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...)

$\rightarrow$ 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)*

$\rightarrow$ No papers on quality management or traceability system and international trade

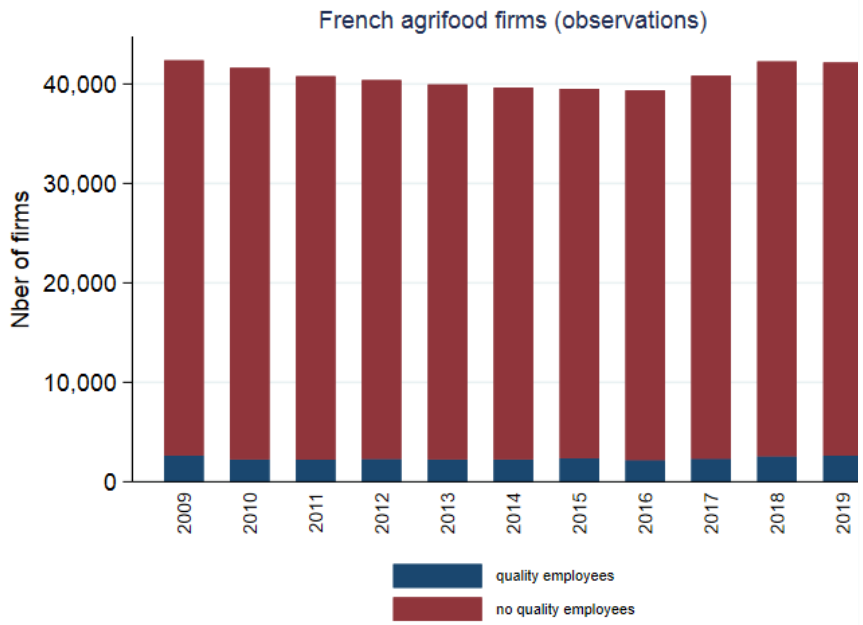
Data sources

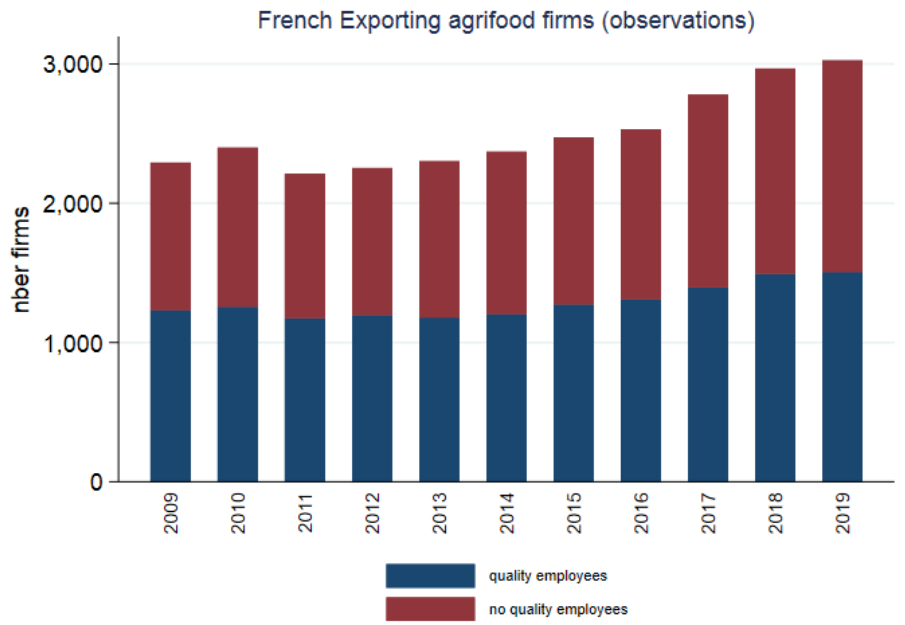
- DADS French administrative employee-firm-level database: number of employees, working hours, total salary, by firm and occupation
  - 387d: quality control manager and engineer
  - 475b: quality control technician for the processing industries
- French Customs trade data: value and quantity exported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

Sample

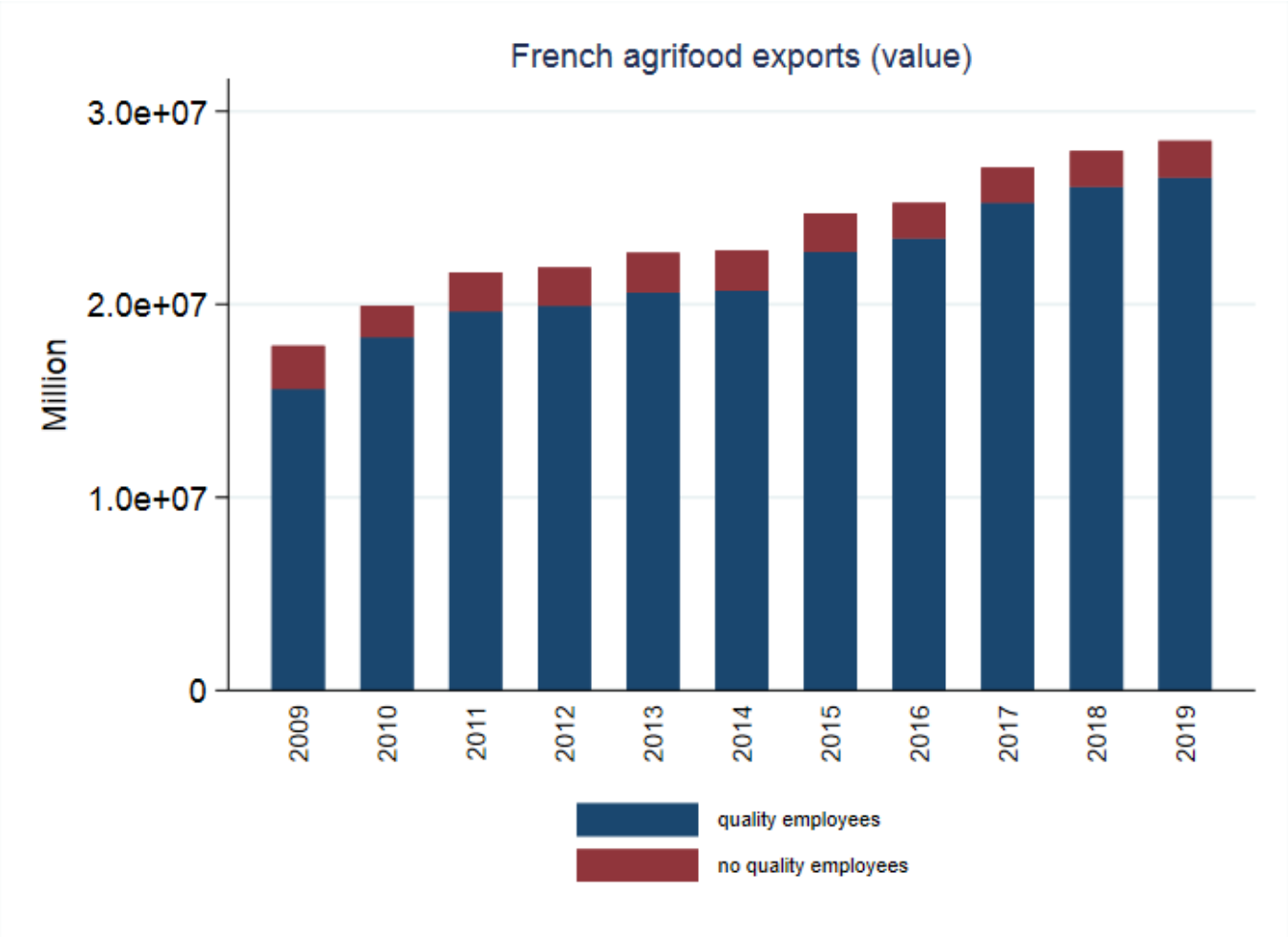
- From 2009 to 2019
- Agri-food products only : 878 products
- Focus on agri-food producing firms (exclusion of wholesalers and retailers): 5,033 exporting firms

Data: Trade and quality management

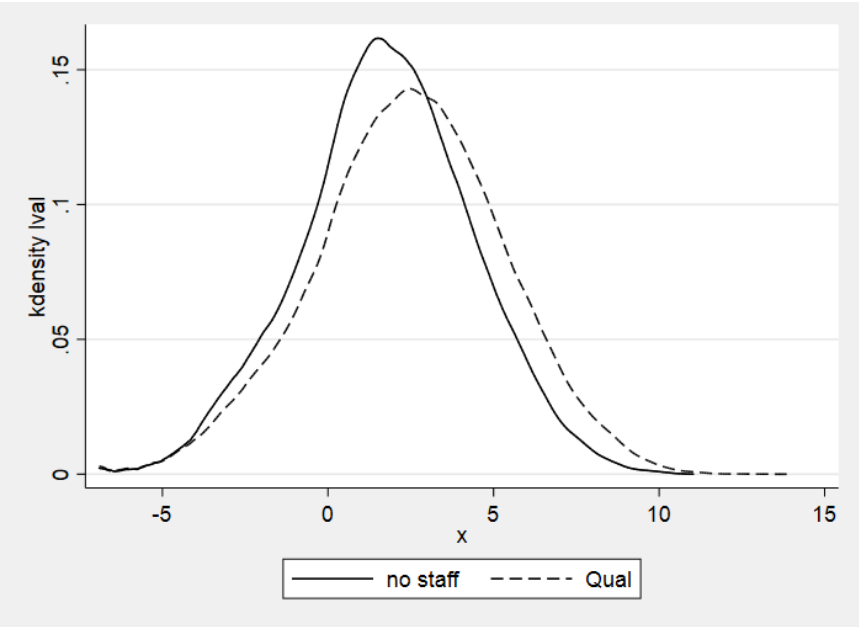


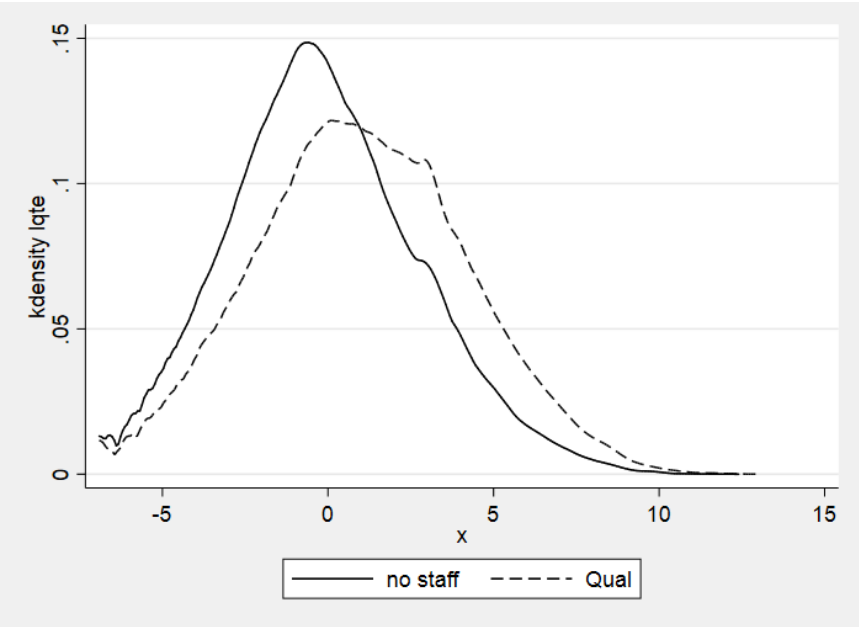


Data: Trade and quality management



Data: Trade and presence of quality management





Specification

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

- $Quality_{ft}$ is a dummy indicating whether firm f has quality management the year t
- Π_{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)	(2)	(3)	(4)	(5)
	All	$\Delta Quality_{ft}$=0	All	All	All
	OLS	OLS	IV	OLS	IV
$Quality_{ft}$	0.187***	0.195***	1.962***	0.025**	0.718***
	(0.018)	(0.040)	(0.116)	(0.012)	(0.119)
$productivity_{ft}$	0.454***	0.517***	0.409***	0.030***	0.026**
	(0.013)	(0.016)	(0.016)	(0.010)	(0.012)
$Size\ 2_{ft}$	0.425***	0.492***	-0.065	0.028	-0.095***
	(0.024)	(0.038)	(0.047)	(0.025)	(0.035)
$Size\ 3_{ft}$	0.630***	0.814***	-0.219***	0.123***	0.025
	(0.030)	(0.047)	(0.066)	(0.033)	(0.040)
$Size\ 4_{ft}$	1.438***	1.561***	0.313***	0.190***	0.056
	(0.030)	(0.044)	(0.081)	(0.042)	(0.052)
N	594,383	393,903	490,878	593,758	490,773
r2	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
$Quality_{ft}$	0.008***	0.014***	0.022***	0.001***	0.018***
	(0.000)	(0.001)	(0.002)	(0.000)	(0.003)
$productivity_{ft}$	0.017***	0.015***	0.020***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size 2_{ft}	0.021***	0.019***	0.015***	0.006***	0.003***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Size 3_{ft}	0.034***	0.028***	0.023***	0.012***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Size 4_{ft}	0.057***	0.054***	0.042***	0.015***	0.010***
	(0.001)	(0.001)	(0.002)	(0.001)	(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_{ft}=1	EU_{ft}=0	All	EU_{ft}=1	EU_{ft}=0
Quality$_{ft}$ × NTM_{jk}	0.026**	0.022	0.042**	0.002***	0.002***	0.001***
	(0.013)	(0.015)	(0.021)	(0.000)	(0.001)	(0.000)
Quality$_{ft}$ × $noNTM_{jk}$	-0.058	-0.141*	0.061	-0.007***	0.007**	-0.003***
	(0.056)	(0.076)	(0.076)	(0.001)	(0.003)	(0.001)
productivity$_{ft}$	0.029***	0.055***	0.001	0.002***	0.004***	0.001***
	(0.010)	(0.012)	(0.017)	(0.000)	(0.000)	(0.000)
Size 2$_{ft}$	0.040	0.077**	0.024	0.007***	0.015***	0.003***
	(0.027)	(0.034)	(0.042)	(0.001)	(0.001)	(0.001)
Size 3$_{ft}$	0.124***	0.194***	0.016	0.015***	0.028***	0.007***
	(0.035)	(0.041)	(0.059)	(0.001)	(0.002)	(0.001)
Size 4$_{ft}$	0.214***	0.393***	-0.023	0.019***	0.038***	0.007***
	(0.044)	(0.053)	(0.073)	(0.001)	(0.002)	(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.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

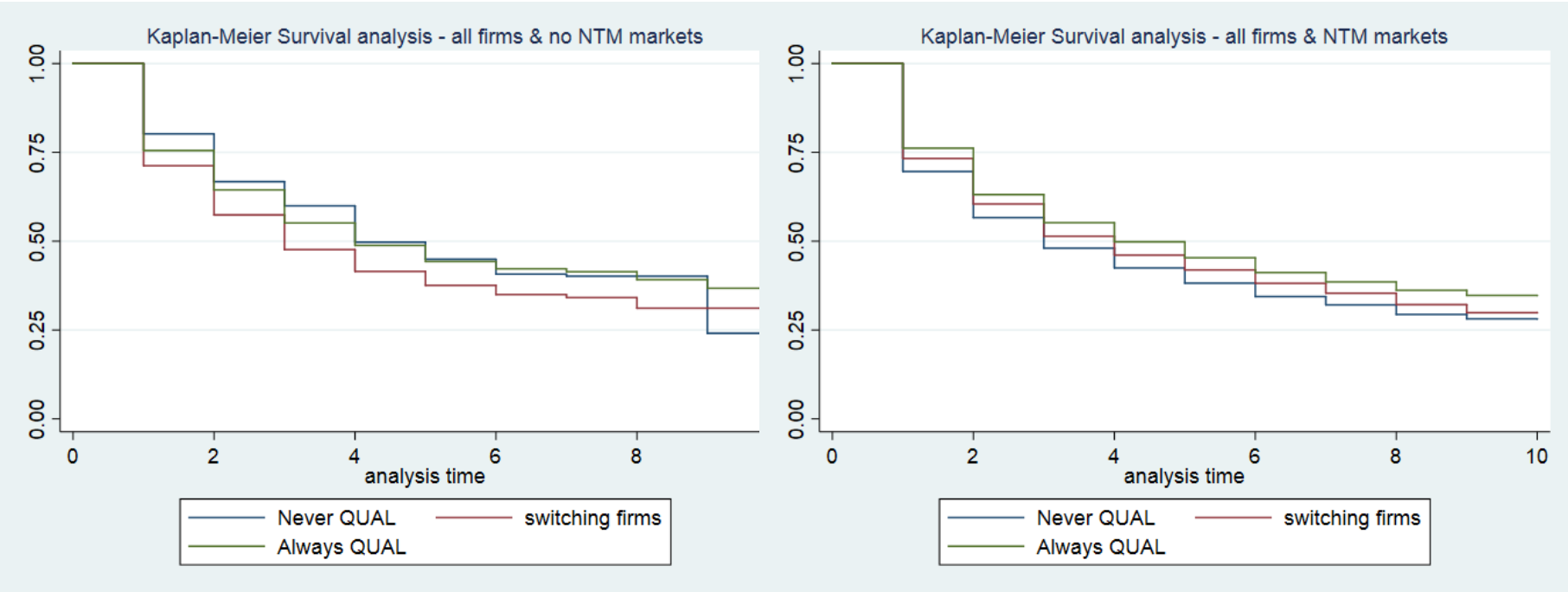
Conclusion

- 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

$\rightarrow$ 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