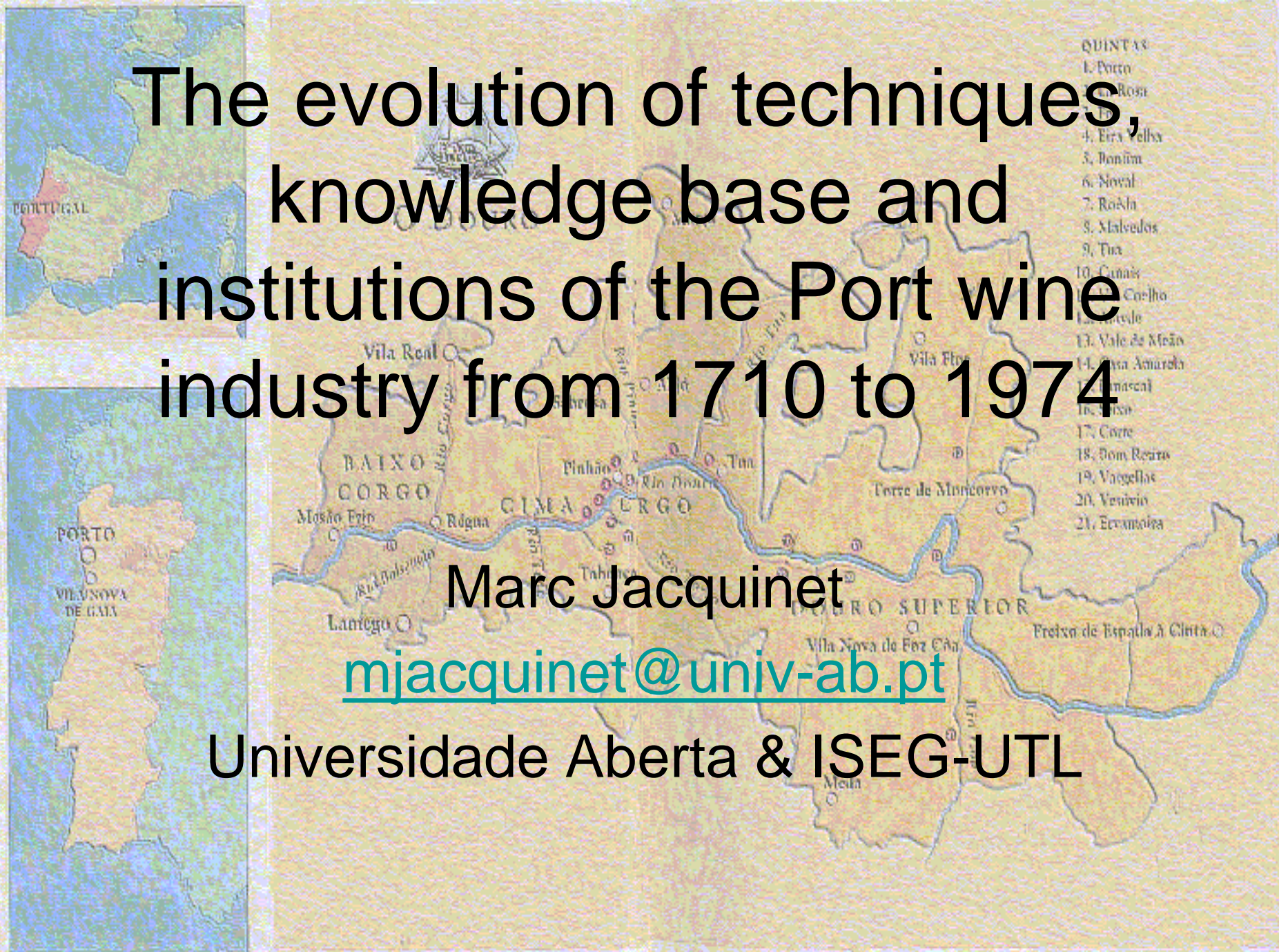


# The evolution of techniques, knowledge base and institutions of the Port wine industry from 1710 to 1974

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# General Background of the presentation

- Objective of the research:  
describe the history and evolution of a specific *technological system* – the Port wine industry, relying, partially on NSI literature:



# General Background

- Problem I: the case under review crosses the notions of *national systems of innovation*, *sectoral systems of innovation* (Malerba 2002); and *regional systems of innovation*, as understood in some strands of the economic literature on regional dynamics;



# General Background

## Problem II:

- In history there is much more variety of cases than generally thought of;
- Can we apply contemporaneous theories or paradigms, such as the one related to the notion of National Systems of Innovation, to (1) remote historical cases, and (2) protracted transformation of a productive sector;

# Theoretical Background

Theoretical grounding:

- Evolutionary theory of technological change (Basalla 1988, Mokyr 2002);

- History of techniques (historical systems, Gille 1978);

- Legal and economic nexus (Samuels);

- Sociology of law and legal institutions;

- Institutional economics;



# Importance of norms

- Norms and institutions;
- Institutions as structured systems of norms (rules);
- I distinguish: Regulatory norms (state and local authorities) from production or technological norms;
- Other systems of norms (social norms);
- Processes of creation and destruction of norms

# Historical and contextual Background

Dutch merchants dominate the wine trade, centered on the French regions (16th and 17th centuries);

British merchants increase their share of the trade (1650-1730) and dominate the trade by the middle of the 18th century

In this context: rise of Port wine trade in the end of the 17th century (till 1800s);



# Another word on regulation

- I distinguish four regimes of regulation (centered on the state):
    - 1 – Weak regulatory regime before 1755;
    - 2 – Despotic regulatory regime (from Pombal to the French invasions): 1756-1808;
    - 3 – Liberal regime: 1820s- 1906;
    - 4 – Contemporaneous regime (1908-1974), a return to strong regulatory agencies.
- Period 3 is one of recurrent crisis and instability.



# The question of the essence of wine

- Wine is the product of the land – modern view (late 19th and first half of the 20th centuries) – primacy given to the natural conditions and geographical setting;
- Traditional view: wine-making is the work of the winegrowers, a difficult and expensive art – primacy to the art of cultivation and winemaking;
- Combination of both views (Dion 1959).



## ... some remarks ...

- Co-evolution of the physical conditions and the techniques and art of wine-making;
- Two aspects of wine-making:
- The work in the vineyard (related to agriculture and cultivation), more related to biology,
- The winemaking proper, closer to chemistry for most of the period,



...

- The relative weight or stress on cultivation and winemaking has not been even during the period under review;
- Ex. Pasteur stresses more the winemaking process (fermentation) while the early treatises (Alarte, Columella, etc) and the late 19th reports on phylloxera stress the conditions of cultivation in the vineyards;



# An essay of periodization

- In the technological transformation of the wine production there is a clear sense of cumulativeness;
- No clear frontier between each technological epoch and the defining principles of each one;
- A general rise of knowledge base, technology, science and experimentation combined with tradition and experience;

# Three technological epochs

- 1 - before the 18th century: tradition (though a regain of interest already in the 16th century in the treatment of vineyards and winemaking);
- 1' – 1680-1750: first transformation based on tradition and diffusion of codified knowledge and experience (O. de Serres, etc.);
- 2 – 1750-1850: second transformation based on science (chemistry) and experimentation (Rouelle, Lavoisier; Gay-Lussac, etc.)
- 3 – 1850-1970: chaptalisation and systematic experimentation, wine blights, vine selection;



# First period – before 1750

- Before the 16th century – first great transformation is the clarification of the vineyard (limits to marcottage), individualization of the vine and the types of vine;
- From 1500-1600 – intensification of the codification of the accumulated knowledge in agriculture and winemaking;
- Before 18th c. – Just a brief comment;

# 1710-1755

- 1712 – first treaty on winemaking in Portugal by Vicêncio Alarte, *Agricultura das vinhas e tudo o que pertence a ellas até perfeito recolhimento do vinho ...*;
- One manuscript (Pereira and Costa 1998);



# Second period: 1756-1845

- Second half of 18th c. – centered on chemistry (Lavoisier, and transition to Gay-Lussac & others);
- Chaptalisation of winemaking and rise of technological treatment of the must;
- Importance of experience and the rise of experimentation, a little more systematic than in the early 18th century;

# 1756-1800 in Portugal

- Diffusion in Portugal (RACL, Tratadistas, land owners, etc.);
- Francisco Pereira da Fonseca (1789, 1789a, 1789b)
- Other authors;



# The birth of national system of regulation of wine production ... also regulating the innovation process: 1756-1777

- 1756 – the landmark:
- The creation of the demarcated area of wine production in the Upper Douro,
- Creation of the chartered company: the Companhia Geral do Alto Douro (CGAD);

# CGAD

- A regulation body;
- Privileged company: exclusiveness of wine trade in Porto city limits, exclusiveness of exports to four Brazilian administrative units (*Capitanias*);
- Later – monopoly of wine-spirit production and strong barriers to entry for any competitors in the north of Portugal;
- Impact on the selection of wine: red versus white wine.

# A remark on the State-centered Regulation

- With the system adopted, a tradition of strong state intervention is installed;
- Crisis of the system at the late 18th century;



- Perturbations to the system (French invasions, British occupation, lost of Brazil, civil wars, political instability) throughout the 19th century, even though the trade goes on;
- Regulation in the second period grows steadily in the 18th century and enters in decay in the 19th century

# Third epoch: 1850-1970

- 19th c., especially after 1850, centered on organic chemistry and biology (Pasteur);
- First clear rise of the scientific base together with the recuperation of oidium and phylloxera devastations;
- End of 20th c., based on genetics;
- Conclusion: Overlapping of the different technological epochs and complexification

# About the regulation of the sector

- Attempts to liberalize the sector (production and trade) failed;
- 1908: new introduction of strong regulation by João Franco after a successful coup and a political failure;
- 1908-1934 – creation of the modern system of production and innovation, preserving the stability of the sector;



# Interaction between institutional setting and production and trade

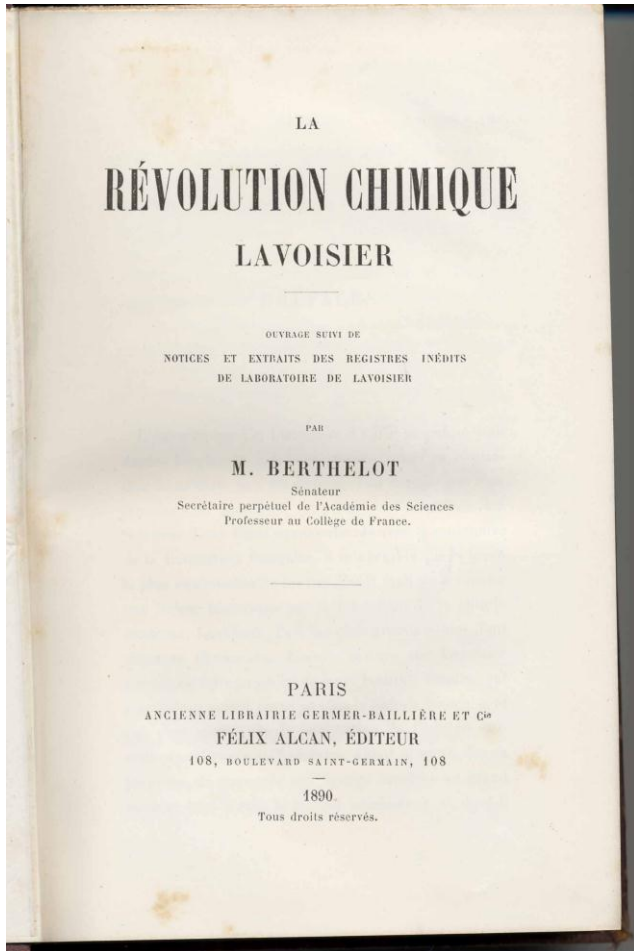
- First conclusion: There is a strong interaction between the state regulation and the productive activities;
- The regulation affected the cultivation of the vine (how to cultivate), what to cultivate (selection of types of wine (red versus white), and types of vine (*castas*); who could sell, and what are the characteristics of the wine to be sold.

# Last period, after the 1970s

- End of 20th c., based on genetics, rigorous selection of vine varieties,
- Other recent trends mechanization of surriba, planting, integrated pest control, theory of *essences*, chemical analysis of wine spirit and Port wine, sophistication of Port wine blending
- Overlapping of the different technological epochs
- Heterogeneoususness of winegrowers, etc.

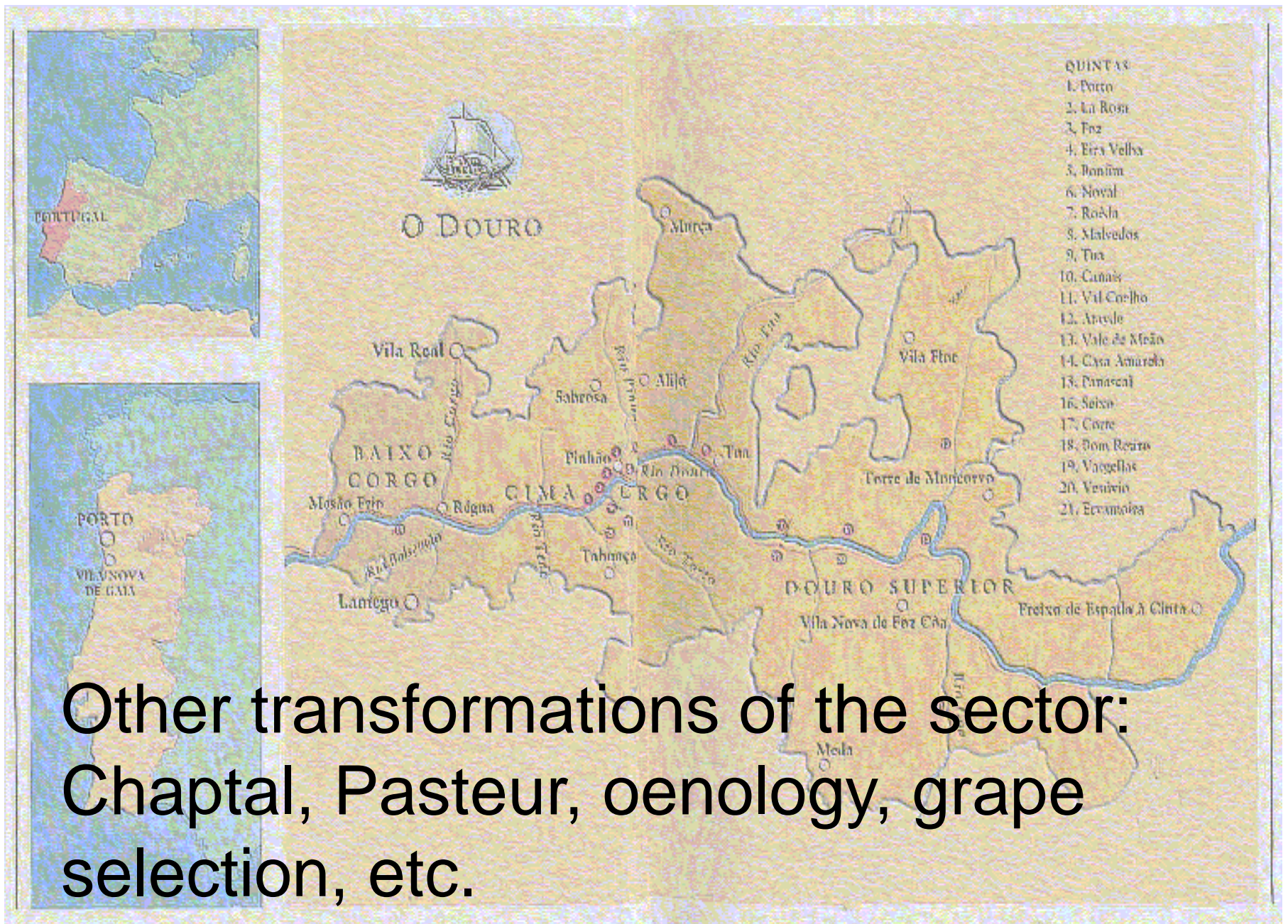
# Some specific aspects of technological change





Lavoisier and experimental chemistry:

- early interaction between science (scholars) and agriculture, mainly in the work of vineyards and the art of winemaking;
- experimentation is more systematic;
- chemistry as “art”



# A small example of technological change

- Technological change is pervasive in the wine industry;
- First in the vineyard, often related to vine diseases, such as the phylloxera and oidium) and increasingly codified in treaties on agriculture;
- Second: in the vinification process (fermentation) and conservation;
- Third: in the trade business (bottle, casks, transport, marketing, etc.).



# Evolution of the Port bottle

- The bottle of wine, has evolved dramatically from the beginning of the 18th century to the early 1800s;
- Until the early 1980s, most of the wine is exported in casks, not bottle;
- However, the second half of the 18th century is characterized by the rise of the export of wine bottles by shippers on a scale unseen before.

# Evolution of the bottle (with very limited production)



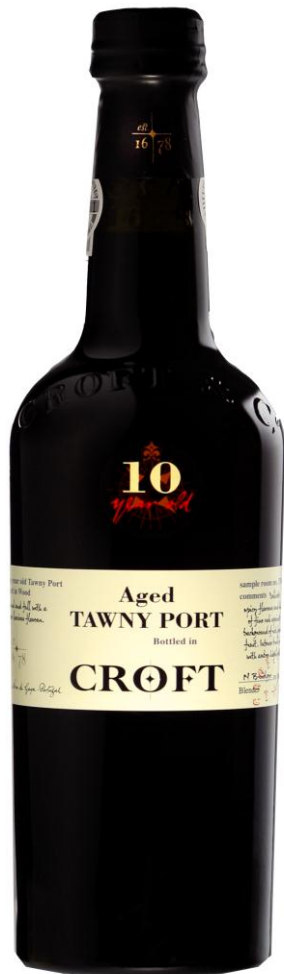
# Consolidation of the wine trade (1730-80), on the rise since 1680s



# Acquisition of the definite shape



- The bottle now – not much different?



If the bottle has not evolved much for the last two centuries, the bottling industry has exploded in recent years, after the implementation of the legislation turning bottling in Portugal compulsory



# Conclusions

- Early interaction between institutions and the technological system;
- The Portuguese case is a pioneer one in the history of wine production and trade, at least when considering the role of the state and the definition of a demarcated area;
- Production crises and regulatory instability are often related;

- After two periods of protracted stagnation (1730s-1740s and 1840s-1900s) strong periods of state regulation followed;
- The system I have discussed includes other elements neglected here (transport, coopering, winetasting, etc) but are important for understanding the interactions between institutions and innovation.