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# Pesticides expenditure in the apple sector : a comparison between Italian and French firms



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# Sanitary and Phytosanitary issue



- Increase of food scandals
  - Mad cow
  - Bird flu ...
  
- Answer consumers' requirements in terms of product's quality to reinforce their confidence
  
- Emergence of standards to answer these requirements in terms of traceability and environment's respect
  
- Standards implemented by :
  - Public authorities
  - Private standards



Why focus on apple's  
production ?

# An important traded production



- The main fruit produced and traded in the world (volume) as well in the southern hemisphere as in the northern
- 1961: 9.5% of the production is exchanged – in 2011: around 11%
- New countries have emerged in the international arena:
  - Demand from Russia
  - Supply by China and Chile

# A production widely “treated”



- Important number of treatments : 35 / apple / year on average
- Number of treatments varies depending :
  - the location,
  - varieties,
  - cultural practices (organic farming, conventional)
- This sector has to comply with the incremental evolution of the whole sanitary and phytosanitary requirements (national and foreign)

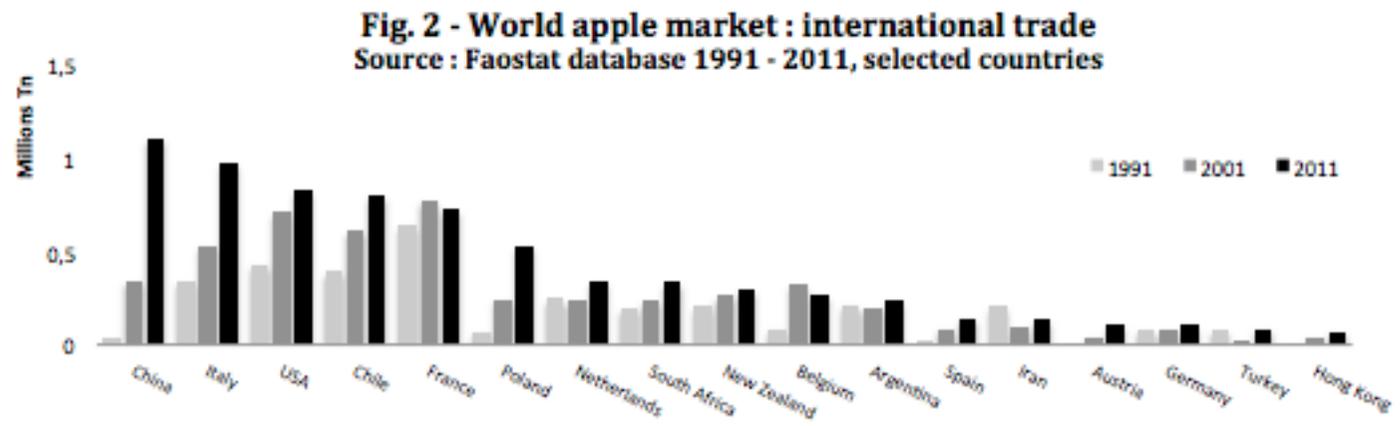


Why focus on French and Italian apple's production ?

# Main producers and exporters



- In 2011, French and Italian are the main countries exporters
- The French exportation are stagnate since the early 90's
- The Italian exportation are increasing and is just behind the new Chinese colossus

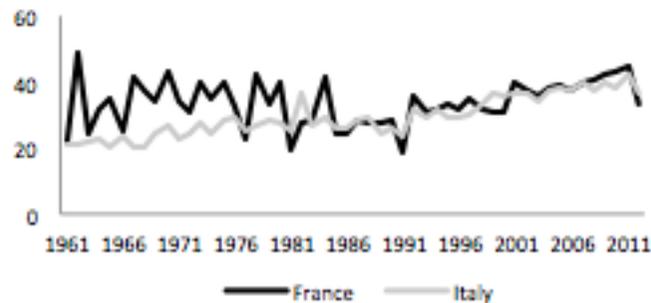


# Common elements: Production side



- Comparable yield rate with on average around 43 tons of apples per hectare

**Fig. 3 : Apple yields (Tn/ha)  
(1961 - 2012, Faostat Database)**



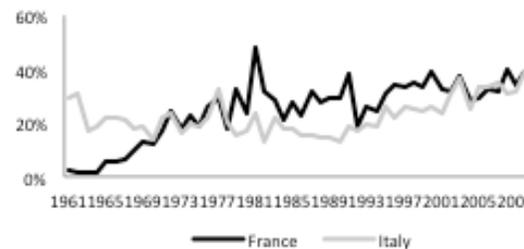
- Geographical proximity – hence, common climatic characteristics
- Similar varietal improvements

# Common elements: Export side



- Same share of exported goods on domestic production – near 40% in 2011

Fig. 4 : Apple export share on production  
(1961 - 2011, Faostat Database)



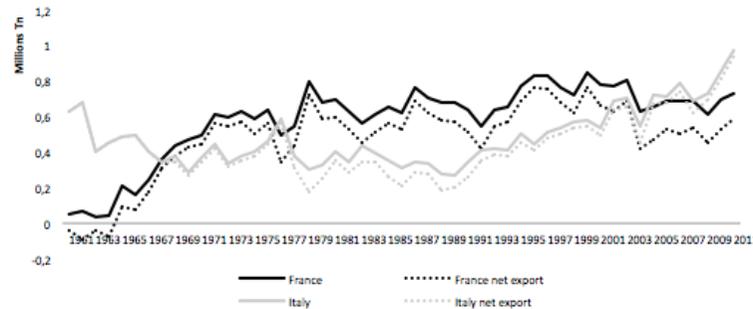
- Top 30 client represent around 96% of their total exports – European market represents 68% for France and 75% for Italy.
- Involved in the same markets:
  - 27 of 27 European countries
  - 47 extra-EU destinations

# Differences of paths



- Since the late 80's, apple Italian exporters reduce the gap with French ones
- In 2003, the Italian volume export exceeded the French volume

Fig. 4 : French and Italian apple exports (gross and net)  
(1961 - 2011, Faostat Database)



- Italy has achieved to penetrate some difficult markets (US, China) one or two years ahead of France
- Italy seems to support a competitive advantage



We assume that differences in export dynamics depends on the different capacities of Italian and French producers to comply with the same regulation and to manage in efficient way the production cost, in particular pesticides



Determinants of pesticides use in France and in Italy  
for apple production ...

... in order to ...

... to reduce the number and the level of pesticides  
use

# Farm Accountancy Data Network (1/2)



- European database
- Annual survey representative of location, production and physical dimension of farms
- Professional farms
  - Threshold conditioned by the structure of each country
  - Thanks this threshold 95% of the total production has to be captured
  - 2010:
    - France: 9600€ of Standard Gross Margin
    - Italy: 4000€ of SGM

# Farm Accountancy Data Network (2/2)



- Data from
  - 2000-2013 for French farmers
  - 2003-2013 for Italian farmers
- Several dimension :
  - Financial - turnover, %apple production value on turnover ...
  - Structural - production's diversification, annual work unit...
  - Individual – training, legal form, region, less favoured area...
- Depending the country all information available are not the same and we have to take it into account in our analysis



What are the determinant of pesticides use ?

# Model implemented



$$\frac{\text{Pesticide expenses}}{\text{turnover}} = \alpha_i + \sum \varphi_i \text{Financial}_i + \sum \beta_i \text{Structural}_i + \sum \chi_i \text{Individual}_i + \sum \delta_i \text{location}_i + \sum \gamma_i \text{year}_i + \varepsilon_i$$

- Linear model
- To capture the size effect, we consider some factors relatively to the turnover
- Because variables are not the same from a database to another, 2 models are implemented

# Variables considered



- Financial :
  - Turnover (quadratic form)
  - % apple production value / turnover – depending the specialization
  - European aids / turnover
  
- Structural:
  - Diversification – inter, intra and interaction term
  - Be insured
  - Be owner
  - Apple area
  - Annual work unit (quadratic form)
  - Be irrigated
  - Be specialized

# Variables considered

- Individual:
  - Agricultural and general training (France only)
  - Be an individual farmer

- Location:
  - Less Favoured Area
  - Main region producing apple
    - France – Pays de la Loire, Midi Pyrénées, Rhône Alpes, PACA
    - Italy – Bolzano, Trento

- Control variable : year



# Financial Dimension

<i>Financial Dimension</i>		
Total turnover	-5.82e-08***	-1.94e-09***
Total turnover (Quadratic form)	1.74e-14***	1.24e-17***
Apple production value / Turnover	.1058748***	.0106208***
Apple production value / Turnover * Specialization	-.0325998***	-.0571006***
European aids / Turnover	.208551***	-.0115987***



## ■ Common impact of financial factors

### ■ Turnover

- The greater turnover the lesser pesticides
- At a threshold, there is a minimum use of pesticides

### ■ Apple production value

- Positive impact – farmers want to protect their production

### ■ European aids

- In Italy, this aids let the producer be able to take more risk and hence decreases his pesticide uses
- In France, the impact is the opposite

# Structural Dimension



	<i>Structural Dimension</i>	
Intra diversification	.0011805**	-.0019292***
Inter diversification	.0092825***	-.0150075***
Intra * Inter diversification	.000295	.0033596***
Be insured	.0125959	.0060102***
Be owner	.0019727***	-.0132425***
Apple Area	-.0028828***	.0025367***
Annual Work Unit	-.0008861***	.0000529***
Annual Work Unit (Quadratic form)	.0000214**	-8.57e-08***
Be irrigated	.0116464***	.0029709***
Be specialized on fruit production	.0213204***	.0329902***

## ■ Common factors

- Irrigated farm have a more intensive use of pesticides than non-irrigated
- When specialized on fruit production, a farmer use relatively more pesticides
- Insured farmers use more pesticides

## ■ Divergence factors

- Diversification: positive impact for French farms
- Owner: use less pesticides in Italy
- Apple area: smallest French farm use more pesticide, while it's biggest in Italy
- Annual Work Unit: in France, the more AWU and the less the use of pesticides

# Individual characteristics



<i>Individual characteristics</i>		
Agricultural training	.0014091***	
General training	-.0020527***	
Be an individual farmer	-.0056759***	.0046437***

## ■ Training

- In France: the use of pesticide is less intensive for farmers whose level of general training is high but whose agricultural training is low

## ■ Be an individual farmer

- Negative impact in France – they use more pesticides
- Positive impact in Italy – they use less pesticides

# Location



Location		
Be in Less Favoured Area (LFA)	-0.0042098***	-0.0466742***
Reference	Pays de la Loire	
Midi Pyrénées	.0274508***	
Rhône Alpes	.0042378***	
Provence Alpes Côte d'Azur	.015094***	
Else	.0075364***	
Reference		Bolzano
Trento		-.0087618***
Else		-.003716***

- It exists some location specificities – some region are more likely to have an intensive use of pesticides than others
- In France and in Italy, farms located in less favoured area use relatively less pesticides

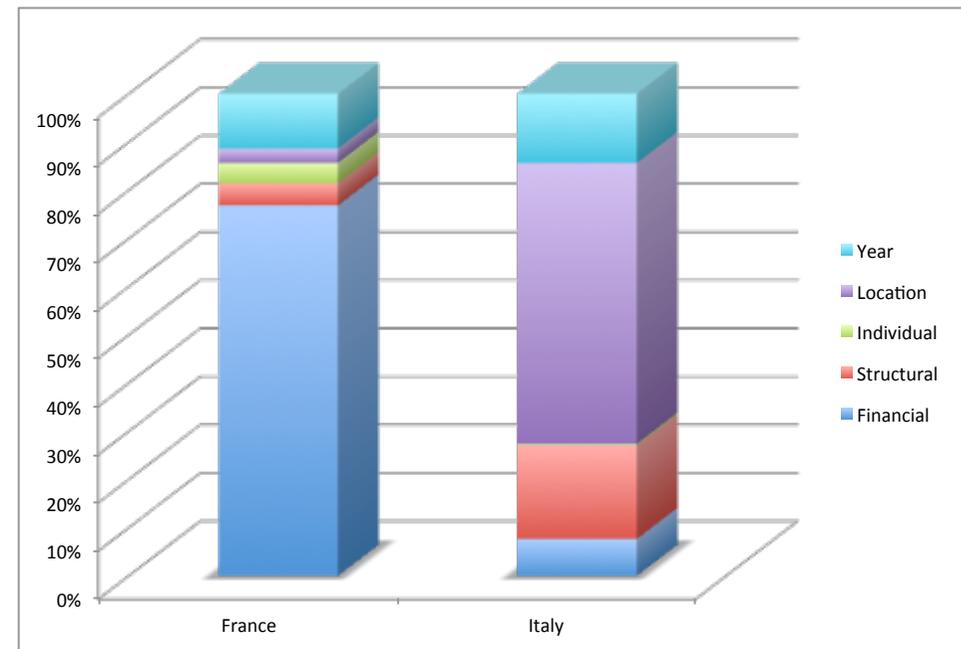


What are the relative importance of factors affecting the use of pesticides use ?

# ANCOVA analysis



- The use of pesticides depends on several factors that vary from a country to another.
- In France, financial factors are the most important
- In Italy, structural and location are the main



# Limits



- Preliminary analysis
- % pesticides expenses / turnover
- Unbalanced panel due to the sampling methodology
- Variables differ from a database to another

# Conclusion



- The producer is the key point of the sanitary and phytosanitary management
- The use of pesticides depends on several factors that vary from a country to another
  - France: Financial
  - Italy: Structural

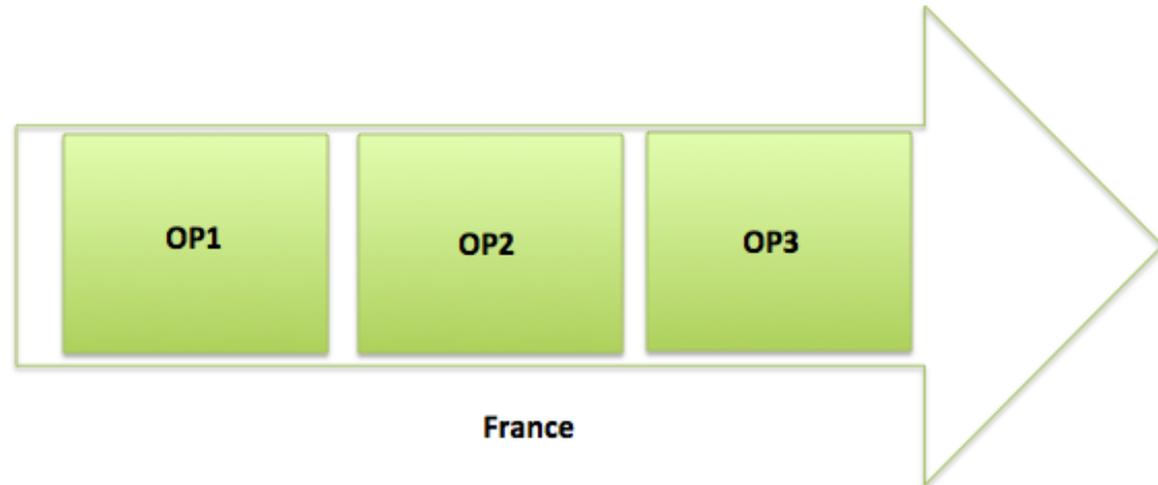
# Perspective



- The structure of supply chain organization



**Italy**





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Thank you for your attention

Any questions ?