Endogenous Competition Exposure:
China's rise, intra-industry and intra-firm adaptation

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Motivation

- Increasing exposure to low-wage country imports is associated with higher probability of firm exit, lower sales growth and intra-firm adjustments such as switching from highly exposed to less exposed products and market share reallocations (Bernard et al., 2006; Iacovone et al., 2013)

- *Exogenously* driven import competition has primarily adverse effects for regional labour markets (Autor et al., 2013; Dauth et al., 2014)

  Objectives:

- Dimensions and scope for *endogenous* adaptation / mitigation of competition at industry and firm level

- Key drivers of firm level competition mitigation

- Simultaneous assessment of firm level employment effects through change in readily observable Chinese import competition and adaptation
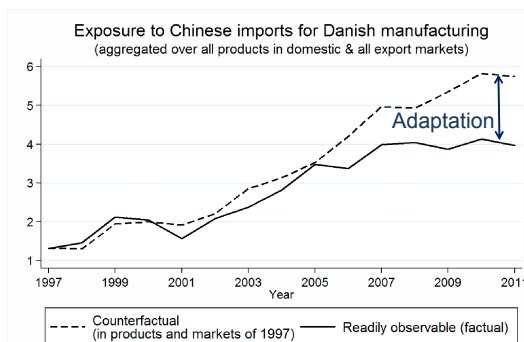

Exposure to Chinese imports for Danish manufacturing
(aggregated over all products in domestic & all export markets)

Counterfactual (in products and markets of 1997) — Readily observable (factual)

Table 1: Levels of competition exposure and measurement

Level	Examples	Exposure Measure
1 Sector	*Manufacturing*	$\Lambda_t = \sum_k \sum_j \alpha_{jt} \lambda_{kjt}$
2 Industry (k)	*Food products (NACE Rev2 No. 10)*	
3 Firm (j)	*Firm j_1, Firm j_2*	$\lambda_{kjt} = \sum_p \sum_d \omega_{kjpdt} C_{pdt}$
4 Product (p)	*Crispbread (HS-6 No. 19.05.10)*	
5 Destination (d)	*Denmark, Germany*	C_{pdt} (Chinese import share of product p in destination d)

α_{kjt} - Manufacturing level sales share of firm j.
ω_{kjpdt} - Firm level sales share of product-destination pd.

Data

- Danish firm register data, combining enterprise statistics with product level sales and product-destination specific export volume

- CEPII - BACI dataset for product-destination specific Chinese imports

- 1997: 2,899 firms and 35,336 product-destinations. 2008: 2,422 firms and 43,556 product-destinations. 1,287 continuing firms.

Decomposition of competition change

- Adopted method: Decomposition of industry level productivity dynamics (Olley and Pakes, 1996)

- Multi-industry framework by Lewrick, Mohler and Weder (2014)

  Basic idea: split change of **readily observable (factual)** competition exposure into:

- **Counterfactual** (i.e. *constant* product- and destination sets and weights, *change* in exogenous competition exposure)

- **Adaptation** (i.e. *change* in product- and destination sets and weights, *constant* competition exposure)

Table 2: Competition exposure change and adaptation, 1997-2008

Panel A: Change in competition exposure

Readily observable (factual) change	171 %	
Counterfactual change	240 %	
Adaptation	69 percentage points (p.p.)	

Panel B: Dimensions of adaptation

	absolute	share (%)
Firm Exit/Entry		
Inter-industry market share reallocations	16 *p.p.*	23
Intra-industry level & allocation effects	31 *p.p.*	46
Surviving firms		
Inter-industry market share reallocations	5 *p.p.*	7
Intra-industry market share reallocations	12 *p.p.*	17
Intra-firm adaptation		
thereof: Product-switching	6 *p.p.*	9
Destination-switching	0 *p.p.*	0
Reallocations between continued products & destinations	-1 *p.p.*	-2
Total adaptation	69 *p.p.*	100 %

disproportionately high contribution

Table 3: Sales share by firm, product & destination set, in %

	1997	2008
Exiting/Entering firms	57.0	51.3
Continuing firms	43.0	48.7
Dropped/added products	5.1	6.9
Continued products	37.9	41.8
Dropped/added destinations	1.8	2.6
Continued destinations	36.1	39.2

Firm level variation in adaptation
(selected NACE Rev. 2 industries)
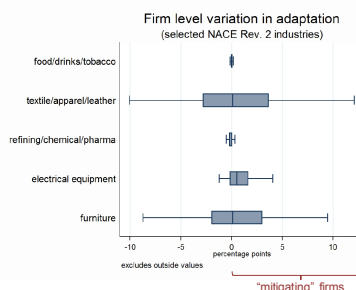
excludes outside values

"mitigating" firms

Table 4: Adaptation and firm characteristics

Dependent variable: Firm-level ADAPTATION$^{1997-2008}$ of competition exposure (in % pts)

	(1)	(2)	(3)	(4)	(5)	(6)	(8)
Log Employment^{1997}	0.24**						
	(0.10)						
Log Average Hourly Wage^{1997}		1.45					
		(0.93)					
Log Labour Productivity^{1997}			0.53				
			(0.32)				
Log Capital Intensity^{1997}				0.06			
				(0.24)			
Log Sales^{1997}					0.26**		
					(0.10)		
High Skilled Employment Share^{1997}						0.03*	
						(0.016)	
Low Skilled Employment Share^{1997}							-0.01
							(0.01)
Constant	-1.24***	-7.67	-7.27*	-1.16	-4.96***	-0.67***	0.17
	(0.39)	(4.68)	(4.24)	(3.02)	(1.80)	(0.19)	(0.37)
Further controls	yes	yes	yes	yes	yes	yes	yes
Observations	1,287	1,287	1,287	1,287	1,287	1,287	1,287
R-squared (within)	0.08	0.08	0.08	0.08	0.08	0.08	0.08
No. of industry FE	80	80	80	80	80	80	80

Notes. Robust standard errors in parentheses are clustered at 3-digit industry level. The dependent variable ADAPTA-TION is measured in percentage points. Further controls are Counterfactual change and Competition exposure of 1997 controlling for the "scope" for adaptation. *** statistically significant at 1 percent level, ** statistically significant at 5 percent level, * statistically significant at 10 percent level.

Employment effects

$$\Delta Y_j^{1997-2008} = \theta_0 + \theta_1 ADAPTATION_j^{1997-2008} + \theta_2 FACTUAL_j^{1997-2008} + \mathbf{Z}_j'\theta_3 + \phi_i + u_j,$$

ΔY	Change in Log employment	ϕ_i	FE for 3-digit industry level
$\mathbf{Z}$	Vector incl. initial employment level and initial competition exposure	u_j	error term

Table 5: Employment effects of Adaptation and Factual competition change

Dependent variable: Log change in firm level employment between 1997 and 2008

		Sub-samples by firm size		
Marginal effects	All firms (1)	Large (2)	Medium (3)	Small (4)
FACTUAL$^{1997-2008}$	-0.62**	-1.88***	-0.46	0.31
	(0.28)	(0.48)	(0.56)	(0.39)
ADAPTATION$^{1997-2008}$	0.34	1.44***	-0.18	-0.49
	(0.28)	(0.70)	(0.43)	(0.34)
Further controls	yes	yes	yes	yes
Observations	1,287	330	615	342
R-squared (within)	0.07	0.04	0.01	0.00

Notes. Robust standard errors in parentheses are clustered at 3-digit industry level. The numbers above show marginal effects of Adaptation and Factual competition change multiplied by 100. Hence, the marginal effects can be interpreted as semi-elasticities. Further controls are initial employment and competition exposure. *** statistically significant at 1 percent level, ** statistically significant at 5 percent level, * statistically significant at 10 percent level.

Conclusion

- Danish manufacturing exposure to Chinese imports increased by 171 % between 1997 and 2008

- Without adaptation it would have had increased by 240 %

- Hence, readily observable competition exposure is significantly shaped by endogenous reallocations (notably firm entry & exit and product-switching)

- Firm size is a key driver for successful intra-firm mitigation

- Large firms are able to mitigate adverse employment effects of Chinese import competition through successful adaptation

ABSTRACT - In this paper we analyse the manufacturing sector's capacity to mitigate the rising import competition from China. In our view, competition exposure is endogenous, i.e. influenced by firms' decisions which products are sold and what markets are served. We construct a counterfactual competition measure to assess the importance of different types of adaptation to increased competition: inter- and intra-industry reallocations, firm entry and exit, and product- and destination switching, among others. Combining Danish firm register data with product-destination level trade statistics we are able to track product-level competition changes on the domestic as well as on each export market. Between 1997 and 2008 the exposure of Danish manufacturing to Chinese imports increased by 171 per cent but would have counterfactually increased by remarkable 240 per cent had the Danish economy not adapted. Firm exit and entry is the most important driver of sector-level adaptation but intra-firm mitigation through product-switching is disproportionately relevant as well. At the disaggregated firm level we find that larger firms are more successful in mitigating competitive pressure. Moreover, they are able to partly mitigate the adverse employment effects associated with increasing Chinese competition.

Selected references

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