
Import and Productivity of Multi-Product Firms

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(Import) Competition



- Erodes profits
- Pushes firms out of comfort zone
- Might even threaten existence
- Firms try to improve efficiency

- Trade liberalization (in general) and firm productivity
 - Canada–U.S. Free Trade Agreement (Trefler 2004)
 - U.S. manufacturing (Bernard, Jensen and Schott 2006)
 - Indonesian firms (Amiti and Konings 2007)
 - Belgian textile industry firms (De Locker 2011)
 - Chilean manufacturers (Pavcnik 2002)
 - Indian firms (Topalova and Khandelwal 2011)
- Import competition
 - Employment, wages (Autor, Dorn and Hanson 2013; Dauth, Findeisen and Suedekum 2014, 2016)
 - Innovation (Autor et al. 2016; Bloom, Draca and Van Reenen 2015)
 - Survival, growth (Bernard, Jensen and Schott 2006)
 - Political radicalization (Autor et al. 2016; Dippel, Gold and Heblich 2015)
- However
 - Fairly rough measures (tariff reductions, industry level)
 - Exact mechanisms unclear

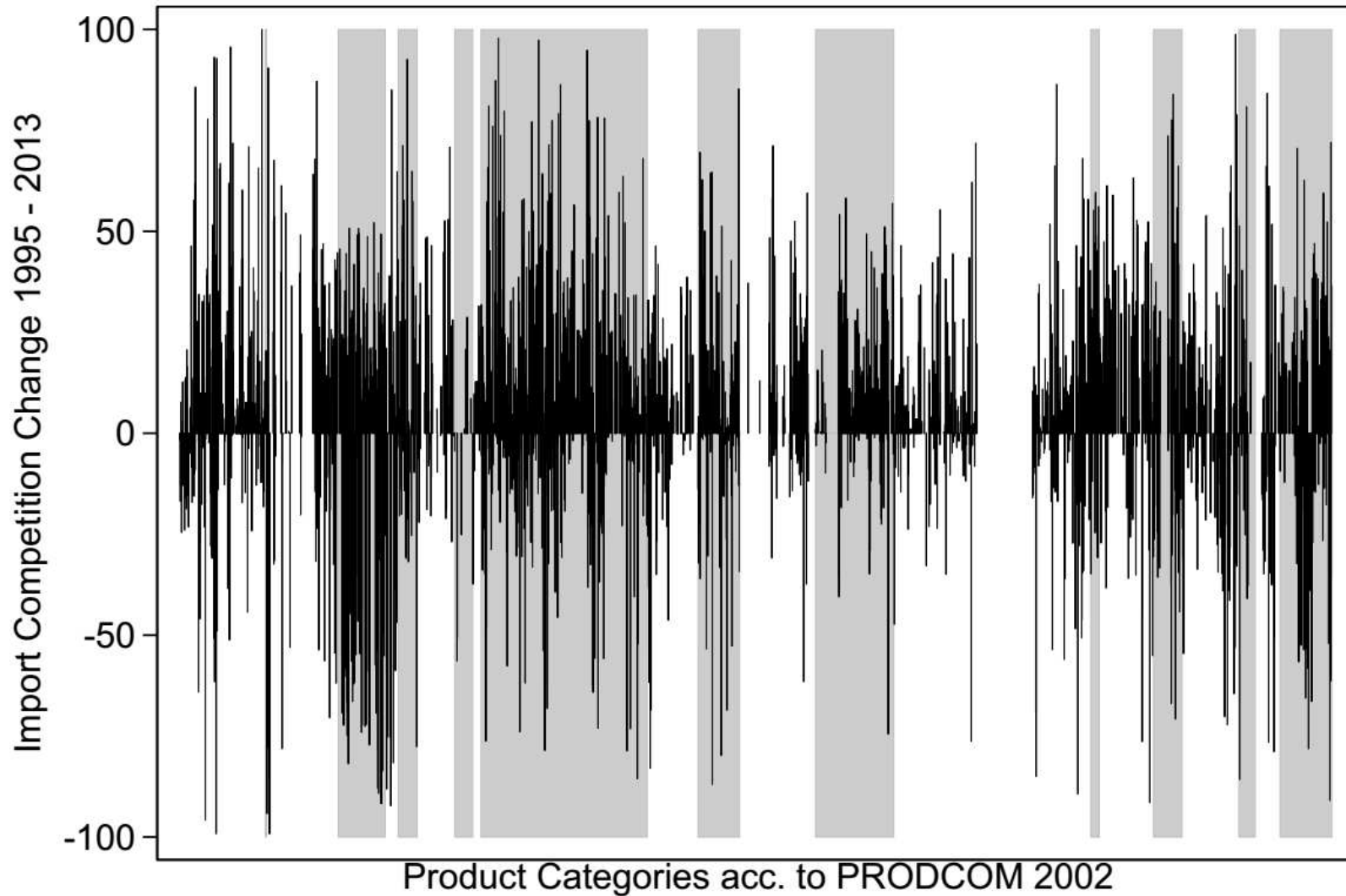
This Paper



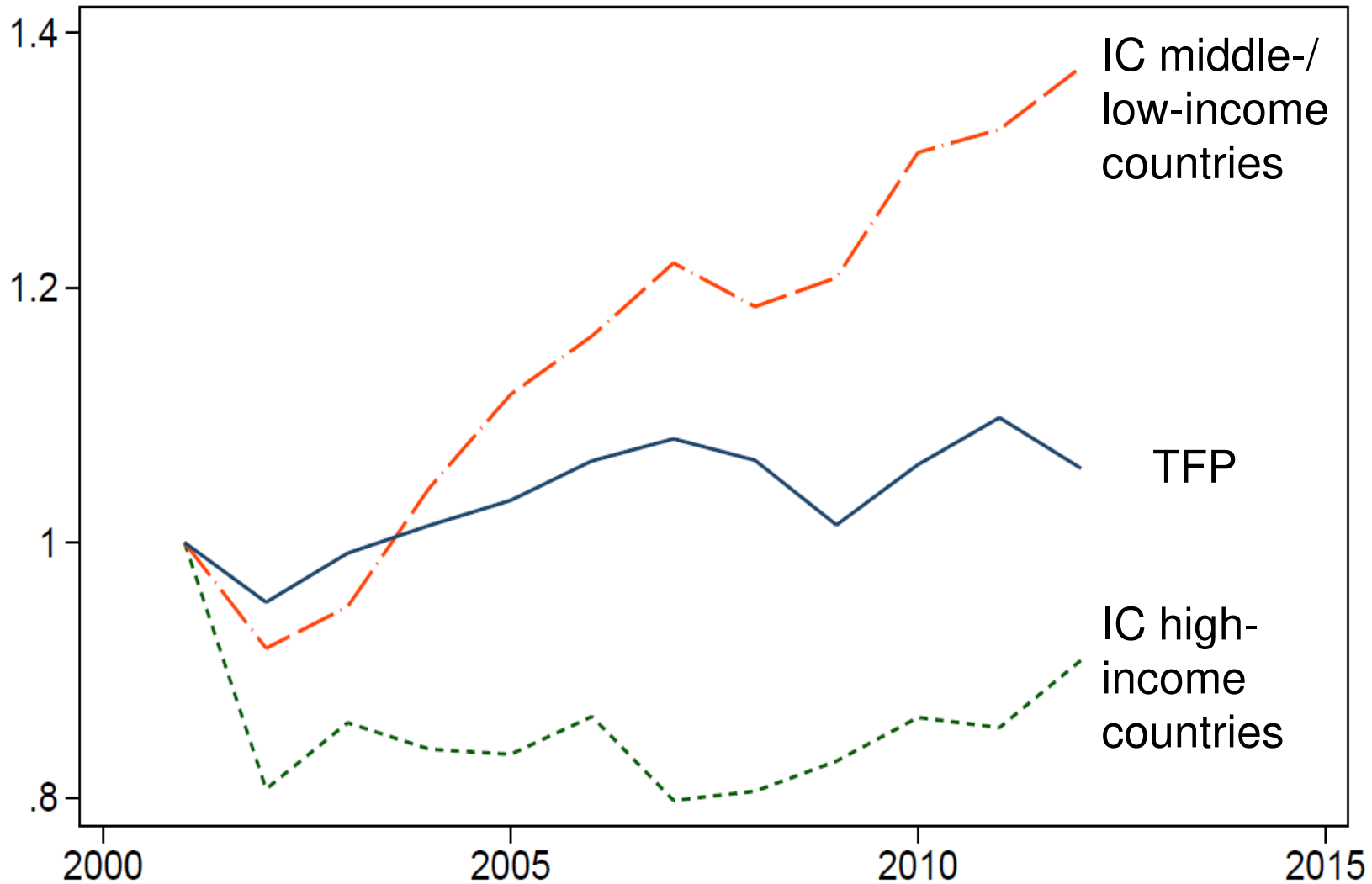
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- Analyzes the effects of IC on firm productivity
 - Focus on the competition channel among other impact channels of trade liberalization (exports, price/quality of inputs)
 - Focus on within firm effects; role of competition not limited to the mechanisms of sorting and selection of firms and (more) efficient (re-)allocation of factors of production between firms (Melitz 2003)
- Considers that firms are multiproduct and heterogeneous to
 - Account for unobserved heterogeneity that might be a source of measurement error and/or bias TFP
 - Assess firm-specific import competition
- Differential effects
 - import country of origin
 - core vs non-core products
 - single-product vs multiproduct firms

IC in different product categories



IC from different countries



Data and Approach



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- Administrative data on multi-product manufacturing firms in Germany
 - Prices (factory gate) and quantities of products 8-digit PRODCOM 2002 by firm
 - 2001-2014
 - 15.000 firms (here)
 - 3.500 products
- UN Comtrade (bilateral trade flows PRODCOM 2002 8-digit product level)
- 3 step approach
 - Estimate firm TFP
 - Measure firm-specific strenght of import competition
 - Causal impact of import competition in TFP

Estimating TFP



- CD production technology (in logs)

$$r_{it} = \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + h \left(\underbrace{M^{-1}(l_{it-1}, k_{it-1}, m_{it-1}^{flex}, \mathbf{z}_{it-1})}_{\omega_{it-1}} \right) + \mathcal{P}_{it} + \xi_{it} + \varepsilon_{it}$$

- Firm-specific price index to account for firm heterogeneity: firm-specific demand shocks/markups, and output-price bias
 - Eslava et al. 2004; Foster, Haltiwanger and Syverson 2008; De Loecker 2011
- **z** further variables to account for firm-specific factors/shocks to productivity
 - EX, # products, R&D, location, IC (De Loecker and Warzynski 2012)
- **p** Firm-specific price for the composite output to account for input-price(/-quality) differences (De Loecker et al. 2016)

Estimating TFP

- LP/Wooldridge estimator / Identifying moment conditions
 - Separate estimations for 2-digit NACE Rev 1.1 sectors

$$E(\xi_{it} + \varepsilon_{it} \mid l_{it}, k_{it}, m_{it-1}, l_{it-1}, k_{it-1}, m_{it-1}^{flex}, \mathbf{z}_{it-1}, \Gamma_{it-1}, p_{it-1}) = 0$$

- TFP
$$\hat{\omega}_{it} = r_{it} - (\hat{\beta}_l l_{it} + \hat{\beta}_k k_{it} + \hat{\beta}_m m_{it} + \hat{y} p_{it})$$

Measuring firm-specific import competition



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- Sum of market shares of country(-group) n on the domestic markets for products g available in firm's i portfolio, each weighted with the share of the respective product in firm's total revenue

$$IC_{it}^n = \sum_g \left[\left(\frac{Y_{igt}}{\sum_g Y_{igt}} \right) \left(\frac{M_{gt}^n}{\sum_n M_{gt}^n + \sum_i Y_{igt}} \right) \right] * 100$$

Identifying the Effect of Import Competition on Productivity



$$\omega_{ijt} = \beta^n IC_{it-1}^n + \mu_i + \mu_{jt} + \mathbf{X}'_{it-1} * \gamma + \varepsilon_{ijt}$$

- OLS likely to underestimate
 - reverse causality (e.g. IC strong where domestic firms weak)
 - OV bias (e.g. industrial policy to increase TFP weaken IC)
 - measurement error
- 2SLS
 - Instrument: IC from country(-group) **n** in **third** countries, not related to Germany and **n** to avoid common shocks

$$IC_{it-1}^{n \rightarrow \text{third}} = \sum_g \left[\left(\frac{Y_{igt-1}}{\sum_g Y_{igt-1}} \right) \left(\frac{M_{gt-1}^{n \rightarrow \text{third}}}{\sum M_{gt-1}^{n \rightarrow \text{third}}} \right) \right]$$

- past product portfolio

Effects of IC on Firm TFP (log)

- Main Results



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	All firms		Single-prod firms		Multi-product firms		
	total imports	country of import origin	total imports	country of import origin	total imports	country of import origin	core vs non-core products * country of import origin
IC_All_Countries	0.0019* (0.0010)		0.0047** (0.0023)		0.0009 (0.0014)		
IC_High_Income		0.0112*** (0.0043)		0.0242* (0.0130)		0.0114** (0.0052)	
IC_Low_Income		-0.0002 (0.0011)		0.0017 (0.0022)		-0.0018 (0.0017)	
IC_Core_Prod_High_Income							0.0065*** (0.0025)
IC_non_Core_Prod_High_Income							0.0007 (0.0035)
IC_Core_Prod_Low_Income							-0.0017 (0.0013)
IC_non_Core_Prod_Low_Income							-0.0025 (0.0022)
Obs. / No. firms	69,588 / 14,772		20,346 / 4,778		53,217 / 10,202		47,849 / 10,033
R2	0.991	0.992	0.991	0.990	0.992	0.992	0.992
Wald-F	131.5	29.07	41.02	6.92	160.8	22.95	16.66

2SLS. Standard errors clustered at firm-level (in parentheses). *** p<0.01, ** p<0.05, * p<0.1. Included controls: revenue share with exports, number of products, time FE, firm*industry FE.

Summary and Conclusions



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- Apply recent methods to more accurately assess firm TFP
- Use firm-specific measure for IC
- Sorting, selection, exit, reallocation not the only channel
- IC stimulates productivity improvements within firms
- Import origin matters
 - Distance to frontier, embodied technology, quality, price
- Different effects for different firms -> differentiated policy
- Interesting for further research
 - Effects stronger for exporters than for non-exporters: international 'experience' matters?
 - Effects stronger for radical product switchers: product portfolio adjustment important mechanism behind productivity?

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