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Quality Upgrading, Competition and Trade Policy: Evidence from the Agri-Food Sector

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Quality Upgrading, Competition and Trade Policy: Evidence from the Agri-food Sector

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IATRC Symposium, Sevilla 2-4 June 2013

Research objective

- We study how quality upgrading is affected by trade liberalization (competition) in the food sector
  - ✓ We do that by estimating directly products quality using the method proposed by Khandelwal (2010)
  - ✓ And within the framework of the distance to the frontier model (Aghion et al. 2005):
    - The degree of competition increases innovation (quality upgrading), but only for firms/products close to the world frontier

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Main findings

- Tougher competition (tariff reduction) leads to a faster quality upgrading, but only for products close to the quality frontier
  - ✓ The results are robust to
    - ❖ Using different measures of import competition
    - ❖ Alternative estimates of product quality
    - ❖ Considering FDI sector policy
    - ❖ Controlling for EU food standards

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Outline

- ***Motivations***
- Theoretical considerations
- Data
- Empirical strategy
- Results
- Conclusions and implications

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Motivations

Why we focus on quality?

- **Quality is a component of TFP (Helpman, 2011)**
- Food quality and safety are considered among the main topics in the public debate, in food policy and in research (Caswell and Mojduszka, 1996; Grunert, 2005; Bontemps et al., 2012)
  - ✓ Growing demand for **high quality** products especially in high income countries
  - ✓ Increasingly pressure on producers from developing countries to adapt their processes and make goods eligible to be exported (Swinnen, 2007; Jouanjean, 2012)

Product quality is considered one of the most important elements that allows firms to have success in the international markets (Sutton, 2007; Helpman, 2011)

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Motivations

- However, quality is **unobservable!**
  - ✓ Commonly proxied using is price (unit value) from trade data

In this paper:

- Estimation of product quality at CN 8-digit level, relying on Khandelwal (2010) intuition:
  - ✓ *higher quality is attributed to products that have higher market share, after controlling for price*
- Study of the extent to which quality upgrading is affected by the reduction of trade tariffs in the exporting country
  - ✓ We rely on a common **distance to the frontier** approach (Aghion et al., 2009) and in particular following Amiti and Khandelwal (forthcoming)

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Value Added

- We infer product quality with the Khandelwal (2010) method in the EU15 market and for the food industry
- We test our main relation disentangling the effect according to different policies on the attraction of FDI inflows
- We test the sensitivity of our results to alternative methods of measuring products quality, along the line recently proposed by Khandelwal, Schott and Wei (2013)
- We use the EU countries import penetration as a proxy of the level of competition in the EU domestic markets.
  - ✓ since EU countries share the same trade policy and, thus, the same external tariffs
- We control whether our main results are robust to controlling for the diffusion of the EU voluntary standards.

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Theoretical considerations

Distance to the frontier - Aghion et al. (2005; 2009)

Δ Quality = f (competition, distance to the frontier)

→ **escape-entry-effect vs. discouragment effect**

Testable hypothesis

Innovation (Δquality) is a non-linear function of competition (tariff reduction) and depends on the distance to the technological frontier:

Key prediction: Δ tariffs ↓

Δ quality (+) for products close to the frontier

Δ quality (-/0) for products distant to the frontier

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Data

Quality estimation and baseline model

- The final database contains more than 700,000 observations; 70 exporters; more than 1,500 food products; 14 importers (EU15, except Luxembourg)
- Trade data from Eurostat Comext: Imports data to EU15 at 8-digit level, for the period 1995-2007
- Production data from Eurostat Prodcom NACE REV 1.1: for the market share estimates in the 14 importing countries
- Feenstra et al. (2002); CEPII, World Bank, Brent Oil: transportation costs; distance, population, oil price.
- WITS-World Bank: Data on import tariff at country-product (HS6-digit) level in the period 1995-2007

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Data

Industries and products for the quality estimations

Industry NACE-4	Manufacture of food products and beverages	Product CN-8
1511	Production and preserving of meat	142
1512	production and preserving of poultrymeat	196
1513	production of meat and poultrymeat products	108
1520	Processing and preserving of fish and fish products	401
1530	Processing and preserving of fruit and vegetables	495
1540	Manufacture of vegetables and animal oils and fats	144
1550	Manufacture of dairy products	204
1560	Manufacture of grain mill products, starches and starch products	178
1580	Sugar and cocoa	60
1581	Manufacture of bread; manufacture of fresh pastry goods and cakes	2
1582	Manufacture of ruskd and biscuits	29
1585	Manufacture of maccaroni, noodles and couscous	11
1586	Processing of tea and coffee	22
1587	Manufacture of condiments and seasonings	11
1588	Manufacture of omogenized food preparaison and dietetic food	7
1589	Manufacture of other food products n.e.c.	37
1590	Production of ethyl alcohol, cider, malt and other non-distilled fermented beverages	18
1591	Manufacture of distilled potable alcoholic beverages	67
1593	Manufacture of wine	99
1596	Manufacture of beer	4
1598	Production of mineral water and soft drinks	11

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Data

Other data for robustness checks

- Data on labour productivity and capital from UNIDO database → for estimating TFP
- Data on FDI sector targeting, coming from the 2005 Census of Investment Promotion Agencies (IPAs), conducted by the World Bank
- European Standard Database-World Bank (EUSDB): data on voluntary standards at HS4-digit level 1995-2003

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Empirical strategy

Quality estimation (Khandelwal, 2010)

'conditional on price, imports with higher market shares are assigned higher quality'

- Quality of product *h*, exported by country *c*, is estimated using the *nested logit* demand function (Berry, 1994):

Market Share

$$\ln(s_{cht}) - \ln(s_{0t}) = \phi_{1,ch} + \phi_{2,t} + \alpha p_{cht} + \sigma \ln(ns_{cht}) + \gamma \ln pop_{ct} + \phi_{3,cht}$$

$$\boldsymbol{Quality} \equiv \phi_{cht} = \hat{\phi}_{1,ch} + \hat{\phi}_{2,t} + \hat{\phi}_{3,cht}$$

- Estimation methods: OLS and 2SLS
- The demand function is estimated **separately** for each importer country – NACE 4-digit

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Empirical strategy

Verifying the Aghion et al. (2009) hypothesis

The relation between competition and *quality upgrading* depends on the proximity to the quality frontier of each variety (CN8):

$$D_{cht} = \frac{\phi^F_{cht}}{max_{c \in ht}(\phi^F_{cht})}$$

Empirical approach (Aghion et al., 2009; Amiti and Khandelwal, 2012)

$$\Delta ln\phi^F{}_{cht} = \alpha_{iht} + \alpha_{ct} + \beta_1 D_{ch,t-5} + \beta_2 tariff_{ch6,t-5} + \beta_3 \left(D_{ch,t-5} * tariff_{ch6,t-5}\right) + \varepsilon_{cht}$$

- ✓ Where, $\Delta \mathbf{ln}\boldsymbol{\phi}^{\mathbf{F}}_{\mathbf{cht}}$ is the change in quality in the period between *t* an *t-5*, $\boldsymbol{\alpha}_{iht}$ *and* $\boldsymbol{\alpha}_{ct}$ are, respectively, importer-product-year and exporter-year fixed effects
- ✓ We expect that $\beta_2 > 0$ and $\beta_3 < 0$

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Results

Product quality and countries' factor endowments

	Ln Quality$_{cht}$			
	(1)	(2)	(3)	(4)
Ln TFP	0.270***			
	(0.0854)			
Ln labour productivity		0.134***		
		(0.0436)		
Ln capital labour ratio			0.105**	
			(0.0516)	
Ln per capita GDP				0.0887***
				(0.0241)
Country-Year FE	YES	YES	YES	YES
Importer-Product-Year FE	YES	YES	YES	YES
No. of obs.	536,519	554,785	617,271	1,016,582
R-squared	0.90	0.89	0.89	0.84

Significance * .10 **.05 *** .01.

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Results

Quality, distance to the frontier and competition: baseline results

Dependent variable: Δ Quality	(1) ALL	(2) OECD	(3) NON OECD	(4) FDI Sector tageted	(5) No FDI Sector tageted
Distance to the frontier (*t - 5*)	-0.831***	-0.881***	-0.551***	-0.856***	-0.785***
	(0.0956)	(0.0357)	(0.0621)	(0.0826)	(0.219)
Tariffs (*t - 5*)	0.217***	0.264***	0.129	0.385***	0.0612
	(0.0776)	(0.0913)	(0.126)	(0.0991)	(0.0740)
Tariffs * distance to the frontier (*t - 5*)	-0.463**	-0.384***	-0.607***	-1.586***	-0.731**
	(0.184)	(0.135)	(0.234)	(0.160)	(0.321)
Country-Year FE	YES	YES		YES	
Importer-Product-Year FE	YES	YES		YES	
No. of obs.	239,332	239,332		70,386	
R-squared	0.54	0.54		0.67	

Significance * .10 **.05 *** .01.

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Results

Robustness checks

Dependent variable: Δ Quality	(1) Exclude PF=1	(2) Frontier Defined After Dropping Top 2	(3) Change in quality percentile	(4) Quality Khandelwal, Schott and Wei (2013)	(5) Unit Values	(6) Import penetration	(7) Controlling for Standards
Distance to the frontier ($t-5$)	-1.323***	-1.742***	-3.270***	-1.135***	-0.710***	-1.021***	-0.625***
	(0.0693)	(0.0701)	(0.283)	(0.0127)	(0.0237)	(0.0336)	(0.0556)
Tariffs ($t-5$)	0.241***	0.208***	0.807***	0.147***	0.106	-0.0686***	0.202***
	(0.0516)	(0.0450)	(0.264)	(0.0369)	(0.0660)	(0.0149)	(0.0750)
Tariffs * distance to the frontier ($t-5$)	-0.528***	-0.608***	-2.202***	-0.314***	-0.149**	0.115**	-0.547***
	(0.135)	(0.147)	(0.518)	(0.0645)	(0.0726)	(0.0423)	(0.145)
Ln standard ($t-5$)							0.256**
							(0.116)
Ln standard * distance to the frontier ($t-5$)							-0.0461***
							(0.0158)
Country-Year FE	YES	YES	YES	YES	YES	YES	YES
Importer-Product-Year FE	YES	YES	YES	YES	YES	YES	NO
Imported-Product FE	NO	NO	NO	NO	NO	NO	YES
No. of obs.	209,540	179,008	239,332	197,203	144,389	218,900	239,332
R-squared	0.57	0.60	0.53	0.55	0.54	0.62	0.24

Significance * .10 **.05 *** .01.

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Conclusions (1)

- We find strong evidence of a non monotonic relation between competition and quality upgrading
  - ✓ Supporting the main predictions of the Aghion et al. (2005; 2009) model
- In countries-sectors considered as a priority target for the FDI inflows, the escape-entry and discouragement effects are much more pronounced
- Results remain stable using alternative measures of the level of competition faced in the domestic country
- Controlling for the diffusion of voluntary standards in the EU countries we found that the effect of tariffs remains stable and robust
  - Moreover, the diffusion of EU standards seems to have, overall, a positive effect on the rate of products quality upgrading

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Conclusions (2)

- Trade liberalization policies can **boost** the rate of quality upgrading and thus the TFP
  - ✓ however, only for products close to the technological frontier
  - ✓ a result reinforced by the policies on the FDI inflows, in particular for the developing countries.
- The distance to the technological frontier is an important element of taking into account in considering the effect of trade liberalization policies

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THANK YOU