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# Advertising, Collective Action, and Labeling in the European Wine Markets

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In this paper we consider the role for collective action in advertising investments needed to compete on foreign markets and/or to enter into new markets. We model the choices facing producers in regions where both AO (high quality) and table (low quality) wines are produced. By joining forces with producers of other regions to invest in advertising, producers may penetrate into new markets. We show that it is profitable to enter into the new markets when, other things being equal, the size of the new market is relatively big, when the traditional market is relatively small, and when the size of the fixed investment in advertising is relatively small. We discuss the policy implications of the results, examining possible modifications of the AO system to facilitate collective action and improve investment levels.

The wine-world market is characterized by two principal wine suppliers: European, based on the Appellation of Origin (AO) organization; and the New World, mainly promoted by new countries, with an organization based on the type of grape. After decades of European domination in the world markets, the wine-producers of Australia, California, Chile, and other emerging wine producing countries are challenging the European leadership (Wittwer, Berger, and Anderson 2003). One question that arises in this evolving market situation is whether the AO system should be reformed or abandoned altogether.

In this paper we consider the role for collective action in advertising investments needed to compete in foreign markets or to enter into new markets. We model the choices facing producers in regions where both AO and wines of lower quality are produced. In the initial situation, each region needs to allocate production between these two markets. We assume a fixed supply of land to represent the choices facing the agricultural sector in the short run, and the fact that the land suitable for grape production in a particular region is given. We thus represent producers' decisions when they choose between growing the low-quality or the higher-quality version. In addition, we model a different situation in which producers may consider joining forces to enter into a new market by allocating part of their production to be sold into the new market.

We thus have a multiple-stage game in which producers choose whether to enter into the new market and how much land to allocate to it. In the

new market they have to compete with the producers from the rest of the world. In the traditional market, they have to decide how to allocate production between the AO and the table wines. In these markets, they face a market for vertically differentiated wine—in which each region is a monopolist—or a Cournot competition for homogeneous products, respectively. We determine when it is profitable for producers to join forces to make the fixed investments in advertising needed to enter new markets. We show that entering new markets may be profitable, other things being equal, if the size of the new markets is big, the fixed costs of advertising are relatively low, and the situation in the internal market is relatively bad. We discuss the policy implications of the results, examining the possible modifications of the AO system to facilitate collective action and improve investment levels.

## The AO System and the Recent Changes in the World Market

Wine characteristics may be classified under two categories reflecting consumers' preferences: vertical and horizontal product differentiation. Under vertical differentiation, if products of differing quality are proposed at the same price, all consumers will only buy products with the highest level of quality. Brands, chateaux, or vineyards try to promote quality. Conversely, under horizontal differentiation (tastes), if products with different characteristics are offered at the same price, consumers will choose goods according to their individual preferences for the various characteristics. The horizontal-differentiation dimension may be taken to explain the two types of organization,

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namely the European one, based on the AO,<sup>1</sup> and that of other world countries, based on the types of grape—that is the *vin de cépage*, or varietal wine, such as Chardonnay, Cabernet, or Merlot. Wines have such a diversity of tastes that, for instance, if a Bordeaux, linked to the AO system, or a Cabernet, a varietal wine, were offered at the same price, there would still be a demand for each of them.

Product promotion and/or the signal of vertical and horizontal characteristics are crucial in this context of multiple options for indicating the wine content. If consumers are not fully informed about product characteristics, they may consume an undesired characteristic or pay a price that does not reflect, for example, the uncertainty associated with the good in question. Imperfect information concerns search characteristics as they are revealed before purchasing but at a cost that can be high, or experience characteristics as they are revealed after purchasing (Nelson 1970). Even with search goods, consumers may have difficulty recognizing or remembering product quality if the overall quality is defined by a great number of characteristics or if the product's origin is uncertain. Since numerous vineyards exist, the signal of specific characteristics is very difficult for an isolated vineyard, because an individual vineyard's ability to implement a signaling strategy or a promotion campaign depends on its profitability, and the more competitive a market, the more difficult it is to signal a high level of quality via price or vineyard advertising. Simply put, given a perfectly competitive market, a firm needs some economic rent to allow it to finance quality signal, advertising, or promotion campaigns. All those difficulties raise the issue of the best individual or collective systems for promoting wine in a context of intense competition on the world market.

The wine sector in the European Union is based on the Appellation of Origin (AO) for medium- and high-quality wines and the table-wine standard for low-quality wines. Wine-making for the AO system in the European Union is very regulated and based on tradition, with a big role assigned to local

<sup>1</sup> In fact, quality wines in the EU are officially defined as *Vins de Qualité Produits dans les Régions Déterminées* (VQPRD), and they are further defined for each country. For instance, Denominazione di Origine Controllata (DOC) in Italy, Denominación de Origen in Spain, Appellation d'Origine Contrôlée (AOC) in France. In the text we generically refer to AO. See Lucatelli (2000) for more details about AO.

wines whose name is generally associated with the production region, e.g., Bordeaux, Chianti, Rioja, Porto. Wines in the AO system are often made by blending specific and sometimes local grape varieties; their grape production is regulated, with a maximum yield allowed per unit of land, and their production regions are strongly delimited (Heien and Martin 2002). The AO system is defined at national and European levels. Even if European consumers respond to these AO based upon regional characteristics, the European system raises the question of the appellations proliferation. Peri and Gaeta (1999) count more than 400 official appellations in the wine sector in Italy alone and 1397 in the wine sector in Europe. Such a profusion assures product diversity but certainly increases buyer confusion (*Consumer Reports* 1997; Sopexa 2001). The recognition of quality labels by French consumers is only 12% for Appellations d'Origine Contrôlée, the French AO system (Loisel and Couvreur 2001). One major problem is the legibility and clarity of a label, especially for those showing some official seal.<sup>2</sup>

Although the AO system has proven successful in guaranteeing a good reputation for many European wines and relatively high profits for their wine producers, as well as such positive externalities as employment and rural development (Giraud-Héraud, Soler, and Tanguy 2002), countries such as France, Italy, Spain, and Portugal have witnessed a tremendous growth of New World wine-makers in the last few years. Indeed, the wine producers of Australia, California, Chile, and other emerging wine producing countries are challenging the European leadership in world markets (Anderson 2001; *The Economist* 1999).

Common characteristics of the emerging wine-producing countries are the lack of detailed rules, i.e., the freedom to experiment with new techniques; the production and marketing of wines according to single varieties—e.g., Chardonnay—sometimes associated with the production region; and a very intense use of marketing investments. All those features appear to be very relevant to the U.S. and other importing markets (Anderson 2001). Moreover, the farming, wine-making, and trading opera-

<sup>2</sup> Berthomeau (2002) discusses the difficulty that the various French appellations have had in entering new export markets due to the absence of any clear specification on the label that distinguishes one appellation from another in consumers' minds.

tions in Australia and other New World countries are much bigger than in the European ones. For instance, the average vineyard in France is less than 2 hectares, versus 111 hectares in Australia. Four firms—Foster, Southcorp, Hardy, and Orlando Wyndham—dominate the Australian market. In addition, recent international mergers revamped international wine trading (Marsh 2003a, 2003b). In 2000, Foster merged with Beringer, a California wine firm. In 2003, Hardy will merge with Constellation Brands, a U.S. company. As Marsh (2003b) puts it, those mergers “threaten to undermine further Europe’s dominance of the sector.”

Unlike that of New World countries, the European wine industry is very fragmented and appears relatively uninterested in the consolidation processes that are taking place worldwide, especially in Australia and the USA. (*The Economist* 2003; Marsh 2003a, 2003b). The opportunities for mergers in Europe are limited by ownership structures with very scattered producers, geographic boundaries, and product diversity. Indeed, apart from some notable exceptions—e.g., the Champagne (*The Economist* 2003), Bordeaux, or Tuscany regions—the wine industry in Europe is made up of many small firms, which may lack adequate capital for the required investments in new technologies and marketing policies (Giraud-Héraud, Soler, and Tanguy 2002).<sup>3</sup> For some commentators there were too many EU interventions and subsidies that have impaired the ability of the wine sector to adapt to changing market conditions, but it is believed that the 1999 reform of the EU Common Market Organization should change producers’ incentives and reduce the previous perverse effects. Indeed, this reform will provide for large expenditures for the restructuring and conversion of vineyards to produce more marketable varieties of grapes

One question that arises in this evolving market situation is whether the AO system is still viable, or if it should be reformed or abandoned altogether. Although it has been the backbone of the French

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<sup>3</sup> A partial solution to the size problem, according to some practitioners, may be the collective organization by farmers through cooperatives and other producer groups. Indeed, cooperatives in the European wine industry are very common and in some regions have a considerable market share of production and processing facilities. In the early '90s, for instance, in Italy the market share of cooperatives in the wine sector was about 55%, in Spain 70%, and in France about 39–74% (Cogeca 1998).

and EU wine sectors in the last decades, some argue that the system needs to be reformed (Berthomeau 2002). The problem is that in many new markets—e.g., the U.S. and UK markets—consumers are drinking more wine, becoming more aware of the international supply of different types of wine, and preferring those which can be more easily recognized. For example, consumers may prefer to buy wines that are made from a grape variety recognized worldwide, such as Chardonnay, Cabernet, or Merlot.

In this respect, some AO wines could find it difficult to be easily recognized and evaluated by consumers in international markets. Consumers buy wines first by choosing the country or region of origin and then by comparing different prices and qualities (Sopexa 2001). It is in this second stage that some consumers may feel confused and fear the risk of uncertain quality, given that there are plenty of different AOs to choose from. In addition, since each AO is provided with a limited supply and hence low market penetration in the usual marketing channels, some argue that the system cannot deal with modern marketing systems and new market demand. One possibility would be for different regions with AO systems to join forces—by producing a common wine, for instance a “*Chardonnay de France*,” and having collective investments in advertising to enter into new markets, the producers in these regions could be able to increase their sales and thus their profits.<sup>4</sup>

These examples raise the issue of the optimal way to promote products. This paper does not attempt to provide a complete cost-benefit analysis

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<sup>4</sup> This may appear to be an extreme simplification. Notice, however, that the wine market is very segmented. For instance, in the U.S., the market is segmented among at least Ultra-premium (with prices above \$14 per bottle), Super-premium (prices of \$7–14, with Cabernet, Merlot, and Chardonnay types of wine), Fighting varieties (\$3–7, with Australia and Chile being the main producers) and Jug wine (the lowest end) (Heien and Martin 2002). What we model in the paper could be a situation where AO wines (the most famous ones, at least) already sell in the Ultra-premium segment abroad, getting a handsome premium (Seale, Marchant, and Basso 2003), while the *Chardonnay de France* tries to enter the Super-premium segment. We believe this strategy could be a reasonable one, given the prevailing price ranges, the fact that production would be less regulated in the *Chardonnay de France* wine segment, and the way consumers buy wines.

to determine the best system for promoting wine in a context of international competition. However, it underlines the essential role of promotion with economies of scale for reaching new markets. Indeed, very simple assumptions will be considered for isolating the link between the market mechanisms, the promotion cost, and the access to foreign markets such as the U.S. for the European wine producers. Moreover, we abstract from imperfect information issues linked to advertising, the role of which is simply to make consumers aware of the product and thus increase its demand. Despite these simplifying assumptions, we believe this model is a useful starting point for the policy discussion on the possible reform of the European AO system.

### The Model

Suppose we represent the choices of different wine-producing regions in the EU; we initially consider for each region the choice of land allocation<sup>5</sup> between the AO system and the table-wine segment. In the AO system producers are able to sell their wine in a market with a given willingness to pay for quality. In the table-wine segment each region has to face Cournot competition. We assume a fixed supply of land for each region,  $X$ , corresponding to the choices facing the agricultural sector in the short run and the fact that land suitable for wine production is a given. We consider the same land potential for each region, i.e., symmetric producing regions.

We consider a very simple model of land allocation (Figure 1). In the initial situation, each region decides how to allocate land between AO (a fraction  $\beta$ ) and table wines (fraction  $1 - \beta$ ). At a different point in time, the producers may be faced with the opportunity to enter a new market. If they enter, they allocate a fraction  $(1 - \gamma)$  of the land to the new market and a fraction  $(\gamma)$  to the traditional market. In order to enter the new market, however,

<sup>5</sup> We are dealing with a perennial crop but we are not modeling planting decisions. As a referee pointed out, the lag between planting and harvesting—on average, four years for grapes—would probably affect planting decisions. We believe, however, that the main results of the paper would not change, because we have no uncertainty in the model. In addition, to be more appropriate, we should refer to production allocation, but since we assume that production is fixed per unit of land, we use both land and production allocation to mean the latter.

they have to invest in advertising, which has fixed costs  $A$ , and they need to join forces with other producing regions. Should they decide to enter into the new market, they would face (Cournot) competition from other countries already present in the new market.

We represent the choices for each symmetric region with a three-stage game. In the first stage, each region has to decide whether to enter the new market, where it would face Cournot competition from other world producers, and how much land to allocate to it (the fraction  $1 - \gamma$ ). In the second stage, it decides how much of the land allocated to the traditional market (the fraction  $\gamma$ ) should be allocated to the AO system (a fraction  $\beta\gamma$ ), in which each region behaves as a monopolist, and how much to the table-wine segment (a fraction  $(1 - \beta)\gamma$ ), where it would face Cournot competition from other European regions in the traditional markets.

In the last stage of the game, we have market competition: each region would be a monopolist in the AO high-quality market and an oligopolist *à la* Cournot in a homogeneous-products market. All the regions together would face the (Cournot) competition of the producers from the rest of the world in the new market. We can solve the game by backward induction (subgame perfect equilibrium). We characterize the different subgames in the next sections.

### The Traditional Markets

In the subgame for the traditional markets, at Stage 3 we have the AO and the table-wine markets. The number of symmetric producing regions,  $m$  is exogenous. The available land for each region  $i$  is  $X_i$ . For simplicity, one unit of land gives one unit of final product in the low-quality segment, e.g., table wine. However, in the AO system, one unit of land gives  $k \leq 1$  unit of high-quality wines.  $k \leq 1$  takes into account the fact that often in the AO system yields are restricted to allow for higher quality. Trade occurs in a single period, with each region producing high-quality and/or low-quality wine. Let  $s$  denote the level of high-quality wine that is exogenously given and equal for each region, and suppose for simplicity that there is no cost.

Each producing region  $i$  is selecting a proportion  $\beta_i$  of the total land  $X_i$  with  $0 \leq \beta \leq 1$  allocated to the high-quality production linked to the AO system,

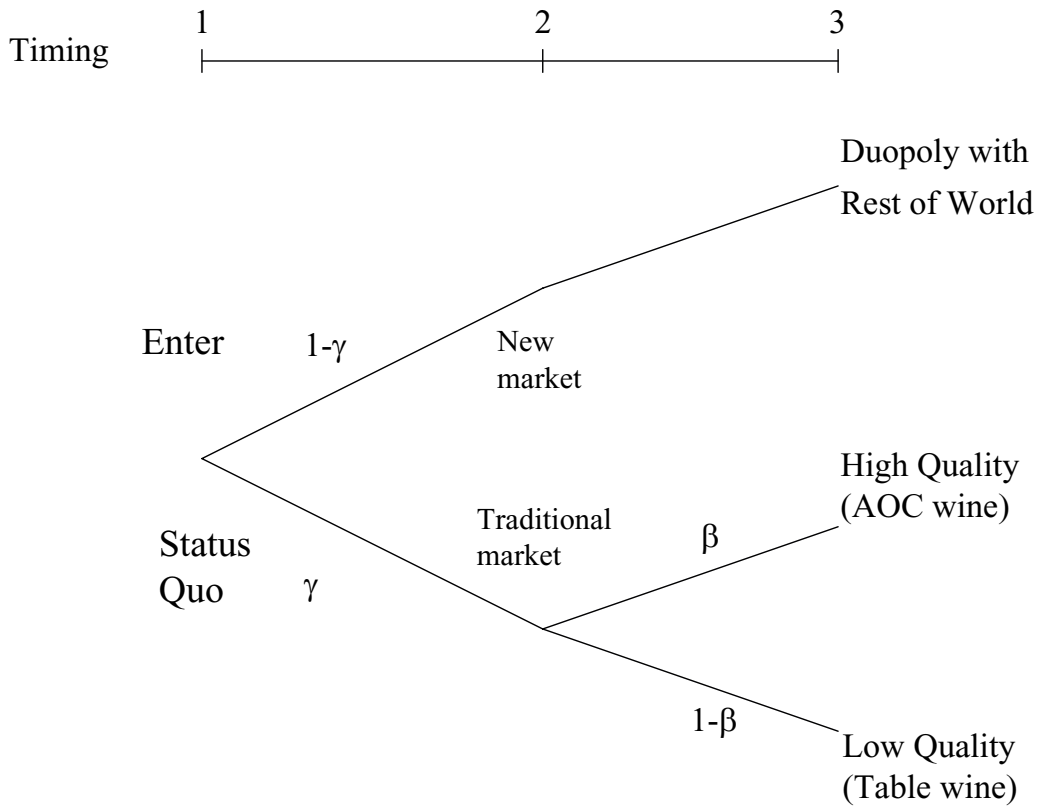


Figure 1.

and a proportion of land  $(1 - \beta) \leq 1$  allocated to the low-quality wines, i.e., the table wines. The quality of the AO wine is known by all sellers and buyers. For simplicity, we assume that demands for low-quality wine—both in internal and new markets—and high-quality wines are completely independent. It may correspond to the wine market where the low-quality products are sold to consumers via the retailing sector while the high-quality products are sold in specialty shops or in restaurants.

The AO Market

In the high-quality wine segment, each AO is a monopolist for its segment or product range. Buyers want to purchase one unit of the good, and they differ in preferences over quality. Heterogeneous preferences are described by a uniformly distributed parameter  $\theta \in [0, 1]$ . For the sake of simplicity and without loss of generality, the mass of consumers is normalized at unity. For a level of quality  $s$  a

consumer who buys one unit of product at a price  $p$  has an indirect utility equal to  $\theta s - p$  (Mussa and Rosen 1978).

Before detailing the equilibrium in the subgame, notice that as long as producing regions are symmetric they apply the same strategy for the choice of  $\beta$  and  $\gamma$ . In Stage 3 in the AO market the price for the high-quality product is determined by the producers (the region) after taking into account the equilibrium between the supply and the demand. On the demand side, the consumer with utility  $\bar{\theta}s - p$  is indifferent between buying and not buying a unit of wine of quality  $s$ , implying that her taste parameter is  $\bar{\theta} = \frac{p}{s}$ . As the distribution of preferences is uniform, the demand for high-quality wine is  $D = 1 - \frac{p}{s}$ , leading to an inverse demand equal to  $p = (1 - D)s$ . Taking into account the equilibrium condition,  $D = kX\beta$ , the profit for each region is

$$(1) \quad \pi_A(s, k) = kX\beta(1 - kX\beta)s.$$

### The Table-wine Market

Each region has also to decide whether to allocate land to, and if so, how much, to the table-wine market—that is, how much to produce, in. In this market, wines from different regions are relatively homogeneous and each region competes as a Cournot oligopolist. Suppose the demand in the market for table wine is

$$(2) \quad Q = N_1(a - p_t),$$

where  $Q$  is the aggregate demand,  $N_1$  is the number of consumers,  $a$  is the size of the market and  $p_t$  is the price of the table wine. The inverse demand is then

$$(3) \quad p_t = a - \frac{Q}{N_1}$$

Notice that by our assumption about the supply of land, by the symmetry of each producing region, and by noting that the land allocated is a fraction for each region, we obtain

$$(4) \quad p_t = a - \frac{(1 - \beta)mX}{N_1}$$

Thus the profit for each region becomes

$$(5) \quad \pi_r(a, m) = (1 - \beta)X \left[ a - \frac{(1 - \beta)mX}{N_1} \right].$$

### Land Allocation

In Stage 2 of the subgame with traditional markets, each region has to maximize the profits from land allocation between the AO and the table-wine market. The choice for the land may be represented by

$$(6) \quad \beta^* = \arg \max_{\beta} \pi_A(s, k) + \pi_r(a, m)$$

where and are given by Equations (1) and (5). The optimal solution is

$$(7) \quad \beta^* = \frac{kN_1s + 2mX - aN_1}{2(m + k^2N_1s)}.$$

It may be easier to interpret the results by letting  $N_1 = m = X = 1$ , so we can simplify to

$$(8) \quad \beta^* = \frac{ks + 2 - a}{2 + 2k^2s}.$$

Please note that  $\beta^*$  increases with wine quality  $s$  in the AO market:

$$\frac{\partial \beta^*}{\partial s} = \frac{k(1 + (a - 2)k)}{2(1 + k^2s)^2} \text{ iff } \frac{1}{k} > (2 - a).$$

Indeed, the higher is the quality in the AO market where each region is a monopolist, the higher the willingness-to-pay of consumers and thus the profits for a given quantity of wine. So it is natural to increase quantity, i.e., to allocate more land to AO, when quality and thus willingness-to-pay is higher.<sup>6</sup>

Analogously, the land allocated to AO increases with the relative yields of AO wines,  $k$ :

$$\frac{\partial \beta^*}{\partial s} = \frac{s(1 + 2(a - 2)k - k^2s)}{2(1 + k^2s)^2} \text{ iff } \frac{1}{k} > (2 - a) - ks.$$

Other things being equal, the profitability of AO wines increases with their relative productivity; hence the higher the productivity, the higher the fraction of land allocated to AO.

Given the optimal choice of  $\beta$ , the profit for each region in the traditional markets is

$$(9) \quad \Pi^r = (a, s, k, m) = \frac{a^2 + 2ak(2k - 1)s + k(4 + k(s - 4))s}{4 + 4k^2s},$$

which after normalizing, i.e., by letting  $N_1 = m = X = 1$  and  $k = 1$ , becomes

$$(10) \quad \Pi^r = \frac{(a + s)^2}{4(1 + s)}.$$

### Entering the New Market

The increase of income in new countries may offer some opportunities for the producing regions of the EU to enter into new markets. Indeed, the wine producers of the New World are gaining market shares in these markets, and the restructuring taking place in the industry outside the EU has the objective to gain the critical mass to deal with the retailing sector in the new markets (*The Economist*, 2003; Marsh 2003a, 2003b). The wine sector in the EU is made of many small firms. Indeed, aside from some big *Maisons* in few regions—e.g., Bordeaux, Champagne, and Chianti—the rest of the industry is composed of many small vineyards, with producers selling to private wine producers of relatively small size or producing for local cooperatives. Since even these latter may lack the critical mass to make the

<sup>6</sup> This simple effect would be mitigated if we had some costs for quality improvement, but the overall effect would be the same.

advertising investments needed to enter the new markets, we consider the possibility for producers of different regions joining forces to be able to make the investments in advertising with a fixed cost  $A$ .

In addition, as it happens, we assume that those consumers buying wine in the retailing stores in the new markets prefer to buy wines based on grape variety. For example, they prefer to buy Chardonnay, distinguishing among different producing regions if offered the opportunity, but do not like to buy wines from a blend of different grapes or of peculiar single grapes of which they face uncertain quality. In other words, new markets' consumers do not know and do not buy the wines with an AO, or if they do they are not willing to pay the premium that traditional markets are willing to pay.<sup>7</sup>

The situation we represent thus would have, for instance, all or many producing regions in France deciding to allocate part of their land to produce a white wine, e.g., Chardonnay, to be sold in the new market as, for example, "*Chardonnay de France*." Each producing region would allocate a fraction  $(1 - \gamma)$  of land to the new market, while a fraction  $\gamma$  would remain for the traditional market; each would pay a share  $(\frac{1}{m})$  of the advertising costs  $A$ ; and each would receive a fraction  $(\frac{1}{m})$  of the profits to be made in the new market.

In the new market, the producing regions of the EU would compete with other producers from the rest of the world. We assume that in the new market, in case the regions of the EU decide to enter, there would emerge a duopoly,<sup>8</sup> with the EU regions grouped together as a unique duopolist playing a Cournot game against the rest of the world, with

the other producers from the New World acting as the other duopolist. The demand faced in the new market is

$$(11) \quad Q_N = N_2(b - p_N),$$

which would lead to an inverse demand

$$(12) \quad p_N = b - \frac{Q_N}{N_2}$$

where  $Q_N = Q_R + mX(1 - \gamma)$ , with  $Q_R$  being the production of the rest of the world ( $R$ ), and  $mX(1 - \gamma)$  being the total production from the EU wine-producing regions allocated to the new market. The problem of the two competing duopolists would be to choose quantity—respectively  $Q_R$  and  $\gamma$ —to maximize their profits:

$$(13) \quad \pi_R = \left( b - \frac{Q_R + mX(1 - \gamma)}{N_2} \right) Q_R,$$

$$(14) \quad \pi_N = \left( b - \frac{Q_R + mX(1 - \gamma)}{N_2} \right) mX(1 - \gamma) - A,$$

### Land Allocation

At Stage 1, each group has to decide whether to enter into the new market and how much land to allocate to it (the fraction  $1 - \gamma$ ). Let us first rewrite the problem for the subgame of the traditional markets, considering now that only a fraction  $\gamma$  of land can be split into AO (hence a total fraction of  $\gamma\beta$ ) and table wine (a total fraction of  $(1 - \beta)\gamma$ ):

$$(15) \quad \max_{\beta} kX\beta\gamma(1 - kX\beta\gamma)s + (1 - \beta)\gamma X \left[ a - \frac{(1 - \beta)\gamma mX}{N_1} \right],$$

which solution—similar to the one calculated in the previous section, but now taking into account also that only a fraction  $\gamma$  goes to the traditional markets—is (again, letting  $N_1 = m = X = 1$  and  $k = 1$  to simplify the interpretation)

$$(16) \quad \beta^*(\gamma) = \frac{2\gamma - a + s}{2\gamma(1 + s)}.$$

Now the problem for the choice of the land to be allocated to the new market for each region, assuming all regions behave symmetrically, may be represented as

$$(17) \quad \max_{\gamma} \pi_A(\beta^*) + \pi_T(\beta^*) + \frac{\pi_N}{m},$$

<sup>7</sup> As is well-explained in the literature, "there is a good evidence that the orientation towards varietal wines is one of the key factors in the success of new world wines. . . . Currently, even if the share of wine from these new wine countries as a proportion of total consumption is very small, but very well represented in premium segments, the role of these products in the revitalization of the wine market is fairly important and the marketing strategies of these countries (in terms of product positioning as well as marketing policies) are setting the stage for competition; in other words these new countries constitute the benchmark against which even the most prestigious EU producers must define their strategies . . ." (Pomarici 1999, 177).

<sup>8</sup> We could also consider an oligopolistic market, which would not change the nature and interpretation of results.



where

$$(18) \quad \pi_A(\beta^*) = kX\beta^*\gamma(1 - kX\beta^*\gamma)s$$

$$(19) \quad \pi_T(\beta^*) = (1 - \beta^*)\gamma X \left[ a - \frac{(1 - \beta^*)\gamma m X}{N_1} \right],$$

$$(20) \quad \pi_N = \left( b - \frac{Q_R + mX(1 - \gamma)}{N_2} \right) mX(1 - \gamma) - A.$$

Solving this problem together with that of the duopoly with the rest of the world, and assuming interior solutions, we obtain (letting  $N_2 = N_1 = m = X = 1$  and  $k = 1$  for ease of interpretation)

$$(21) \quad \gamma^* = \frac{3 + (5 + 2a)s - b(1 + s)}{3 + 7s},$$

$$(22) \quad Q_R^* = \frac{b + (a + 1)s + 3bs}{3 + 7s},$$

which also gives the optimal land allocated to AO:

$$(23) \quad \beta^* = \frac{6 + 7s - 3a - 2b}{6 - 2b + 10s + 4as - 2bs}.$$

As one would expect, notice that  $\gamma^*$ , the optimal land allocated to the traditional markets, increases with the size of the traditional market:

$$\frac{\partial \gamma^*}{\partial a} = \frac{2s}{3 + 7s} > 0;$$

decreases with the size of the new market:

$$\frac{\partial \gamma^*}{\partial s} = \frac{1 + s}{3 + 7s} < 0;$$

and increases with the exogenous quality in the AO markets:

$$\frac{\partial \gamma^*}{\partial s} = \frac{6a - 6 + 4b}{(3 + 7s)^2} > 0 \text{ iff } 6a - 6 + 4b > 0.$$

Indeed, the higher the quality in the AO market, the higher are the profits for a given quantity of wine, and hence producers would increase the production in those markets.

Analogously, the optimal land allocated to AO ( $\beta^*$ ) within the traditional markets increases with the size of the traditional market:

$$\frac{\partial \beta^*}{\partial a} = \frac{(b - 3 - 2s)(3 + 7s)}{2(b + bs - 5s - 3 - 2as)^2} > 0$$

$$\text{iff } (b - 3 - 2s)(3 + 7s) > 0;$$

decreases with the size of the new market:

$$\frac{\partial \beta^*}{\partial b} = \frac{(a - s)(3 + 7s)}{2(b + bs - 5s - 3 - 2as)^2} < 0$$

$$\text{iff } (a - s)(3 + 7s) > 0;$$

and increases with the exogenous quality in the AO markets:

$$\frac{\partial \beta^*}{\partial s} = \frac{6a^2 + 9b + a(3 + b) - 9 - 2b^2}{2(b + bs - 5s - 3 - 2as)^2} < 0$$

$$\text{iff } 6a^2 + 9b + a(3 + b) - 9 - 2b^2 > 0.$$

Again, the higher the quality in the AO market, the higher the profits for a given quantity of wine and hence producers would increase the production in that market.

### Results and Policy Implications

Given the optimal choices of  $\beta$  and  $\gamma$ , we can calculate the increment in profit for each region when it moves from staying in the traditional market to entering the new market as well:

$$\Pi^A(a, b, s, A) = \Pi^{N+T}(\cdot) - \Pi^T(\cdot) = \frac{(1 + 2s)(b + 2s + bs - 2as)^2 - A(1 + s)(3 + 7s)^2}{(1 + s)(3 + 7s)^2},$$

where  $\Pi^{N+T}(\cdot)$  are the total profits, i.e., those in the traditional plus those in the new markets; and  $\Pi^T(\cdot)$  are the profits for each group when they do not decide to enter the new markets. It is then profitable to join the other regions to make the collective investment in advertising and enter the new markets when, other things being equal, the size of the new market (the intercept  $b$ ) is relatively big, when the traditional market (the intercept  $a$ ) is relatively small, and when the size of the fixed investment in advertising  $A$  is relatively small as well.

The increase in profits is also a complex function of the exogenous quality  $s$  and of the  $k$  parameter. To further discuss individual regions' incentives to join the collective undertaking in advertising<sup>9</sup> it would be useful to more fully investigate the effects of  $k$  and  $s$  and consider the possible heterogeneity of producing regions. This is beyond the scope of this

<sup>9</sup> In the comparison of the profits received from a traditional market strategy and those with a more aggressive strategy with collective advertising, we

paper, but we could reasonably guess that when quality is higher—thus having higher willingness to pay, because we do not have any costs for quality here—we should also have less land allocated to table wine, in either the traditional or the new markets. More difficult to guess is the effect of  $k$ , since an increase in productivity for the AO system may increase its profitability but could also possibly require less production.

We may also expect different outcomes according to the initial situation in the traditional markets. If we started from a situation in which  $s$  is high and the AO is relatively profitable, with relatively little production and land allocated to the table-wine segment, the profit increase from entering the new market would probably be low. In the opposite case, with low willingness-to-pay for quality in a particular AO and a relatively high fraction of production allocated to the table-wine market, one could reasonably expect a higher increase in profits. This would explain why the good AO regions—e.g., Bordeaux, Alsace, and Champagne—may not be interested in joining the “*Chardonnay de France*” project, which instead could be a viable solution for the market problems of relatively low-quality wine regions.

Looking at the policy implications, we need to start from the principles that guide policy interventions in the wine sector in the EU. Since the traditional forms of intervention—e.g., market intervention through public distillation of low-quality wines—are not sustainable, the EU is shifting more responsibilities to producers and their organizations, i.e., more self-regulation. Given this trend, one may wonder whether decisions left with producers of different regions, with possible differences among regions, would lead to a better equilibrium for the industry. Results on this matter are still controversial (Zago 2002), but the idea emerges that decisions based on majority-voting among heterogeneous agents may lead to suboptimal equilibria. For example, producers from the better AO regions could

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have considered each region as behaving symmetrically and jointly with other regions. In fact, one may need to consider the individual incentives faced by the region when deciding whether to join the collective undertaking in advertising. In other words, the decision of individual regions may resemble that of a firm joining a cartel. If a region does not join the collective advertising—i.e., it free rides—it may save on its share of the fixed costs and still benefit from an amelioration of market conditions in the traditional Cournot market.

try to impede such a marketing strategy, fearing that their reputation could be damaged (Cabral 2000).

An alternative would be a reform based on public intervention, such as the *Institut National des Appellations d'Origine* (INAO) in France, rather than the choice of few powerful regions. In fact, such a reform could consider the different national wines as a unique portfolio and optimize overall reputation in an umbrella-branding fashion (Sullivan 1990) to maximize economic welfare via the positive externalities generated. In addition, contrary to regulation based on industry decisions, public regulation should also take into consideration consumers' welfare.

## Conclusion

The European wine sector and its market organization is being reformed, with fewer distortionary subsidies and a marked shift toward a more market-prone system in which producers may respond more efficiently to demand needs. In this context, the labeling system of European Union quality wines, based on the *Appellation d'Origine* regulation, is under consideration for possible reforms. After helping small and big producers alike to survive and make profits in the last decades, it is now seen as an obstacle to restructuring and consolidation in the European wine industry. Giving origin to a plethora of labels of local wines, it would impede the reaching of a needed critical mass to make the necessary investments to enter new markets.

We consider the role for collective action in advertising investments and the profits that may result from the more aggressive marketing strategy of entering new markets. Other things being equal, there is a bigger profit increase from joining forces with other regions when the size of the new markets is big, the fixed costs of advertising are relatively low, and the market situation in the internal market is relatively bad. When producing regions differ in their potential for quality wine, they may also have different incentives to switch from more traditional marketing choices and enter into new markets. We also argue that possible modifications of the AO system to facilitate collective action and improve investment levels may be unlikely from a self-regulating industry with heterogeneous regions. In addition, public initiative may be preferred when consumers' concerns need to be taken into account.

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