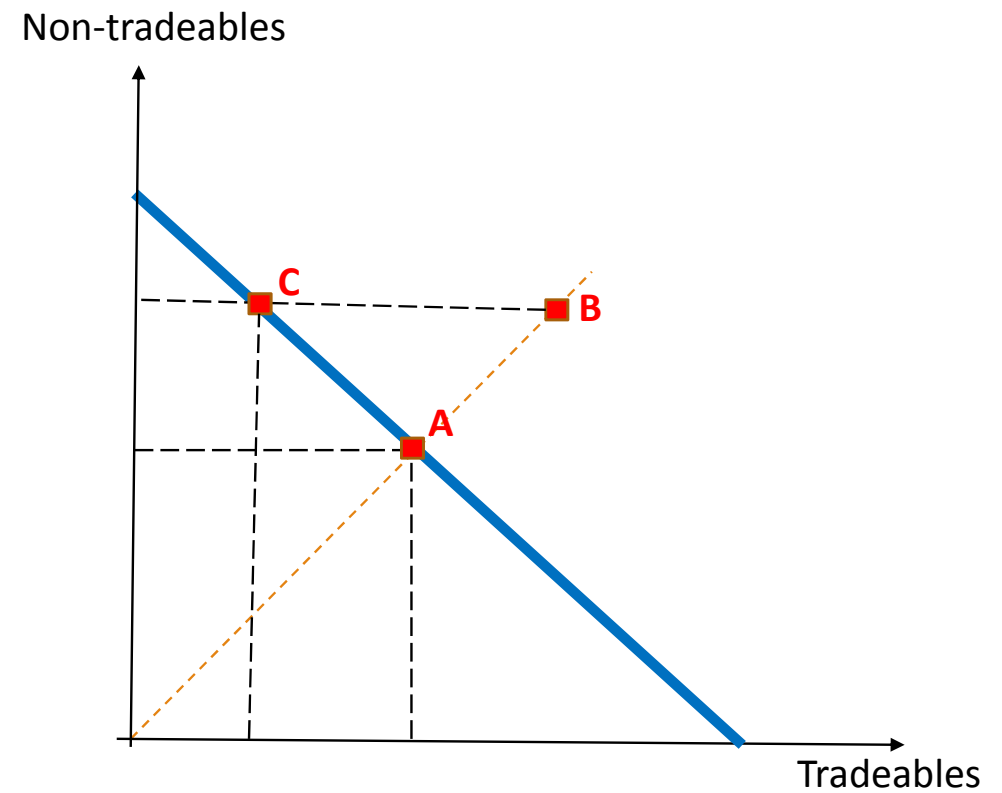
- More consumption than production (point **B**)



Trade deficit and manufacturing jobs: A simple model

Current account deficit:

- More consumption than production (point **B**)
- Domestic production of non-tradeables (point **C**)



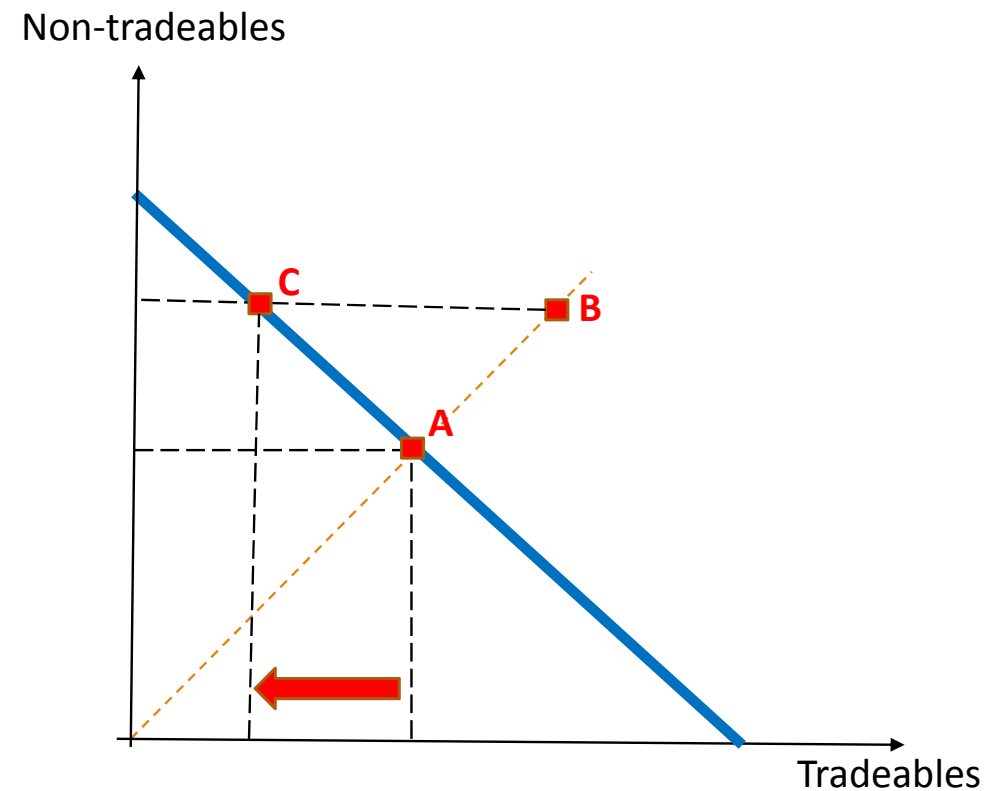
Trade deficit and manufacturing jobs: A simple model

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





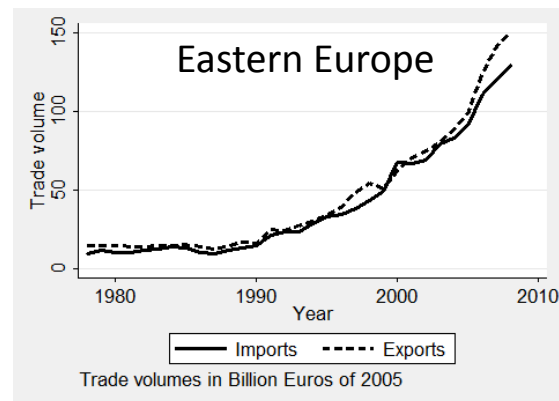
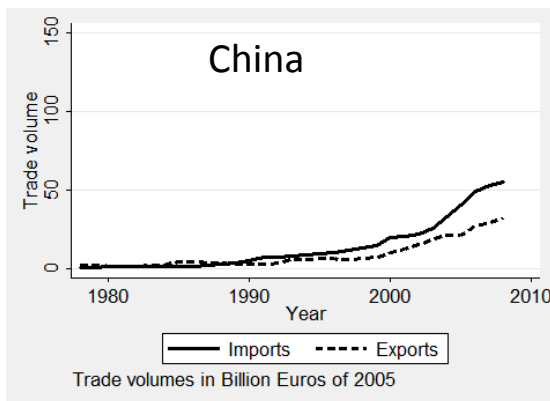
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„The Rise of the East and the Far East“ : Dauth, Findeisen & Südekum

(JEEA 2014, CEPR 2016, JEconGeogr 2016, AER 2017)



Period	China		Eastern Europe	
	Imports	Exports	Imports	Exports
1988	3.1	3.0	11.0	13.3
1998	12.9	5.6	42.0	51.0
2008	53.1	30.1	103.8	134.0
Growth	1628.3%	893.2%	843.9 %	905.3%

Period	Other Asian dev. countries		Rest of the World	
	Imports	Exports	Imports	Exports
1988	5.0	5.1	289.4	402.1
1998	12.5	7.5	357.7	506.9
2008	20.0	16.3	490.2	842.7
Growth	296.5 %	219.0 %	69.4 %	109.6 %

- 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

TOP-10 EXPORT INDUSTRIES

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

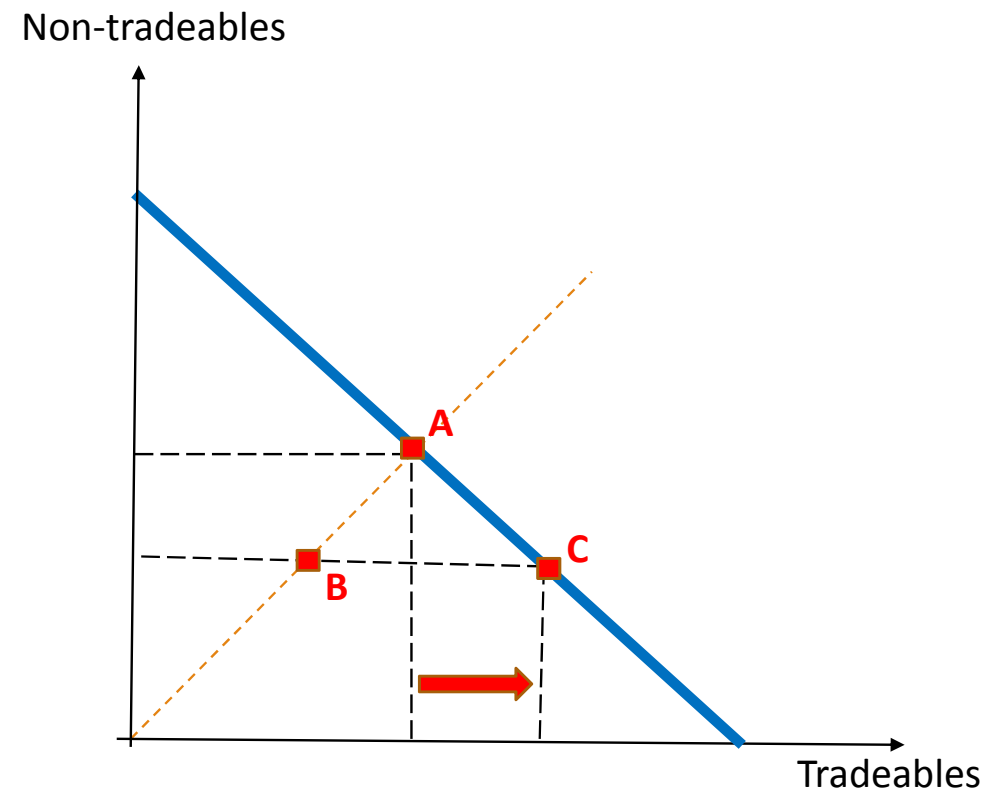
TOP-10 IMPORT INDUSTRIES

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

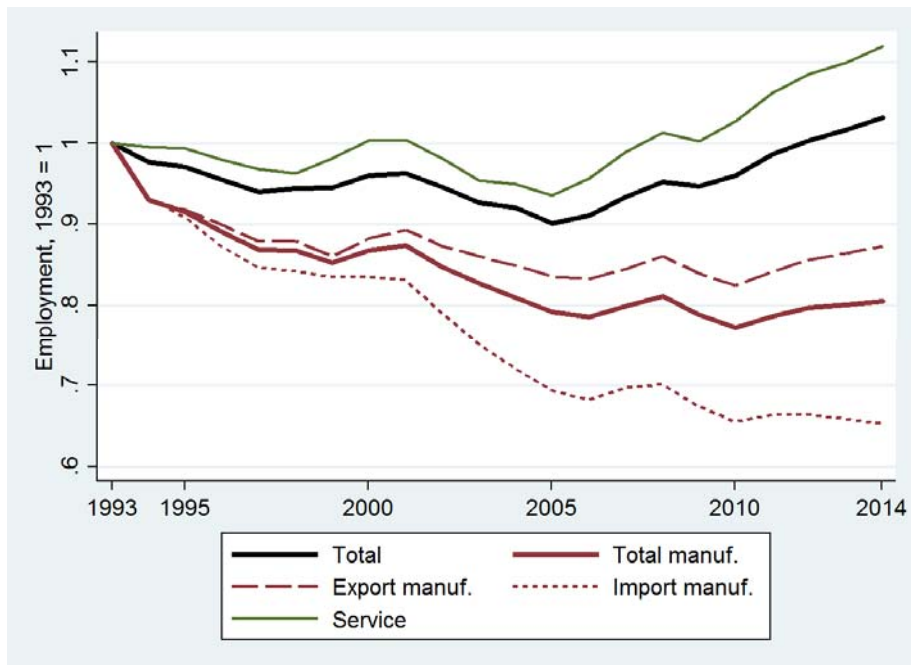
German export- and import volumes with China and Eastern Europe (in billion 2010-€)

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)

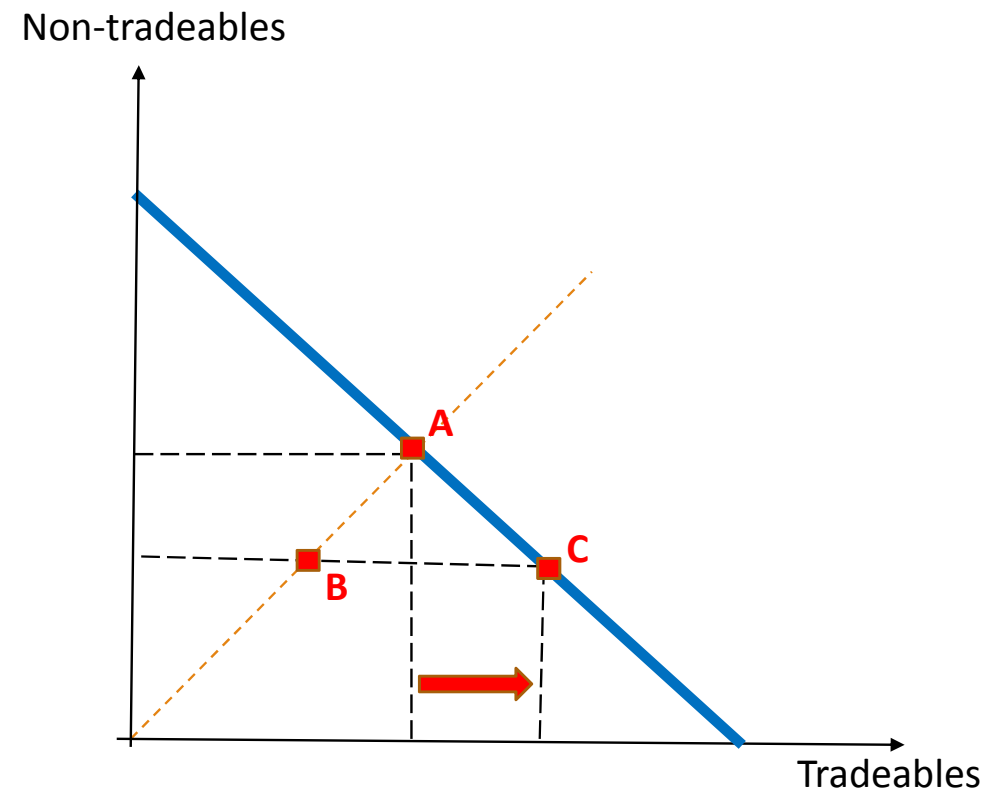


Full and part-time jobs (without mini-jobs), 1993=1

- 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**

Globalization and the German labor market: Back to theory

- Model predicts different impact of globalization on the German than the American labor market!
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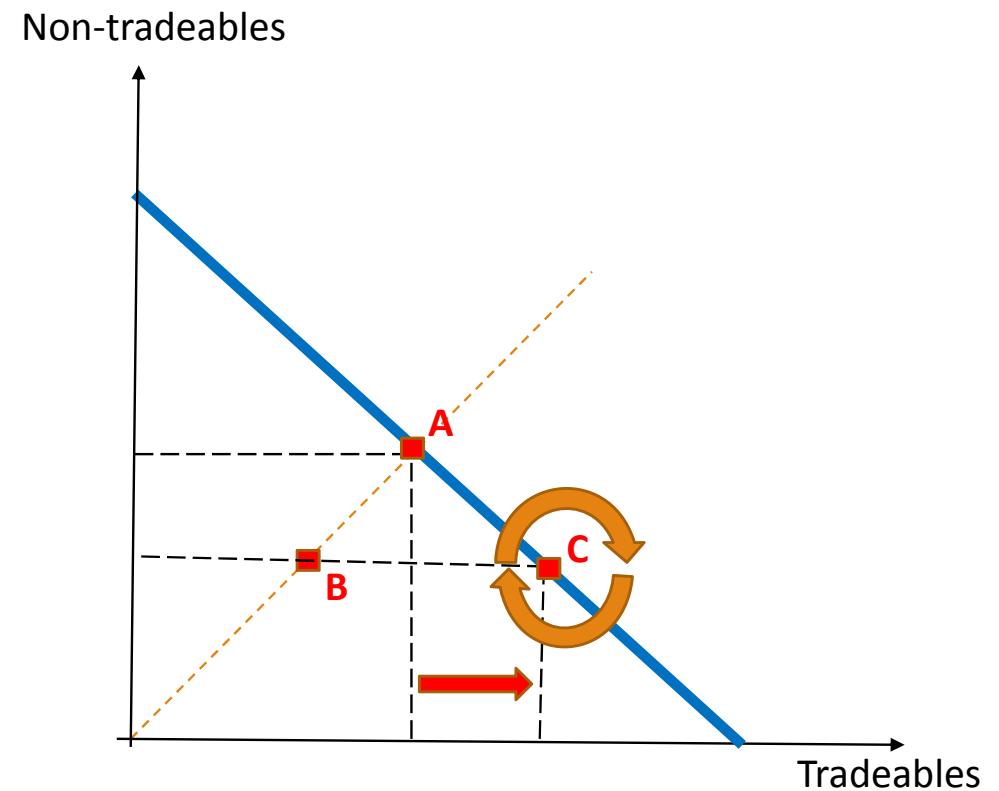


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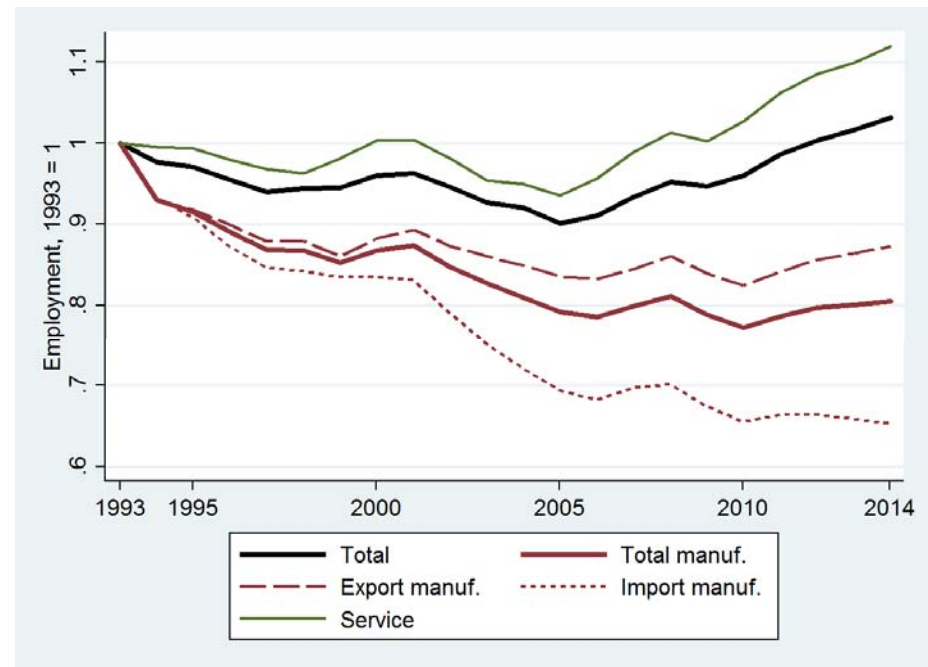
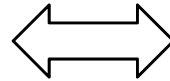
Adjustment costs

- Transitions of workers from import- to export-manufacturing or services may involve frictions
- Common feature of US and German labor market

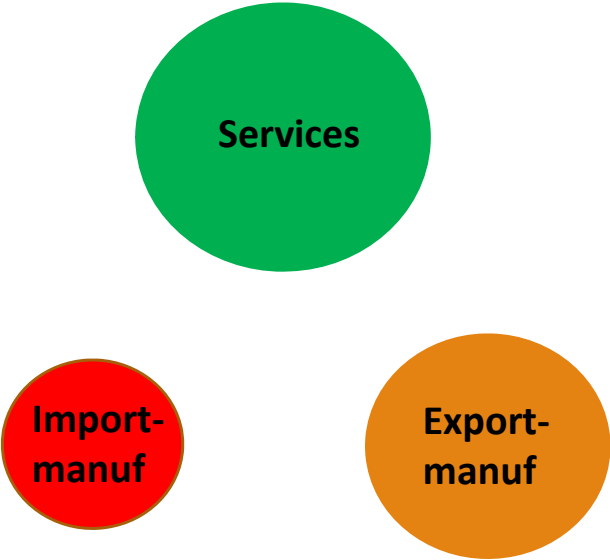


Transitions behind aggregate trends

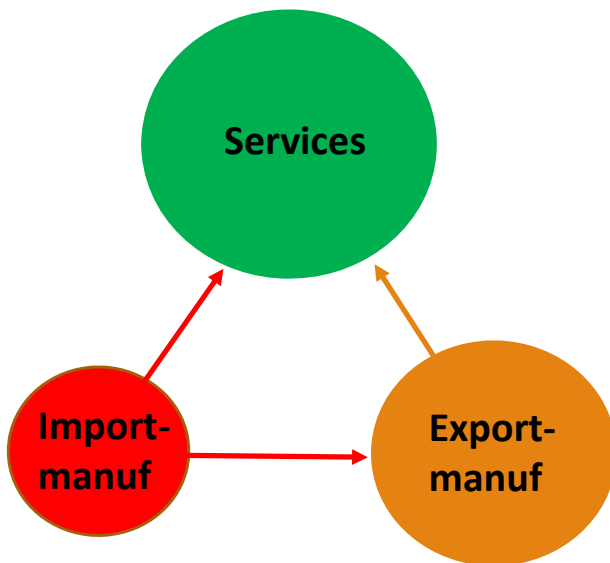
Origin in (t-1)	Destination in t					Total Origin
	Service	Exp-manuf	Imp-manuf	Other jobs	Non-empl.	
Service	10,870	135	62	102	1,579	12,747
<i>orig %</i>	85.3	1.1	0.5	0.8	12.4	[43.6 %]
<i>dest %</i>	84.8	2.8	3.2	1.5	54.6	
Exp-manuf	117	4,341	28	18	383	4,888
<i>orig %</i>	2.4	88.8	0.6	0.4	7.8	[16.7 %]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



Micro-anatomy of structural change

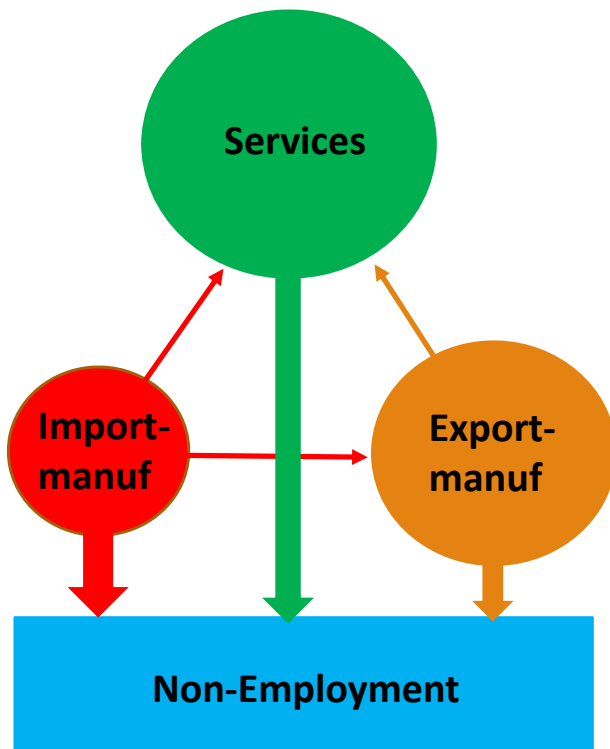


Micro-anatomy of structural change



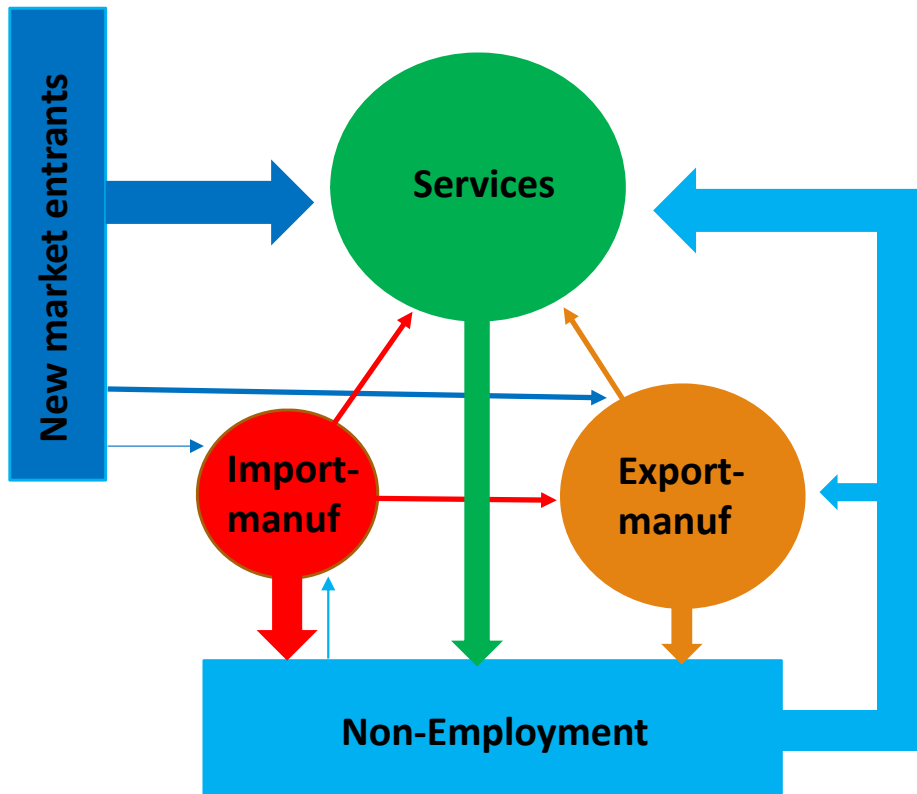
- Direct annual net flow of workers from **import-** to **export-**manufacturing or towards **services** are small

Micro-anatomy of structural change



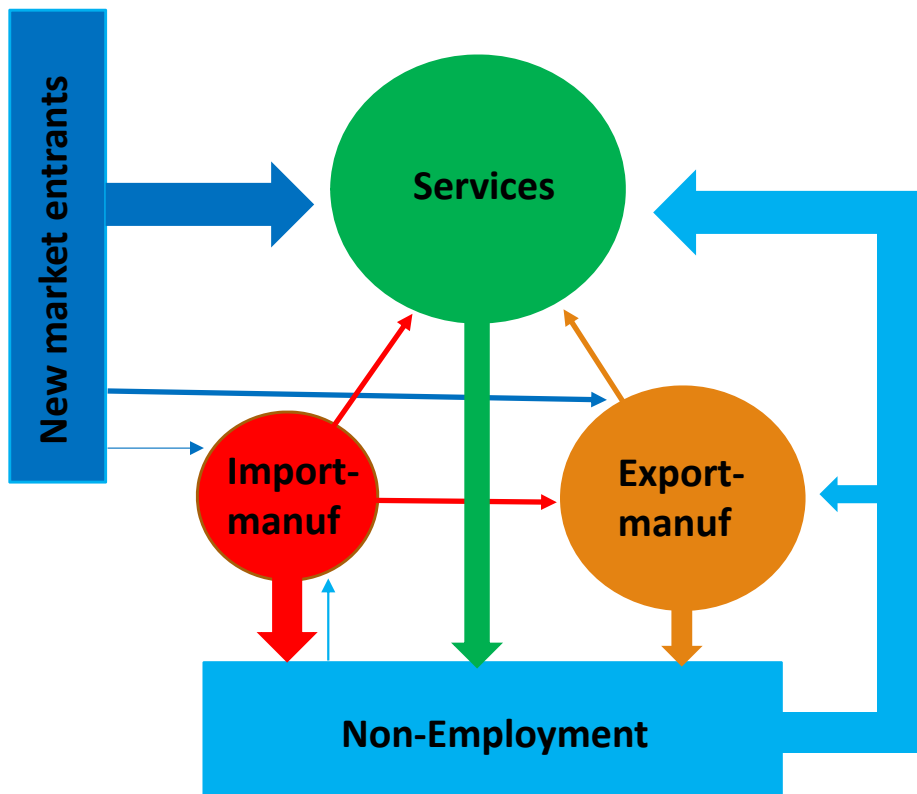
- Direct annual net flow of workers from **import-** to **export-**manufacturing or towards **services** are small
- Much larger flows into **non-employment**

Micro-anatomy of structural change



- Direct annual net flow of workers from **import-** to **export-**manufacturing or towards **services** are small
- Much larger flows into **non-employment**
- Expansion of **services** and stable **export-**manufacturing driven by **entrants** and **returnees**, not direct switchers

Micro-anatomy of structural change



- Direct annual net flow of workers from **import-** to **export-**manufacturing or towards **services** are small
 - 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

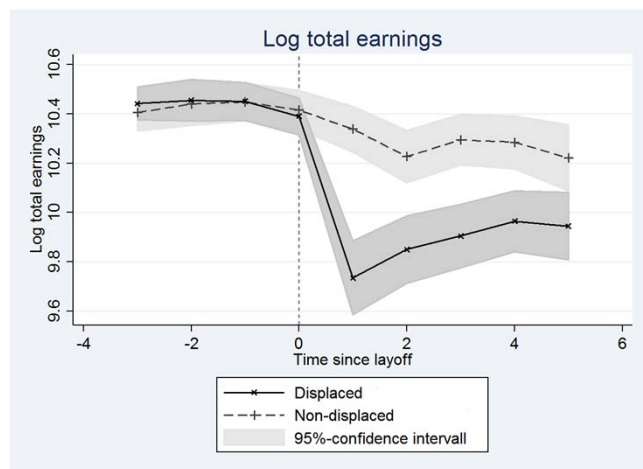
		Dependent variable: 100 x cumulated earnings relative to earnings in base year				
		(1)	(2)	(3)	(4)	(5)
		All employers	Manufacturing sector		Other Sector	
Same 2-dig industry			yes	yes	no	no
Same employer			yes	no	no	no
import exposure		-0.1665*** (0.042)	-0.2859*** (0.090)	-0.0760 (0.056)	0.0002 (0.036)	0.1952*** (0.046)
export exposure		0.5719*** (0.151)	0.7092** (0.324)	0.2275 (0.244)	-0.0410 (0.116)	-0.3238*** (0.124)
R ²		0.155	0.075	0.028	0.035	0.044

		Dependent variable: dummy=100 if worker ever				
		(1)	(2)	(3)	(4)	(5)
		becomes unemployed	stays in manufacturing sector		Leaves Sector	
Stays in 2-dig industry			yes	yes	no	no
Stays in firm			yes	no	no	no
import exposure		0.0194*** (0.006)	-0.0324** (0.013)	-0.0046 (0.006)	-0.0064 (0.005)	0.0434*** (0.012)
export exposure		-0.0478** (0.019)	0.0745 (0.051)	0.0101 (0.022)	0.0167 (0.022)	-0.1013*** (0.037)
R ²		0.153	0.079	0.014	0.023	0.061

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

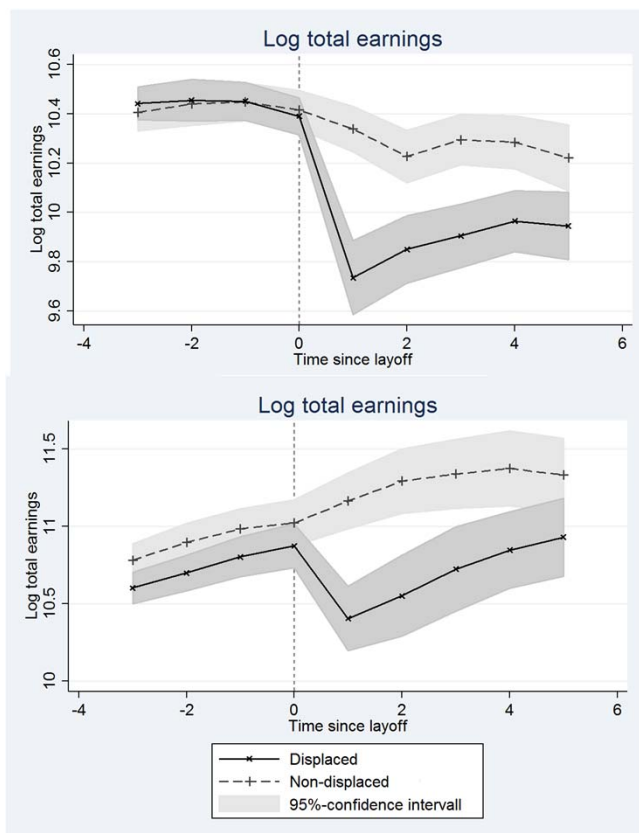
Earnings profiles in import- and export-manufacturing



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”

Earnings profiles in import- and export-manufacturing



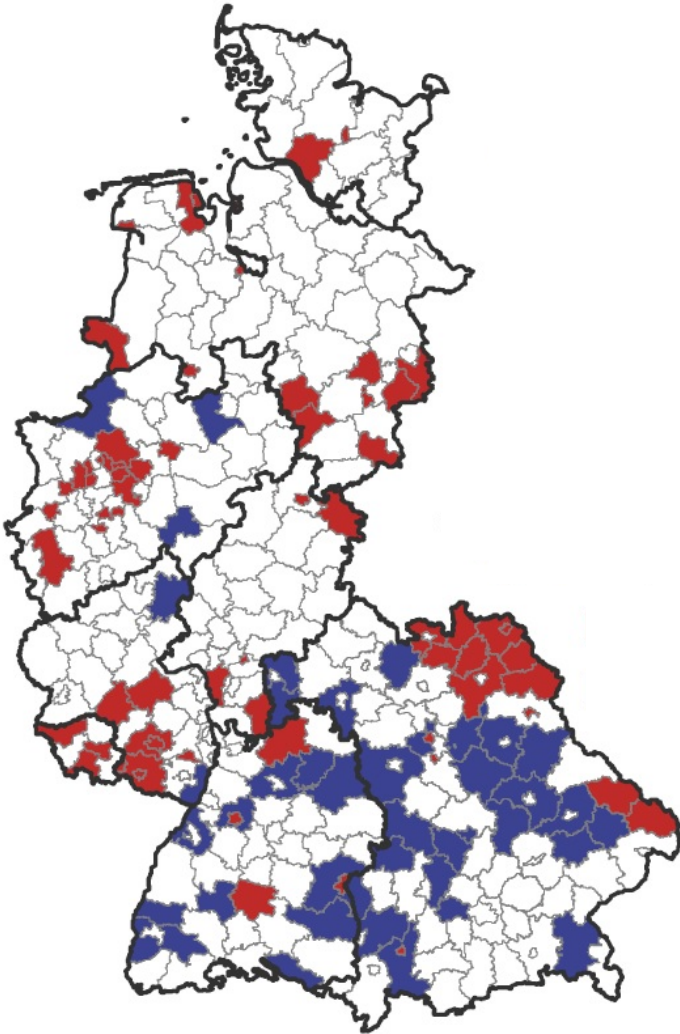
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Strongly export-exposed worker (e.g., “automobile”)

- 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



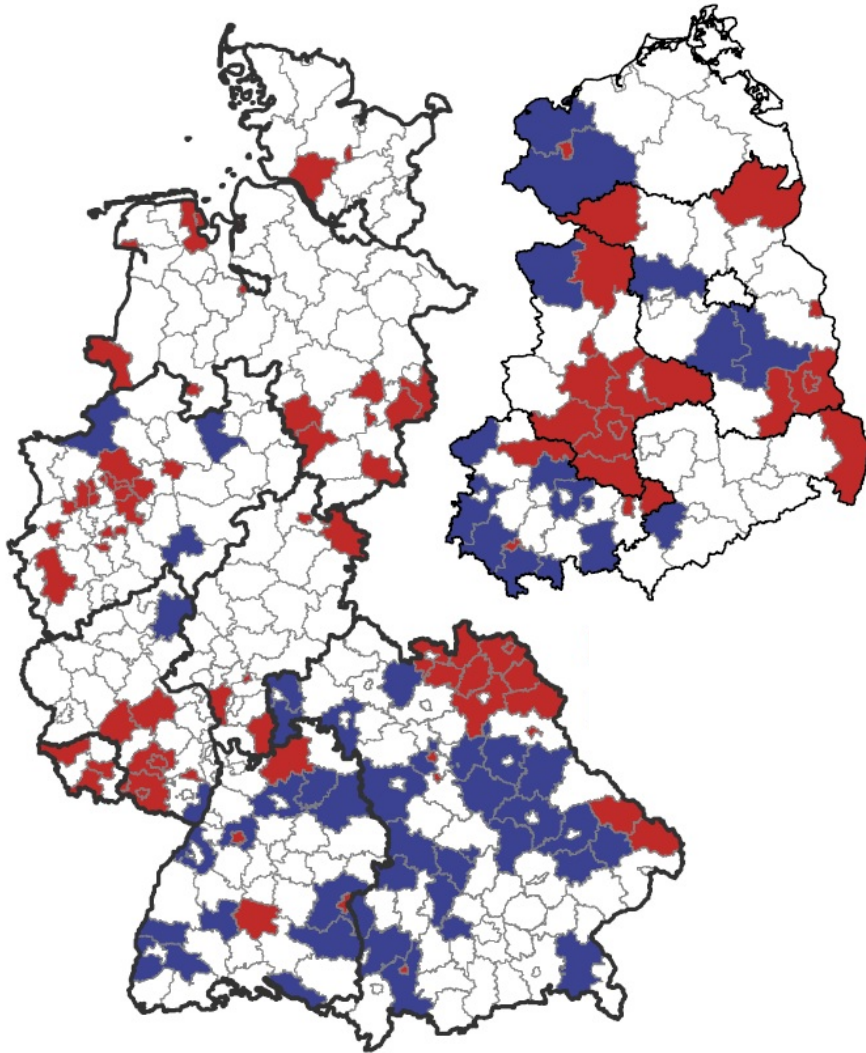
Highly import-exposed regions

- Ruhr area → Coal & steel
- Südwestpfalz → Textiles and shoes
- Oberfranken → Toys, consumer electronics

Highly export-oriented regions

- Lower Bavaria, Stuttgart, Allgäu → Cars & car parts

Regional impact across German regions



Highly import-exposed regions

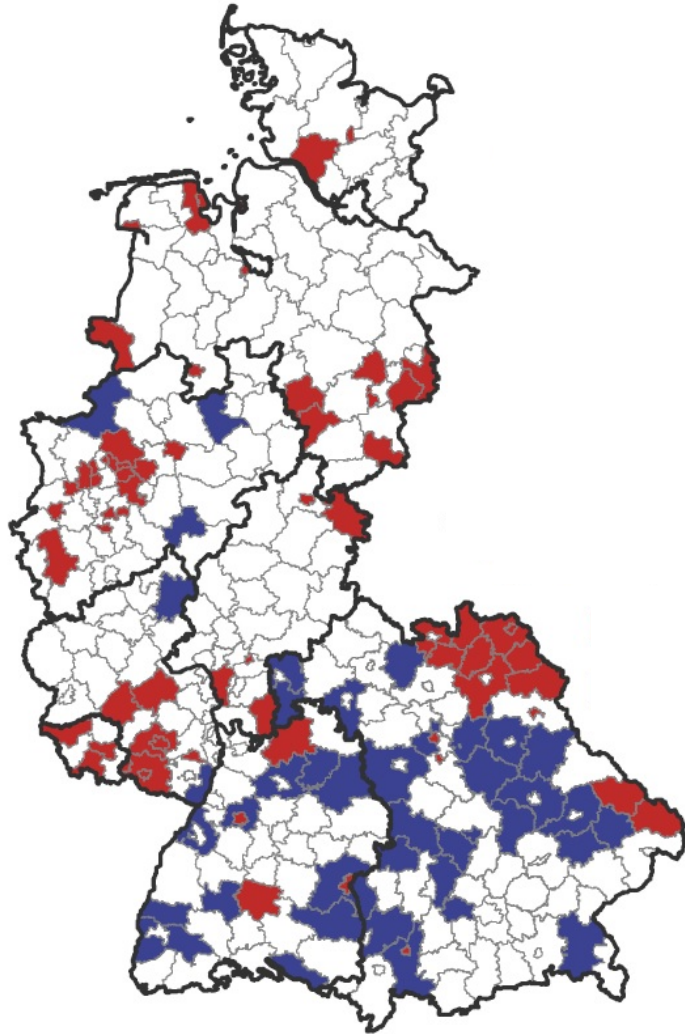
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Highly export-oriented regions

- Lower Bavaria, Stuttgart, Allgäu → Cars & car parts

Eastern Germany

- Much smaller manufacturing sector overall
→ smaller impacts of trade, lower geographical variation



Aggregate effect 1990-2010

- 541.522 imports (mainly in ■)
+ 985.054 exports (mainly in ■)
+ 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 ■ not necessarily filled with those workers who lost their jobs in ■

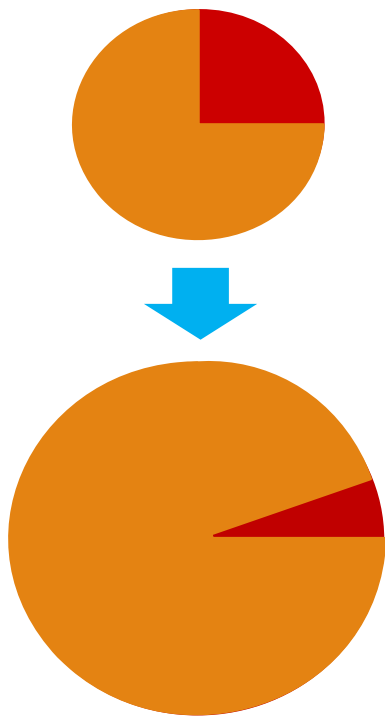


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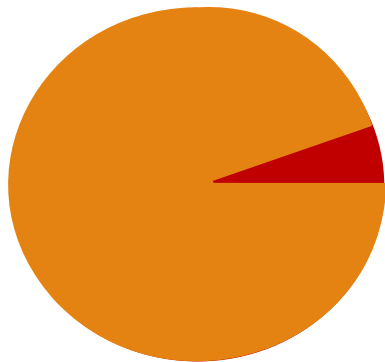
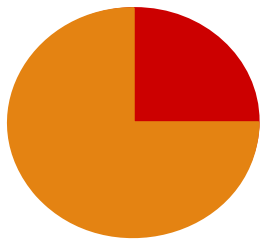
Two problems of globalization



- 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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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



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