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On the competitiveness effects of quality labels: Evidence from French cheese industry

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Motivation

- **Protected Designations of Origin (PDO)**, an European label certifying :
 - the characteristics of the product
 - that it was produced, processed and prepared in a defined region
 - the use of a recognized know-how
- **Protection** of the name of the product on the European market
- Hot topic in international negotiations
- Included in trade agreements' **negotiations** (CETA Canada, EPA Japan)



Motivation

- This **European quality policy** aims to :
 - Fitting consumer concerns about the attributes of food products (quality and geographical characteristics)
 - Sustaining competitiveness within the agri-food chains

⇒ **Do PDO really impact the competitiveness of firms?**

Literature on European geographical labels

- **Consumer's side** : perception of labelled products

- Consumers' willingness to pay (*Menapace et al. 2011*)
- Price elasticities (*Hassan et al. 2011*)
- Price premium (*Deselnicu 2013*)

⇒ The premium varies substantially according to products and markets

- **Producer's side** :

- Determinants of adoption of PDO (*Bouamra-Mechemache & Chaaban 2010a*)
- Comparison with private certifications (*Bouamra-Mechemache & Chaaban 2010b*)
- Impact of PDO on survival of firms (*Bontemps et al. 2013*)

⇒ Again, important heterogeneity among sectors

⇒ We do not know the impact of PDO on **export competitiveness** and whether **foreign consumers** value PDO products

This paper

- Analyses the Link between official labels and higher prices and perception of quality
 - On unit values
 - On quality perceived by foreign consumers
- Analyzes the role of official labels (PDO) on **export performance** at the firm-product level in the French cheese industry
 - At the extensive (probability of export) margin
 - At the intensive (quantity) margin
- Uses an **original and exhaustive dataset** of firms and products concerned by PDO in the French cheese industry
 - Multi-product exporters may provide both labelled products and non labelled products
 - merged with custom data (value and quantity available at the firm-product-destination level)

Insight of the model

- Consumers value vertical variety

$$q_{ijk}(v) = [\lambda_{jk}(v)]^{\varepsilon-1} E_{jk} P_{jk}^{\varepsilon-1} [p_{ijk}(v)]^{-\varepsilon} \quad (1)$$

with

$$\lambda_{jk}(v) = [\theta_{ik} e^{\xi_j \times \text{PDO}(v)}] \eta_j \quad (2)$$

- $\lambda_{kj}(v)$ quality perceived by consumers of j for variety v of product k
- ξ_j quality shifter associated with PDO labeling
- θ_{ik} minimum quality offered for product k
- η_j consumer valuation of variety v

Insight of the model

- **Additional cost shifter due to PDO labelling**

$$c_{ijk}(f) = \omega_i(f)[\theta_{ik}]^\alpha e^{\beta \text{PDO}_{fk}} \tau_{ijk} / \varphi_{fk} \quad (3)$$

- $\omega_i(f)$ price index of inputs used by firm f
 - τ_{ij} trade costs for product k shipped from country i to country j
 - $[\theta_{ik}]^{\alpha_j}$ cost shifter due to product quality without PDO label
 - $e^{\beta \text{PDO}_{fk}}$ additional cost shifter due to PDO labelling
- Additional product entails a decrease in productivity $\varphi_{fk} = \varphi(f) \times \text{Rank}_{fk}^{-\gamma}$

⇒ **Profit-maximizing prices**

$$p_{ijk}(f) = \frac{\varepsilon}{\varepsilon - 1} \frac{\omega_i(f)[\theta_{ik}]^\alpha e^{\beta \text{PDO}_{fk}} \tau_{ijk}}{\varphi(f) \text{Rank}_{fk}^{-\gamma}} \quad (4)$$

21 French cheeses with PDO certification

FROMAGES, BEURRES ET CRÈMES AOP DE FRANCE

THIÉRACHE / BRIE

NORMANDIE

CENTRE / VAL-DE-LOIRE

BOURGOGNE / CHAMPAGNE

FRANCHE-COMTÉ / ALSACE-LORRAINE

AUVERGNE

SAVOIE

CHARENTES-POITOU

RHÔNE-ALPES

AQUITAINE / MIDI-PYRÉNÉES

MÉDITERRANÉE

LA PLUS BELLE PREUVE D'AUTENTICITÉ

AOP

ARNTINE / MIDI-PYRÉNÉES

- Ossau-iraty
- Rocamadour
- Laguiole
- Brie des Causses
- Roquefort

AUVERGNE

- Saint-nectaire
- Cantal
- Fourme d'Ambert
- Brie d'Avallerg
- Salers

BOURGOGNE / CHAMPAGNE

- Epoisses
- Beurre et crème de Bresse
- Mâconnais
- Langres
- Chaource
- Chablis

FRANCHE-COMTÉ / ALSACE-LORRAINE

- Comté
- Morbier
- Brie de Gex

MÉDITERRANÉE

- Bannon
- Polardon
- Brocciu

SAVOIE

- Gruyère
- Comté de Normandie
- Puy-d'Avallerg
- Livarot
- Neuchâtel
- Beurre et crème d'Alsace

CHARENTES-POITOU

- Chabichou du Poitou
- Beurre Charentes-Poitou

RHÔNE-ALPES

- Picodon
- Fourme de Montbrison
- Brie de Valromey Saas-et-Valromey
- Rigotte de Comté

SAVOIE

- Beaufort
- Reblochon
- Abondance
- Chevillard
- Tomme des Bauges

FRANCHE-COMTÉ / ALSACE-LORRAINE

- Comté
- Morbier
- Brie de Gex

THIÉRACHE / BRIE

- Maroules
- Brie de Melun
- Brie de Meaux

POUR VOTRE SANTÉ, ÉVITEZ DE GRIGNOTER ENTRE LES REPAS. WWW.MANGERBOUGER.FR

www.fromages-aop.com

Data

INAO dataset : authorized **plants** for a given **PDO product** in 2012

- 1 Correspondence **products** \Rightarrow **NC8 codes**
 - A PDO product may correspond to several NC8
 - A NC8 may correspond both to PDO and non-PDO product \Rightarrow All exports of a authorized firm of a NC8 code concerned by a PDO are considered labelled.
- 2 Correspondence **plant** (SIRET) \Rightarrow **firms** (SIREN)
- 3 Merge SIREN-NC8 with **French customs dataset** :
 - **Export** of French firms in value and quality, by destination market and 8-digit (NC8) product
 - PDO authorized firms are **multi-products** firms: they export both labelled and non-labelled products
- 4 Merge with **FARE Dataset** (INSEE) to limit our analysis to agri-food firms

Direct effect of PDO on unit value and perceived quality: empirical strategy

- Empirical model:

$$Y_{fjk} = \gamma_0 + \gamma_1 PDO_{fk} + FE_f + FE_{jk} + \varepsilon_{fjk} \quad (5)$$

- Two dependent variables:

- **Unit value** $\ln(uv_{fjk})$ of product k exported to country j by firm f , computed as value exported divided by quantity exported
- **Quality value (perceived by consumers)** $\ln(qual_{fjk})$ of product k supplied by firm f consumed in country j , computed from a CES demand as in Kandhelwal, Schott and Wei (2013) in two steps:

$$\ln Q_{fjk} + \sigma \times \ln(uv_{fjk}) = FE_k + FE_j + \eta_{fjk} \quad (6)$$

with $\sigma = 5$. Conditional on price, a variety with a higher quantity is assigned higher quality. It follows that:

$$\ln(\widehat{qual}_{fjk}) = \widehat{\eta}_{fjk} / (\sigma - 1) \quad (7)$$

Direct effect of PDO on unit value and perceived quality: results

• Unit value

- PDO products benefit from a price premium, as compared to non-PDO products, whatever the destination country (EU and non-EU)
- Surprisingly no effect on countries with knowledge of GIs in 2012 (own GIs or agreements: Japan, Switzerland, South Korea)

• Perceived quality

- PDO products considered as a product of higher quality by consumers
- Quality perceived on EU and non-EU markets

Direct effect of PDO on margins: empirical strategy

- Empirical model :

$$Y_{fjk} = \gamma_0 + \gamma_1 PDO_{fk} + FE_f + FE_{jk} + \varepsilon_{fjk} \quad (8)$$

- Two dependent variables:
 - **Extensive margin** ($X_{fjk} = 0$ or 1 if $Q_{fjk} > 0$)
 - **Intensive margin** ($\ln Q_{fjk}$: log quantity exported by firm f of product k to j)
- Key variable:
 PDO_{fk} , dummy indicating whether firm f benefits from PDO labeling for k
- FE_f firm fixed effects
- FE_{jk} product NC8-destination fixed effects

Direct effect of PDO on margins: results

- **Extensive margin**

- PDO labeling increases the probability to export
- Especially on EU markets and countries with knowledge of GIs in 2012

- **Intensive margin**

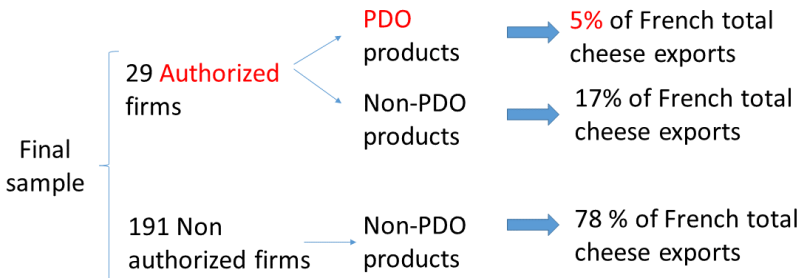
- No significant effect of PDO
- Expected negative impact of the product rank on the exported quantity

Conclusion

- Our results confirm the **export competitiveness role** of PDO labelling in the French cheese industry
 - On the unit value, the quality perceived and the extensive margin
 - Especially if these products are among the main exported products of the firm
 - Higher impact on the European market and on countries who recognize PDO
- Coming back to our **theoretical model** : two channels for PDO effects
 - Increase in the unit value of PDO products (**cost and demand effect**)
 - Increase the quality perceived by the consumers (**demand effect**)
 - Increase in the probability to export PDO products (**demand effect**)
 - No impact on the demand (neither positive nor negative) addressed to PDO compare to non-PDO products (**volume constraints**)

⇒ Our empirical analysis shows that the **demand effect dominates**

Annex 1: Stylized facts (1)



Annex 2: Stylized facts (2)

Table: Descriptive statistics on authorized and non authorized firms

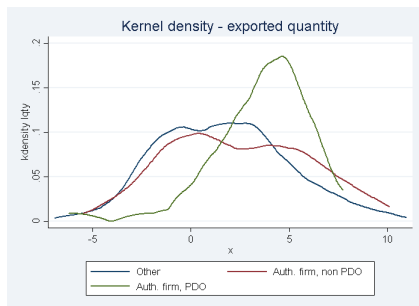
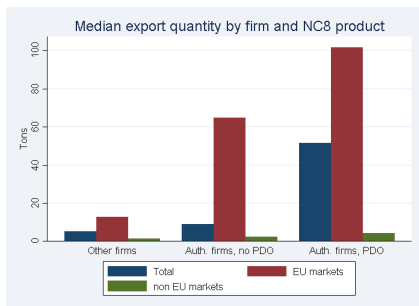
	Type of firm	Nber of firms	Mean	Sd	Median	Min	Max
productivity (1000 €/employee)	<i>Authorized</i>	29	1,489	5,264	355.6	145.9	28,759.1
	<i>Non-authorized</i>	191	582	1,949	292.8	0	26,131.4
Number of Employees	<i>Authorized</i>	29	244	428	87	10	1,744
	<i>Non-authorized</i>	191	211	383	52	1	2,620
Number of products	<i>Authorized</i>	29	7.59	6.31	6	1	24
	<i>Non-authorized</i>	191	3.33	4.23	2	1	29
Number of destinations	<i>Authorized</i>	29	15.8	18	9	1	73
	<i>Non-authorized</i>	191	5.9	12.4	2	1	101
Total export value (1000 €)	<i>Authorized</i>	29	23,705.8	54,030	2,078.5	0.43	238,541
	<i>Non-authorized</i>	191	6,575.2	30,304.6	92.8	0.173	372,192

Notes: Authors' computation using INSEE and INAO datasets.

Authorized firms account for 5% of firms and 22% of exports in value

Annex 3 Stylized facts (3)

Export quantity by firm and NC8 category of good (2012)



Notes: Authors' computation using French Customs and INAO datasets.

Annex 6 Results : direct effect of PDO on unit values

Dependent variable	ln uv_{fkj}		
	(1)	(2)	(3)
PDO _{fk}	0.115** (0.052)		
ln Rank _{fk}	-0.012 (0.022)	-0.012 (0.022)	-0.011 (0.022)
PDO _{fk} × UE _j		0.104* (0.059)	0.104* (0.059)
PDO _{fk} × non-UE _j		0.133* (0.070)	0.164** (0.080)
PDO _{fk} × GI _j			0.008 (0.092)
Fixed effects	f, kj	f, kj	f, kj
N	2,365	2,365	2,365
r2	0.71	0.71	0.72

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Standard errors are clustered at the destination-8-digit-product level.

Annex 7 Results : direct effect of PDO on perceived quality

Dependent variable	ln Qual _{fkj}		
	(1)	(2)	(3)
PDO _{fk}	0.140*** (0.077)		
PDO _{fk} × UE _j		0.157** (0.05)	0.157** (0.05)
PDO _{fk} × non-UE _j		0.112** (0.095)	0.121*** (0.094)
PDO _{fk} × GI _j			0.074 (0.125)
Fixed effects	f	f	f
N	2,365	2,365	2,365
r2	0.19	0.19	0.19

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the destination-8-digit-product level.

Annex 5: Results : direct effect of PDO on the extensive margin

Dependent variable	$X_{fjk} = 1$ if $q_{fjk} > 0$ and $= 0$, otherwise			
	(1)	(2)	(3)	(4)
PDO _{fk}	0.539*** (0.113)			
ln Rank _{fk}	-0.950*** (0.060)	-0.947*** (0.061)	-0.949*** (0.061)	-0.911*** (0.062)
PDO _{fk} × UE _j		0.855*** (0.143)	0.867*** (0.144)	
PDO _{fk} × non-UE _j		0.167 (0.159)	-0.019 (0.167)	
PDO _{fk} × GI _j			1.447*** (0.369)	
PDO _{fk} × UE _j × Rank _{fk} ¹⁻³				1.316*** (0.180)
PDO _{fk} × UE _j × Rank _{fk} ⁴⁻¹⁵				0.259 (0.215)
PDO _{fk} × non-UE _j × Rank _{fk} ¹⁻³				0.008 (0.205)
PDO _{fk} × non-UE _j × Rank _{fk} ⁴⁻¹⁵				0.103 (0.268)
PDO _{fk} × GI _j × Rank _{fk} ¹⁻³				1.641*** (0.425)
PDO _{fk} × GI _j × Rank _{fk} ⁴⁻¹⁵				1.305* (0.682)
# of obs.	26317	26317	26317	26317

Annex 6: Results : direct effect of PDO on the intensive margin

Dependent variable	$\ln Q_{fkj}$			
	(1)	(2)	(3)	(4)
PDO _{fk}	0.141 (0.247)			
Rank _{fk}	-1.387*** (0.12)	-1.387*** (0.12)	-1.391*** (0.121)	-1.382*** (0.118)
PDO _{fk} × UE _j		0.227 (0.3)	0.23 (0.299)	
PDO _{fk} × non-UE _j		-0.008 (0.365)	-0.189 (0.376)	
PDO _{fk} × GI _j			0.73 (1.016)	
PDO _{fk} × UE _j × Rank _{fk} ¹⁻³				0.374 (0.340)
PDO _{fk} × UE _j × Rank _{fk} ⁴⁻¹⁵				-0.242 (0.660)
PDO _{fk} × non-UE _j × Rank _{fk} ¹⁻³				-0.420 (0.475)
PDO _{fk} × non-UE _j × Rank _{fk} ⁴⁻¹⁵				0.466 (0.619)
PDO _{fk} × GI _j × Rank _{fk} ¹⁻³				0.734 (1.246)
PDO _{fk} × GI _j × Rank _{fk} ⁴⁻¹⁵				0.795 (0.969)
Fixed effects	f, kj	f, kj	f, kj	f, kj
N	2365	2365	2365	2365
r2	0.67	0.67	0.67	0.67