The irresistible rise of the craft brewing sector in Italy: can we explain it?

(draft version)

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Summary

This research empirically investigates the emergence of craft breweries in Italy over the period 1993-2014, whose rise has generated, in the recent years, an high number of entries in the sector.
Two different order of possible drivers can be taken into account. therefore the rise of craft brewing can be simply interpreted as the consequence of a change in the beer market, particularly the increasing attention of consumers to the quality of productions and their geographical origin, with the consequent differentiation and segmentation of the market. Secondly, it can be argued tha, the rise of craft breweries in Italy shows a territorial concentration thus indicating that also local factors may represent major drivers. Due to agglomeration economies of different nature, areas with a specialization in food and, above all, beverages production may represent preferential territories for new entries. The same can be argued for areas showing a strong tendency towards agricultural diversification.At the same time, this geographical concentration may generate congestion effects (or localized diseconomies) whenever localized entries become too many given the size of the market. The present study proposes an empirical investigation on the role of local drivers in determining the entry into this sector of new craft breweries as well as the selection process of the existing breweries. This investigation takes the form of an entry-exit analysis and is carried out through a sequence of survival models.

Keywords: Craft breweries, Beer industry, Entry and exit, Survival analysis.

JEL Classification codes: L11, L66, Q13.

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1. INTRODUCTION

In the last decades, the beer industry has been shacked by a phenomenon called the "craft beer revolution", whose origin dates back in the 1970s in the United States; this new sector has met the needs of an increasing share of consumers that, after years of standardization and mass-production, started to prefer an old style, tastier and more full-bodied beer, realized by small producers. From the mid 1990s this market segmentation slowly started to spread in the italian market as well, particularly surprising situation for a country known world-wide for its wine production, certainly not for beer. And, from the mid 2000s on, both the number of microbreweries and the popularity of craft beers boomed across the country.

This paper will try to give an answer to this question: what drivers induced this revolution in the italian beer market? Is the phenomenon basically generated and lead by market drivers (satisfaction of new consumers' needs, in particular) or by local factors, which may contribute to make specific areas preferential territories for new entries (for example, agglomeration economies of different nature)?

Section 2 provides a short introduction on the evolution of beer production and consumption worldwide. Section 3 discusses the main characteristics of craft brewing, as of as of its emergence, within the Italian market over the last years. In particular, the section reviews the main possible drivers of entry into the sectors and possible forces inducing selection and, eventually, market exit. These drivers are distinguished between market forces and local/geographical factors and their role differs in affecting the entry and exit dynamics. Section 4 presents the empirical approach here adopted to perform such entry-exit investigation. It is a sequence of survival models whose of estimation results are then reported and discussed in section 5. Section 6 finally draws some general concluding remarks.

2. THE EVOLUTION OF BEER PRODUCTION AND CONSUMPTION WORLDWIDE: A SHORT OVERVIEW

The origin of beer production dates back to millenniums. However, only in the last two centuries this activity took the form of one of the major branches of the food industry. In particular, it was the industrial revolution to boost the development of the beer sector: economies of scale together with scientific discoveries allowed a rapid diffusion of this drink, which started to be carried over long distances without suffering organoleptic and qualitative deterioration. Thanks to technological innovations, it became possible to produce a bigger and bigger amount of beer and to minimize both flaws and unpleasant odours; furthermore, the discovery of the *Saccharomyces carlsbergensis* yeast, in Carlsberg's laboratories (in 1883), made possible to reproduce "lager" beers for mass production (Table 1). Not only the standardization of a new and particular type of beer became possible, but for the first time ever the product of the fermentation

was a perfectly clear and transparent beer, huge revolution for those times in which beers were cloudy, letting 'lagers' becoming soon extremely popular (Hornsey, 2003).

This event represented the start of the bottom-fermentation revolution, which "occurs at low temperatures (33-60° Fahrenheit[1]) and requires 6-10 days. Because the process of making this style of beer involved longer storage time, it came to be called 'lager', which means "storehouse" in German" (Tremblay et al., 2005: 5). This process constantly necessitates cooled fermentation tanks, particularly difficult and expensive to be implemented by small firms, but ideal for big firms and the achievement of economies of scale. Therefore, technological innovations like mechanization, faster transportation networks, refrigeration, pasteurization, improvement of storage conditions and, especially, the transition from top to bottom fermentation, made it possible to achieve consistency in the brewing process, stability of the beer once bottled (Gourvish, 1998) and to transport it everywhere: from 1880s on, the United States and continental Europe "embarked on the road to industrialization (Teich, 1990)" (Poelmans et al., 2011: 16).

During the 20th century the production of beer increased enormously (Stack, 2003) and, by the end of 2013, the world beer production was about to cross the threshold of 2 millions of hectolitres. Furthermore, despite the variety of beer styles and traditions (Table 1), the German lager beer has become the most widely produced and consumed around the world.

Table 1: Major beer traditions (referring to particular geographic areas)

German and Czech styles	These two countries are recognized worldwide for producing bottom-fermented beers. Styles like *Lager* or *Pils*, usually less expensive because of the economies of scale operating in their production, have cornered the market and have been representing the vast majority of beer consumption worldwide for decades. Other important styles are *Bock*, *Weizen* and Kölsch, etc.;
British and anglophone styles	These countries, in particular the United Kingdom, have preserved a passion for traditional top-fermenting styles, called *Ales* (and its different versions, such as *Mild*, *Bitter*, *Pale Ale* and *Scotch Ale*). In the last years the *Campaign for Real Ale*, based in England, has been successful in promoting the production and consumption of the traditional British ale (named *Real Ale*), "brewed using traditional ingredients and left to mature in the cask (container) from which it is served in the pub through a process called secondary fermentation" (Camra, 2014);
Belgium style	It's a country with an enormous variety of beer styles, mostly brewed with top-fermenting yeast, such as *Trappist* beers, *Abbey* beers, *Blanche* (white beers), *Saison*, etc.; a limited amount of beer production is also based in the Pajottenland region, where spontaneous-fermenting yeasts are used (e.g. *Lambic*, etc.).

Source: Elaboration on Cleri (2013).

Even though, during the 20th century, the Temperance Movement (that brought to the prohibition of producing, selling and buying alcohol beverages from 1919 to 1933), the *dust bowl* (a severe drought in the 1930s) and grain rationing (due to the World Wars) affected seriously the production of beer in the United States, from 1950 on the volume of its beer production rocketed and it became, by far, the uncontested world leader in the beer industry for many decades. But, Prohibition, *dust bowl* and rationing conditioned drastically the composition of beer: in fact, barley became more and more expensive and, as a consequence, beer recipes were realized with increasing shares of corn and rice, that brought to cheaper drinks and with less alcoholic content (Triossi, 2013). Furthermore, industrialization and mass production drastically reduced the number of breweries, passing from several thousand of firms at the end of the 20th century to 43 in 1983 (Swaminathan, 1998).

[1] From 0 to 15° Celsius.

But the United States is no longer the world leader in the beer industry: in 2002 China overtook the U.S. yearly production and, in 2008, the aggregate European Union-27 production as well (see Table 2). The largest world brewer, instead, is the belgian Anheuser-Busch InBev that, in 2013, produced the 20.2% of the overall world beer production (The Bart Report, 2014).

Table 2: Evolution of the global beer market (2001, 2007, 2013)

Country	Per-Capita beer consumption (litres) (2012)	2001		2007		2013	
		Production (1.000 hl.)	Ranking	Production (1.000 hl.)	Ranking	Production (1.000 hl.)	Ranking
China	32	227.000	2	393.137	1	506.500	**1**
United States	77	233.000	1	232.839	2	224.093	**2**
Brazil	68	84.000	4	96.000	5	135.500	**3**
Germany	106	108.500	3	103.970	4	94.365	**4**
Russia	74	63.000	6	115.000	3	88.600	**5**
Mexico	60	62.307	7	81.000	6	82.500	**6**
Japan	43	71.300	5	62.804	7	57.200	**7**
United Kingdom	68	56.802	8	51.341	8	42.420	**8**
Poland	98	24.140	11	35.500	9	39.560	**9**
Spain	68	27.710	9	34.350	10	32.700	**10**
Czech Republic	149	17.881	17	19.897	17	18.605	**22**
France	30	18.866	16	15.096	24	18.500	**24**
Belgium	74	15.039	19	18.565	20	18.069	**25**
Italy	**29**	**12.782**	**22**	**13.520**	**27**	**12.688**	**30**

Source: http://www.barthhaasgroup.com/en/.

Switching to the world beer consumption, it is higher – by far – than any other alcoholic drink, both in terms of value and volume (Colen et al., 2011). While in 1960 the volume of beer consumption was twice the consumption of wine, in 2005 it had grown up to six times (153 billion litres for beer, 24 billion litres for wine and 18.5 billion litres for spirits); in terms of value, instead, although beer is sold, on average, at cheaper prices than wine or spirits, in 1990 the values of beer and spirits consumption were almost the same; but, in 2005, the value of beer consumed worldwide had become about 130 billion US$, the spirits about 90 billion US$ and wine about 65 billion US$. In 2012, global consumption of beer surpassed 187 billion litres (1% more than 2012), its 27th consecutive annual increase (www.kirinholdings.co.jp/english/news/2014/0108_01.html).

Empirical evidences suggest that the price elasticity of the demand of beer is negative[2] and that the cross elasticity of its demand compared to wine, spirits and soft drinks, is close to zero (Tremblay et al., 2005). Colen et al. (2011), in their econometric study on the global changes in the consumption of beer, agreed to define beer as a normal good[3], although they show a non-linear relationship between income and consumption of beer (upside-down U shape). In fact, in countries with relatively low average income but experiencing economic growth, the consumption of beer is constantly increasing (Russia, Brazil, China and India – Deconinck et al., 2011; JunFei et al., 2011; Arora et al., 2011) but, in countries whose level of

[2] In several researches carried out in the United States, United Kingdom and Ireland, its average value is –0.5 (Fogarty, 2008).

[3] Most of the researches estimate a low income elasticity of demand, between 0.35 and 0.90 (Fogarty, 2008).

individual income is already over 29,000 international dollars, per-capita beer consumption is decreasing. Furthermore, the econometric research showed, for countries with a strong beer tradition (such as Belgium, Germany, Czech Republic and United Kingdom), a significant negative correlation between the level of openness to international trade and the share of beer consumption (calculated over the total of alcoholic consumption), whereas the opposite is happening for countries traditionally wine (Italy, Spain, France) or spirits (Russia) consumers.

These results are consistent with Aizenman et al. (2008), Bentzen et al. (2010) and Leifman (2001), according to which economic integration and globalization have caused a convergence in alcoholic consumption patterns (Table 3).

Table 3: Share of beer, wine and other spirits in total alcoholic consumption (in litres of pure alcohol)[1]

Country	1961			2000			2010		
	Beer	Wine	Oth. spirits	Beer	Wine	Oth. spirits	Beer	Wine	Oth. spirits
Polonia	27,66	12,24	60,10	49,29	21,19	29,52	**55,14**	9,35	35,51
Germany	57,14	17,32	25,54	55,46	24,63	19,91	**53,61**	27,83	18,55
Czech Republic	69,01	19,05	11,94	56,58	13,84	29,58	**53,51**	20,48	26,00
United States	47,05	11,15	41,79	56,27	14,25	29,48	**50,00**	17,29	32,71
Spain	11,04	65,39	23,58	37,68	37,05	25,27	**49,74**	20,12	28,19
Belgium	71,28	15,06	13,67	57,26	35,62	7,03	**49,10**	36,33	14,38
Russia	14,61	17,14	68,26	21,44	6,92	71,64	**37,59**	11,42	50,99
United Kingdom	80,95	4,32	14,73	49,26	25,97	18,37	**36,94**	33,82	21,83
Italy	**2,08**	**89,60**	**8,26**	**17,71**	**76,24**	**6,05**	**22,95**	**65,57**	**11,48**
France	11,25	74,41	14,33	15,26	63,02	19,88	**18,80**	56,41	23,08
Polonia	27,66	12,24	60,10	49,29	21,19	29,52	**55,14**	9,35	35,51

Source: Elaboration on Colen et al. (2011), World Health Organization (http://apps.who.int/gho/data/node.main.A1022?lang=en&showonly=GISAH).

[1] The entries in bold indicate which beverage has the highest share in total alcohol consumption.

3. THE EMERGENCE OF CRAFT BREWING IN ITALY: EVIDENCE AND POSSIBLE EXPLANATIONS

As a consequence of the rampant spread of lager beer, the drastic reduction in the number of breweries (due to industrialization and mass production) and the increasing adjunct of cheaper grains such corn and rice, the beer market was (and still is) cornered from light and extremely standardized beers. This is the main reason that brought to the craft revolution, which started in the 1970s in the United States and whose aim was the (re)discovery of traditional beer styles.

To set a common definition of craft beer is not easy and it is debated in every country. In the United States, for example, small brewers have always tried to differentiate their products from the ones of the giant brewers: according to the Brewers Association, craft brewer is defined as small (annual production of 7 million hl. of beer or less), independent (less than 25 percent of the craft brewery can be owned or controlled by an alcoholic beverage industry member that is not itself a craft brewer) and traditional (a brewer that has the majority of its total beverage alcohol volume in beers whose flavor derives from traditional or innovative brewing ingredients and their fermentation).

In general, craft brewers reinterpret traditional beer styles (generally avoiding the use of cheaper cereals like the ones – mainly rice and corn – used in the industry), characterizing them in a unique way as

well. During the last years, in fact, their ability has been to vary the quantity and variety of different hops, to distinguish their recipes using other raw or malted cereals (wheat, spelt, oat, rye, etc.) or modifying the recipes with the addition of fruit, spices, etc.

As a result, they usually obtain a darker, stronger and more flavorful beer (*all-malt*) than the beers of mass producers which, instead, use variable shares of corn and rice (from 25% to 65%), less expensive than barley, and their beers have less alcohol by volume, a golden colour and less flavour (Goldammer, 1999; Tremblay et al., 2005). This is one of the reasons why price elasticity of demand for craft beers is much lower than the one of industrial beers (Kleban et al., 2011).

Up to twenty years ago, Italy counted only very few major industrial beer producers, mainly located in the northern east Regions which were, until the foundation of the Kingdom of Italy in 1861, under the Kingdom of Lombardy–Venetia, crown land of the Austrian Empire.

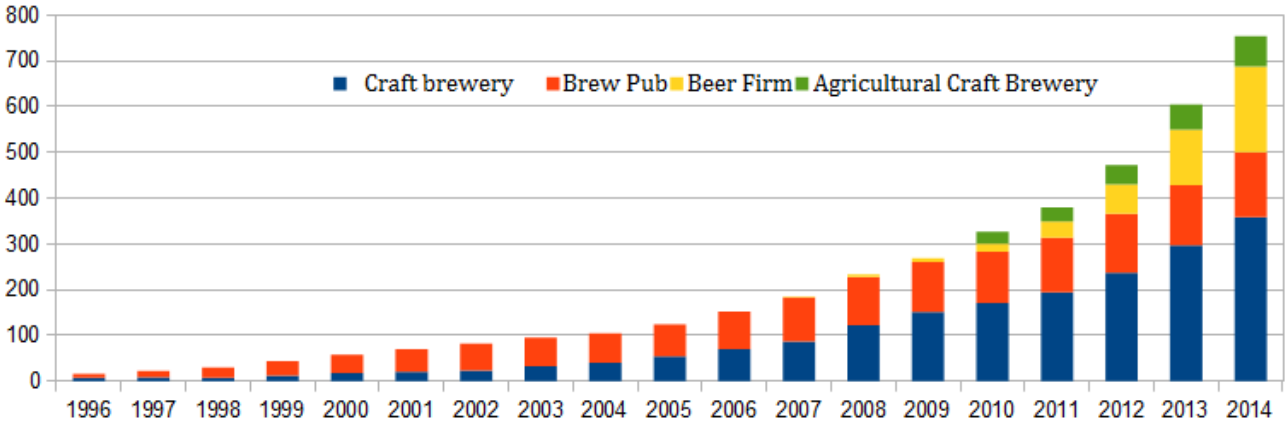
But it's only from mid 1990s that the craft beer movement started to grow, mostly in the northern areas. In 1995, the Legislative Decree n. 504 brought some simplifications and innovations into the complex bureaucratic procedures which the production of beer was subjected to, and 1996 is considered the year in which the italian craft beer sector was born. The first microbreweries had a very small productive capacity and their beers, great innovation for those years, were neither pasteurized nor filtered. Some of the pioneers, such as “Birrificio Italiano” and “Baladin”, are now world-renowned. According to Agostino Arioli, founder of the “Birrificio Italiano” (in 1996), the italian craft beer sector has been the first one, in Europe, to follow what it was happening in the United States, especially for the creativeness used into the reinvention of traditional recipes (Manzi, 2012).

Italy has never been known as a beer-producing (or consuming) country: nevertheless, thanks to the small productive capacity of the microbreweries (that allowed flexibility and opportunity to experiment) and the italian artisan ability, Italy has become more and more respected from beer lovers, both in Italy and abroad (Rosso, 2014) and now it can be recognised worldwide for new beer styles as well (Manzi, 2012; see Table 4).

According to Assobirra, in 2013 the craft beer sector produced of 320.000 hl., equal to 2,4% of the national total beer supply in Italy, and the number of craft breweries is increasing year after year (over 750 by the end of 2014; Figure 1).

Based on the Brewers Association's taxonomy, the italian microbreweries – whose per capita production, for the great majority, doesn't exceed 10,000 hectolitres per year – can be categorised into four different typologies: 1) *craft brewery*, whose sales are mostly realized off-site; 2) *brew pub*, whose turnover chiefly comes from its bar/pub; 3) *beer firm*, which hires another brewery to brew its beer, or part of its beer production; 4) agricultural craft brewery, a newness in the italian beer landscape, arised from the Ministerial Decree n. 212/2010 which sum up a new list of goods (beer, bread, grape spirit, flour, and baker's fresh products) to be considered related to agricultural production (with reference to beer production, at least 51% of the raw materials used for producing it have to be produced from the agricultural firm itself – Turco, 2010). It's important to highlight that this law has opened new and potentially interesting spaces for multifunctionality in agriculture (Van der Ploeg, 2009).

Figure 1: Italian microbreweries (by category; 1996–2014)



Source: Elaboration on www.microbirrifici.org.

Table 4: Italian beer styles

National styles	Ingredients/Distinguishing raw materials
Beers with different cereals	Spelt, rye, kamut, wheat, etc.;
Chestnut beers	Different types of chestnuts, cooked or dehydrated, more or less smoked;
Beers with grape or wine	Yeast of the grape peel, use of must or wort, maturation in oak barrels were wine was aged, etc.
Beers linked to the *terroir*	Local products, mostly fruit

Source: Elaboration on Giaccone et al. (2012).

3.1. The drivers of entry

Most literature on market dynamics, therefore on firms' entry, concentrates on the role of market variables and signals inducing profit maximizing , or rent seeking, companies to enter a new market or sector (Geroski, 1991). The market is new for the given firm, but the firm itself is already incumbent in other markets. Moreover, the market is not new by itself but it is simply experiencing changes, for instance shifts in the technological paradigm or changes in consumers' preferences or behavior, that are increasing the profitability of this market thus favoring the entry of new firms.

Something similar can be argued also in the case of craft breweries in Italy. In fact, as mentioned, this market is relatively new at least for the country and most new craft breweries are new activities, that is, without any former presence of experience in other markets. What drives entry, therefore, is not some rationale economic and financial calculation of the profitability of the new market given observable conditions and a detailed analysis of the competitors. It is rather the feeling, or the intuition, that deep cultural changes in the consumers' attitude towards food now also involves alcoholic drinking and, consequently, the Italian beer market is now experiencing a deep and unprecedented revolution. Such intuition, together with enthusiasm, passion and imitation, more than clearly identifiable market forces, seem to be the key drivers of entry into the craft brewing sector in Italy. One major consequence of this is that while, market signals expressed by changes of consumers' preferences may maintain general validity regardless the specific spatial context where the potential new craft breweries are located, the other drivers are very often strongly localized and significantly affected by geographical factors. Let's consider these two orders of basic drivers more in detail.

As discussed, the rise of craft breweries can be simply interpreted as the consequence of a change in the beer market in Italy, with a combination of a strongly growing demand and an increasing attention of

consumers to the quality of productions and their geographical origin, which has caused differentiation and segmentation of demand in this respect. According to such interpretation, the phenomenon is basically generated and lead by market drivers with a limited, if any, role of localized factors. Secondly, however, it can be argued that, though rapid and intense, the rise of craft breweries in Italy might show territorial concentrations thus indicating that local factors could represent major drivers as well. Areas with a certain level of social capital, or specialization in food and, above all, alcoholic beverages production, may represent preferential territories for new entries.

A significant role in the diffusion of craft breweries in Italy is the increasing attention addressed to a pre-industrial way of production, a cultural climate that can be seen as an exogenous change in the sphere of consumption (Garavaglia, 2010). In post-industrial societies (Bell, 1973), thanks to the improvement of life conditions, less and less people need to struggle for existence, while it becomes more and more meaningful to define one's own choices and one's own place in the society (Sacco et al., 2004). Persons cultivate taste (Bourdieu, 1984) and differentiate themselves on this basis, and the ones with more economic and cultural capital are more likely to determine/condition the taste of the society. And what makes the task of the researcher more difficult is the omnivorous nature of modern consumers, where "in place of the traditional high/low divide as a status marker, high status is signaled by selectively drawing on multiple cultural forms from across the cultural hierarchy" (Johnston et al., 2010: 35).

The post-industrial consumers brings along two consequences: on the one hand, it's more and more important their growing influence to orient businesses strategies according to their needs (Wilkinson, 2001); on the other hand, there's a growing involvement of the consumers in the production of the desired goods, such as, e.g., the so called craft consumer, "who typically takes any number of mass-produced products and employs these as the 'raw materials' for the creation of a new 'product', one that is typically intended for self-consumption" (Campbell, 2005: 27-28). The success of craft breweries may also be partially originated from what Harvey (2004) calls an effect of postmodernity, namely the necessity of more and more people to reaffirm an identity (individual or collective, often connected to a physical location) as defense of one's own traditions and local peculiarities (jeopardized from global economy and homogenisation): either the sector is able to answer to these needs, or consumers become producers themselves.

In the first case, the role of the producers is fundamental to recall a belonging to a certain terroir, (Paxson, 2013; Trubek, 2008), creating a sense of identity telling a story about the food produced, often based on a romantic idea of local and tradition: a form of "neolocalism", through which reattaching people to their local community and economy (Shortridge, 1996; Flack, 1997; Shortridge et al., 1998). Researches in the U.S. show that consumers of craft beers look for all-malt drinks, made by small craftsmen who brew traditionally; on the other hand, they tend to avoid beers produced by big industrial brewers or contract brewers (the latter is either a firm that hires a brewery to produce its beer or a brewery that hires another brewery to produce additional beer – Maytag, 1996; Wall Street Journal, 1996; Carroll et al., 2000). For some people, there's also a sort of elitist behavior, preferring local beers instead of the ones advertised on the media or sold at a long distance (Schnell et al., 2003; Pratt, 2007).

What consumers see and believe can influence their decisions about which goods to purchase or not: some researches (Allison et al., 1964; Lee et al., 2006; Galizzi et al., 2009; Garavaglia, 2010), in fact, showed that consumers, e.g., are not able to identify their favorite drinks when drinking from nude bottles. In the second case, it's the direct participation in the production process of the consumers to make this phenomenon original. Until few decades ago, people's identities were mostly shaped and defined through the work that person was doing, but in a society in which most of the people don't produce goods but knowledge, information and services, persons shape themselves not only by purchasing goods (Halter, 2000), but also

producing them during their leisure (productive leisure). It's a more substantial approach than the act of consuming, since more and more during their leisure, than on their workplace, people define their identity and their place in the society. Production has become less important for the society, but more and more important at personal level (De Solier, 2013). Furthermore, productive leisure can be seen as a fundamental trial period in which someone, with no pressure and for fun, can test handcrafted skills that, in the future, might turn into a business venture.

Moving to the role of local influence and geographical factors, it is worth noticing that in economic and sociological literature it is well established the idea that the whole Italian industrialization process has been mostly based on the success of localized systems of small and medium enterprises in semi-peripheral areas rather than on fordist factories (Bagnasco, 1988; Becattini, 1979; Trigilia, 2005). The "local", intended as both institutional, social and cultural context, can positively contribute to create value and economic development (Carboni, 2009), and this concept is deeply linked to a central theoretical framework on local development: the embeddedness, namely the idea that production, distribution and consumption of goods are constrained by non-economic institutions, like culture, social conventions and values of a certain place. As a consequence, both the economy and economic actions are embedded in social relations (Granovetter, 1973; 1985), relations which condition economic behaviors and impose restrictions upon the extension of the market. (Magatti, 2002).

It's a process that emerges from specific historical, economic and cultural conditions of a certain localized social structure, and for this reason it's been called social construction of the market (Bagnasco, 1988). It's also important to highlight that the concept of embeddedness can be interpreted in different ways. In Polanyi (1968), e.g., the approach is different: the economy is embedded in both non-economic (political and cultural) and economic institutions, but social relations are ancillary to the economic ones (Laville et al., 1999). In this view, the economic sphere conserves a relative autonomy which, in turn, influence the evolution of social relations. According to Polanyi, the rise of the craft beer sector might derive from exogenous market drivers with a limited, if any, role of localized factors. Passion for beer doesn't arise from local traditions, that in Italy doesn't exist, but from consumer's aesthetic and taste.

3.2. Market dynamics and the sector's life cycle: the drivers of exit

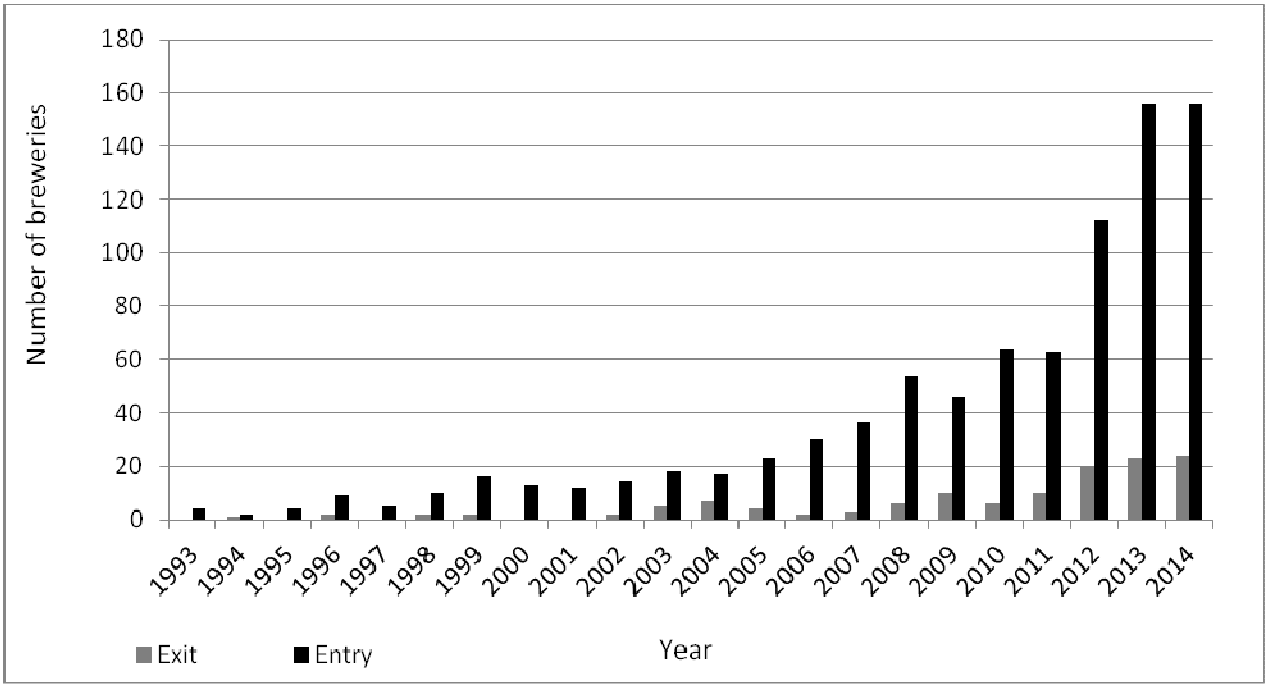
The rapid rise and the evolution of the craft brewing sector in Italy, however, can not be only represented by the increasing entries in the sector. As for any other sector, its lifecycle is a combination of new entries and of a selection process on the incumbent producers. Though we may conclude, looking at data (Figure 1), that sector is still in is explosive stage, more recent years also signal an increasing rate of turnover, that is, while entries still increase, we also observed an increasing number of exits (Figure 2). The literature discussing the forces underlying this selection process, that is inducing some incumbent firms to exit the market, often proposes the analogy between market and natural selection (Geroski, 1991). Eventually, this analogy expresses that exit the market is somehow a failure to survive within the market and, as in natural habitats, this occurs for some non-favorable combination of individual (or idiosyncratic) characteristics (of the brewery, in the present case) and of the environment (here the local context and the beer market).

The local environment can be relevant for survival in both directions. In particular, the presence of other craft breweries or, more generally, of other activities related to alcoholic drink production may prevent or facilitate exit, *ceteris paribus*. In the former case, the presence of localized agglomeration economies may improve the competitiveness (thus, the fitness) of an individual production unit. In the latter case, in fact, these external economies are negative and reduce the fitness of individual breweries as expression of

congestion effects. This localized economies are related to the positive or negative externalities of entries that may, at the same time, improve quantity and quality of the workforce, of agricultural raw material, technology and the local market size or crowd out them ("too much entry"; Geroski, 1991) .

The impact of these factors on market exit, however, depends on the specific characteristics of the brewery that define its fitness in the given local and market environment. In this respect, of major relevance in this respect is the production mix, that is the number and quality of difference beers produced by the brewery, as well its cost competiveness as indicated by plant size, technology, quality of production factors (particularly labor force), quality of the commercial network and entrepreneurial skills in turn indicated by some proxies like the age, the experience, the education level of the entrepreneur.

Figure 2: Entries and exits in the Italian craft brewing (1996–2014)



4. THE EMPIRICAL MODELS

In social sciences, duration models (also known as event history analysis) supply information on the causes behind a transition between two states (e.g., the transition for a person between a single status to a married one, or for a firm which is initially out of the market but then it enters in it, etc.) of the units observed within a specific time span (Knoke, 2011).

The transition is called event, the hazard that this event occurs is the dependent variable of the model and the covariates explain their positive (or negative) effect to the event occurrence.

In this paper, for each unit of the population under investigation, both the event "entry in the market" and the event "exit from the market" are separately analyzed, in order to understand if local factors positively or negatively contribute to the evolution of the italian craft beer sector.

What is important to know, in these models, it is the duration (how long each observation is at-risk of an event during the observation period for?) and the destination (does the event happen during the observation period?).

Since the time span is arbitrarily determined, censoring problems may arise, because it's not possible to define (or it's only partially possible) the behaviour of some observations, with consequent loss of

information. A way to limit this problem, in parametric and semi-parametric models, is to opt for the likelihood estimation method.

A useful estimator to understand the life cycle of the population under observation is the Kaplan-Meier (Kaplan et al., 1958), a non parametric analysis in which neither time-distribution assumptions nor influence of the covariates are considered: the result of this procedure is the estimation of a "survivor function"4 (Bontemps et al., 2013), that is the probability of a microbrewery to remain in its initial state until time t (in other words, the probability that the event does not occur); the inverse of this function is the "hazard rate": it is the "propensity of an event to occur" (Knoke, 2011: 7) during the time span [t, t+1], on condition that the event had not already occurred earlier than t, that is to say that the microbrewery is "survived" up to t. This means that the "hazard rate" contains the information, with regard to the microbreweries survived up to time t, about the possibility of the event to occur from t on (Blossfeld et al., 2014).

In semi-parametric estimations, instead, only the effect of the covariates is introduced in the model, but not the assumption on the time-distribution. The most popular version among the semi-parametric regression models (used in this research) is the Cox proportional hazards model (Cox, 1972), which leaves the hazard rate function unspecified (StataCorp., 2013):

(1) $h(t_j) = h_0(t_j)\lambda, \quad \lambda = \exp(\mathbf{x}_j\boldsymbol{\beta})$

where, for the generic j-th observation, $h(t_j)$ is the hazard function, $h_0(t_j)$ is an unspecified function (also called *baseline hazard*) because no assumption on the distributional form of the "hazard rate" is made, λ is the scaling factor that expresses the proportionality of hazard as a linear function of the vector of covariates $\mathbf{x}_j$ and of their respective unknown parameters $\boldsymbol{\beta}$.

The selection of this model is advisable when the main aim is to know the extent and the effect of the covariates only, without doing exogenous assumptions. Because of this, the regression coefficients are obtained through partial likelihood estimation: in this way, standard errors are higher than the ones of the parametric models, but the results are more robust.

The last useful technique to estimate event history data is the one of the parametric regression models. In fact, if socio-economic theory – or previous empirical evidences – suggests a particular distribution of the "hazard function", the parametric models are preferred (Knoke, 2011), and they can be either Proportional Hazard (PH) or Accelerated Failure-Time (AFT) models.

For PH models, the only difference with the Cox proportional hazards model is that, in the parametric model, the function $h_0(t_j)$assumes a specific distribution (either exponential, Weibull or Gompertz), whereas in the AFT ones, *t* is expressed in logarithmic form as linear function of the covariates (StataCorp., 2013):

(2) $\log(t_j) = \mathbf{x}_j\boldsymbol{\beta} + z_j$

where the distributional assumption on the error term z_j determines the regression model and, unlike PH models, AFT models are robust to the omission of covariates (Keiding et al., 1997). If z has a normal distribution, a log-normal regression model is obtained; if z has a logistic distribution, a log-logistic regression model is obtained; exponential and Weibull distribution, instead, can be used both in the proportional and in the acceleration form.

4 Non increasing and approaching to zero during the time interval.

The effect of the AFT models is to change the time scale for a factor equal to $\lambda = \exp(-\mathbf{x}_j \boldsymbol{\beta})$: if $\lambda > 1$, the expected time of the potential occurrence of the event decreases (and the hazard rate increases), whereas if $\lambda < 1$, the expected time increases (but the hazard rate decreases).

The models analyzed in this research are non-nested, therefore a common approach to select one among the parametric models is to choose the one with the smallest Akaike Information Criterion (AIC) (StataCorp., 2013).

5. DATA AND EMPIRICAL ESTIMATION

The time span under observation goes from 1993 to 2014, it is measured in yearly intervals and each microbrewery is localized referring to its plant, and not in its legal head office (even if the two very often correspond).

The source used to create the data-set of the italian microbreweries is the website www.microbirrifici.org. The operating microbreweries, by the end of 2014, are 754, while those that closed their business during the time span considered are 112, for a total amount of 866 observations.

The independent variables (or covariates) used in the econometric analysis are time-constant (the information cannot change over time) and their sources are the following:

- the website www.microbirrifici.org;
- the ISTAT data warehouse.

These independent variables, which represent the potential drivers of the entry/exit dynamics subject to test, are categorized into three different orders (Table 5): territorial/local (number 1, 2, 4 and 5), geographical (number 6 and 7) and market (number 3, 8 and 9).

Table 5: Independent variables used in the econometric analysis

Variables	Territorial disaggregation	Year	Source
1) % employees of the beverage industry on employees of the manufacturing industry	Province	2011	Industry and services census (Istat)
2) % employees of the food industry on employees of the manufacturing industry	Province	2011	Industry and services census (Istat)
3) Unemployment rate	Province	2011	Population and housing census (Istat)
4) % familiar and non familiar labour (permanent employees only) in agriculture on population	Municipality	2010	Agricultural census (Istat)
5) Number of microbreweries already active over the birth year of the new microbrewery	Province		www.microbirrifici.org
6) Region *dummies*	Region		www.microbirrifici.org
7) Altimetric zone *dummies* (1 = Interior mountain; 2 = Litoral mountain; 3 = Interior hill; 4 = Litoral hill; 5 = Plain)			Istat
8) Type of microbrewery *dummies* (craft brewery, brew pub, beer firm, agricultural craft brewery)			www.microbirrifici.org
9) Birth year, year of exit from the market (if exited), number of different beers produced, top/bottom fermenting process adopted			www.microbirrifici.org

In this work on the craft breweries, four different censoring cases emerged: (i) with reference to the entries in the market, it is not possible to observe the potential craft breweries which considered to enter, but

only those ones that actually did it in the observed time span (it's a potentially relevant censoring problem, whose size is obviously impossible to interpret); (ii) craft breweries which entered after 1993 but are still active at the end of 2014 (right-censoring, because the event exit will happen in a later time, after 2014); (iii) the craft breweries that will enter in the market from January 2015 on cannot be observed as well (right-censoring); (iv) the craft breweries entered in the market before 1993 and exited before 2014 (left-censoring).

With respect to this last case, only two microbreweries started brewing before 1993: however, this doesn't influence the likelihood estimation and, as shown by Rabe-Hesketh et al. (2008), "the correct contribution to the likelihood of a left-truncated firm under delayed entry is obtained by discarding the periods preceding 199[3]" (Bontemps et al., 2013: 423).

5.1. Analysis of the market entries

To check the potential influence that market and territorial factors could have had on the decision of the microbreweries to enter in the market, two variables have been created: gestation, which measures – from 1993 (used as reference year) – the numbers of years needed by each microbrewery to enter in the market (so, if a microbrewery was born in 1993, its variable gestation will count 1, whereas if it was born in 2014, its variable gestation will count 22); entry, instead, it is a dummy whose value always equals 1 (in fact, all the microbreweries have to be in the market in order to be able to observe them, that is why the value of this variable cannot equal 0).

The event entry can happen only once. There are only two microbreweries which entered in the market, exited after few years and then entered again: in this particular case, for each microbrewery the first and the second entry were treated as two perfectly distinct observations (each observation's entrance in the market is registered in different years and different values are ascribed to the variable gestation).

Instead, with respect to the two microbreweries whose entrance in the market happened in 1983 and 1988, according to Bontemps et al. (2013) these two observations were included in the database with the 1993 as birth year.

In the following paragraphs, the results of the estimates will be shown in this order: firstly the non parametric model, then the semi-parametric and, last, the parametric ones.

5.1.1. Non parametric results

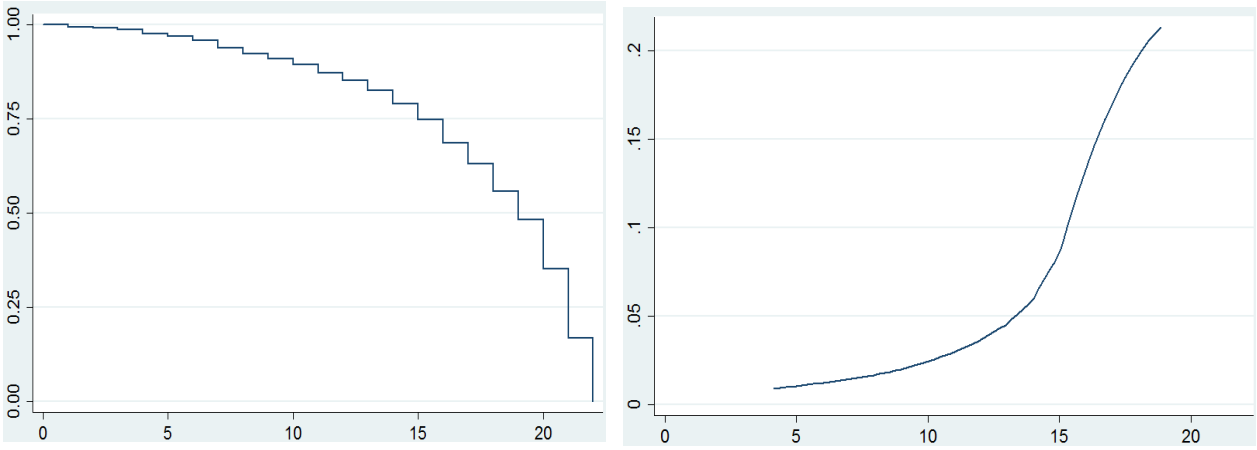
In Figure 3 two graphs are plotted: the Kaplan-Meier survivor function (a) and the Hazard rate function (b).

The abscissa measures the so called gestation, or rather the years passed (counting from 1993) for the entrance of the microbreweries in the market. In the graph a, connected with "x = 1" – value which ideally represents the year 1993 – the microbreweries have to enter in the market yet (expressed by the value 1.00 of the ordinate) but, at the end of the interval 1–2 (correspondent to the interval 1993–1994), few microbreweries made appearance in the market. In fact, in "x = 2", which is the beginning of the interval 2–3 (time span 1994–1995), the share of the variable gestation decreases and lower than 1.00 (or 100%), whose percentage difference is equal to the share of those entered in the market in 1993, and so on.

In "x = 15" (beginning of the interval 2007–2008), only 25% of the microbreweries population already entered in the market (that is to say that 75% of all the italian microbreweries made their appearance from 2007 on). In "x = 22", at last, the ordinate sets to zero because all the microbreweries started their beer business within the end of 2014.

The explanation gave for the graph b is the contrary of what said for the graph a. The "hazard" connected to the entrance of new microbreweries in the market (measured in the ordinate) increases as the value of the variable gestation (on the abscissa) increases. At the beginning only few microbreweries produce craft beer (therefore the "hazard" of opening a microbrewery is relatively low; connected with "x= 16", instead, the hazard rate is approximately 0.1: this means that, ideally, among the population observed and still not operative at the beginning of the period 16 (year 2008), 10% of them have started to produce craft beer within the time span 2008–2009. The hazard rate, as it can be easily observed, rises very quickly approaching "x = 22", given that the function registers the boom of the entries (therefore, the hazard rate is relatively higher) happened in the craft beer sector in the last few years.

Figure 3: Kaplan-Meier survivor function (left) and Hazard rate function (right)



5.1.2. A comparison between semi-parametric and parametric results

The models presented in the Table 6 are the Cox Proportional Hazards and the Gompertz. The latter was chosen, among the parametric models (both PH and AFT), because its Akaike information criterion was the lowest.

For each variable of each models, firstly the "hazard rate" is shown (if it is higher than 1 it means that the correspondent variable increases the hazard rate, whereas if it lower than 1, it decreases the hazard rate), the "sign" ("+" if the effect is positive, or rather the hazard raises, and "–" if the effect is negative, that is the hazard reduces) and the "p-value" (one star means a significance level between 10% and 5%, two stars a significance level between 5% and 1% and three stars a significance level lower than 1%, that is that variable is highly statistically significant.

In both models the same variables are simultaneously statistically significant: this is a positive aspect given that to obtain almost identical estimates, through different models, it reveals the reliability of the estimates themselves.

The Gompertz model was preferred to the other parametric models because its A.I.C. value was the lowest; also, Gompertz distribution is the one which better adapts to an increasing hazard function.

The variables that negatively influence the hazard rate (in other words, those reducing the propensity of the microbreweries still out of the market to enter into it) are the unemployment rate of the Province where the microbrewery is located, the number of microbreweries already in the market (in the same Province) during the year of the launch of the new microbrewery, the share of employees in the food industry on those of the manufacturing industry in the Province of the microbrewery, the dummies top-fermentation

and typologies of microbrewery, few Regions (Lombardy, Veneto, Emilia-Romagna, Tuscany and Marche) and the altimetric zone 1, correspondent to the interior mountain.

Instead, the variables that positively influence the hazard rate are the share of employees in the beverage industry on those of the manufacturing industry in the Province of the microbrewery, the number of different beers produced and the bottom-fermentation dummy.

5.2. Analysis of the selection process: market exits

To assess the propensity of the microbreweries, once entered in the market, to survive, and to understand if territorial and market factors can affect on this strategic decision, it was necessary to create two new variables: the first, called life, is the duration variable and it shows how long each microbrewery (has) remained on the market for; the second, exit, is a dummy which take the value 0 if the microbrewery is still on the market by the end of 2014, or 1 if the production of beer ceased within 2014.

The event exit can happen only once. As in the previous case, in the two cases in which a microbrewery entered, exited from the market and started its production again, each microbrewery generated two different observations (the first, which entered and then exited and, the second, which entered again in the market5.

5.2.1. Non parametric results

Symmetrically to what done for the analysis of the entrance in the market, in Figure 4 the Kaplan-Meier survivor function (a) and the Hazard rate function (b) are shown.

The abscissa measures the duration variable (life), that is the number of years that the observed microbreweries, after having entered, have remained on the market (or rather the age of the microbreweries), with a smallest value of "x = 1" for the ones whose activity lasted one year only, and a maximum of "x = 21" (there is only one microbrewery born in 1994 and still open). The ordinate, instead, measures the percentage of microbreweries remaining on the market as the age grows. The value of the ordinate goes from 0 to 1, or rather from 0% to 100%.

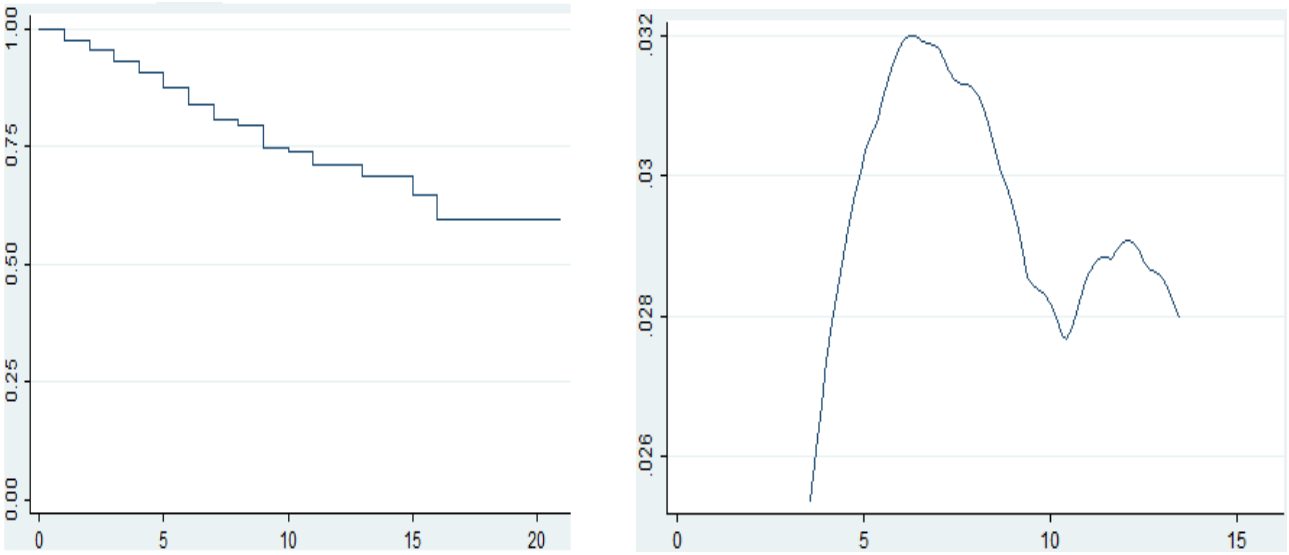
The Kaplan-Meier survivor function (a) shows that in "x = 1" the value of the ordinate is 1 (because all the microbreweries lasted one year), in "x = 2" the value of the ordinate decreases because the share of those microbreweries which survived one year only is deducted; from "x = 16" on, the value of the ordinate is around 0.6 (or 60%). This means that, among the microbreweries entered in the market in the time span 1993–2014 (and whose vast majority, to this day, is composed of very young producers), the probability that they will continue to produce beer for 15 years (at least) is higher than 60%.

The hazard rate function (b), instead, measures the hazard related to the exit of the producers from the market (on the ordinate): it increases initially, then decreases and it slightly increases and decreases again after the tenth year. Since the numbers of older craft beer producers is limited (only 81 of them are between 11 and 21 years old and 26 only are 15 years old or older), the hazard function is not estimated anymore after the fourteenth year.

The hazard rate function is always very small though and it estimates, on the basis of the current market scenario, a prediction about the ability to survive of the microbreweries still open, particularly interesting for the majority of them, which started their beer production in the recent years.

[5] Both the microbreweries that started again their production of beer, they are still on the market by the end of 2014.

Figure 4: Kaplan-Meier survivor function (left) and Hazard rate function (right)



5.2.2. A comparison between semi-parametric and parametric results

The models presented in the Table 7 are the Cox Proportional Hazards and the Log-normal. The latter was chosen, among the parametric models (both PH and AFT), because its Akaike information criterion was the lowest.

With regards to the Cox Proportional Hazards model only, for each variable, the "hazard rate", the "sign" and the "p-value" are shown. For the Log-normal one, instead, of each variable the "coefficient" (and not its hazard rate) and the "p-value" are shown.

As it is possible to see in Table 7, even if with few slight differences, in both models the same variables are simultaneously statistically significant: as in the previous estimation, this is considered a positive aspect.

The Log-normal model was preferred to the other parametric models because its A.I.C. value was the lowest and its distribution is the one which better adapts to a firstly increasing and then decreasing hazard function. Peculiarity of the Log-normal model is that it is not shown the hazard rate, for each variable, but the coefficient6.

The variables that negatively influence the hazard rate (in other words, those reducing the propensity of the microbreweries to exit from the market) are the number of microbreweries already in the market (in the same Province) during the year of the launch of the new microbrewery, the different typologies of beer produced and the dummy of the agricoltural craft brewery.

Instead, the variables that positively influence the hazard rate are the share of employees in the agricultural sector on the population of the municipality and the Regions Piedmont, Lombardy, Emilia-Romagna, Umbria, Abruzzo, Apulia and Sicily.

6 See tab. 6.2, function number six; this function is not written in the exponential form, therefore the influence of the coefficients on the hazard rate (either they increase or decrease it) is not in terms of greater or lower than 1, but greater or lower than 0. For each variable, the greater is the value of the coefficient, the lower is its hazard rate (Cameron e Trivedi, 2005).

6. CONCLUDING REMARKS

The results of the entry/exit analysis show which territorial and market factor affect the microbreweries' strategic decisions. The sole variables resulting highly significant in both the specifications (entry and exit) are the number of the craft beer producers in the same province during the birth year of the new producer and the different types of beer produced by each microbrewery.

With respect to the number of producers, the result may indicate that emerging in a competitive territory, where there are already several beer producers, it is more difficult, therefore the decision to enter in the market should be more elaborate and complex than for the others located in less crowded places. But, on the other hand, those which finally enter and survive in a competitive environment run a lower risk of closing their business in the future. Not only though: the fact that many microbreweries live in a territory may indicate a favourable cultural and socio-economic basis (*milieu*), where a prior unfulfilled demand of local and high quality goods/drinks is now satisfied thanks to the production of craft beer.

Regarding the number of different types of beer produced, higher it is lower is the chance to exit from the market, because it shows a solid business structure (often this is the outcome of a relatively long history of craft beer production): these characteristics are positively correlated to the economic performance, which increases the probability of surviving (Dunne et al., 1988).

Symmetrically, people considering to start producing craft beer should have a good business plan, to know in which distribution channels to sell their beers and clear ideas on the beer styles and the different types of beer to produce: all this could be a good strategy to ease their entrance.

But this might also be expression of an informed and highbrow consumer, who orient the firms' supply and the number of goods they produce.

Other variables, instead, have effect either on the entrance or on the exit solely.

Regarding those variables that reduce the propensity to enter in the market, the unemployment rate might point out that, in provinces where it is particularly high, the local market could be economically "depressed" and not appropriate for selling craft beers, typically more expensive than industrial beers and also than wine of decent/medium quality.

The negative influence of the share of the employees in the food industry (on the employees of the manufacturing industry) might stand for a vocation of that province as an industrial food producer, so less "interested" in the artisan production of food. Regarding the rural degree of a territory, what the estimates show is that rural areas don't have a positive correlation with the spread of the craft beer production: this might come from a relatively higher age of the population living in those areas that, together with the italian historical inclination to produce wine, make the craft beer business (and the often unknown opportunity to diversify the farm production through the cultivation of cereals and the following production of beer) not attractive.

Where, instead, there are economic activities connected to the beverage industry, agglomeration economies could arise, as in the case of wine producers that, interested in the success of the craft beer sector, have decided to start producing beer as well, though choosing the beer firm typology. In this particular situation, a clear advantage consists both in using already well-established distribution channels and in avoiding the investment in the brewing plant.

As for the variables referring to the production techniques, the top-fermenting procedure shows a negative influence on the decision of entering in the market, probably because it is more and more recognised in the collective consciousness as the way of production more directly ascribable to the craft beer philosophy, and the most used from the producers: therefore, the adoption of this technique might put the new potential incoming in a even stronger competition with the others. That's why, to the contrary, the

bottom-fermenting process has a positive effect on the decision to enter, being a relatively less used technique from the microbrewers yet.

Referring to the the different possible typologies of microbrewery, being an agricultural craft brewery reduces the risk to exit from the market (it's the typology which registered the lowest number of exits: from 2010 to 2014, only 1 on 73 ended its beer production): even if this figure has been legislatively created at the end of 2010, the data is surprising though.

As for the Regions, Lombardy, Emilia-Romagna, Tuscany, Piedmont and Umbria7 registered relatively strong growth rates in the recent years, so becoming territories where the competition among producers is more intense. A congestion effect in these areas might induce some producers to exit from the market since not able to withstand a certain level of competition. Moreover, in Abruzzo, Apulia and Sicily, a higher risk of exiting might come from socio-economic factors, but also from a poorer beer culture than the one in northern and centre Regions, which could constitute a less appropriate milieu to start the production of craft beer yet.

For the same reason previously explained, Lombardy, Emilia-Romagna and Tuscany (and Marche as well, which has surprisingly registered substantial growth rate for such a modest densely populated Region, and for an almost absolute lack of beer tradition), the propensity to enter in the market is lower because there is already a high number of craft beer producers there.

Lastly, the negative effect of the altimetric zone 1 on the decision to enter in the market, may mean that those territories are isolated and it is more unlikely to start a business there.

[7] Considering the per capita craft breweries, the entrances are considerably high.

Table 6: The entry model: results of Cox PH and Gompertz models

	COX PH				GOMPERTZ			
Variable	**Hazard**	**Std. Err.**	**Sign**	**p-value**	**Hazard**	**Std. Err.**	**Sign**	**p-value**
Production Mix:								
type_beers_produced	1.044	.004	+	***	1.051	.005	+	***
bottom_fermentation	1.359	.114	+	***	1.366	.113	+	***
top_fermentation	.494	.058	–	***	.449	.052	–	***
craft_brewery	.568	.054	–	***	.511	.048	–	***
beer_firm	.437	.048	–	***	.407	.044	–	***
Local factors:								
unemployment_rate	.914	.025	–	***	.925	.025	–	***
microbreweries_at_birth_year_in	.902	.007	–	***	.905	.007	–	***
%_employees_beverage_industry	1.102	.043	+	**	1.110	.044	+	***
%_employees_food_industry	.981	.007	–	***	.981	.007	–	***
%_employees_agricultural_sector	.993	.005	–		.992	.006	–	
Geographical factors:								
Valle d'Aosta	.469	.260	–		.378	.209	–	*
Piedmont	.760	.177	–		.718	.1668	–	
Lombardy	.651	.148	–	*	.580	.131	–	**
Veneto	.526	.128	–	***	.487	.118	–	***
Trentino/südtirol	.617	.193	–		.581	.182	–	*
Liguria	.734	.231	–		.759	.236	–	
Emilia-Romagna	.361	.090	–	***	.328	.081	–	***
Tuscany	.475	.114	–	***	.443	.106	–	***
Umbria	1.000	.315	+		.907	.284	–	
Marche	.488	.129	–	***	.458	.121	–	***
Abruzzo	.703	.217	–		.629	.193	–	
Molise	1.100	.536	+		.928	.447	–	
Lazio	.894	.255	–		.738	.208	–	
Campania	2.022	.858	+	*	1.542	.654	+	
Basilicata	.945	.537	–		.993	.562	–	
Apulia	1.077	.415	+		.861	.328	–	
Calabria	2.019	1.028	+		1.519	.769	+	
Sicily	.830	.382	–		.691	.314	–	
Sardinia	1.101	.482	+		.943	.411	–	
altimetric_zone_1	.737	.095	–	**	.745	.096	–	**
altimetric_zone_2	.854	.248	–		.791	.228	–	
altimetric_zone_3	.937	.086	–		.944	.087	–	
altimetric_zone_4	.928	.132	–		.919	.129	–	
Constant					.003	.001	–	***
***Gamma parameter					.410	.011		
Likelihood ratio	485.54				498.81			
AIC.					–481.82			

Table 7: The exit model: results of Cox PH and Log-normal models

	COX PH				LOG-NORMAL		
Variable	**Hazard**	**Std. Err.**	**Sign**	**p-value**	**Coefficient**	**Std. Err.**	**p-value**
Production Mix:							
type beers produced	.755	.029	–	***	.182	.024	***
bottom fermentation	1.276	.301	+		-.186	.1567	
top fermentation	1.248	.318	+		-.156	.182	
craft brewery	1.037	.277	+		-.029	.173	
beer_firm	.865	.334	–		-.091	.221	
agricultural craft brewery	.094	.098	–	**	1.490	.569	***
Local factors:							
unemployment_rate	.953	.066	–		.017	.043	
microbreweries at birth year in	.894	.035	–	***	.048	.024	**
% employees beverage industry	.956	.094	–		.057	.071	
% employees food industry	.984	.019	–		.007	.012	
% employees agricultural sector	1.029	.016	+	*	-.017	.009	*
Geographical factors:							
Valle d'Aosta	0.001	0.000	–		3.182	25.594	
Piedmont	7.054	5.669	+	**	-1.126	.474	**
Lombardy	7.541	5.821	+	***	-1.234	.456	***
Veneto	2.360	2.014	+		-.306	.499	
Trentino/südtirol	3.077	2.931	+		-.716	.582	
Liguria	6.023	5.858	+	*	-.936	.602	
Emilia-Romagna	10.120	8.104	+	***	-1.529	.474	***
Tuscany	5.537	4.655	+	**	-1.157	.488	**
Umbria	6.523	6.235	+	**	-1.099	.603	*
Marche	2.942	3.035	+		-.420	.605	
Abruzzo	6.690	6.440	+	**	-.983	.594	*
Molise	7.801	11.394	+		-1.536	.872	*
Lazio	5.596	5.724	+	*	-.921	.587	
Campania	9.254	11.457	+	*	-1.159	.768	
Basilicata	7.833	11.804	+		-1.064	1.016	
Apulia	8.721	10.232	+	*	-1.314	.692	*
Calabria	1.845	2.979	+		-.012	.957	
Sicily	25.754	34.876	+	**	-1.950	.795	**
Sardinia	5.240	6.668	+		-.782	.769	
altimetric_zone_1	.849	.296	–		.123	.234	
altimetric_zone_2	0.001	0.000	–		5.645	18.506	
altimetric zone 3	1.268	.341	+		-.208	.179	
altimetric_zone_4	1.339	.511	+		-.265	.241	
Constant					2.950	.550	***
***Sigma parameter					1.009	.073	
Likelihood ratio	152.00				157.65		
AIC.					623.96		

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