Quality Labels and Export Performance: Evidence from the French Cheese Industry

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Quality labels and export performance: Evidence from the 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 trade agreements' **negotiations** (TTIP)

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

$\Rightarrow$ **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*)

  $\Rightarrow$ 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*)

  $\Rightarrow$ Again, important heterogeneity among sectors

  $\Rightarrow$ No analysis of the impact of PDO on **export competitiveness**

This paper

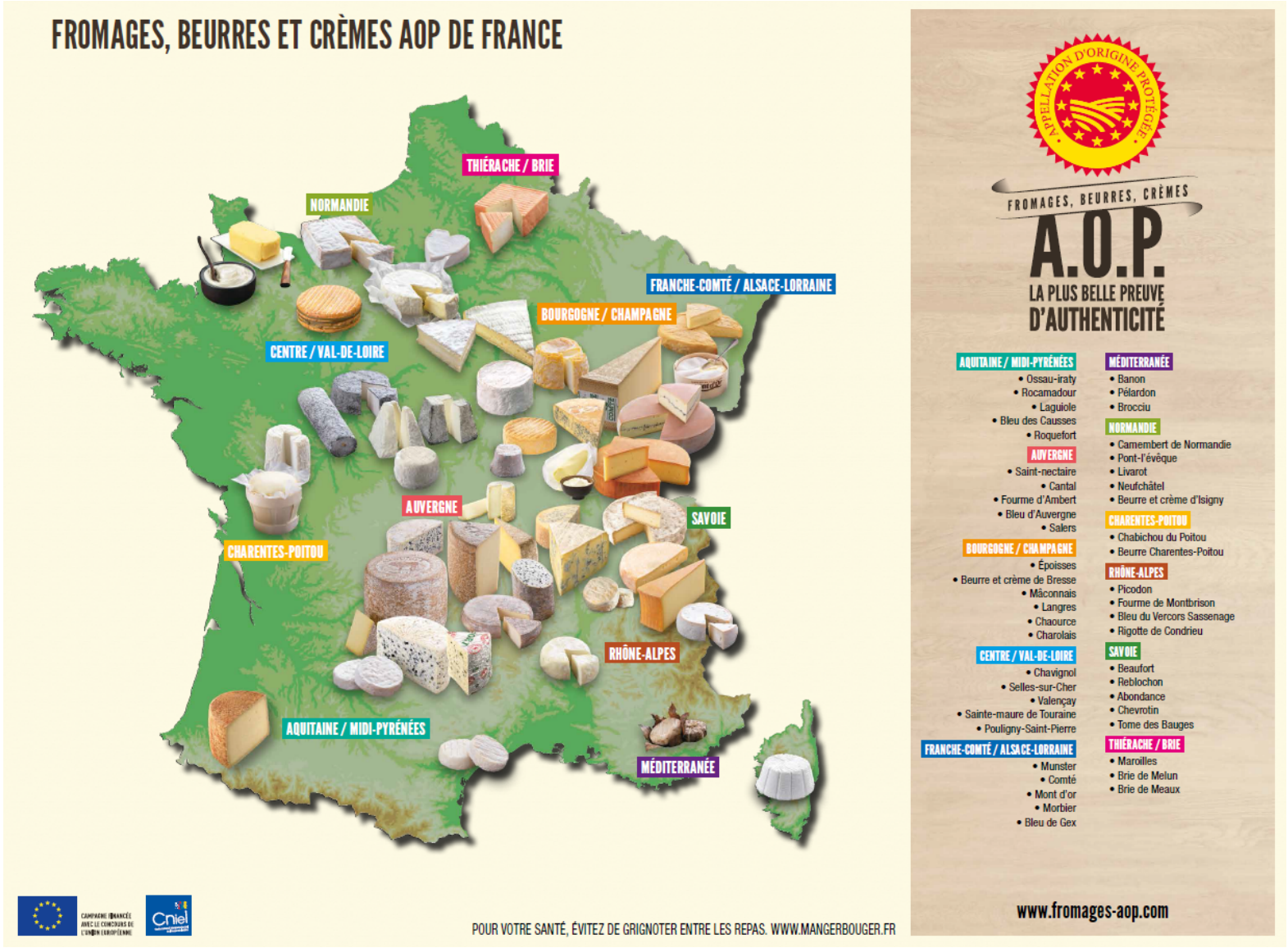
- Analyzes the role of official labels (PDO) on **export performance** in the French cheese industry
  - At the extensive (probability of export) margin
  - At the intensive (quantity) margin
  - On unit values
- Uses an **original and exhaustive dataset** of firms and products concerned by PDO in the French cheese industry
  - multi-product exporters may provide both labelled products and non labelled products
  - merged with custom data
- Shows :
  - A **positive impact** of PDO at the extensive and intensive margin
  - A positive effect mainly driven by the **European destinations**
  - A **spillover effect** of PDO authorization for non-PDO products within authorized firms

Literature on trade and quality

- Impact of **trade costs on quality mix** :
  - Country-level data (*Schott 2004, 2006, Hummels and Klenow 2005, Baldwin and Harrigan 2011*)
  - Firm level data (*Bastos and Silva 2010, Martin 2012*)
- **Firm-level heterogeneity in quality** :
  - Firms with higher quality goods have better export performance
  - Unit values as proxy for quality (*Manova and Zhang 2012, Johnson 2012*)
  - Expert ranking as measure of quality (*Crozet et al. 2012*)
  - R&D and innovation as proxy for quality in the food sector (*Curzi and Olper 2012*)

$\Rightarrow$ This paper : an alternative measure of quality

21 French cheeses with PDO certification



Data

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

1. Correspondence **products** ⇒ **NC8 codes**
   - A PDO product may correspond to several NC8
   - A NC8 may correspond both to PDO and non-PDO product ⇒ All exports of a authorized firm of a NC8 code concerned by a PDO are considered labelled.
2. Correspondence **plant** (SIRET) ⇒ **firms** (SIREN)
3. Merge 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) :
   - **Accounting data** of French firms (value added, workers, turnover)

Stylized facts

Table : Descriptive statistics on authorized and non authorized firms

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

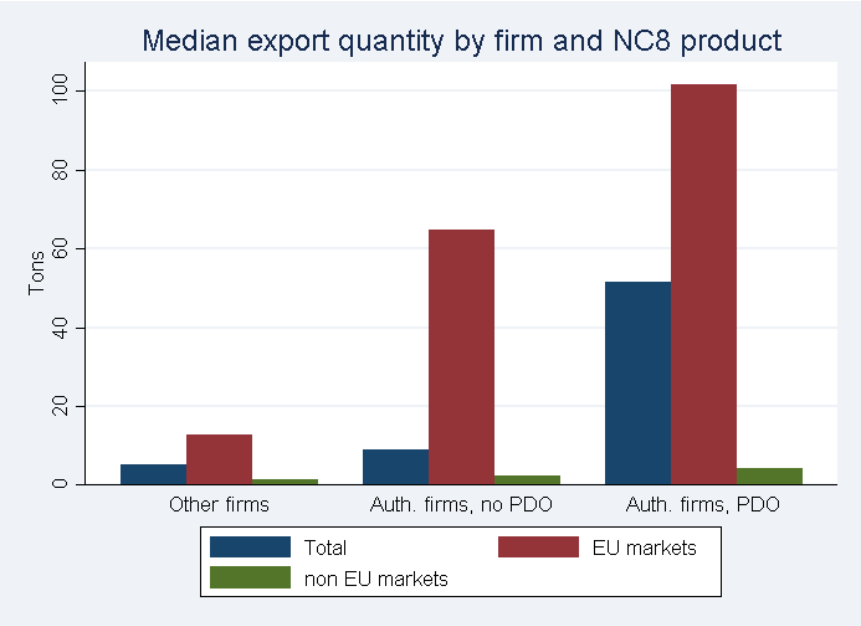
Notes: Authors' computation using INSEE and INAO datasets.

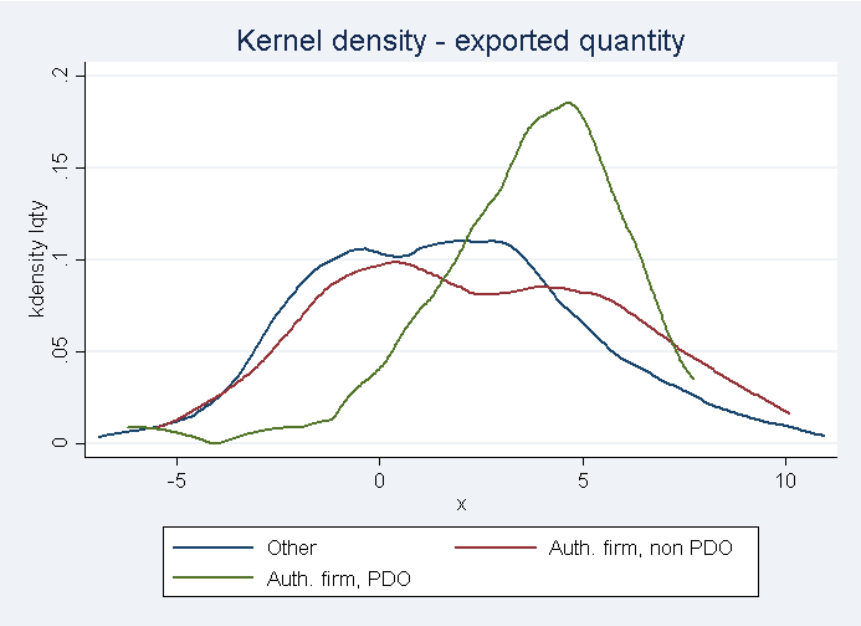
Authorized firms account for 5% of firms and 22% of exports in value

Stylized facts

PDO products = 5% of French total cheese exports
non-PDO products of authorized firms = 17% of French total cheese exports
Non authorized firms = 78% of French total cheese exports

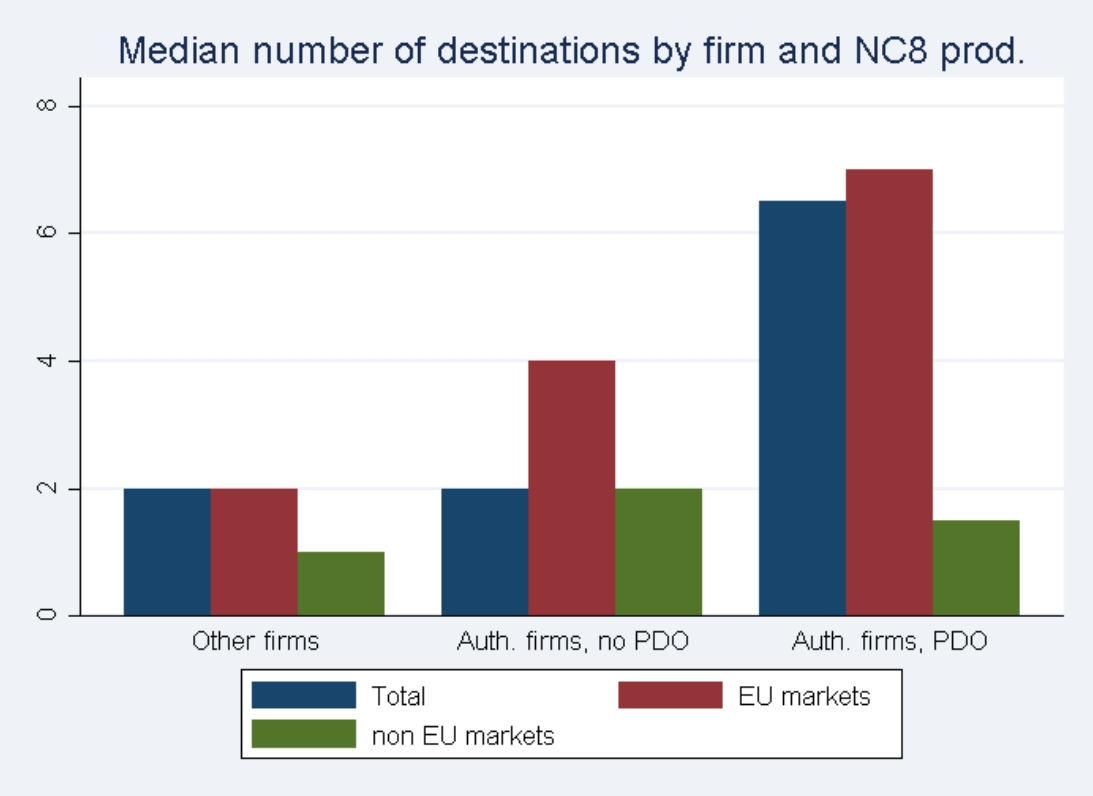
Export quantity by firm and NC8 category of good (2012)





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

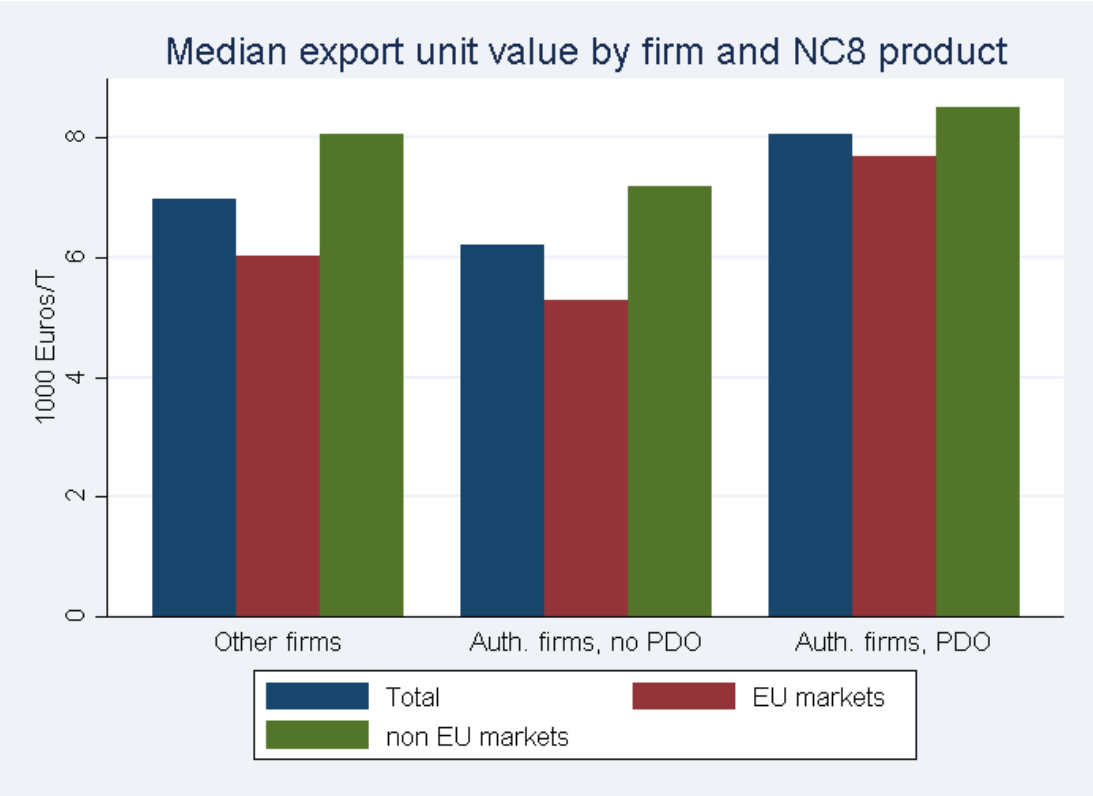
Stylized facts



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

⇒ suggest a positive role of labelling in firms export performance, both at the extensive and intensive margin

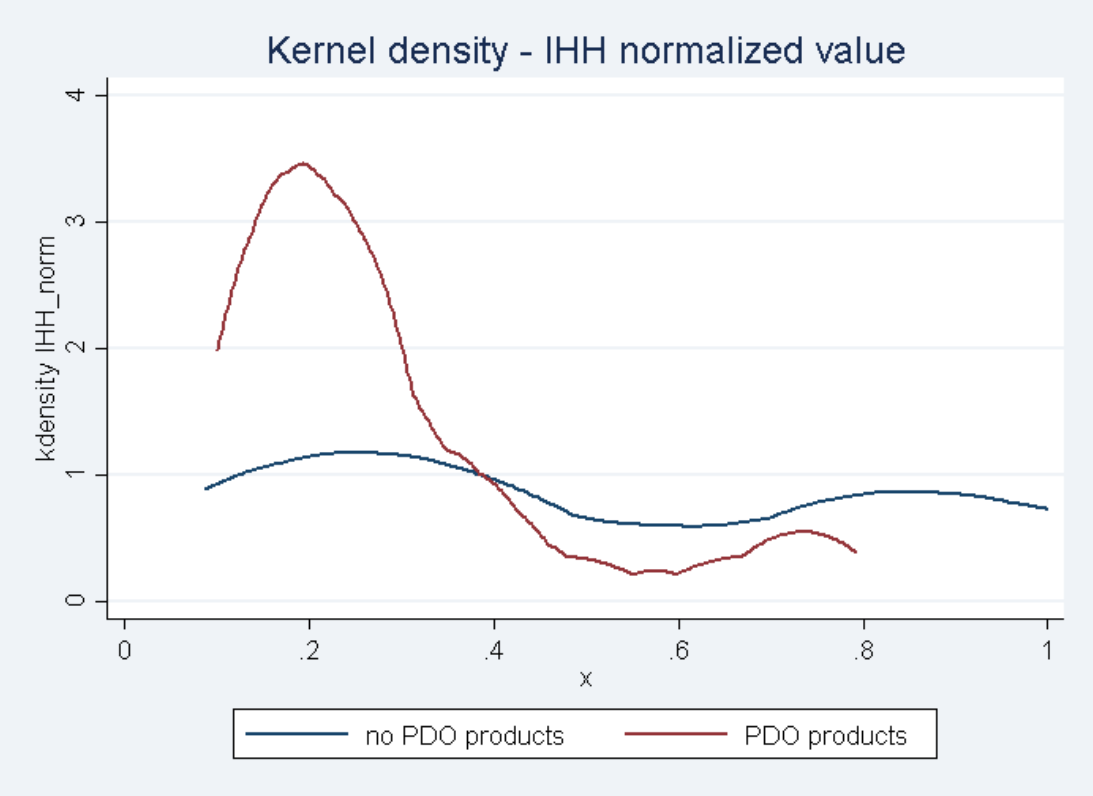
Stylized facts



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

⇒ A price premium only on European markets

Stylized facts



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

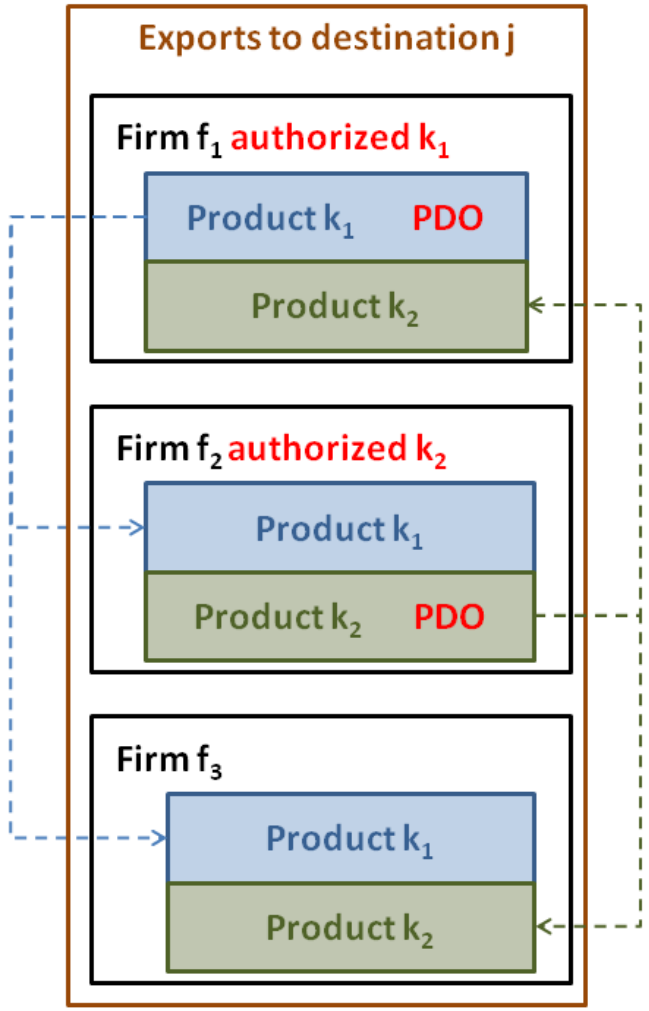
⇒ PDO products exhibits a smaller firm's concentration than non-PDO products

Direct effect of PDO : empirical strategy

- Does PDO labelling entail better performances for French exporters?

Direct Effect:
PDO versus non PDO flows
for a given destination **j**
and a given product $\mathbf{k_1}$

(Across firm comparison)



Direct effect of PDO : empirical strategy

- Empirical model :

$$\begin{cases} X_{fjk} \\ lnQ_{fjk} \\ lnuv_{fjk} \end{cases} = \gamma_0 + \gamma_1 PDO_{fkt} + \gamma_2 Z_f + \Gamma Y_{fkj} + \epsilon_{fjk} \quad (1)$$

- three dependant variables:
  - **Extensive margin** (X_{fjk}=0 or 1 if $Q_{fjk} > 0$)
  - **Intensive margin** (lnQ_{fjk}: log quantity exported by firm f of product k to j)
  - **Unit value** uv_{fjk} of product k exported to country j by firm f
- Key variables: PDO_{fkt}, dummy indicating whether firm f benefits form PDO labelling for$k$
- Z_f firm controls (size and productivity)
- Y_{kj} product NC8-destination fixed effects

Results : direct effect of PDO on the extensive margin X_{fjk}

	(1)	(2)	(3)	(4)
PDO_{fjk}	0.026***		0.031***	
	(0.003)		(0.005)	
$PDO_{fjk} \times EU_j$		0.118***		0.172***
		(0.006)		(0.011)
$PDO_{fjk} \times$ non-EU_j		0.005*		0.014***
		(0.003)		(0.005)
$PDO_{fjk} \times IHH_k$			-0.024	
			(0.019)	
$PDO_{fjk} \times IHH_k \times EU_j$				-0.176***
				(0.030)
$PDO_{fjk} \times IHH_k \times$ non-EU_j				-0.030**
				(0.013)
Cheese industry_f	0.019***	0.019***	0.019***	0.020***
	(0.002)	(0.002)	(0.002)	(0.002)
Productivity_f	0.014***	0.014***	0.014***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
1st class of nber of Employees_f	*Ref.*	*Ref.*	*Ref.*	*Ref.*
	-	-	-	-
2nd class of nber of Employees_f	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
3rd class of nber of Employees_f	0.009***	0.009***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)
4th class of nber of Employees_f	0.043***	0.043***	0.043***	0.043***
	(0.001)	(0.001)	(0.001)	(0.001)
Fixed effects	kj	kj	kj	kj
Nber Obs.	121,119	121,119	121,119	121,119
r2	0.18	0.18	0.18	0.18

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results : direct effect of PDO on the intensive margin ln Q_{fjk}

	(1)	(2)	(3)	(4)
PDO_{fjk}	0.173		0.881**	
	(0.169)		(0.356)	
$PDO_{fjk} \times EU_j$		0.113		0.947**
		(0.206)		(0.433)
$PDO_{fjk} \times$ non-EU_j		0.297		0.101
		(0.295)		(0.496)
$PDO_{fjk} \times IHH_k$			-2.772**	
			(1.229)	
$PDO_{fjk} \times IHH_k \times EU_j$				-3.034**
				(1.379)
$PDO_{fjk} \times IHH_k \times$ non-EU_j				0.843
				(1.722)
Cheese $industry_f$	2.146***	2.146***	2.146***	2.220***
	(0.261)	(0.261)	(0.261)	(0.261)
$Productivity_f$	0.500***	0.500***	0.494***	0.498***
	(0.035)	(0.035)	(0.035)	(0.035)
1st class of nber of $Employees_f$	*Ref.*	*Ref.*	*Ref.*	*Ref.*
	-	-	-	-
2nd class of nber of $Employees_f$	0.272	0.279	0.272	0.273
	(0.187)	(0.187)	(0.187)	(0.187)
3rd class of nber of $Employees_f$	0.815***	0.821***	0.827***	0.830***
	(0.130)	(0.130)	(0.130)	(0.130)
4th class of nber of $Employees_f$	1.692***	1.696***	1.698***	1.700***
	(0.129)	(0.130)	(0.129)	(0.129)
Fixed effects	kj	kj	kj	kj
Nber Obs.	4,651	4,651	4,651	4,636
r2	0.55	0.55	0.55	0.55

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results : direct effect of PDO on the trade unit value ln uv_{fjk}

	(1)	(2)	(3)	(4)
PDO_{fjk}	0.025		0.115	
	(0.034)		(0.071)	
$PDO_{fjk} \times EU_j$		0.021		0.110
		(0.041)		(0.087)
$PDO_{fjk} \times$ non-EU_j		0.034		0.066
		(0.059)		(0.099)
$PDO_{fjk} \times IHH_k$			-0.351	
			(0.246)	
$PDO_{fjk} \times IHH_k \times EU_j$				-0.321
				(0.276)
$PDO_{fjk} \times IHH_k \times$ non-EU_j				-0.140
				(0.345)
Cheese $industry_f$	-0.071	-0.071	-0.071	-0.062
	(0.052)	(0.052)	(0.052)	(0.052)
$Productivity_f$	-0.080***	-0.080***	-0.081***	-0.081***
	(0.007)	(0.007)	(0.007)	(0.007)
1st class of nber of $Employees_f$	*Ref.*	*Ref.*	*Ref.*	*Ref.*
	-	-	-	-
2nd class of nber of $Employees_f$	0.033	0.033	0.033	0.032
	(0.037)	(0.037)	(0.037)	(0.037)
3rd class of nber of $Employees_f$	-0.076***	-0.075***	-0.074***	-0.074***
	(0.026)	(0.026)	(0.026)	(0.026)
4th class of nber of $Employees_f$	-0.158***	-0.158***	-0.157***	-0.157***
	(0.026)	(0.026)	(0.026)	(0.026)
Fixed effects	kj	kj	kj	kj
Nber Obs.	4651	4651	4651	4636
r2	0.56	0.56	0.56	0.56

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Robustness : direct effect of PDO on trade - PPML estimators

	(1)	(2)	(3)	(4)
PDO_{fjk}	0.648***		0.844***	
	-0.05		-0.1	
$PDO_{fjk} \times EU_j$		0.877***		0.985***
		-0.067		-0.129
$PDO_{fjk} \times$ non-EU_j		0.329***		0.822***
		(0.081)		(0.169)
$PDO_{fjk} \times IHH_k$			-0.798**	
			-0.345	
$PDO_{fjk} \times IHH_k \times EU_j$				-0.403
				-0.408
$PDO_{fjk} \times IHH_k \times$ non-EU_j				-1.933***
				-0.621
Cheese $industry_f$	1.066***	1.072***	1.065***	1.078***
	-0.083	-0.083	-0.083	-0.083
$Productivity_f$	0.458***	0.457***	0.457***	0.454***
	-0.013	-0.013	-0.013	-0.013
1st class of nber of $Employees_f$	*Ref.*	*Ref.*	*Ref.*	*Ref.*
	-	-	-	-
2nd class of nber of $Employees_f$	0.211***	0.208***	0.215***	0.209***
	-0.066	-0.066	-0.066	-0.066
3rd class of nber of $Employees_f$	0.538***	0.540***	0.540***	0.545***
	-0.042	-0.042	-0.042	-0.042
4th class of nber of $Employees_f$	1.354***	1.350***	1.356***	1.348***
	-0.043	-0.043	-0.043	-0.043
Fixed effects	kj	kj	kj	kj
Nber Obs.	54,091	54,091	54,091	54,091
r2	0.2	0.2	0.2	0.2

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results : direct effect of PDO

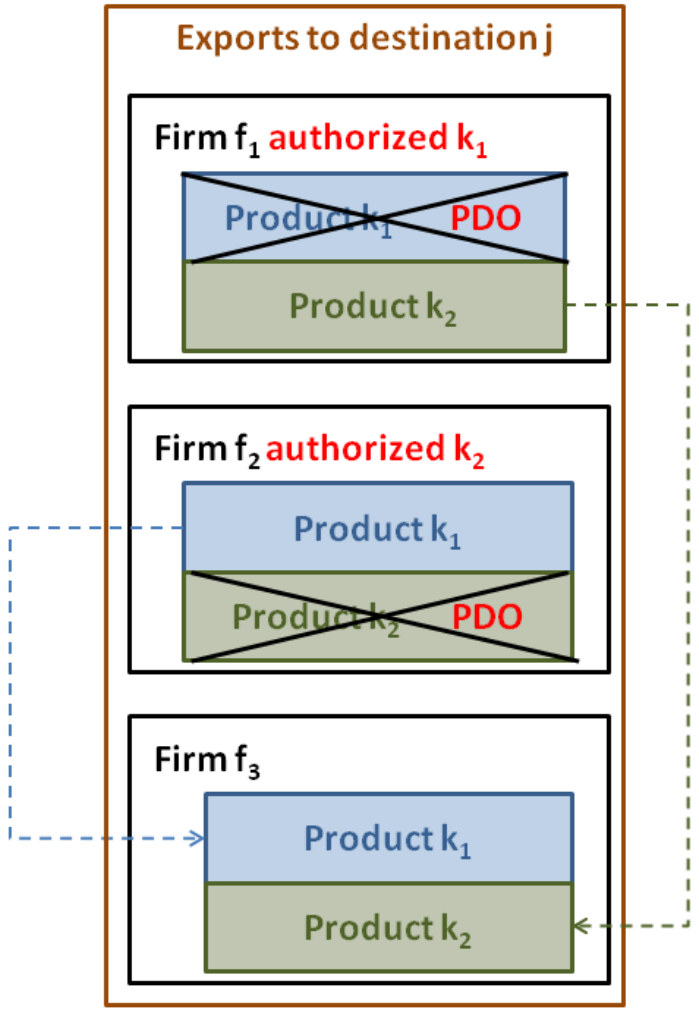
- Positive impact of PDO labelling on the **probability of trade**, whatever the destination
  - higher impact to European markets
- The impact of PDO labelling on **trade quantities** depends on the level of firm's **concentration** for the product
  - 11 products (among 16) with positive effect (IHH<0.318)
  - Effect on **European markets** only
- No significant effect of PDO labelling on **Trade Unit Value**

Spillover effect of PDO : empirical strategy

- Does authorization entail better performances for non PDO products?

Spillover Effect:
Authorized versus non authorized firms
for a given destination **j**
and a given product $\mathbf{k_1}$
for non PDO flows

(Across firm comparison)



Spillover effect of PDO : empirical strategy

- Empirical model :

$$\begin{cases} X_{fjk} \\ lnQ_{fjk} \\ lnuv_{fjk} \end{cases} = \gamma_0 + \gamma_1 Authfirm_f + \gamma_2 Z_f + \Gamma Y_{fkj} + \epsilon_{fjk} \qquad (2)$$

- three dependant variables:
  - **Extensive margin** (X_{fjk}=0 or 1 if $Q_{fjk} > 0$)
  - **Intensive margin** (lnQ_{fjk}: log quantity exported by firm f of product k to j)
  - **Unit value** uv_{fjk} of product k exported to country j by firm f
- estimation on non-PDO flows only
- Key variables: $Authfirm_f$, dummy indicating whether firm f is authorized to handle PDO products
- Z_f firm controls (size and productivity)
- Y_{kj} product NC8-destination fixed effects

Results : Spill-over effect of PDO - Extensive Margin

	(1)	(2)	(3)	(4)
Auth. $firm_f$	0.001		0.010***	
	(0.001)		(0.002)	
Auth. $firm_f \times EU_j$		0.039***		0.053***
		(0.003)		(0.006)
Auth. $firm_f \times$ non-EU_j		-0.007***		0.003
		(0.001)		(0.002)
Auth. $firm_f \times IHH_k$			-0.029***	
			(0.006)	
Auth. $firm_f \times IHH_k \times EU_j$				-0.037***
				(0.012)
Auth. $firm_f \times IHH_k \times$ non-EU_j				-0.033***
				(0.006)
Cheese $industry_f$	0.020***	0.020***	0.021***	0.021***
	(0.002)	(0.002)	(0.002)	(0.002)
$Productivity_f$	0.014***	0.014***	0.014***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
1st class of nber of $Employees_f$	*Ref.*	*Ref.*	*Ref.*	*Ref.*
	-	-	-	-
2nd class of nber of $Employees_f$	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
3rd class of nber of $Employees_f$	0.009***	0.009***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001))
4th class of nber of $Employees_f$	0.041***	0.041***	0.041***	0.040***
	(0.001)	(0.001)	(0.001)	(0.001)
Fixed effects	kj	kj	kj	kj
N	115,197	115,197	115,197	115,197
r2	0.17	0.17	0.17	0.17

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results : Spill-over effect of PDO - Intensive Margin

	(1)	(2)	(3)	(4)
Auth. $firm_f$	-0.180		0.672***	
	(0.113)		(0.199)	
Auth. $firm_f \times EU_j$		0.113		0.670**
		(0.149)		(0.274)
Auth. $firm_f \times$ non-EU_j		-0.533***		0.140
		(0.164)		(0.262)
Auth. $firm_f \times IHH_k$			-2.889***	
			(0.555)	
Auth. $firm_f \times IHH_k \times EU_j$				-1.681**
				(0.691)
Auth. $firm_f \times IHH_k \times$ non-EU_j				-2.361***
				(0.712)
Cheese $industry_f$	2.246***	2.252***	2.277***	2.362***
	(0.270)	(0.269)	(0.268)	(0.269)
$Productivity_f$	0.493***	0.483***	0.482***	0.477***
	(0.039)	(0.039)	(0.039)	(0.039)
1st class of nber of $Employees_f$	*Ref.*	*Ref.*	*Ref.*	*Ref.*
	-	-	-	-
2nd class of nber of $Employees_f$	0.144	0.126	0.168	0.158
	(0.213)	(0.213)	(0.212)	(0.212)
3rd class of nber of $Employees_f$	0.849***	0.812***	0.874***	0.837***
	(0.141)	(0.142)	(0.141)	(0.141)
4th class of nber of $Employees_f$	1.708***	1.688***	1.764***	1.729***
	(0.142)	(0.142)	(0.141)	(0.142)
Fixed effects	kj	kj	kj	kj
N	4,274	4,274	4,274	4,259
r2	0.56	0.56	0.57	0.57

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results : Spill-over effect of PDO - Trade Unit Value

	(1)	(2)	(3)	(4)
Auth. $firm_f$	-0.154***		-0.188***	
	(0.023)		(0.040)	
Auth. $firm_f \times EU_j$		-0.164***		-0.184***
		(0.030)		(0.055)
Auth. $firm_f \times$ non-EU_j		-0.141***		-0.171***
		(0.033)		(0.053)
Auth. $firm_f \times IHH_k$			0.117	
			(0.111)	
Auth. $firm_f \times IHH_k \times EU_j$				0.057
				(0.139)
Auth. $firm_f \times IHH_k \times$ non-EU_j				0.101
				(0.143)
Cheese $industry_f$	-0.064	-0.064	-0.065	-0.058
	(0.054)	(0.054)	(0.054)	(0.054)
$Productivity_f$	-0.066***	-0.066***	-0.066***	-0.065***
	(0.008)	(0.008)	(0.008)	(0.008)
1st class of nber of $Employees_f$	*Ref.*	*Ref.*	*Ref.*	*Ref.*
	-	-	-	-
2nd class of nber of $Employees_f$	0.033	0.034	0.032	0.034
	(0.043)	(0.043)	(0.043)	(0.043)
3rd class of nber of $Employees_f$	-0.100***	-0.098***	-0.101***	-0.097***
	(0.028)	(0.028)	(0.028)	(0.028)
4th class of nber of $Employees_f$	-0.122***	-0.121***	-0.124***	-0.120***
	(0.028)	(0.028)	(0.028)	(0.029)
Fixed effects	kj	kj	kj	kj
Nber Obs.	4274	4274	4274	4259
r2	0.57	0.57	0.57	0.57

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results : spillover effect of PDO

- Being authorized has a positive impact on the **probability to export** non-PDO products
  - for 15 products among 40 (IHH<0.345)
  - for all products on European markets
- The impact of authorization on **trade quantities** of non-PDO products depends on the level of firm's **concentration** for the product
  - 8 products with positive effect (IHH<0.23)
  - Positive effect on **European markets** for 18 products (IHH<0.932)
- Authorized firms export non-PDO products with smaller **Trade Unit Values**

Conclusion

- Our results confirm the **export competitiveness role** of PDO labelling in the French firm industry
  - PDO products benefit from better export performance
  - This advantage mainly holds on **EU markets**
  - This advantage depend on the level of concentration of French firms for the product
  - **Spill-over effect** for authorized firms for their non-PDO products
- The effect on **unit value / price** has to be further investigated
  - Difficult the disentangle the "**quality**" effect to the "**productivity**" effect
  - Small evidence of price premium for PDO products in the literature
  - The **productivity** effect is unclear : authorized firms are bigger and more productive, but PDO specifications require more expensive inputs and sometimes entail production constraints

Further research

- Further investigate the differences among **destination** countries
  - Heterogeneity within and outside the European Union
- Consider the belonging to a **group** / **brand name** as explanatory variable
- Perform **robustness checks**