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# When Quality Management Helps Agri-food Firms to Export

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## Motivation

Increasing demand for **traceability and safety** for food products :

- Public regulation (EC regulation 178/2002 of food traceability)
- Sanitary and Phytosanitary Standards (SPS) and Technical Barrier to trade (TBT) at the border
- Private certifications (HACCP, ISO, IFS, BRC...)

→ The ability to produce safe products, ensure their traceability and have it recognized through certification is an important component of competitiveness

## This paper

### Investigates the impact of **firms' commitment to traceability and food safety** on **export performance**

- Relies on the presence of quality management and control **personnel** to proxy this commitment
- Uses firm-level data from 2009 to 2019
- Estimates the impact of quality management on the intensive and extensive margin of trade, on trade unit values
- Explores the heterogeneity of the effect by product-destination (presence of Non Tariff Measures)

## Quality management and control personnel

- Staff in charge of the firm's products **sanitary and safety quality**:
  - Design quality protocols
  - Conduct inspections and tests
  - Create quality documentation and traceability systems
  - Report feedback from customers and analyse safety issues
- May impact **trade**:
  - by increasing the **efficiency** of supply chains
  - by helping the products to **comply** with regulatory requirement
  - by enhancing the firm's **reputation** (by reducing hazards, recalls and complains, and potentially through certifications)

## Literature

- Traceability and quality management system on firms competitiveness on domestic markets (*Alfaro and Rabade 2009, Epelbaum and Martinez 2014, Aiello et al. 2015*)
- Valuation of food traceability system by consumers (*Graia et al. 2013, Liu et al. 2019*)

→ No papers on quality management or traceability system and international trade

## Data sources

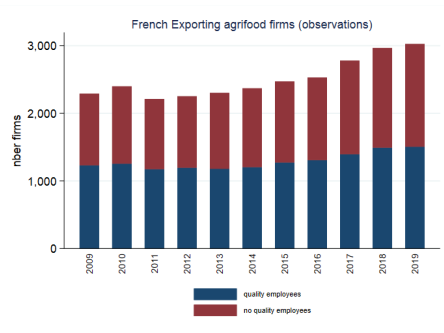
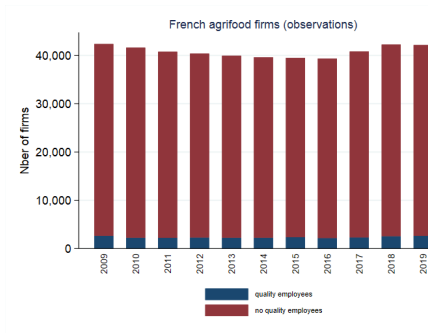
- DADS French administrative employee-firm-level database: number of employees, working hours, total salary, by firm and occupation
  - 387d: quality control manager and engineer
  - 475b: quality control technician for the processing industries
- French Customs trade data: value and quantity exported by firm, product (HS6), destination and year
- FARE Data characteristics of firms (value added, turnover)

## Sample

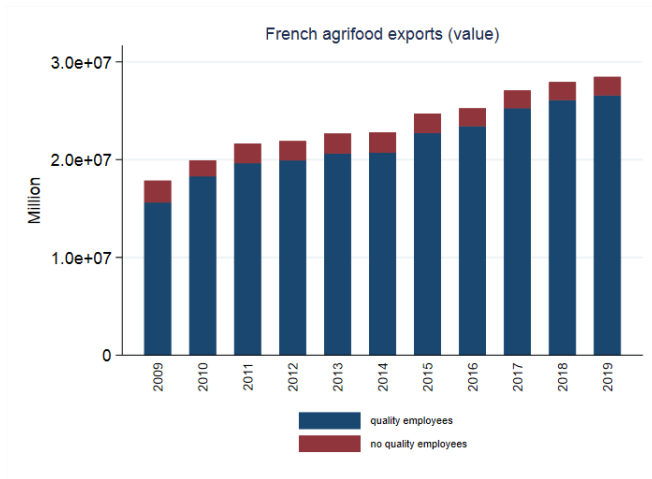
- From 2009 to 2019
- Agri-food products only : 878 products
- Focus on agri-food producing firms (exclusion of wholesalers and retailers): 5,033 exporting firms



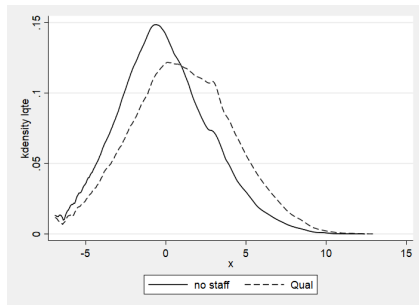
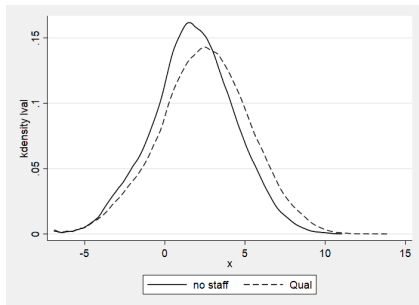
# Data: Trade and quality management



# Data: Trade and quality management



# Data: Trade and presence of quality management



## Specification

$$Exp_{fjkt} = \alpha Quality_{ft} + \beta \Pi_{ft} + v_f + \xi_{jkt} + \varepsilon_{fjkt}$$

- $Quality_{ft}$  is a dummy indicating whether firm  $f$  has quality management the year  $t$
- $\Pi_{ft}$  time variant firm characteristics (size, productivity)
- $jkt$  fixed effects controls for characteristics of the market of country  $j$  and good  $k$  the year  $t$
- $f$  firm fixed effect controls for time invariant firms characteristics
- $Exp_{fjkt} =$ 
  - $lv_{fjkt}$  log of export values of  $f$  to  $j$  for the  $k$  at  $t$
  - $X_{fjkt}$  dummy=0 if  $f$  exports  $k$  to  $j$  at  $t$

## Endogeneity

- Endogeneity of firm's decision to invest in quality management: could be linked to the firm's decision to export (or to export more / to some specific destination) or to its product specialization
- Instrumental variable approach, using the following IV :
  - Share of firms in the same sector (APE) and department with quality management staff
  - Share of exported products with NTM on the European market

## Results : intensive margin of trade

	$\ln v_{fjkt}$				
	(1) All OLS	(2) $\Delta Quality_{ft}=0$ OLS	(3) All IV	(4) All OLS	(5) All IV
Quality <sub>ft</sub>	0.187*** (0.018)	0.195*** (0.040)	1.962*** (0.116)	0.025** (0.012)	0.718*** (0.119)
productivity <sub>ft</sub>	0.454*** (0.013)	0.517*** (0.016)	0.409*** (0.016)	0.030*** (0.010)	0.026** (0.012)
Size 2 <sub>ft</sub>	0.425*** (0.024)	0.492*** (0.038)	-0.065 (0.047)	0.028 (0.025)	-0.095*** (0.035)
Size 3 <sub>ft</sub>	0.630*** (0.030)	0.814*** (0.047)	-0.219*** (0.066)	0.123*** (0.033)	0.025 (0.040)
Size 4 <sub>ft</sub>	1.438*** (0.030)	1.561*** (0.044)	0.313*** (0.081)	0.190*** (0.042)	0.056 (0.052)
N	594,383	393,903	490,878	593,758	490,773
r <sup>2</sup>	0.344	0.363	0.004	0.483	-0.004
Underidentification stat.			4769.369		1411.635
F stat for weak id			1773.104		1130.119
Weak id. p-value			0.000		0.000
Endogeneity test stat			229.228		35.994
p-value endogeneity test			0.000		0.000
destination-product-year	yes	yes	yes	yes	yes
firm	no	no	no	yes	yes

Notes: All continuous variables are in logarithm.

Robust standard errors clustered by firm-year in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Results : extensive margin of trade

	$X_{fjkt}$				
	(1)	(2)	(3)	(4)	(5)
	All	$\Delta Quality_{ft}=0$	All	All	All
	OLS	OLS	IV	OLS	IV
Quality <sub>ft</sub>	0.008*** (0.000)	0.014*** (0.001)	0.022*** (0.002)	0.001*** (0.000)	0.018*** (0.003)
productivity <sub>ft</sub>	0.017*** (0.000)	0.015*** (0.000)	0.020*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Size 2 <sub>ft</sub>	0.021*** (0.001)	0.019*** (0.001)	0.015*** (0.001)	0.006*** (0.000)	0.003*** (0.001)
Size 3 <sub>ft</sub>	0.034*** (0.001)	0.028*** (0.001)	0.023*** (0.001)	0.012*** (0.001)	0.008*** (0.001)
Size 4 <sub>ft</sub>	0.057*** (0.001)	0.054*** (0.001)	0.042*** (0.002)	0.015*** (0.001)	0.010*** (0.001)
N	11,127,999	7,209,619	7,624,979	11,127,997	7,624,977
r2	0.124	0.132	0.007	0.171	-0.000
Underidentification stat.			94066.504		41955.844
F stat for weak id			8157.149		6562.125
Weak id. p-value			0.000		0.000
Endogeneity test stat			60.305		44.885
p-value endogeneity test			0.000		0.000
destination-product-year	yes	yes	yes	yes	yes
firm	no	no	no	yes	yes

Notes: All continuous variables are in logarithm.

Robust standard errors clustered by firm-year in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Results : markets with NTM

	ln $v_{fjkt}$			$X_{fjkt}$		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	$EU_{\hat{t}=1}$	$EU_{\hat{t}=0}$	All	$EU_{\hat{t}=1}$	$EU_{\hat{t}=0}$
Quality $_{\hat{t}} \times NTM_{jk}$	0.026** (0.013)	0.022 (0.015)	0.042** (0.021)	0.002*** (0.000)	0.002*** (0.001)	0.001*** (0.000)
Quality $_{\hat{t}} \times noNTM_{jk}$	-0.058 (0.056)	-0.141* (0.076)	0.061 (0.076)	-0.007*** (0.001)	0.007** (0.003)	-0.003*** (0.001)
productivity $_{\hat{t}}$	0.029*** (0.010)	0.055*** (0.012)	0.001 (0.017)	0.002*** (0.000)	0.004*** (0.000)	0.001*** (0.000)
Size 2 $_{\hat{t}}$	0.040 (0.027)	0.077** (0.034)	0.024 (0.042)	0.007*** (0.001)	0.015*** (0.001)	0.003*** (0.001)
Size 3 $_{\hat{t}}$	0.124*** (0.035)	0.194*** (0.041)	0.016 (0.059)	0.015*** (0.001)	0.028*** (0.002)	0.007*** (0.001)
Size 4 $_{\hat{t}}$	0.214*** (0.044)	0.393*** (0.053)	-0.023 (0.073)	0.019*** (0.001)	0.038*** (0.002)	0.007*** (0.001)
N	541567	358155	183189	7830743	3199581	4631141
r2	0.49	0.53	0.47	0.18	0.21	0.16
destination-product-year	yes	yes	yes	yes	yes	yes
firm	yes	yes	yes	yes	yes	yes

Notes: All continuous variables are in logarithm.

Robust standard errors clustered by firm-year in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



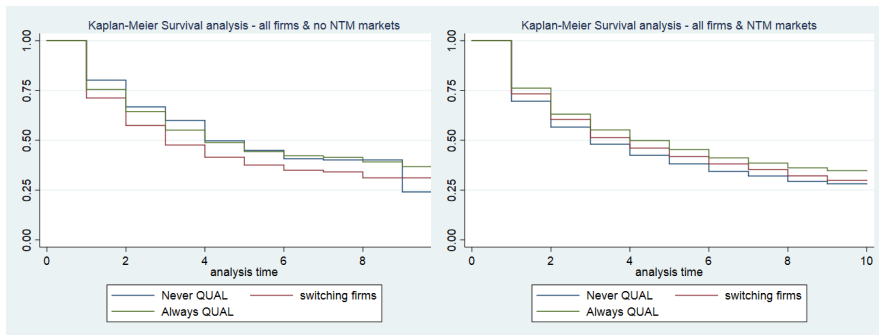
## Conclusion

- We show that quality management employees:
  - increase firms market access to foreign countries
  - help firms to export more ...
  - ...but only to destination-products with NTM

→ Compliance effect

## Future steps : impacts on the duration of trade

### Kaplan-Meier survival functions of each length of spell



→ Different survival probability for firms with and without quality management on market with NTM