



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

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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  $k$
- $\xi_j$  quality shifter associated with PDO labeling
- $\theta_{ik}$  minimum quality offered for product  $k$
- $\eta_j$  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  $f$
- $\tau_{ij}$  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**

**FROMAGES, BEURRES, CRÈMES**  
**A.O.P.**  
LA PLUS BELLE PREUVE D'AUTHENTICITÉ

**AQUITAINE / MIDI-PYRÉNÉES**

- Ossau-Iraty
- Rocamadour
- Laguiole
- Bleu des Causses
- Roquefort

**Auvergne**

- Saint-nectaire
- Cantal
- Fourme d'Ambert
- Bleu d'Auvergne
- Salers

**Bourgogne / Champagne**

- Epoisses
- Beurre et crème de Bresse
- Mâconnais
- Langres
- Chaurance
- Chaudas

**Centre / Val-de-Loire**

- Chaource
- Selles-sur-Cher
- Valençay
- Sainte-meur de Touraine
- Préalpays-Saint-Pierre

**Normandie**

- Camembert de Normandie
- Pont-l'Évêque
- Livarot
- Neuchâtel
- Beurre et crème d'Alsace

**Provence / Alpes**

- Chabichou du Pailhou
- Beurre Charentes-Poitou

**Rhône-Alpes**

- Picodon
- Fourme de Montbrison
- Beurre du Valromey Saasengage
- Rigotte de Comté

**Savoie**

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

**Thiérache / Brie**

- Maroilles
- Brie de Melun
- Brie de Meaux

**Alsace-Lorraine**

- Munster
- Comté
- Mout d'Or
- Moutier
- Bleu de Gex

**Méditerranée**

- Bann
- Pélardon
- Brocciu

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POUR VOTRE SANTÉ, ÉVITEZ DE GRIGNOTER ENTRE LES REPAS. [WWW.MANGERBOUGER.FR](http://WWW.MANGERBOUGER.FR)

[www.fromages-aop.com](http://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:

$$\widehat{\ln(qual_{fjk})} = \widehat{\eta_{fjk}} / (\sigma - 1) \quad (7)$$

## 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**

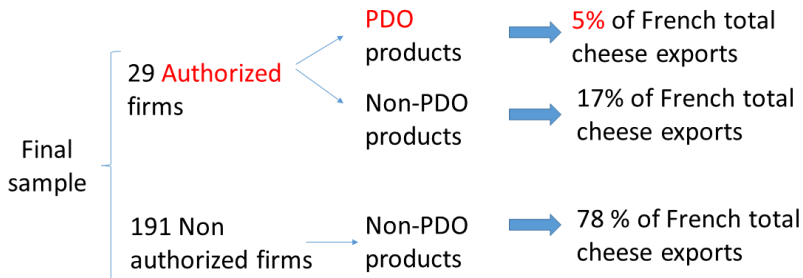
- No significant effect of PDO
- Expected negative impact of the product rank on the exported quantity

## 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

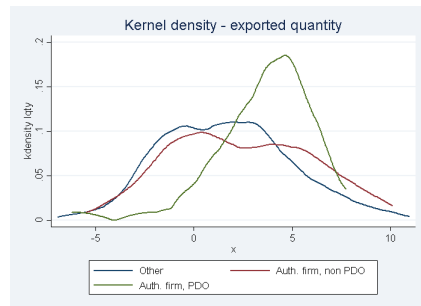
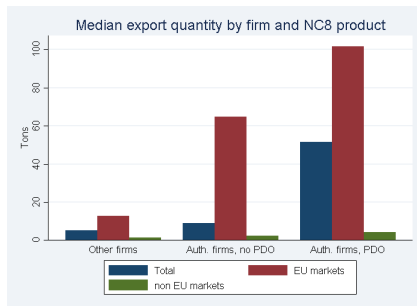
	Type of firm	Nber of firms	Mean	Sd	Median	Min	Max
productivity (1000 €/employee)	<i>Authorized</i>	29	1,489	5,264	355.6	145.9	28,759.1
	<i>Non-authorized</i>	191	582	1,949	292.8	0	26,131.4
Number of Employees	<i>Authorized</i>	29	244	428	87	10	1,744
	<i>Non-authorized</i>	191	211	383	52	1	2,620
Number 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)
$PDO_{fk} \times UE_j$		0.104* (0.059)	0.104* (0.059)
$PDO_{fk} \times non-UE_j$		0.133* (0.070)	0.164** (0.080)
$PDO_{fk} \times GI_j$			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 <sub>fkj</sub>		
	(1)	(2)	(3)
PDO <sub>fk</sub>	0.140*** (0.077)		
PDO <sub>fk</sub> × UE <sub>j</sub>		0.157** (0.05)	0.157** (0.05)
PDO <sub>fk</sub> × non-UE <sub>j</sub>		0.112** (0.095)	0.121*** (0.094)
PDO <sub>fk</sub> × GI <sub>j</sub>			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	$X_{fjk} = 1$ (1)	if $q_{fjk} > 0$ (2)	and $= 0$ , otherwise (3)	(4)
PDO <sub>fjk</sub>	0.539*** (0.113)			
ln Rank <sub>fjk</sub>	-0.950*** (0.060)	-0.947*** (0.061)	-0.949*** (0.061)	-0.911*** (0.062)
PDO <sub>fjk</sub> × UE <sub>j</sub>		0.855*** (0.143)	0.867*** (0.144)	
PDO <sub>fjk</sub> × non-UE <sub>j</sub>		0.167 (0.159)	-0.019 (0.167)	
PDO <sub>fjk</sub> × GI <sub>j</sub>			1.447*** (0.369)	
PDO <sub>fjk</sub> × UE <sub>j</sub> × Rank <sub>fjk</sub> <sup>1-3</sup>				1.316*** (0.180)
PDO <sub>fjk</sub> × UE <sub>j</sub> × Rank <sub>fjk</sub> <sup>4-15</sup>				0.259 (0.215)
PDO <sub>fjk</sub> × non-UE <sub>j</sub> × Rank <sub>fjk</sub> <sup>1-3</sup>				0.008 (0.205)
PDO <sub>fjk</sub> × non-UE <sub>j</sub> × Rank <sub>fjk</sub> <sup>4-15</sup>				0.103 (0.268)
PDO <sub>fjk</sub> × GI <sub>j</sub> × Rank <sub>fjk</sub> <sup>1-3</sup>				1.641*** (0.425)
PDO <sub>fjk</sub> × GI <sub>j</sub> × Rank <sub>fjk</sub> <sup>4-15</sup>				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)
$PDO_{fk} \times UE_j$		0.227 (0.3)	0.23 (0.299)	
$PDO_{fk} \times non-UE_j$		-0.008 (0.365)	-0.189 (0.376)	
$PDO_{fk} \times GI_j$			0.73 (1.016)	
$PDO_{fk} \times UE_j \times Rank_{fk}^{1-3}$				0.374 (0.340)
$PDO_{fk} \times UE_j \times Rank_{fk}^{4-15}$				-0.242 (0.660)
$PDO_{fk} \times non-UE_j \times Rank_{fk}^{1-3}$				-0.420 (0.475)
$PDO_{fk} \times non-UE_j \times Rank_{fk}^{4-15}$				0.466 (0.619)
$PDO_{fk} \times GI_j \times Rank_{fk}^{1-3}$				0.734 (1.246)
$PDO_{fk} \times GI_j \times Rank_{fk}^{4-15}$				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