Inside the black box of collective reputation[(*)]

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Abstract

The literature on collective reputation is still in its infancy. Despite the existence of a
(limited) number of valuable theoretical works studying the process of collective reputation
building, there is still no comprehensive analysis of this concept. In addition, due to data
limitation, there are no empirical studies testing the determinants of group reputation. This
work intends to provide a comprehensive analysis of reputational equilibria within coalitions
of agents. In order to do so, we design a static and dynamic (over 30 years) study on the
universe of coalitions of companies, within the wine market, looking at the role exerted by
the characteristics of the coalition itself (its age and size), the rules set and the actions put
forward by the group of agents in order to reach and maintain a certain level of collective
reputation, and the context in which they operate. Results shed new lights into this
ubiquitous phenomenon.

I. Concepts of Reputation: Individual versus Collective

Over the last four decades, since Akerlof (1970) demonstrated that the presence of imperfect (asymmetric) information can lead to market failure, the literature has extensively investigated the determinants and the consequences of reputation, the latter being defined as the beliefs about seller's skills and behaviour (Bar Isaac and Tadelis, 2008).[1] Indeed it has been shown that even a small amount of imperfect information is sufficient to give rise to (Kreps and Wilson, 1982) and to maintain (Fudenberg and Levine, 1992) a reputation effect.

The extent of this intuition is so large that since then it has been applied to every field of economic profession (and also to other disciplines such as: artificial intelligence, biology, computer science, political science, psychology, scientometrics and sociology[2]). Reputation has first emerged as a valuable asset (also tradable, Tadelis, 1999) in monetary economics, where central banks (Rogoff, 1985), policymakers (Barro and Gordon, 1983), investment banks (Chemmanur and Fulghieri, 1994), and even borrowers (Diamond, 1991) need to establish a certain degree of reputation. The relevance of the concept of reputation has been then extended to economic agents in every economic field (see Kreps, 1990 and Weigelt and Camerer, 1988 for general discussion), with a spectrum of applications that ranges from R&D[3] to traditional manufacturing sectors and professional services[4] (even to Medieval trade[5]).

In particular, given the experience nature of the good and the presence of significant information asymmetries, it has been noted that the wine market is an ideal field in order to investigate reputation phenomena since "common examples [of asymmetric information contexts] include mundane transactions in which a person buys a bottle of wine with unknown quality" (Bar-Isaac and Tadelis, 2008, p. 275[6]).

Since economic agents hardly work in isolation, reputation is rarely an individual matter. In fact, they tend to operate within institutions such as

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[1] "Such information and beliefs about the seller's skill and behavior, which we refer to as the seller's "reputation," are a consequence of many things. These include direct observations on past performance, experience with other sellers, reports from third parties, actions that the seller may undertake outside of the transaction, and numerous other factors", p. 277. In a similar vein, Cabral (2005, p. 4) defines reputation as the situation "when agents believe a particular agent *to be* something". Thus, the concepts of quality and reputation are connected but not necessarily coincident, the former being affected by the latter and by a number of other factors such as marketing campaigns, word-of-mouth phenomena, etc.

[2] See Mui, Halberstadt and Mohtashemi (2002).

[3] See Seybert (2010).

[4] See Fombrun (1996).

[5] In this sense see Grief (1989).

[6] For an application to the wine industry see Castriota and Delmastro (2011).

business companies, or companies themselves can co-operate under a collective brand label. A shared brand name can reduce information asymmetries especially when the scale of production is too small and individual agents fail to establish a reputation on a stand-alone basis. Therefore, more recently economists have developed the concept of collective reputation as an aggregate of individual reputations (Tirole, 1996[7]). This again applies widespread in economics (and once more in other social sciences), from the above mentioned contexts in which works the concept of individual reputation, up to the very general notion of markets and institutions (Grief, 2006).

The agri-food sector figures prominently for possible applications of collective reputation models. Geographical names have been used since ancient times to identify high quality products like Greek olives, Parma ham, Danube salmon, Russian caviar and, more recently, Washington apples. In particular, a marketplace where historically geographical appellations have played a crucial role is viticulture, with wines from Barolo, Bordeaux, Burgundy, Champagne, Chianti, Montalcino, Napa Valley and Rioja being the most famous examples.

In this (and other) sector(s), having a good collective reputation implies significant advantages. First, collective (or group) reputation is important because agri-food markets (but think also of financial markets or professional services) are dominated by a huge variety of products/services and abundance of information. Consumers willing to economize on the costs of ascertaining quality often rely on the reputation of groups of firms for their purchases (Andersson, 2002). In particular, when forming expectations consumers have to choose what sources of information to use and the extent of deepening to achieve (Costanigro et al., 2010).

The first source of information is usually related to geographical group brands (i.e., appellations and denominations), information on firm and/or product characteristics requiring a higher level of expertise (Fleckinger, 2007). Second, the use of a well-known group brand may enable (small) producers, that dominate most agri-food markets, to reap the benefits of a reputation rent, without incurring all the costs that a company has to face when it has to establish the reputation of a commercial brand name.[8] Finally, some people attach value to the regional traditions and are willing to pay a premium for it (Vogel, 1995) while others associate quality with the respect of a set of rules on safety, integrity, or conformity to industrial processes, which requires the creation of agreed norms among a coalition of local producers.

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[7] Before Tirole (1996), economists mostly referred to *conventions* (see for instance Kandori 1992, and Kreps, 1990 who relates conventions to corporate culture).

[8] As to the European wine sector, Bureau and Valceschini (2003, p. 3) claim that "the appellation of origin has proved successful in allowing even small producer groups to benefit from a well-established reputation".

Despite the ubiquity of the concept, the economic literature on collective reputation is still in its infancy. So far, some research has concentrated on modeling the process of collective reputation building (Tirole, 1996; for a dynamic stochastic extension see Levin, 2009), with implications on product quality, market equilibrium, firms' performance and welfare effects (Winfree and McCluskey, 2005, Evans and Guinnane, 2007, Fleckinger, 2007).

Empirically, while there are a few papers trying to evaluate the impact of collective (and individual) reputation on firm performance[9], there is no work that has so far tested the determinants of the process of collective reputation building.

Thus, this work intends to open the black box. In particular, after an analysis of the theoretical mechanisms of the collective reputation building process (in Section II), we set up an empirical exercise intended to test comprehensively the determinants of this process. So, in Section III, we provide detailed explanations of our empirical setting, defining an appropriate measure of group reputation and shedding light on the product and geographic market under consideration, the groups of economic agents under investigation and all the explanatory variables taken into consideration. Notice that we operate on a universe of coalitions (i.e., all Italian wine denominations) of firms (i.e., wineries) and not on a sample.

Section IV provides first econometric evidence through a static exercise. We analyze correlations between the collective reputation and a comprehensive set of possible determinants, i.e., the size and age of the coalition, the geographic context in which it operates, the rules set up in order to discipline and monitor each member's action.

However, since reputation building processes may be history dependent (Tirole, 1996), we go further in Section V with a dynamic exercise which covers 30 years. We are thus able to provide unique econometric evidence by using panel data analysis over a very long period of time.

Section VI concludes.

II. Building a Collective Reputation

From the theoretical viewpoint collective reputation is usually modeled as an aggregate of all the agents in the coalition (see Tirole, 1996 and Landon and Smith, 1998) or of its most famous members (Gergaud and Livat, 2004).

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[9] Due to the large availability of data from prestigious wine guides, some empirical papers dealing with (the consequences of) collective reputation refer to the agri-food sector (wine in particular). For studies analyzing (among other things also) the impact of collective reputation on wineries reputation or on wine prices see Landon and Smith (1998), Schamel and Anderson (2003), Costanigro et al. (2010) and Castriota and Delmastro (2011).

In his seminal paper, Tirole (1996) made one of the first attempts of modeling group reputation as an aggregate of individual reputations, studying the joint dynamics of individual and collective reputations and deriving conditions to build group reputations. In his work, new members joining a group "inherit" the good or bad reputation of the coalition, so that collective reputation turns out to be history dependent. Also in Gergaud and Livat (2004) individual and collective reputations influence each other, this latter work studying the joint dynamics.

Having said about the dynamics of collective reputation, it is fair to acknowledge that economists are very far from having developed a comprehensive analysis of the determinants of collective reputation building process. The aim of this section is thus to summarize theoretical achievements drawing up reputation literature, while in the next sections we investigate thoroughly the determinants of the reputational evolution of coalitions of economic agents.

When trying to investigate the elements which drive the success of coalitions in terms of prestige, it is clear that some of the variables affecting individual reputation should be important determinants of collective reputation as well given that some mechanisms of reputation building are expected to work in the same way at the individual and coalition levels.

First, like for companies[10], the age of the coalition and of its brand is important since it takes time for the brand to get known among consumers and for entrepreneurs and employees to learn by doing. This is particularly true for experience goods (such as wine), where consumer/expert learning is crucial for reputation. Furthermore, stereotypes about the expected quality of a group are history dependent since collective reputation is a long term, path dependent process (Tirole, 1996).

Second, size can be another driver, given that large coalitions of companies (but also large companies themselves) have higher resources for marketing campaigns and a larger buyer base which, combined with word-of-mouth phenomena, make big coalitions more visible to the market (see Rob and Fishman, 2005 for a theoretical approach to individual firms). On the other hand, Kandori (1992), analysing the information transmission mechanisms through which self-interested community members sustain a rule in a context where agents care only about their own interests, shows the opposite pattern: the higher the number of community members, the less the effective social norms. Informal sanctions can improve the behavior in infrequent trades: a simple action rule and local information transmission are shown to be sufficient to induce a mutually beneficial outcome.

In a similar vein, Fishman et al. (2008) argue that in absence of perfect monitoring the members of a community have an incentive to invest on the

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[10] See Melnik and Alm (2002) for an empirical application to firms.

group reputation, but also an incentive to free ride which can lead to lower investments in quality, especially when the brand size increases: "if too many firms are admitted to the brand, the incentive to free ride necessarily overrides the reputation effect and reduces the incentive to invest, relative to stand-alone firms. This is because once the brand is sufficiently large, the marginal contribution of an individual member's investment to the brand's visibility and reputation becomes negligible, in comparison to the payoff from free riding" (p. 4).[11]

The second group of determinants is represented by the rules set and the actions put forward by the members of a coalition in order to reach and maintain a certain collective reputation standard. In this sense, the setting of minimum quality standards (MQS) is a classic example of this kind of norms (but see also Grief, 2006, for an historical application of this concept). Indeed, many professions are subject to occupational licensing and quality regulation, whose standards are sometimes set by the public authorities but more often (at least partially) by the professional groups themselves.

Some economists believe that entry regulation is meant to increase the producers' incomes at the expense of consumers, while others consider it as a solution to the asymmetric information problem between producers and consumers. In this latter view, introducing minimum standard requirements can increase clients' trust and lead to a Pareto-improvement, if the risk to meet an incompetent or fraudulent producer diminishes.[12] Rouviere and Souberyan (2008) show that free entry is not socially optimal due to the producers' incentive to free ride on the collective reputation and, again, find that the introduction of minimum quality standards to correct this market failure is necessary to avoid good companies staying out of the market, which in turn justifies entry regulation. Indeed, under certain assumptions, Fleckinger (2007) shows that in an asymmetric information context entry regulation and minimum quality standards can be socially efficient.

However, imposing some minimum quality standards is useless if the members of the coalition do not respect the rules, which recalls the importance of the concepts of social capital and enforcement. In order to keep reputation, it is necessary a strong discipline which is maximized when it is

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[11] Jin and Leslie (2009) provide empirical evidence of the existence of free riding problems when finding that franchised restaurants have lower hygiene standards with respect to chain affiliated ones, thereby taking advantage from (but also damaging) the chain quality.

[12] A number of studies identify a positive effect of their introduction on quality (Leland, 1979), quality and price competition (Ronnen, 1991) and social welfare (Crampes and Hollander, 1995, Ecchia and Lambertini, 1997, Garella and Petrakis, 2008, and Saitone and Sexton, 2008). In their study on collective reputation McQuade, Salant and Winfree (2008) find that in non-monopolistic markets the introduction of MQS would be welfare improving. On the contrary, a negative impact has been found by Shapiro (1983) on products supply, Bockstael (1984) on social welfare and producer returns, Maxwell (1998) on profitability of innovations, Scarpa (1998) on quality and profits, and Valletti (2000) on social welfare.

sustained by the treat of exclusion from the group (Tirole, 1996), which in turn requires traceability (Winfree and McClucskey, 2005)[13] and frequent and effective controls[14].

This and previous remarks on the role played by conventions create room for the last group of determinants: the context where a coalition operates. Many studies on the determinants of growth have shown that local GDP, the quality of infrastructures and of institutions, and social capital influence a country's growth rate (see, among others, Abrams and Lewis, 1995) which is given by the performance of individual firms. In addition, in collective reputational studies the level of trust in a coalition of agents (strongly affected by the level of corruption and criminality in the region) is the result of decades or centuries of historic events which have shaped the mentality of a population, the level of enforcement of social norms, and thus might have a great impact on the quality of goods and consequently on collective reputation (see again Kandori, 1992, and Kreps, 1990). Finally, in some sectors the so called "primitives" (like the climate and the quality of land in agriculture) are fundamental in determining the quality of the final products, hence, other things being equal, of their group reputation.

III. Study Design

In this Section we proceed to discuss the empirical analysis we set up in order to investigate properly collective reputation building process and its determinants.

A. Field of Analysis: The Wine Market

Four factors have been individuated in order to determine the importance of reputation for economic transactions: (i) the rate at which buyers learn from outcomes, including the rate of information diffusion among buyers; (ii) the seller's value of future interactions; (iii) the characteristics of the demand that determine how sensitive buyers are to reputation; (iv) the extent of uncertainty about the seller and/or her products (Bar-Isaac and Tadelis, 2008).

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[13] The authors show that, when collective reputation does not have firm traceability, firms will extract too much from the stock of reputation, selling low-quality products at high prices justified by the high past levels of quality.

[14] Principal-agent theories suggest that, if transaction costs are low, tighter monitoring will increase agent's work effort. However, when the relation between principal and agent is not only economic but also personal, then the effect of closer monitoring might be more than counterbalanced by the feeling of distrust which ends up reducing total effort (Frey, 1993). Furthermore, in a recent contribution Moav and Neeman (2010) find that the relationship between the precision of information about an agent's performance and his incentives to exert high effort is not monotonic.

In this respect the wine market represents an ideal testbed in order to investigate phenomena related to reputation (see also supra). First of all, wine is an experience good, meaning that buyers learn only after purchase about the real characteristics of the product, which makes reputation an important variable affecting purchases.[15] Second, entrepreneurs often have intrinsic psychological motivations, so that they have a long time horizon and a high discount factor (Scott Morton and Podolny, 2002). Third, consumers are very sensitive to reputation, especially when they refer to the high quality spectrum of the market, i.e., premium, super-premium, ultra-premium, and icon wines (Heijbroek, 2003). Finally, since the wine market is dominated by uncertainty and asymmetric information, the so-called "wine denominations" were born as collective responses to market failures connected to wine frauds and, more generally, to radical consumer uncertainty on the quality of producers and their products (Unwin, 1991).

Having discussed the elements that make the wine market a natural field to investigate the determinants of collective reputation, several characteristics make the Italian market a perfect candidate for analysis. In fact, Italy is the leading country in the world for both grapes and wine production, and wine export (before France, Spain and the USA). It is also the third consumption market after France and the USA and before Germany, China and the UK.[16] In addition, the Italian market is characterized by great variability of wineries quality and high uncertainty for consumers.[17] Finally, due to historical reasons and to the high population density, the property of land is dispersed among many small producers. It turns out that in Italy only a minority of wineries are able to build a strong reputation on a stand-alone basis, while for most of them the reputation of one (or more) wine denomination is fundamental.[18]

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[15] Fleckinger (2007) points out that expert ratings "even preempt public consumption: it is the very role of premieres and journalists of specialized press to provide the public with an evaluation before purchase take place. Again, the case of wine where experts are the first to taste and give an overall appreciation for a given region for the current year is illustrative". See next paragraph for a discussion about the role of experts in the wine market.

[16] World Vitivinicultural Statistics (2009), Organisation Internationale de la Vigne et du Vin (OIV). Note that reported figures are in absolute values so that in pro-capita terms Italian position is even better.

[17] "If consumers are fazed when presented by the challenge of a very long list of names to memorize, there may be some consolation in the fact that never before [in Italy] have so many fantastic choices been available" (Hugh Johnson's Wine Book 2004, p. 106).

[18] Immediately after World War II the Italian Government had to face the dramatic problem of small unemployed/underpaid farm workers. Thus, in 1950 the Parliament issued a law (Nr. 841/50) to expropriate the land of big landowners (latifundia) and redistribute it to the farm workers. As a result, the average size of farms is nowadays much smaller than what it was before 1950.

B. *Coalition of Economic Agents: Wine Denominations*

As said, wine denominations (and other geographic food labels) are the joint response of wineries (farmers) located within a specific geographic area to market failures. They establish rules for producing and selling a wine under the same umbrella brand name (see for instance Winfree and McCluskey, 2005). In this sense, wine denominations are a perfect example of coalitions of economic agents who share a common reputation.[19]

In Italy, coalitions of wineries are formed at two levels. At the first higher level, wineries are organized within firms producing one appellation of quality wines (i.e., DOCG and DOC).[20] Appellations are regulated by national decrees (i.e., *disclipinari*) that rule technical and economic aspects of wine production (see infra). However, appellations include a very broad spectrum of products and producers.

So, at a second lower level, wineries producing homogeneous wines are arranged into more specific coalitions called wine denominations.[21] This is because national legislative decrees that institute appellations divide them into a number of denominations (from 1 up to 52 for each appellation) that substantially differ one from another in terms of a relevant number of characteristics. First, the specific characteristics of the wine produced (grapes, color, type). Second, the technical rules set up in order to establish minimum quality standards. Third, the number of producers that joined the denomination. Thus, even within the same appellation, reputation varies considerably among denominations.

For instance, Asti Spumante and Moscato d'Asti are the two denominations that belong to the same appellation (DOGC Asti). They differ in terms of group size (in 2006, the number of producers was 4,784 for Asti

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[19] Note that denominations satisfy building blocks of theoretical models: i) individual past behavior of each single winery is imperfectly observed by consumers; ii) the past behavior of members of a denomination influences the group's current behavior; iii) the behavior of new wineries of a denomination depends on the past behavior of their elders; iv) a denomination's reputation is as good as that of its members (see Tirole 1996).

[20] In the EU there exists a classification of wines based on two broad categories, quality wines (i.e., VQPRD, Vins de Qualité Produits dans les Regions Determinées) and table wines, where quality wines are mainly identified with the origin of grapes. Italian wines are classified into four categories (from the lowest to the highest level of quality): *vini da tavola* (table wines), *indicazione geografica tipica* (IGT – typical geographic indication), *denominazione di origine controllata* (DOC – controlled denomination of origin) and *denominazione di origine controllata e garantita* (DOCG – controlled and guaranteed denomination of origin). In the year 2008, there existed 358 appellations (36 DOCGs and 317 DOCs).

[21] "Nowadays (at 31/12/1997) in Italy there are 18 DOCGs and 279 DOCs. Both types of appellations consist of almost 1.200 collective wine brands of different typologies of wine, specifically provided for by the relative national decree." (Italian Sommelier Association, *General Notions of National Oenology*, p.132). Indeed, in 1998 there were 1,237 wine denominations, number that has increased up to 1,424 in 2008 (see Table A.1).

Spumante and 519 for Moscato d'Asti), wine type (the former is a dry or sweet sparkling wine, while the latter is a sweet low alcoholic wine), minimum quality standards (the minimum wine alcoholic content is 5,5° for the former and 8,5° for the latter), and international reputation (Asti Spumante scores 1-2 stars in the Hugh Johnson's wine guide, while Moscato d'Asti reaches 2-3 stars).

From above considerations it derives that our analysis will concentrate at the denominations level. In fact, the umbrella brand name is defined at that level so as collective reputation and most of its possible determinants, from the type of wine to the minimum quality standards.

In order to test empirically factors influencing group reputation we have collected data on the universe of wine denominations that have been so far (and since 1963) established in Italy.[22]

C. Measures of Collective Reputation: Denomination's Ratings

In markets with incomplete and asymmetric information rating agencies have emerged as a natural market response. They have the scope of gathering information, signaling (i.e., providing new information to the market), and certification (i.e., evaluating the reputation of institutions, firms, and individuals; for a recent review of Credit Rating Agencies see Mathis, McAndrews and Rochet, 2009).

In the wine market, complexity of products, large number of sellers and labels, and finiteness of buyers' memory have stimulated the creation of mechanisms to centralize and disseminate information. In particular, wine guides (i.e., structured evaluations of experts and gurus) have assumed the function of rating agencies (Hay, 2010). Their role has become so important that they exert a significant effect on wine prices both in the short run and in the long run (Ali at al., 2008). More generally, guides play a decisive role for reputation of individuals (e.g., chefs, oenologists), firms (e.g., wineries, restaurants) and coalitions of agents (e.g., wine and other denominations, collective brand names) in all agri-food sector (see Gergaud, Smeets and Warzynski, 2010 for an analysis of French gastronomy[23]).

If these conditions hold true for the wine market in general, the natural characteristics of the Italian market (e.g., large number of wine denominations, wineries and labels, and great variability of quality between

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[22] Since we analyze the universe of Italian wine denominations the present study does not suffer from sample selection bias which usually harms most reputational studies.

[23] "For most chefs, having his restaurant being awarded one or more stars in the famous Michelin *Guide Rouge* represents a major achievement, a recognition of their work, and also increased notoriety generating a significant stream of future revenues. In this specific industry, experts play a decisive role, and reputation of restaurants and chefs are basically established according to their opinion" (Gergaud, Smeets and Warzynski, 2010, p. 1).

different products) make it ideal to study reputation in terms of score evaluations provided by wine guides. [24]

So, in order to measure collective reputation we have employed the stars assigned by a wine guide[25] (see Table 1 for a description of the explanatory and dependent variables of wine denominations). In particular, we measure group reputation by relying on scores assigned by the Hugh Johnson's wine guide. We chose Hugh Johnson's wine book, because it is the most diffused and acclaimed international guide, and it is the only one that rates continuously (Italian and other) wine denominations. Furthermore, Hugh Johnson's wine guide is published yearly since 1978, so that we can observe wine ratings for 30 years.

Hugh Johnson's wine guide assigns, when present, from 1 to 4 stars to each denomination.[26] Of course not all denominations reach an international standing: indeed only half – i.e., 723 out of 1,424 – of all Italian wine denominations are present in the guide. Thus, we assign 0 to wine denominations with no international reputation, and the relative number of stars to denominations present in the guide.

D. Other characteristics of a coalition: size, history, rules and system of (quality) controls

We collect information on the general characteristics of the wine denominations, drawing upon national decrees and Italian Chambers of Commerce. In particular, we examined all national decrees, issued from 1963 to 2008, that have instituted (and eventually modified) denominations. The decrees regulate all the relevant aspects of denominations, including the year of establishment (age of the denomination), the type of denomination (i.e., DOCG or DOC, see footnote 20), compulsory minimum quality standards, additional quality standards and other product characteristics (e.g., color and type).

As a preliminary remark, it is important to notice that national decrees are issued by the Italian Government after a specific application presented by a local coalition of producers. Of course, the role of the Government is not only to rubber and stamp the decree proposal; however, the enactment of the decree is the ending of a lengthy and complex process

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[24] "Wine lovers often complain that Italian wines are difficult to understand….You simply have to adopt one of three ploys. You could plump for a familiar producer's name, like Antinori, or seek out a recognizable denomination like Barolo…There is a third way: seek help…there are guides" (Hugh Johnson's Wine Book, 2009, p. 94).
[25] Another possible way would be to ask consumers their opinion about all wine denominations. However this is practically unfeasible since we should have asked consumers their opinion for more than one thousand different types of wine denominations. Moreover, this data would be static and not dynamic as in our case.
[26] Hugh Johnson assigns also half stars in the form of intervals, such as 1-2 stars, 2-3 stars, 3-4 stars.

which starts and represents the expression (voted by each member) of the coalition of producers of the wine denomination.

In particular, for each denomination, the decree provides specific rules over the province(s) and sub-zones where the wine can be produced, the horizontal characteristics of the wine, and the *quality standards* to be achieved (in both the agronomical and oenological phases of wine production). As to these latter, criteria include: species to be planted and minimum percentages of vines which must be used; maximum number of plants and grapes per hectare (grapes yields); maximum ratio between wine obtained and grapes used (grapes/wine); minimum wine alcohol content, minimum wine total acidity, and wine ageing practices.

Moreover, the decree may establish the introduction, within the same denomination, of further types of wine, where quality standards are set more severely on a voluntary basis (*vertical differentiation*) with respect to technical aspects such as the selection of vineyards (classico and sottozona), the agronomical procedures (passito, vin santo and late harvest), and the oenological standards (novello and riserva). As to the spectrum of *horizontal differentiation* of a wine denomination, controls include the color (white, rosé and red) and type (dry, slightly sweet, sweet, sparkling, and spumante).

Dynamic data from all Italian Chambers of Commerce (110, one for each Italian province) have been also gathered in order to assess the number of producers that adhere (from 1993 onwards) to all Italian wine denominations.[27]

In this respect, it is worth noting that inspections on the compliance of above mentioned norms and rules by members of a wine denomination are conducted at the Frauds General Inspection Department of the Ministry of Agriculture. So we have gathered data on the wine inspection activity of local offices[28] of such body (data have been acquired since 2003). In particular, we define (two) measures of the level of effectiveness of the local system of quality controls: the percentage of local wine producers controlled every year by the local body (using ISTAT data for the universe of wineries in that region[29]), and the average amount of penalties (in €) given by the local body

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[27] The authors gratefully acknowledge the fundamental role played by Unione Italiana Vini in collecting such data.

[28] These are the local offices of the Frauds General Inspection Department of the Ministry of Agriculture: Conegliano (with branches in S. Michele all'Adige, Verona and Udine) for Friuli Venezia Giulia, Veneto and Trentino Alto Adige; Milan (with branch in Brescia) for Lombardy; Turin (with branches in Asti and Genoa) for Piedmont, Liguria and Valle d'Aosta; Bologna (with branch in Modena) for Emilia Romagna; Florence (with branch in Pisa) for Tuscany; Rome (with branch in Pescara) for Lazio and Abruzzo; Ancona (with branch in Perugia) for Marche and Umbria; Naples (with branches in Salerno, Campobasso and Potenza) for Campania, Basilicata and Molise; Bari (with branch in Lecce) for Puglia; Cosenza for Calabria; Palermo (with branch in Catania) for Sicily; Cagliari for Sardinia.

[29] ISTAT (Italian Statistical Office), *5° Censimento Generale dell'Agricoltura* (2000).

per administrative notification. Variables are three-year averages (i.e., average values in the period 2005-2007) so that such measures of efficacy of quality controls are not influenced by yearly shocks. In this sense, we control both for the probability of being checked and the (economic) costs of cheating.

We complete the information set by collecting data on average socio-economic indicators for the province(s) of production of each wine denomination that capture the following context aspects: domestic demand structure (local GDP per capita), local entrepreneurial ability (index of entrepreneurship), geographical externalities (index of economic infrastructures), trust climate (crimes per 100,000 inhabitants) and the importance of natural endowment (value of vineyards).

IV.   Static Analysis

Even though reputation may be time dependent, we start with a static analysis. In fact, static analysis – in 2008, after 30 years of evaluations (recall that the first evaluation was in 1978) – may be regarded as a "steady-state equilibrium" analysis in theoretical models; so that it conveys interesting information. More practically, data in 2008 are exhaustive while dynamic information is partially incomplete (see Section V): the static investigation allows us to estimate at one time the role exerted on collective reputation by all possible factors.

Table 2 reports descriptive statistics for the year 2008. Collective reputation ranges from 0 to 3.5 stars, with average of 1.03 and standard deviation of 1.09. The average age of the denominations is 24 years, ranging from 42 for the oldest to 1 for the youngest. Minimum quality standards vary significantly according to the coalition's willingness to increase the average product quality. Also the characteristics of the coalition (i.e., the number of producers) and the socio-economic indicators for the provinces of interest are subject to radical differences among the denominations.[30]

Table 3 shows the number of wine denominations for each category of international reputation, in terms of stars awarded by Hugh Johnson's wine guide in 2008.

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[30] Differences in economic conditions and social capital are usually substantial across countries but small between regions. Italy represents one of the few exceptions, given its huge differences in the level of GDP per capita, level of infrastructures, organized crime and social capital when moving from the North to the South. It is worth to remember that Banfield's (1958) pioneering study on the effect of social trust on economic development was based on a small community in Southern Italy. Guiso, Sapienza and Zingales (2004), using data on blood donations and electoral participation, find that the huge differences in social capital among Northern and Southern Italy contribute to explain the gap in financial development and, in turn, economic prosperity.

It is important to notice that the vast majority of regressors used in our study are exogenous. Therefore, reverse causality issues are confined to few possible cases even in static regressions. Indeed, all independent variables are lagged of (at least) one year; i.e., reputation refers to 2008 scores, while regressors are recorded one year before (except for the number of members of a denomination, see infra).

Furthermore, variables such as the age of the denomination and socio-economic controls are clearly exogenous. A similar line of reasoning holds true for minimum quality standards and variables capturing vertical and horizontal product differentiation, which can be hardly influenced by the reputation of the denomination.[31]

The only three variables potentially affected by reverse causality are the type of denomination (i.e., DOCG versus DOC), the size of the coalition and the value of lands. The DOCG level is awarded to wines with outstanding superior characteristics which over time have gained prestige. However, legal procedure to obtain a DOCG is long, complex, uncertain and requires a lot off lobbying activity (see supra). As a result, DOCs are usually upgraded to DOCG with a considerable and unpredictable delay from the date of application.

As to the size of a coalition, it might be the cause of group reputation since size is associated with visibility, but also its consequence if an increasing collective reputation attracts a growing number of firms willing to benefit from the accumulated asset. However, the inflow of new producers into a coalition is not free since (i) the grapes must grow in a limited area pointed in the legal decree and (ii) the coalition usually fixes a maximum number of producers for a three-year period, subject to eventual renewal. This reduces the risk of reverse causality. Next, in order to rule out this doubt we use two years lagged data for the number of producers (year 2006), while all the other independent variables, as said, refer to the year 2007. In addition, we first run econometric estimates without including the number of producers, and only then we include also this variable into the econometric models.[32]

With respect to the value of land, which is clearly (at least partially) affected by the prestige of the wines which can be produced, there is nothing we can do, but it is not the main target of the research. However, it is worth noting that recently a number of studies have questioned the direct impact of

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[31] As mentioned the process of awarding a denomination (DOC or DOCG) and setting MQS is very lengthy and complex, and involves many agents and institutions at different levels so that reverse causality is unrealistic.

[32] Note that the introduction in the estimates of this variable causes also a reduction of the number of observations from 1,424 to 1,391. This is because some denominations have been created from 2006 onwards, and thus we do not have data on the number of producers.

terroir on the quality of wine (see, for example, Gergaud and Ginsburgh, 2008).

A. Econometric Estimates

Given the discrete nature of the dependent variable the econometric methodology relies on ordered Logit regressions with robust standard errors. The sample used is the universe of all 1,424 denominations, whose reputation is regressed on the variables listed in Table 1. Therefore, the structure of the equations will be the following:

$$REPUTATION_i = \beta_0 + \beta_1 COALITION\_CHARACT_i + \beta_2 RULES_i + \beta_3 CONTROLS_i + \\ + \beta_4 PRODUCT\_CHARACT_i + \beta_5 CONTEXT_i + \varepsilon_i$$

where REPUTATION is the score assigned by the Hugh Johnson's wine guide and the subscript i refers to the denomination. Table 4 shows five models (the fifth will be discussed in the next paragraph). In the first we control for the characteristics of the coalition (COALITION_CHARACT), the socio-economic variables at the province level (CONTEXT) and the horizontal differentiation controls (PRODUCT_CHARACT). Without including rules (RULES) - i.e., compulsory and voluntary quality standards - and controls (CONTROLS), the dummy variable for the DOCG category turns out to exert a strong positive effect. On average, DOCG denominations have higher minimum quality standards and consequently are more prestigious than DOC ones.

In line with theoretical predictions age has a strong positive effect: everything else being equal, older denominations have built over time their reputation. Indeed, especially for experience goods, it takes time to build a good reputation.

Socio-economic variables go in the expected direction with GDP per capita, number of enterprises per 100 inhabitants, index of level of infrastructures and average value of vineyards having a significant and positive effect on reputation. Note also that the social context impacts on the reputation of a coalition of producers, with areas characterized by a higher level of crimes suffering from lower levels of collective reputation (results of single variables are omitted for reasons of space and available upon request).

Variables capturing horizontal differentiation are not expected to play any role, unless they reflect the personal taste of the evaluator or the quality of the national products relative to that of foreign ones. As expected, in our estimates coefficients are generally jointly significant (see the Wald test at the end of the table), but individually they are only weakly significant

(results of single variables are again omitted for reasons of space and available upon request).[33]

In the second regression we insert as an additional control the minimum quality standards required by the law to produce wines belonging to a certain denomination. All quality standards are strongly significant, except for wine alcoholic content. Note that stricter rules in terms yields, grapes/wine conversion ratio, wine acidity and ageing greatly improve the reputation of the coalition of producers. This finding provides a solid empirical ground to those theoretical works identifying a positive, rather than negative, link between minimum quality standards on one hand and quality and group reputation on the other.

The size of the coefficient of the dummy variable DOCG decreases significantly but is still significant at 5% level. Minimum quality standards are aimed at increasing the average product quality and thereby capture a big part of the positive effect of the DOCG label.

The third regression repeats the exercise by adding the voluntary quality standards aimed at providing additional vertical differentiation. Previous results hold, with only the size and significance of the DOCG dummy variable decreasing (even more). Strict requirements on both agronomical (i.e., sottozona) and oenological (late harvest, passito, vinsanto and riserva) activities display a positive and significant influence on the reputation of the coalition.

Finally, in the fourth regression we control for the system of quality controls. As evident from the estimates, having a more effective system of controls, in term both of monitoring and punishment, greatly impacts on the reputation of the coalition of agents, with both variables being individually and jointly statistically significant at 1% level.

The bottom of the table reports joint tests for significance of coefficients (Chi-squared Wald tests) for the five groups of variables (characteristics of the coalition, rules, controls, geographical context and characteristics of the collective product, respectively). The null hypothesis that the coefficients are jointly equal to zero is rejected at 1% level for the first four groups. The coefficients of the variables measuring horizontal differentiation are weaker and even insignificant in some regression.

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[33] The only one which is statistically significant is Spumante, which has a negative coefficient. This is probably due to the implicit comparison with the French counterpart Champagne which can rely on a tradition of centuries tracing back to Napoleon. The great commander used to claim that after each battle there is need for a bottle of good Champagne, either to celebrate or to seek consolation.

B. Optimal Number of Members of a Coalition

In the last column of Table 4 we focus on the role exerted by the size of the coalition, measured by the number of its members. In fact in Model 5 we extend Model 4 by using the number of producers as additional control; to check for a possible non-linear relationship, we also consider the square of the number of producers. The relation is indeed concave, with those coefficients being of opposite sign (i.e., positive the linear and negative the squared) and statistically significant at conventional levels.

Figure 1 reports a graphical simulation of the relationship between the number of firms in a coalition and the reputation of the denomination itself (while other independent variables are set to zero).[34] The reputation of the denomination benefits from the size of the coalition because of higher visibility and market power, and increases until a peak at around 3,300 members. However, after this peak the effect of group size on collective reputation is negative due very probably to free-riding problems. This result sheds definitive lights on the relation between members of the coalition and group reputation and confirms recent theoretical predictions (Fishman et al., 2008).

It is also important to notice that this concave relation between coalition size and group reputation rules out the possibility of reverse causality which, in fact, would require a linear relationship between the two variables of interest. Indeed, if it were Y (reputation) influencing X (number of producers), by inverting the axes of the plot in Figure 1 we would not have anymore an univocal relationship between the two variables. In other words, if the causality direction went from collective reputation to number of producers, it would be difficult to justify that relation: starting from a top reputation, a decline in it can lead both to a decrease and an increase in the number of producers. While a decrease makes sense, an increase does not. On the contrary, it would be easy to understand a reverse causality problem if the two variables had a linear relationship which, however, is not the case here.

Looking again at the two last regressions of Table 4, we can see that while the effect of age, rules (MQS, additional QS), and quality controls is strongly confirmed, that of DOCG vanishes. This is an interesting piece of news, meaning that, after controlling for all factors, the reputation of the denomination depends on all the other objective characteristics considered in the analysis, and not on an institutional signal. [35]

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[34] The simulation has been performed by estimating Model 5 with robust OLS.

[35] A significant coefficient attached to the DOCG dummy variable would mean either that the evaluator got influenced by the institutional signal or that there are some unobserved components we cannot control for.

V. Dynamic Analysis

In the previous section we showed, within a static framework, that the reputation of a coalition depends on the rules and actions (and number) of its members. We also illustrated that institutional signals may play a less significant (even null) role, once we control for all relevant aspects, while the context is key in shaping the behavior of the members of the coalition and affecting the quality of their products, hence their reputation. In this section, we investigate dynamics of collective reputation.

In order to do this we create a database with seven waves, starting from 1978 and acquiring information every five years: i.e., in 1978, 1983, 1988, 1993, 1998, 2003 and 2008. The structure of the dataset is the same as in the previous chapter, with two exceptions: first, new denominations have been created over time, therefore old waves have a lower number of observations; second, the level of investigation declines when going back in time since for the first waves it is not possible to get information for all the considered variables.

Looking at Table A.1 reported in the Appendix we can see that the number of denominations has grown from 686 to 1,424 over the last 30 years. However, while for the year 2008 we have information on all the variables listed in Table 1 and used in the static analysis, before 1993 we are not able to collect detailed data on compulsory minimum quality standards, the number of producers in the denomination and the context variables at the province level. As to the latter, however, in the dynamic econometric analysis we can instead insert regional dummy variables without losing much information.[36] Finally, data on the system of control dates back to 2003; hence they are not reported in the dynamic analysis.

A. *Dynamics of Collective Reputation*

Figure 2 shows the evolution of reputation of Italian denominations in the last 30 years. The plot clearly shows the increasing reputation of national wine denominations, mainly due to the definition of stricter MQSs and additional QSs, linked to the introduction, in 1980, of the DOCG system of appellations[37], and to the upgrading of oenological and agronomical standards of DOCs. This evolution provides further evidence on the

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[36] We follow consolidated geo-statistics analysis (i.e., ISTAT classification) by dividing Italy in five macro-regions: North-West (Piedmont, Aosta Valley and Liguria), North-East (Lombardy, Veneto, Friuli Venezia Giulia and Trentino Alto Adige), Center (Tuscany, Emilia Romagna, Marche, Umbria and Lazio), South (Campania, Abruzzo, Molise, Puglia, Basilicata and Calabria), and Islands (Sardinia and Sicily). North-West is the omitted one to avoid the dummy variable trap.

[37] The first DOCGs to be awarded were Barolo, Barbaresco, Brunello di Montalcino and Vino Nobile di Montepulciano in 1980. Then Chianti and Chianti Classico followed in 1984.

determinants of collective reputation and will be analyzed later in this section.

As to the dynamics of collective reputation Table 5 shades new lights. To study reputational dynamics we have computed transition probabilities (from time "t" to "t+5") where each state is defined by the values of collective reputation. In other words, we report, in Table 5, the probabilities that a coalition characterized by an *i*-level of reputation (from 0 to 4 stars) at time "t" turns, after five years, to a *j*-level.

First, in line with theoretical predictions (Levin, 2009, p. 10, see also Proposition 1 of Tirole, 1996), there is persistence in the data (79% of observations do not change reputation state over a five year period) with reputation being hence history dependent. In particular, bad collective behavior in the past increases the probability of being stuck within a bad reputation equilibrium; the probability of remaining in a bad reputation state being significantly higher that others (87.5%). In other words, data show the presence of a "bad reputation trap".

Nevertheless, a not negligible percentage of coalitions, more that 20%, change their reputation level from one period to the next. The probability of changing is higher for lower (but not the lowest) and higher levels of reputation, so that, second and contrary to theoretical predictions, other possible steady state equilibria are more likely for intermediate values of reputation.

As a final remark on dynamics, transition probabilities show that, when it changes, collective reputation tends to adjust smoothly, with very rare big reputational jumps.

B. Determinants of Collective Reputation at "t=0" and t=30

Given the persistence in reputational dynamics, it is fundamental to investigate determinants of collective reputation at time "t =0", i.e., at the time of the first reputational evaluation (i.e., 1978).

In this study we have this unique opportunity since we collected data on collective reputation and its determinants since 1978, the first year of publication of HJ's guide, hence the first year in which Italian denominations were ever rated.[38] In this sense, we regress determinants of collective reputation at a time when there were still no public knowledge on Italian wine denomination quality.

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[38] Note that in 1978 there were no other structured source of ratings of wine denominations and Italian denominations were still very young (the first DOC was established in 1963, while the first French classification system dated to 1855), so that 1978 HJ's evaluations represented the very first reputational assessment.

We can also compare this result with previous static analysis, after 30 years of ratings (i.e., 2008), and look at eventual differences. However, in doing so, we have some data constraint. As mentioned above, in 1978 data on MQS are missing, so as geographical controls which are replaced with regional dummies. In addition, in 1978 DOCGs were not already established (see footnote 36) as well as the "novello" type of wine.

Table 6 presents results of robust Logit regressions on determinants of collective reputation at time 0 and after 30 years. Note that in 1978 the universe of wine denominations included 686 coalitions of producers, while this number has reached 1,424 nowadays.[39] Results of estimates strongly confirm previous considerations. First, the age of the coalition still remains the regressor which exhibits the strongest (positive) explanatory power. Second, quality rules set up by the members of the coalition of producers (i.e., QS) display a joint significant effect on collective reputation (se the Wald test reported at the end of the Table), with single coefficients of both agronomical (i.e., sottozona) and oenological (i.e., riserva) standards positive and strongly significant. Similarly, geographical and horizontal differentiation controls display a relevant role, even bigger than in the 2008 estimation.

C. Panel Data Analysis

In Table 7 we repeat the exercise of Table 4 by running Random Effects Ordered Probit regressions on the yearly level of collective reputation. In the first model the time span considered ranges from 1978 to 2008 (seven waves) while in the second from 1993 to 2008 (four waves). The regressions include different categories of variables depending on the availability of data (see again Table A.1 in the Appendix).

The number of observations declines when reducing the number of waves and when adding the number of producers as a further control. Nevertheless, results obtained in Table 4 hold: age, compulsory and voluntary quality standards exert a positive effect on collective reputation. The same holds true for the number of producers whose non-linear effect persists.

We also insert time dummies in order to control for time shift events. In particular we want to check the effects of episodes such as the introduction of the DOCG system in 1980 and the methanol scandal in 1986.[40] Time

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[39] Given the reduced number of observations in 1978 relative to the large number of possible reputation state (i.e., 9), we proceed to estimate logit instead of ordered logit models, where the dependent variable takes the value 0 as before (i.e., when reputation is absent) and 1 if it is present, irrespective of the exact number of stars awarded by HJ.

[40] The scandal arose when a (limited) number of firms traded wine adulterated with methanol which, at that time, due to fiscal discounts was cheaper than sugar. While, when assumed in reasonable amounts, ethanol is not toxic for the human body, methanol is poisoning and can be responsible for severe damages to the nervous system, blindness or

dummies show (for the first 25 years) a positive trend, due, as said, to the effort of Italian winemakers which, despite the 1986 scandal of the wine adulterated by use of methanol, has translated into better quality.

Finally, we have tested determinants of reputation by using a dynamic panel data model (i.e., Arellano and Bover, 1995, and Blundell and Bond, 1998, estimator). Results are reported in the Appendix (see Table A.2). Of course, such model does not take into account the categorical ordered nature of our dependent variable, and explanatory variables are confined to those that are time variant. However, results provide further insights and confirmation of previous results. Indeed, reputational persistence is witnessed by the value of the lagged dependent variable. Minimum quality standards are again jointly significant with both agronomical (i.e., yields) and oenological (i.e., acidity) aspects being statistically relevant. Lastly, once again it is confirmed the concave effect of the number of members of the coalition of producers.

VI. Conclusions

While the literature on individual reputation is huge, that on collective reputation is still scarce and scattered. Existing theoretical works analyze mainly the dynamics of collective reputation, but not the determinants of it, while (the very few) empirical papers focus on the consequences of collective reputation, especially on the price the seller is able to charge.

However, so far no (empirical) work has analyzed comprehensively the determinants of group reputation. We do so by studying the determinants of collective reputation in the Italian wine market, our database being composed by the *universe* of wine denominations in the last thirty years. Our dependent variable is the international reputation of wine denominations. We control for a number of potential variables ranging from the general characteristics of the group of producers to the quality rules standards set by the coalition, from the system of controls to the geographical context in which firms operate, to the variables measuring the characteristics of the collective brand product.

The economic literature has associated the introduction of quality standards with both negative (entry barrier to new firms) and positive (higher average product quality) effects on social welfare, quality and reputation. Our findings provide evidence in favor of the positive effects of

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even cause death. Between December 1985 and March 1986 several people were intoxicated and 23 died. This dramatic event is usually considered the driver of the quality revolution in the Italian wine market over the last 25 years: a huge effort had to be made in order to recuperate credibility and reputation in both the domestic and foreign markets.

compulsory and voluntary rules on group reputation. Similar results hold for the frequency and accuracy of controls.

In markets with strong asymmetric information, free entry may end up being sub-optimal since the relation between number of producers in the coalition and group reputation is concave. At the beginning, when the scale of production is small, a growing number of members ensure higher visibility, but after a peak the collective reputation declines since the incentive to free ride prevails.

Note also that we provide evidence that in efficient markets institutional signals are usually overestimated; in fact their impact tend to diminish (or even vanish) once one controls for all relevant variables.

As the dynamics of collective reputation, we show the persistence in reputation, which is strongly history dependent. In particular, we provide evidence of the presence of a "bad reputation trap". Moreover, when it changes, collective reputation tends to adjust smoothly, big reputational jumps being very rare.

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Table 1 - Dependent and Explanatory Variables

Variable	Source	Description
Collective reputation of the coalition		
Collective reputation	HJ's wine book	Number of stars awarded to the denomination, from 1 to 4, while 0 means absence of reputation
General characteristics of the coalition		
DOCG	National decrees	DV equal to 1 if the denomination is a DOCG
Age	National decrees	Age of the denomination (in years) since it was first awarded a DOC
Producers	Chambers of Commerce	Number of wineries producing the denomination
Quality rules set up by the coalition:		
a) Minimum quality standards (compulsory)		
Compulsory vines	National decrees	Minimum percentage of all compulsory vines (%)
Grapes yields	National decrees	Maximum quintals of grapes per hectare (q/ha)
Grapes/wine	National decrees	Maximum conversion ratio: grapes used in wine obtained (%)
Wine alcoholic content	National decrees	Minimum wine alcoholic content (in %)
Wine total acidity	National decrees	Minimum total acidity (grams per liter)
Wine ageing	National decrees	Minimum ageing (number of months)
b) Additional voluntary quality standards (vertical differentiation)		
Classico	National decrees	DV equal to 1 if the wine is from an historical restricted area within the limits of the denomination
Sottozona	National decrees	DV equal to 1 if the wine belongs to a defined restricted area of the denomination
Passito	National decrees	DV equal to 1 if the wine is strong, mostly sweet, from grapes dried
Late harvest	National decrees	DV equal to 1 if the wine is a late harvest
Vin Santo	National decrees	DV equal to 1 if the wine is strong and sweet, from "passito" grapes, using traditional methods
Novello	National decrees	DV equal to 1 if the wine is early vintage with carbonic fermentation
Riserva	National decrees	DV equal to 1 if the wine is a selection aged for statutory period, usually in casks or barrels
System of quality controls		
% producers controlled	Ministry of Agriculture/ISTAT	Percentage of wineries (with respect to the universe of local producers) yearly controlled by the local office of the Frauds General Inspection Department of the Ministry of Agriculture (average three-year value)
Amount of penalties	Ministry of Agriculture	Average amount (in €) of penalties yearly given by the local office of the Frauds General Inspection Department of the Ministry of Agriculture per number of administrative notification (average three-year value)
Characteristics of the collective brand product: horizontal differentiation controls		
White	National decrees	DV equal to 1 if the wine is white
Rose	National decrees	DV equal to 1 if the wine is rosé
Red	National decrees	DV equal to 1 if the wine is red
Dry	National decrees	DV equal to 1 if the wine is dry
Slightly sweet	National decrees	DV equal to 1 if the wine is slightly sweet (i.e., *amabile* or *abboccato*)
Sweet	National decrees	DV equal to 1 if the wine is sweet
Sparkling	National decrees	DV equal to 1 if the wine is sparkling (i.e., *frizzante*)
Spumante	National decrees	DV equal to 1 if the wine is sparkling and is produced with Charmant-Martinotti or Champenoise (in Italy *metodo classico*) methods
Geographical context controls		
GDP per capita	Unioncamere	GDP per capita in the province(s) of production of the denomination
Entreprises	Unioncamere	Enterprises (per 100 inhabitants) in the province(s) of production of the denomination
Infrastructures	Unioncamere	Infrastructures index (Italy=100) in the province(s) of production of the denomination
Crimes	Unioncamere	Crimes (per 100,000 inhabitants) in the province(s) of production of the denomination
Value of vineyards	INEA	Value of vineyards (per ha) in the province(s) of production of the denomination

Table 2 - Descriptive Statistics of the 2008 Sample

Variable	Obs.	Mean	Std. Dev.	Min	Max
Collective reputation (number of stars)	1,424	1.03	1.09	0	3.5
DOCG (DV)	1,424	0.04	0.19	0	1
Age (years)	1,424	24.10	12.71	1	42
Producers (number)	1,391	117	369	0	6,592
Compulsory vines (%)	1,424	82.73	13.61	25	100
Grapes yields (q. per ha)	1,424	112.54	21.29	40	200
Grapes/wine (%)	1,424	68.60	5.75	25	75
Wine alcoholic content (°)	1,424	11.46	1.13	9	18
Wine total acidity (gr. per l.)	1,424	4.67	0.41	3	6.5
Wine ageing (months)	1,424	2.32	7.94	0	96
Classico (DV)	1,424	0.02	0.15	0	1
Sottozona (DV)	1,424	0.13	0.34	0	1
Passito (DV)	1,424	0.13	0.34	0	1
Late harvest (DV)	1,424	0.04	0.20	0	1
Vin Santo (DV)	1,424	0.04	0.20	0	1
Novello (DV)	1,424	0.07	0.25	0	1
Riserva (DV)	1,424	0.31	0.46	0	1
% producers controlled (%)	1,424	0.01	0.003	0.005	0.02
Amount of penalties (€)	1,424	351.88	944.77	0.21	3,024.74
White (DV)	1,424	0.49	0.50	0	1
Rose (DV)	1,424	0.010	0.099	0	1
Red (DV)	1,424	0.50	0.50	0	1
Dry (DV)	1,424	0.94	0.24	0	1
Slightly sweet (DV)	1,424	0.13	0.34	0	1
Sweet (DV)	1,424	0.18	0.39	0	1
Sparkling (DV)	1,424	0.13	0.33	0	1
Spumante (DV)	1,424	0.14	0.35	0	1
GDP per capita (€)	1,424	25,099	6,473	9,182	35,619
Enterprises (per 100 inh.)	1,424	9.38	1.24	6.00	12.00
Infrastructures (index)	1,424	100	63	24	449
Crimes (per 100,000 inh.)	1,424	2,931	1,066	1,075	6,546
Value of vineyards (000 € per ha)	1,424	56.50	43.34	14.00	193.00

Note: (DV) stands for Dummy Variable.

Table 3 – Collective Reputation in 2008

Collective reputation	N. of denominations	%
0	701	49.2%
1	52	3.7%
1.5	169	11.9%
2	283	19.9%
2.5	129	9.1%
3	84	5.9%
3.5	6	0.4%
4	0	0
TOTAL	1,424	100.0%

Note: HJ also assigns half stars, so that 1.5 (2.5, and 3.5) means between 1 (2, 3) and 2 (3, 4) stars.

Table 4 – Static Regressions on Collective Reputation (ordered logit, year 2008)

Regressors	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*
DOCG	1.53	5.16*	0.69	2.09**	0.63	1.95***	0.18	0.42	-0.01	-0.01
Age	0.09	16.38*	0.10	17.64*	0.10	16.96*	0.11	16.90*	0.10	15.24*
Producers/1000									1.20	4.01*
(Producers/1000) ^2									-0.17	-2.46**
Compulsory vines			0.02	4.00*	0.03	4.99*	0.03	5.20*	0.03	4.92*
Grapes yields			-0.02	-6.52*	-0.02	-5.56*	-0.01	-3.73*	-0.02	-4.20*
Grapes/wine			-0.06	-2.71*	-0.04	-1.86***	-0.03	-1.38	-0.03	-1.21
Wine alcoholic content			-0.18	-1.36	-0.14	-1.51	-0.10	-1.01	-0.09	-0.89
Wine total acidity			-1.22	-7.13*	-1.05	-6.15*	-1.07	-6.11*	-1.03	-5.88*
Wine ageing			0.05	4.47*	0.04	4.15*	0.05	4.52*	0.05	4.50*
Classico					0.21	0.50	0.42	1.08	0.06	0.14
Sottozona					0.54	3.09*	0.77	4.34*	0.90	5.01*
Passito					0.68	1.49	0.81	1.76***	0.90	1.97**
Late harvest					0.98	2.53**	1.04	2.75*	0.97	2.58**
Vinsanto					0.96	1.79***	-0.39	-0.68	-0.36	-0.62
Novello					-0.13	-0.43	0.04	0.14	-0.01	-0.05
Riserva					0.34	2.41**	0.35	2.54**	.037	2.58**
% producers controlled (%)							161.48	7.86*	157.90	7.30*
Amount of penalties (€)							0.000002	5.51*	0.000001	5.30*
Wald test: Prob>Chi2[a]										
General characteristics of the coalition	0.0000		0.0000		0.0000		0.0000		0.0000	
Quality rules: MQS (compulsory)			0.0000		0.0000		0.0000		0.0000	
Quality rules: Additional voluntary QS (vertical differentiation)					0.0000		0.0000		0.0000	
System of quality controls							0.0000		0.0000	
Characteristics of the collective brand product	0.0000		0.0291		0.1119		0.0035		0.0006	
Geographical context	0.0000		0.0000		0.0000		0.0108		0.0145	
N. of observations	1,424		1,424		1,424		1,424		1,390	
Pseudo R2	0.17		0.22		0.23		0.26		0.26	

Notes: Ordered Logit regressions with robust standard errors. Coefficients of horizontal differentiation and geographical context controls are omitted for reasons of space.
[a] Joint tests for significance of coefficients (Chi-squared Wald tests).
* Significantly different from zero at the 0.01 level; ** Significantly different from zero at the 0.05 level; *** Significantly different from zero at the 0.10 level

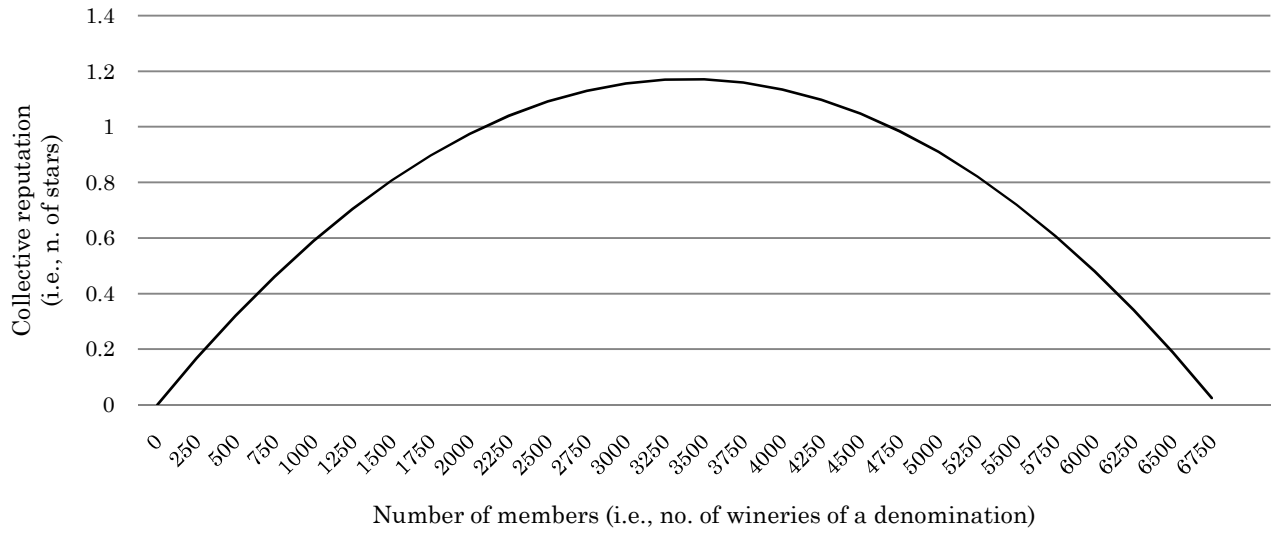# Fig. 1 - The Optimal Number of Members of a Coalition

Collective reputation (i.e., n. of stars)

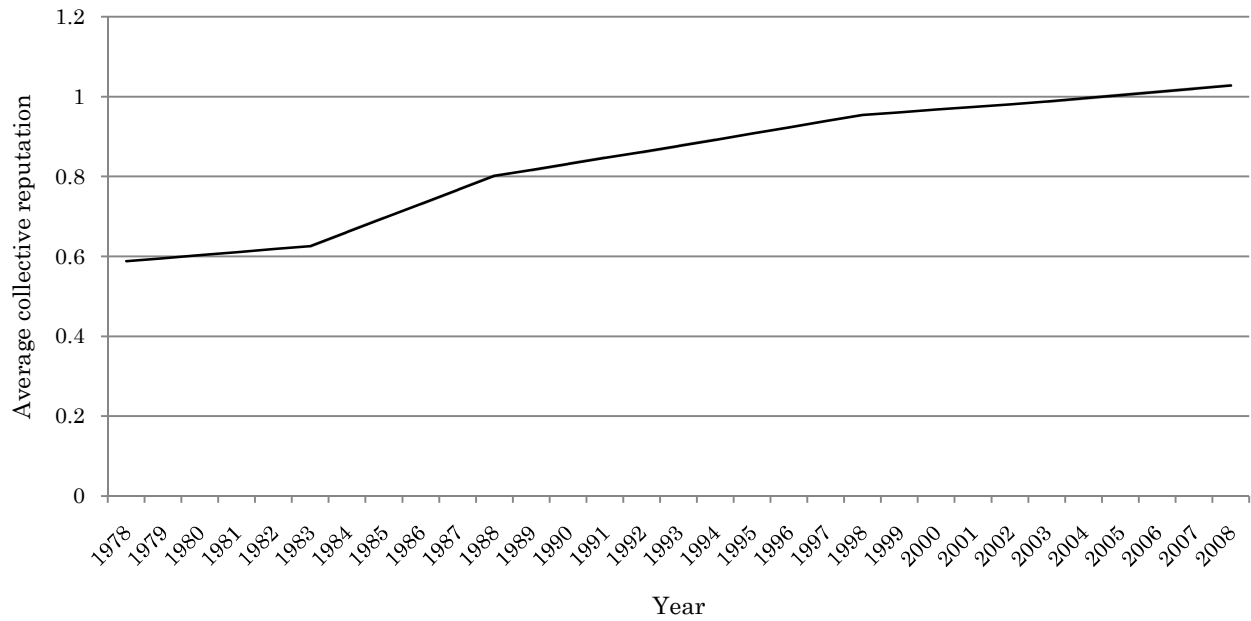Number of members (i.e., no. of wineries of a denomination)

Fig. 2 - Evolution of Average Collection Reputation

Average collective reputation

Year

Table 5 - Transition Matrix of Collective Reputation from Period "t" to "t+5"

Reputation at time:		"t+5"										TOTAL
		0	0.5	1	1.5	2	2.5	3	3.5	4		
	0	87.5%	1.2%	3.7%	3.0%	3.0%	0.7%	0.9%	0.0%	0.0%		100.0%
	0.5	1.4%	54.9%	2.8%	0.0%	9.9%	31.0%	0.0%	0.0%	0.0%		100.0%
	1	5.9%	0.0%	63.6%	9.3%	17.4%	3.6%	0.2%	0.0%	0.0%		100.0%
	1.5	0.8%	0.0%	2.7%	75.9%	17.8%	2.5%	0.2%	0.0%	0.0%		100.0%
"t"	2	2.0%	0.1%	2.1%	6.8%	78.5%	8.4%	2.1%	0.0%	0.0%		100.0%
	2.5	0.0%	0.3%	0.0%	0.6%	20.9%	65.9%	11.7%	0.6%	0.0%		100.0%
	3	0.3%	0.7%	1.4%	0.0%	4.8%	10.9%	80.3%	1.4%	0.3%		100.0%
	3.5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	21.4%	78.6%	0.0%		100.0%
	4	0.0%	0.0%	0.0%	0.0%	6.3%	0.0%	12.5%	18.8%	62.5%		100.0%

Table 6 - Regressions on Collective Reputation at "t = 0" (1978) and "t = 30" (2008)

Regressors	t=0 (1978)		t=30 (2008)	
	Coef.	z	Coef.	z
DOCG			1.58	2.38**
Age	0.33	8.26*	0.11	17.10*
Classico	0.16	0.24	-0.39	-0.79
Sottozona	0.85	3.40*	1.26	4.96*
Passito	-0.16	-0.27	0.47	0.97
Late harvest	0.18	0.31	1.32	3.21*
Vinsanto	-0.54	-0.74	1.30	2.55**
Novello			-0.20	-0.61
Riserva	0.84	3.59*	0.35	1.97**
Wald test: Prob>Chi2[a]				
General characteristics of the coalition	0.0000		0.0000	
Quality rules: Additional QS (vertical differentiation)	0.0000		0.0000	
Characteristics of the collective brand product	0.0000		0.0005	
Geographical context[b]	0.0000		0.0000	
N. of observations	686		1,424	
Pseudo R2	0.31		0.40	

Notes: Logit regressions with robust standard errors. The dependent variable is a dummy equal to 1 if the denomination has a collective reputation (presence in the HJ's wine book), 0 otherwise. Coefficients of horizontal differentiation controls are omitted for reasons of space.
[a] Joint tests for significance of coefficients (Chi-squared Wald tests).
[b] Geographical controls are regional dummies for regression a t=0, and variables described in Table 1 for estimate at time t=30.
* Significantly different from zero at the 0.01 level; ** Significantly different from zero at the 0.05 level

Table 7 - Panel Data Regressions on Collective Reputation

Regressors	1978-2008		1993-2008	
	Coeff.	*z*	*Coeff.*	*z*
DOCG	0.28	2.02**	-0.13	-0.47
Age	0.12	30.71*	0.17	20.18*
Producers/1000			0.84	5.81*
(Producers/1000) ^2			-0.08	-3.18*
Compulsory vines			0.01	3.88*
Grapes yields			-0.05	-4.38*
Grapes/wine			-0.01	-3.00*
Wine alcoholic content			-0.04	-0.53
Wine total acidity			-0.50	-10.9*
Wine ageing			0.06	6.2*
Classico	0.07	0.44	-0.45	-1.77***
Sottozona	0.25	3.28*	0.48	2.14**
Passito	0.08	0.48	0.99	4.29*
Late harvest	0.06	0.41	1.10	4.3*
Vinsanto	1.41	7.33*	-0.38	-1.35
Novello	-0.47	-3.33*	-0.04	-0.02
Riserva	0.38	5.86*	0.45	3.09*
Wald test: Prob>Chi2[a]				
General characteristics of the coalition	0.0000		0.0000	
Quality rules: MQS (compulsory)			0.0000	
Quality rules: Additional QS (vertical different.)	0.0000		0.0000	
Characteristics of the collective brand product	0.0000		0.0000	
Geographical context	0.0000		0.0000	
N. of observations	7,014		3,249	
Wald test	0.0000		0.0000	

Notes: Random effect ordered probit regressions. Regressions include geographical context (i.e., macro-regional dummies for 1978-2008, and variables of Table 1 for 1993-2008) and horizontal differentiation controls, which are omitted for reasons of space. Time dummies are also included.
[a] Joint tests for significance of coefficients (Chi-squared Wald tests).
* Significantly different from zero at the 0.01 level, ** Significantly different from zero at the 0.05 level, *** Significantly different from zero at the 0.10 level

APPENDIX

Table A.1- Availability of Data over the Time Period: 1978-2008

Year	Obs.	Collective reputation	General Characteristics of the coalition	Members	Quality Rules:		System of controls	Collective brand	Context
					MQS	Other QS			
1978	686	Yes	Yes	No	No	Yes	No	Yes	No (RD)
1983	749	Yes	Yes	No	No	Yes	No	Yes	No (RD)
1988	809	Yes	Yes	No	No	Yes	No	Yes	No (RD)
1993	876	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1998	1,237	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
2003	1,334	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2008	1,424	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Data about reputation is available since 1978, the year of the first issue of the Hugh Johnson's wine book. Information about age and DOCG status is of available for all period under consideration. Compulsory minimum quality standards and the number of producers are available only from 1993 onwards, while the voluntary additional QS from 1978, as well as horizontal differentiation which is time invariant. Variables on the systems of controls are available since 2003. Context variables are available only from 1993, before regional dummies (RD) are used in regressions.

Table A.2- Dynamic Panel Data Regressions on Collective Reputation

Regressors	1993-2008	
	Coeff.	*z*
Collective Reputation a "t -1"	0.92	18.05*
DOCG	-0.47	-2.49**
Age	-0.003	-1.49
Producers/1000	0.14	1.78***
(Producers/1000)^2	-0.01	-1.67***
Compulsory vines	-0.001	-0.33
Grapes yields	-0.05	-2.19**
Grapes/wine	0.001	0.31
Wine alcoholic content	-0.09	-1.11
Wine total acidity	-0.23	-3.22*
Wine ageing	-0.008	-0.5
Wald test: Prob>Chi2[a]		
Quality rules: MQS (compulsory)	0.0214	
N. of observations	2,976	
Wald test	0.0000	

Notes: Arellano-Bover/Blundell-Bond robust regression. Sargan test passed.
Additional voluntary quality standards and horizontal controls omitted because time independent.
[a] Joint tests for significance of coefficients (Chi-squared Wald tests).
* Significantly different from zero at the 0.01 level
** Significantly different from zero at the 0.05 level
*** Significantly different from zero at the 0.10 level