At the core of wine: the age dynamics of Italian vineyards

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Objectives and relevance

Objective
• Introducing a demographic analysis perspective in the study of the productive base in the wine sector

This allows
• Analyzing the present age structure as the outcome of past time trends
• projections in the future of present actions (i.e. investments, policies, etc.)

Relevance
• Assessing production trends (total quantity, varieties)
• In a fast changing environment (climate, demand, competitors), projecting in the future the impact of present choices in highly valuable to firms stakeholders and policy makers
Contents

• Setting the framework:
  – grape life
  – Demographic equations

• Analyzing the evolution of the Italian vineyard in the period 1970-2010
• Projecting trends for 2020 and 2030
• At national level (regional in the paper)
• Total wine grapes (and for selected varieties in the paper)
Stylized life of vineyards

a) starts at year 0 when the baby grapevines are planted (nor grafts neither significant replenishments)

b) “Average” economic life of the grapevines is 30 years (Fregoni, 2013)

c) Older vines, 30-50 years, should commonly be considered non-desirable due to reductions in productivity and/or quality drawbacks (LaVigneLeVin, 2016; Todorov, 2012)

d) Vineyards older than 50 years are regarded as exceptional for market oriented efficient production units. Such old cultivations occur when there are no financial capabilities for investing

e) Explantations of younger grapevines may be due to:
   
i) non recoverable illnesses;
   
ii) need to change grape varieties;
   
iii) changes in the use of land. (i.e. changes in the agricultural crop; switch to non-agricultural uses, incl. abandonment).
Demographic equations measure balance/unbalances in grapevines population

dynamic equilibrium:

\[ C(X)^{t1} = C(X+1)^{t2} \]

At \( t1 \):

\[ C(X)^{t1} = C(X+1)^{t1} = C(X+2)^{t1} = C(X+3)^{t1} = \ldots = C(X+n)^{t1} \]

\[ \sum_i C(X_i)^{t1} = \text{POP}^{t1} \]

And, also, over time is:

\[ \text{POP}^{t1} = \text{POP}^{t2} \]

When a negative trend is in place we observe that:

\[ C(X)^{t1} \neq C(X+1)^{t2} \]

and:

\[ C(X+1)^{t2} - C(X)^{t1} = E^{t1-t2} \]

Where \( E \) measures the explantations occurred, whether early or timely.
Sharp decline of Cultivated area (000. hcts) 1970-2010

- Few investments in renovating vine varieties and vine training system.
Past trends affect the present production base

Unbalanced age structure with old and very old plants

Demographic equations by age classes
% balance rates
Past & present trends affect the future production base

1) Baseline scenario: 2000-2010 trends unchanged
2) Optimistic scenario: new plantation expand at maximum rate allowed by CMO (1% /yr)
3) Conservative scenario: % new plantation as in 2000-2010; halt of early explantations
Past and present trends affect the future production base.

Total vineyard area in 2010 and 2030 under different scenarios.

The demographic structure of Italian vineyard at 2030 under different scenarios.
Concluding remarks

• A simple methodology for analyzing vineyards demographic trends and their effects on vines age structure

• Allows for measuring path of expansions/reductions and the consequent unbalances also into the future

• The Italian case study:
  – Actual tendencies would led to further area reduction despite new positive trends (2000-2010)
  – A (well possible) scenario in between 2&3 will led to an increase of cultivated area due to new vineyards as well as reduced rate of early explantations

• Future: further insights at regional level and for single grape varieties (some already in the paper)