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

Sabine Duvaleix-Treguer, Charlotte Emlinger, Carl Gaigné, Karine Latouche

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

S. Duvaleix-Treguer[a] C. Emlinger[b]

C. Gaigné [c] K. Latouche [d]

[a] *AGROCAMPUS OUEST, UMR SMART-LERECO*

[b] *CEPII, Paris*

[c] *INRA, UMR SMART-LERECO*

[d] *INRA, UMR SMART-LERECO*

2nd August 2018 – ICAE-Vancouver

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 negiociations
- 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

$\Rightarrow$ **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

  $\Rightarrow$ 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

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

- $\lambda_{kj}(v)$ 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**

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

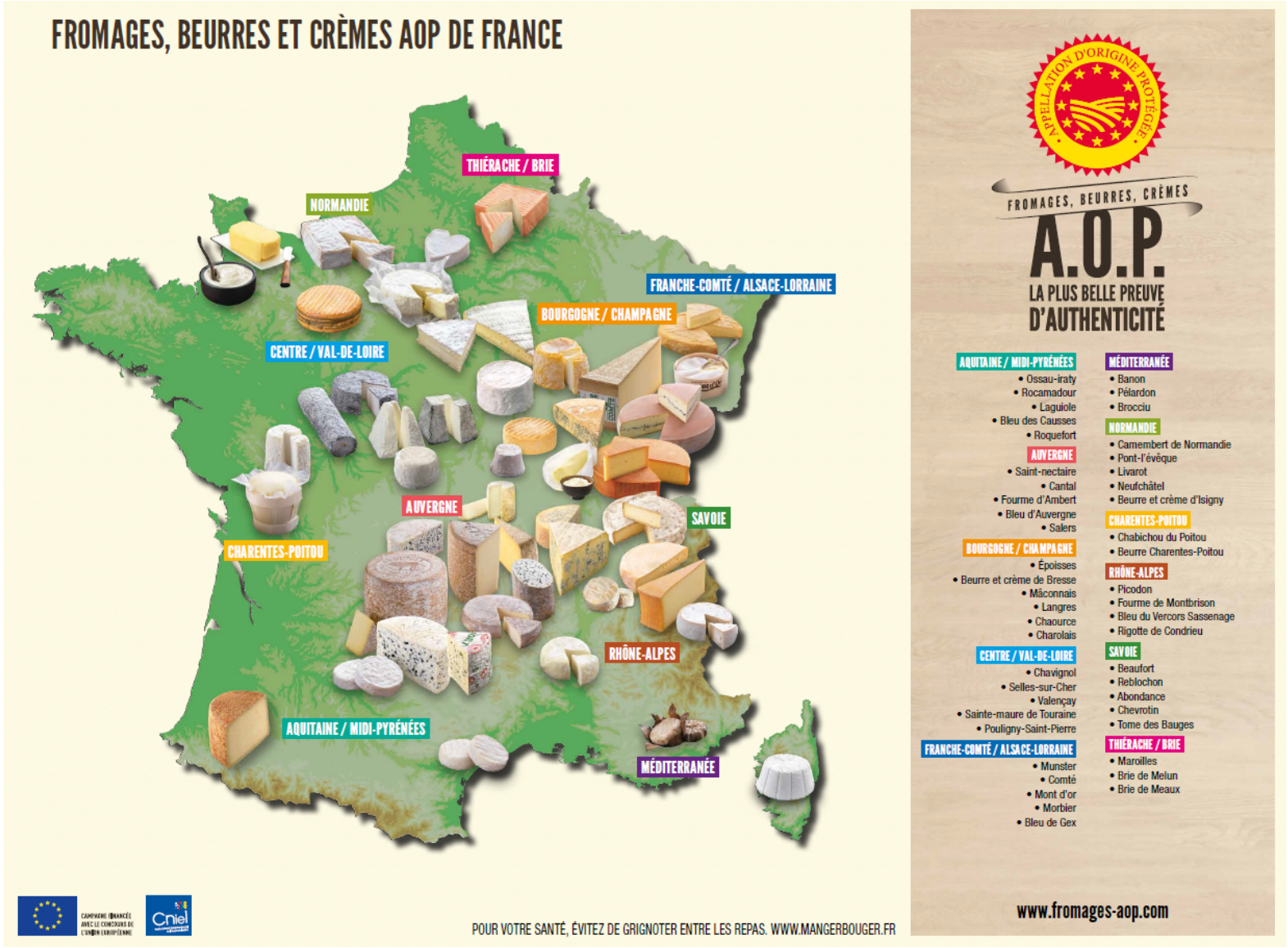
  - $\omega_i(f)$ price index of inputs used by firm f
  - τ_{ij} trade costs for product k shipped from country i to country j
  - $[\theta_{ik}]^{\alpha_j}$ cost shifter due to product quality without PDO label
  - $e^{\beta \mathrm{PDO}_{fk}}$ additional cost shifter due to PDO labelling

- Additional product entails a decrease in productivity $\varphi_{fk} = \varphi(f) \times \mathrm{Rank}_{fk}^{-\gamma}$

$\Rightarrow$ **Profit-maximizing prices**

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

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 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:

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

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, Swizerland, South Corea)
- **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** (lnQ_{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

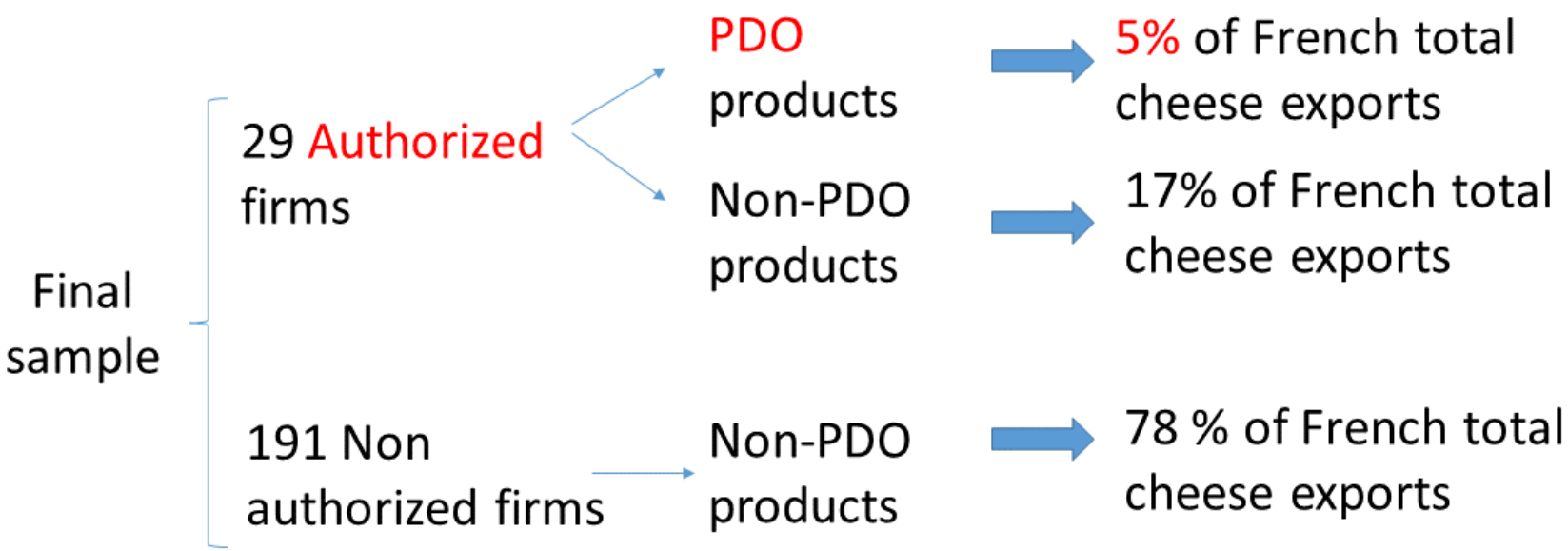
Conclusion

- 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**)

$\Rightarrow$ 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

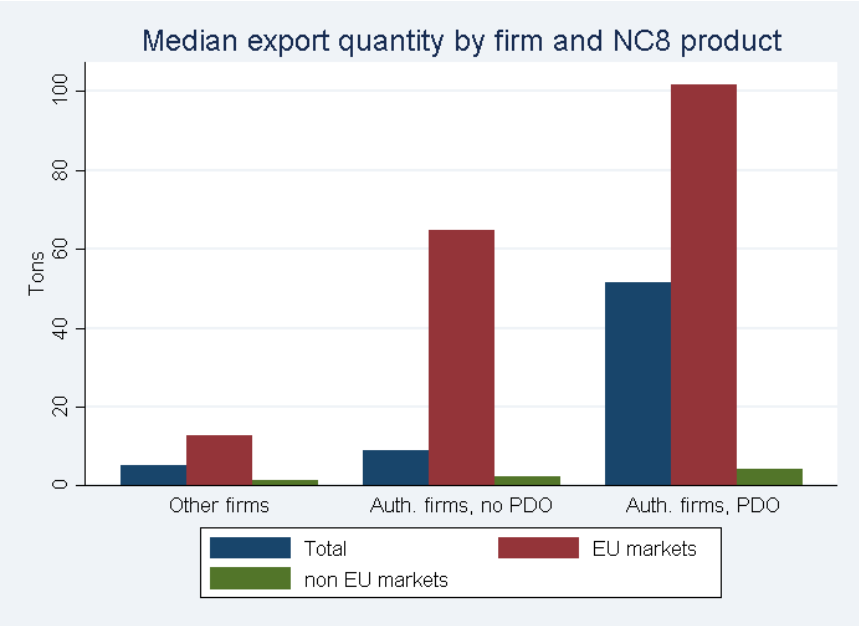
	Type of firm	Nber of firms	Mean	Sd	Median	Min	Max
productivity	*Authorized*	29	1,489	5,264	355.6	145.9	28,759.1
(1000 €/employee)	*Non-authorized*	191	582	1,949	292.8	0	26,131.4
Number of	*Authorized*	29	244	428	87	10	1,744
Employees	*Non-authorized*	191	211	383	52	1	2,620
Number of	*Authorized*	29	7.59	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

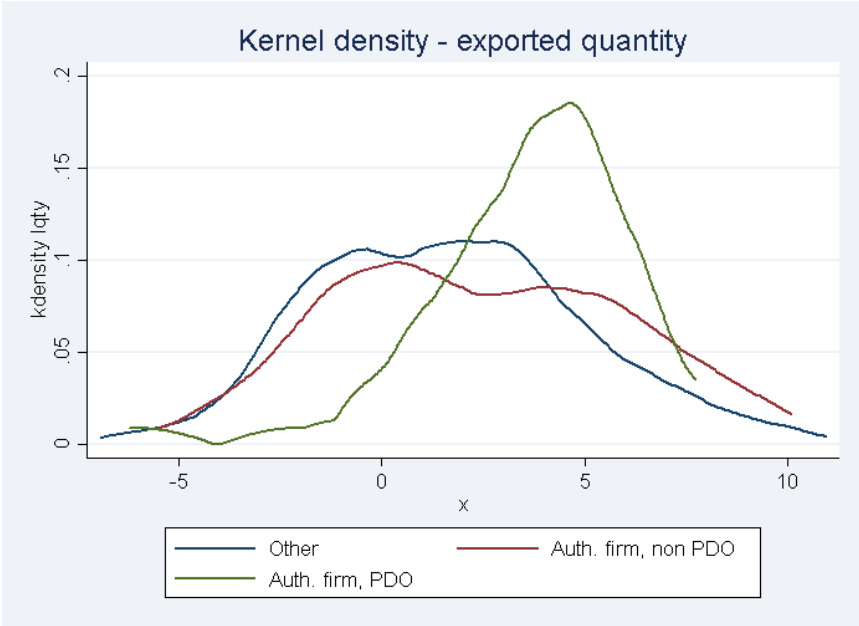
Notes: Authors' computation using INSEE and INAO datasets.

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

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	-0.012	-0.011
	(0.022)	(0.022)	(0.022)
$PDO_{fk} \times UE_j$		0.104*	0.104*
		(0.059)	(0.059)
$PDO_{fk} \times$ non-UE_j		0.133*	0.164**
		(0.070)	(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	$\ln Qual_{fkj}$		
	(1)	(2)	(3)
PDO_{fk}	0.140***		
	(0.077)		
$PDO_{fk} \times UE_j$		0.157**	0.157**
		(0.05)	(0.05)
$PDO_{fk} \times$ non-UE_j		0.112**	0.121***
		(0.095)	(0.094)
$PDO_{fk} \times GI_j$			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 $q_{fkj} > 0$ and $= 0$, otherwise			
	(1)	(2)	(3)	(4)
PDO_{fk}	0.539***			
	(0.113)			
ln $Rank_{fk}$	-0.950***	-0.947***	-0.949***	-0.911***
	(0.060)	(0.061)	(0.061)	(0.062)
$PDO_{fk} \times UE_j$		0.855***	0.867***	
		(0.143)	(0.144)	
$PDO_{fk} \times$ non-UE_j		0.167	-0.019	
		(0.159)	(0.167)	
$PDO_{fk} \times GI_j$			1.447***	
			(0.369)	
$PDO_{fk} \times UE_j \times Rank_{fk}^{1-3}$				1.316***
				(0.180)
$PDO_{fk} \times UE_j \times Rank_{fk}^{4-15}$				0.259
				(0.215)
$PDO_{fk} \times$ non-$UE_j \times Rank_{fk}^{1-3}$				0.008
				(0.205)
$PDO_{fk} \times$ non-$UE_j \times Rank_{fk}^{4-15}$				0.103
				(0.268)
$PDO_{fk} \times GI_j \times Rank_{fk}^{1-3}$				1.641***
				(0.425)
$PDO_{fk} \times GI_j \times Rank_{fk}^{4-15}$				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***	-1.387***	-1.391***	-1.382***
	(0.12)	(0.12)	(0.121)	(0.118)
$PDO_{fk} \times UE_j$		0.227	0.23	
		(0.3)	(0.299)	
$PDO_{fk} \times$ non-UE_j		-0.008	-0.189	
		(0.365)	(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