

DO COOPERATIVES COPE BETTER?

Survival analysis of French agricultural cooperatives¹

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Abstract. This paper studies the survival of French agricultural cooperatives. Although usually studied from a neoclassical perspective, they are considered inefficient despite several reports emphasising their resilience. Are cooperatives more resistant than traditional businesses? To answer this question, we use a discrete-time survival model. Our results reveal that ownership structure influences survival: cooperatives tend to merge more than traditional companies, but they are less likely to exit by liquidation. Traditional financial ratios cannot be used to fully explain the capacity of cooperatives for resistance.

Keywords: agricultural cooperatives – survival analysis – exit paths – financial ratios

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Cooperatives carry significant weight in the French economy. They boast more than 26 million members and employ 5.1% of the country's employees. Their combined revenue is worth more than €300 billion and has been steadily rising for 10 years. Despite this, cooperatives have attracted little attention from finance researchers. Their acapitalist approach and financing choices, usually limited to capital contributions by members and bank loans, partly explain this situation. However, there is not only a lack of interest in the field of finance. The literature has long adopted the neoclassical paradigm to highlight the problems of investment and governance facing cooperatives (Cook, 1995 ; Cook et Iliopoulos, 2000), thus accentuating their marginalisation. One study even notes the gradual disappearance of cooperatives from economics handbooks since the Second World War (Kalmi, 2007). But the current economic climate has seen the emergence of the cooperative model as a response to the many failings of companies. Several reports have highlighted this model's resilience (Birchall, 2013 ; Birchall et Ketilson, 2009 ; Roelants et al., 2012), and the United Nations even declared 2012 "International Year of Cooperatives". These structures, which face an increasing need for financing, are developing their legal status to relieve the constraints that previously limited their access to external sources of long-term capital. Indeed, cooperatives have seen an 8% increase in their equity capital since 2010 (PwC, 2015). Although these factors have been used to deduce that cooperatives are resilient, few academic studies specifically focus on their survival rates compared to traditional firms. This article sets out to complement the existing literature by analysing the resistance of cooperatives, using specific survival analysis methodologies.

Since they first emerged, cooperatives have consistently been compared and contrasted with "traditional" companies. They constitute an alternative form of organisation with a specific ownership structure: cooperatives are owned by their members rather than capital contributors (Hansmann, 1996).⁴ But the cooperative model in fact covers a wide range of realities. There are several categories of cooperatives generally defined according to the identity of their members and their activities: user cooperatives; producer cooperatives whose associates are employees; business cooperatives whose associates are entrepreneurs; banking cooperative whose associates are clients or partners; and cooperative companies based on collective interests whose associates can be all stakeholders. Each of these can also cover several types (for example, user cooperatives include school cooperatives, consumer cooperatives, resident cooperatives, etc.). The range of cooperatives as a whole is therefore highly heterogeneous, comprising diverse operational structures. In the interest of homogeneity, this study looks at a particular category: business cooperatives. In France, most of the cooperatives that

⁴ Throughout this article, the term "ownership structure" is used to describe the way in which owner rights are distributed and is therefore considered as the variable that distinguishes between cooperatives and traditional firms.

fall under this category are agricultural cooperatives. They represent a market share of nearly 40% in the agri-food sector and own one out of every three food brands. Almost three out of every four farmers are members of a co-op, generating combined revenue of more than €85 billion.⁵ This significant economic force justifies paying particular attention to agricultural cooperatives. This study compares these structures with traditional businesses operating in the same sector.

In the literature, the notion of resistance carries several different meanings. It is therefore necessary to clarify the position adopted when referring to the resistance of cooperatives. Resistance is often associated with the capacity for resilience, defined by Bégin and Chabaud (2010) as the capacity of a company to (1) absorb shocks, (2) renew itself and (3) learn lessons from its experiences. Although the resilience of cooperatives has often been emphasised, few empirical studies have been devoted to this question. After all, it is hard to appreciate resilience in quantitative terms. How is shock absorption to be defined? How can we measure a company's capacity to learn from past experiences? Most studies of resistance therefore look at company performance, which they compare before and after a crisis situation (Amann et Jaussaud, 2012 ; Boubakri et al., 2010). However, Markman and Venzin (2014) question the relevance of using traditional performance indicators to measure resistance to crises, or resilience, since this is necessarily a long-term characteristic. They therefore suggest using an *ad hoc* measurement that accounts for average cost effectiveness and risk over a 10-year period, tested on a panel of banking institutions. Focusing on the long term in this way seems appropriate given that resisting a crisis is about lasting rather than temporary resistance. In this vein, in a study of family firms, Wilson et al. (2013) point out that the performance of such structures relates to their survival across several generations; it is a reflection of viability and longevity. They deduce from this that performance could simply be summarised as the ability to avoid bankruptcy in the long term. These authors propose a shift towards another vision of resistance to crises, that of survival. Survival analysis emerged in the 1910s and was popularised by the work of Kaplan and Meier (1958) and Cox (1972). The study of survival data is the study of the time lapse before an event occurs. This makes it possible to estimate the instantaneous risk of an event occurring based on time and other possible parameters, and also to compare the survival functions of several different groups. The major advantages of survival analysis in the context of this study are the ease of comparing cooperatives with traditional firms and the objectivity of the variable being measured: the structure is either active or no longer exists. In light of the objectives of this study and the lack of consensus on measuring performance in cooperatives (Soboh et al., 2009, 2012), we use survival analysis to understand resistance, thereby testing the influence that ownership structure has on the capacity for survival.

⁵ Key figures for 2016 – Coop de France (website).

The objective of this study is twofold. First, we want to test the survival capacity of cooperatives and compare it against that of traditional companies in order to check the assertion that cooperatives are more resistant. Second, we want to ascertain whether the determinants of survival among cooperatives are the same as in the case of traditional businesses or whether it is necessary to adopt a specific financial approach.

Our results show that the cooperative ownership structure influences survival when we take into account the different ways in which a structure can exit (dissolution, liquidation and merger). Cooperatives have a higher tendency to merge with other structures than traditional companies. However, they are less likely to exit as a result of liquidation. The influence of traditional financial determinants on survival is confirmed in the case of traditional companies, but is found to be weaker in cooperatives; traditional financial ratios therefore seem to be less suited to the study of cooperatives.

This paper is structured as follows. The first section develops our theoretical framework and research hypotheses. The second provides details of how our database was compiled and lays out the economic strategy adopted and variables used. The third section presents the results, and the final section offers a discussion.

1. Literature review and research hypotheses

Analysing the resistance capacity of cooperatives first of all involves considering the influence of ownership structure on survival (1). We then reverse our perspective: surviving means not exiting. We therefore look at the different exit paths followed by cooperatives in an effort to better understand the challenges they face (2). Lastly, we try to define the specific relationship between financial determinants and survival in the case of cooperatives (3).

1.1 Ownership structure and survival

Many researchers have suggested that cooperatives are more resistant in times of crisis (Birchall, 2013 ; Birchall et Ketilson, 2009 ; Roelants et al., 2012). They argue that cooperatives can rely on abundant capital to absorb shocks during such challenges and that during the recovery period the lack of constraints in terms of profit maximisation allows them to pursue medium- and long-term objectives. This ensures a sustainable return to their activities. Furthermore, democratic control and the fact that each member invests in the structure's capital guarantee their involvement, create a sense of responsibility and improve their ability to respond quickly and be committed in times of crisis. These theoretical arguments are based on the original ownership structure used by cooperatives. The

fact that members have a share in ownership is said to explain their capacity for resistance over time and in the face of crisis.

Ownership structure has therefore already been raised in the literature as a factor that can affect survival. Studies on this issue have primarily focused on worker-owned firms (see among others (Berner, 1988 ; Estrin et Jones, 1992). More recently, Pérotin (2004, 2006) studied the effect of economic cycles on the creation and dissolution of employee-owned cooperatives and traditional companies, positing that an exit can be more costly for a cooperative member than for a shareholder, given that the former not only loses his capital investment but also his job. She therefore suggests that members of such cooperatives may be willing to accept lower profits than investors and be more patient and combative before declaring bankruptcy. This would explain why the number of cooperatives that shut down during a recession is lower. However, the results reveal that while the economic cycle affects the number of employee-owned cooperatives created (higher in times of recession), it has no distinct effect on the number that exit. Burdín (2014) postulates that although giving control to employees aligns their interests with those of the firm and therefore potentially improves its capacity for survival, this can also make it more difficult to offer credible guarantees to investors, thus impeding investment. To settle this issue, he studied the likelihood of survival among Uruguayan employee-owned cooperatives compared to companies owned by investors. His results reveal that the cooperatives have a longer life-cycle than conventional firms and that the cooperative status has a positive effect on the likelihood of survival, both during times of crisis and periods of growth.

Studies have also been extended to other types of cooperatives. Nuñez-Mickel and Moyano-Fuentes (2004) suggest that the cooperative structure acts as an “environmental buffer”, protecting the organisation against possible variations in its environment. By using internal suppliers (all of whom are members), the cooperative strengthens its links with them and ensures systematic access to fundamental resources. This mechanism reduces the likelihood of failure and, as a result, increases survival rates among cooperatives when compared to traditional capitalist firms. Frenken (2014) looked at Dutch dairy firms and put forward the hypothesis that cooperatives benefit from lower transaction costs and therefore higher rates of survival. He confirmed that cooperatives enjoyed higher survival rates. However, he also identified another determinant of survival the “first-mover advantage”, whereby the earlier the company enters the market, the higher its chances of survival. Monteiro and Stewart (2015) set out to understand why cooperatives exist. They conducted a comparative analysis of cooperatives and conventional companies, studying their sectors, distinctive characteristics and likelihood of survival. They found that cooperatives are present in highly concentrated sectors with low entry costs. They are generally older, larger and have a more qualified

and more productive workforce. The authors also demonstrate that cooperatives are more likely to survive than conventional firms.

In light of the existing studies and the arguments in favour of cooperative structures, we propose the following hypothesis:

H1: Cooperatives have a higher rate of survival than traditional firms.

1.2 Survival or exit?

The life-cycle of cooperatives (Cook et Burrell, 2009) suggests that a few years after they are first established they experience organisational problems that force them to reinvent themselves or shut down. There are three main exit paths for agricultural cooperatives: liquidation, demutualisation and the merger.

In recent case studies of failed agricultural cooperatives, (Bond et al., 2009 ; Hariyoga et Sexton, 2009) reveal that financial constraints lead to bankruptcy when accompanied by poor governance. The reasons behind the liquidation of cooperatives generally correspond to a traditional pattern: poor governance can lead to financial difficulties, followed by liquidation.

Demutualisation can be defined as the conversion of a cooperative into another form of organisation, usually one owned by shareholders (traditional company). There are two competing perspectives in the literature (Fulton et Hueth, 2009). The first is that cooperatives only exist as a response to market failures; as soon as the environment evolves and balance is restored to the market, the incentives to adopt the cooperative structure disappear and cooperatives abandon their particular status (Cross et Buccola, 2004). The second, in contrast, is that cooperatives can be victims of their own success. Several scenarios are possible. A cooperative may gradually favour a focus on profit to the detriment of its members and naturally convert to a traditional capitalist structure (Stanford et Hogeland, 2004). Faced with an increase in value, members may also feel it is in their interest to vote in favour of demutualisation in order to free themselves from the non-optimisation constraint on their capital (Chaddad et Cook, 2004). This is even more likely to apply to members approaching retirement, who will no longer benefit from the advantages of the cooperative or profit from the increase in its value (Davis, 2001) since their shares in its capital are reimbursed at their nominal value. Lastly, financing constraints can push cooperatives towards abandoning their status in order to attract outside investors. Yet conversions among agricultural cooperatives are not common. Chaddad and Cook (2007) attributed this to the strong roots of the cooperative structure in farming. They also note that there are other economic reasons to justify the role of cooperatives: faced with the market power held by large supermarkets and the food-processing industry, producers of specific perishables can use the cooperative status to ward off the risk of a “hold-up”. Agricultural cooperatives are also less

incentivised to demutualise: given that their capital is not usually redistributed, members are not in a position to capitalise on the value of their investment.

And so the most usual exit path for cooperatives is the merger. As a whole, the literature emphasises the role of capital constraints. Richards and Manfredo (2003) tell us that the phenomenon of restructuring is a response to the financial constraints that stem from a lack of access to external capital, while Chaddad and Cook (2007) present mergers and acquisitions as an alternative to liquidation. From this perspective, one might consider mergers between cooperatives as a defensive move (Saisset et Cheriet, 2012). However, mergers can also result from real strategic choices. Indeed, Krogt et al. (2007) note that cooperatives favour prudent growth strategies and generally opt for mergers, strategic alliances and joint enterprise as they do not require high levels of owners' equity and carry relatively low risks. This point of view is confirmed by Hudson and Herndon (2002), who found that the majority of mergers in the case of agricultural cooperatives are horizontal. More recently, looking at the financial profiles of acquiring and acquired cooperatives, Melia-Marti and Martinez-Garcia (2015) showed that mergers can also serve as real drivers of external growth. In the particular case of French agricultural cooperatives, we are currently seeing a shift towards mass concentration and regrouping around the core business (Triboulet et Filippi, 2014). Through mergers and acquisitions, this shift has given rise to complex and very large cooperative groups (Saisset et Cheriet, 2012). This critical mass is intended to enable cooperatives to cope with the globalisation of markets and the concentration of large-scale retailing (Filippi et al., 2008). Mergers, which effectively entail the disappearance of the acquired entity, can in fact be a way for cooperatives to reinvent themselves in order to survive.

In light of this, it is necessary to account for the different possible exit paths followed by cooperatives, as they sometimes cover very different realities. We therefore propose the following hypothesis:

H2: The survival rate of cooperatives depends on the exit path considered.

Cooperatives appear to be particularly affected by liquidations (although rare) and mergers. The liquidation of a cooperative is similar to the case of a traditional company. But mergers seem to be both an alternative to liquidation for cooperatives facing difficulties and an opportunity for flourishing cooperatives to develop or reinvent themselves. We therefore propose the following two complementary hypotheses:

H2a: Cooperatives are less likely than traditional firms to exit by liquidation.

H2b: Cooperatives are more likely than traditional firms to exit by merger.

1.3 Value redistribution and survival

Cooperatives can generally be distinguished from traditional companies in that they are controlled and owned by their members rather than shareholders (Hansmann, 1996). This understanding of what the cooperative is immediately throws up crucial differences (LeVay, 1983): cooperatives are governed by the “one person, one vote” principle, members play a dual role as owners and users, and the cooperative pursues a twofold objective of cost-effectiveness for the organisation (to ensure its long-term survival) and utility maximisation for its members. Yet most studies that analyse cooperatives through the prism of ownership rights theory fail to account for these specific features. Cooperatives are defined as organisations in which ownership is reserved for members, in which entitlements to residual profits are neither appreciable nor transferable but simply redeemable at their nominal value, and in which profits are in proportion to activities conducted with the cooperative rather than the amount of capital invested (Chaddad et Iliopoulos, 2013). In light of this, cooperatives have long been studied like traditional businesses, and many researchers have highlighted their sources of inefficiency (Cook, 1995 ; Vitaliano, 1983). However, no clear empirical response has been provided and more recent studies have emphasised the importance of constructing measurements that account for the real *raison d’être* of cooperatives (Soboh et al., 2009).

Cooperative members take on a dual role as users and shareholders/decision-makers. And while the traditional literature has attributed significant weight to the role of the shareholder, in most cases it is the role of the user that takes precedence in conventional cooperatives (Nilsson, 2001). The objective of a cooperative is not to generate profit for its owners but to do so for a group of members (Nilsson et Svendsen, 2011). In this regard, Borgen (2004) argues that the critiques found in traditional studies are the result of an incompatibility between the ownership structure being analysed and the supposed strategic objectives. Cooperative members are generally treated as rational investors, even though they reason primarily as co-op users. One of the reasons for setting up an agricultural cooperative is to generate input at attractive prices or to purchase the output of members at higher prices (Barton, 1989 ; Staatz, 1987). So despite a large number of studies pointing out that the relationship between members and their cooperative is not purely economic (Cechin et al., 2013 ; Österberg et Nilsson, 2009), the price paid by cooperatives to farmers remains a crucial factor underpinning their membership (Hernandez-Espallardo et al., 2013). A cooperative’s profitability therefore necessarily reflects the remuneration policy applied to its members (Franken et Cook, 2015) and cannot be interpreted in the same way as that of a traditional firm. Indeed, this remuneration often leads to a “cooperative dilemma” between members, many of whom have an individual objective to maximise remuneration for their contribution as part of a short-term vision, and the co-op’s administrators, whose objective is to create and preserve value within the cooperative in order to invest and secure

the long-term survival of its activities (Deshayes, 1988 ; Saisset, 2014). It is therefore clear that the redistribution of value in cooperatives can generate tensions that are inherent to this ownership structure. This makes it necessary to adopt an alternative to the traditional financial approach and account for these various objectives (Soboh et al., 2012).

In summary, the literature suggests that cooperative members may favour remuneration for their output over return of capital or the preservation of the value created within the cooperative. This value redistribution is necessarily reflected in the financial statements. When an organisation exits, this is usually understood in terms of its financial health, but the use of traditional financial ratios cannot account for the dynamics at work in cooperatives. We therefore propose the following hypothesis:

H3: Value redistribution is different in cooperatives, and traditional financial determinants have no (or little) influence on their survival.

2. Methodology

The research methodology used to test the influence of ownership structure on survival requires several phases. The first involves constructing a database that includes the financial data on the businesses that have exited and those that are still active. A method of analysis must then be selected that suits the particular nature of the data used. In the context of this study, the presence of censored data led us to adopt a discrete-time survival model. Finally, prior to testing the influence of ownership structure on survival, it is necessary to identify the determinants of survival already listed in the literature.

2.1 Presentation of the data

We used the AMADEUS database⁶ to access financial statements from 2002 to 2014. This online database provides historic data over a 10-year period. However, businesses are removed from the database after 18 months of accounts revealing no activity. We therefore worked using DVDs containing photographs of the database taken each year on the same date. This gave us access to information relating to all of the businesses, whether they were active or exited between 2002 and 2014.

The objective of this study is to compare the survival of agricultural cooperatives and traditional business operating in the same sectors. We considered agricultural cooperatives as a whole: farming, fishing and fish-farming cooperatives, agri-food processing cooperatives (food processing and drinks

⁶ Amadeus (Bureau van Dijk) is a database containing financial and commercial information that can be compared across the 500,000 biggest public and private enterprises in Europe in terms of total asset value. It covers 43 countries.

manufacturing cooperatives) and wholesale and retail cooperatives. We collected the financial data of businesses (cooperatives and non-cooperatives) from the following NACE⁷ divisions: 01, 03, 10, 11, 46.2, 46.3 and 47.2. Given that the objective was to compare the survival of organisations at an individual level, we decided to collect the financial data relating to individual financial statements.

Once we had established our database, we then processed the information several times for the purposes of harmonisation. First, we verified that businesses declared inactive in a given year had not changed status in the following years, which would indicate that they are but had not ceased to exist. We then removed inactive businesses whose status had changed over time from the sample. Second, we regrouped businesses into four main categories based on their legal status: cooperatives, corporation-type non-cooperatives, limited company-type non-cooperatives, and others. In the interest of homogeneity, we decided only to compare cooperatives against the second and third of these categories. Lastly, 414 dates for the creation of cooperatives were unknown in the database or equal to 2002, when cooperatives were required to be listed on the commercial registry. Specific searches enabled us to find the date for 280 of these, but for the remainder we do not have a founding date.

Table 1. Number of organisations that exited by year and by ownership structure

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
NON COOP	388	725	845	928	709	516	1369	2378	2026	1907	1087	1723	14602
COOP	7	32	36	46	50	45	93	43	38	61	49	56	556

The final sample includes 85,703 corporation-type and limited company-type businesses and 2,721 cooperatives. Of these, 556 co-ops and 14,602 companies exited during the observation period.

2.2 Econometric strategy

The comparison between the agricultural cooperatives and non-cooperative businesses in our sample is based on the survival analysis method (Hosmer et Lemeshow, 1999 ; Kalbfleisch et Prentice, 2002 ; Mills, 2011). The analysis of survival data is the study of the time lapse before a given event occurs, in this case the exit of a business.

In order to evaluate the influence of ownership structure on the likelihood of survival, we use a complementary log-log (cloglog) model, a discrete-time version of the Cox proportional hazards model. This model is suited to censored survival data (Allison, 2010). We do not know the precise date on which the event occurs but only the time lapse (year) during which it happens. Using a discrete model

⁷ NACE (from the French “*nomenclature statistique des activités économiques dans la Communauté européenne*”) is the statistical classification of economic activities in the European Community. It lists 615 codes across four hierarchical levels.

also has the advantage of being easily adaptable to variables with different values over time (time-varying covariates) such as financial ratios.

The discrete-time survival model can be used to estimate the probability of an event occurring during interval t , conditional on the fact that the event did not occur before t and accounting for the effect of covariates (x). The risk function in discrete time is written as follows:

$$\lambda(t) = \Pr (T = t | T \geq t, x)$$

where T is the event time. Conversely, the survival function is expressed as follows and represents the likelihood that the event will not occur before t :

$$\hat{S}(t) = \Pr (T > t | T \geq t, x) = 1 - \lambda(t)$$

In the interest of simplicity, let us suppose that the dependent variable models the risk or the likelihood that the business has exited, subject to survival and certain covariables before t . This gives us:

$$\Pr (y_i = 1) = \lambda_i.$$

Three elements are needed to estimate a discrete-time model: random component (the response variable, which in this case is binary: the business has or has not exited), a systematic component (the model's explanatory variables) and the function that links the response variable to the explanatory variables.

We chose to specify the relationship between this risk and the variables using a cloglog-type link function, the "most useful for grouped-time: where time is really continuous, but measurement only occurs at discrete timepoints and captures event information about a time interval" (Allison, 1982).

The transformation of the hazards function is as follows:

$$\log[-\log(1 - \lambda_i)] = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2}(t) + \dots + \beta_k k$$

And the probability of the event occurring is:

$$\lambda_i = 1 - \exp[-\exp(\beta'x)]$$

Our methodology was developed in two stages. We began by establishing a model for the entire population studied. We introduced our variable of interest in connection with ownership structure (does the organisation have cooperative status?) as well as all of the control variables represented by the determinants of survival highlighted in the literature. This allowed us to explore whether ownership structure influences the exit likelihood of an organisation.

We then divided our sample into two sub-populations: cooperatives and non-cooperatives. The aim here is to identify the determinants of survival for each sub-population. This allows us to observe whether the determinants of survival in the case of cooperatives are specific. To find the best model

for each sub-population, we adopted the “purposeful selection” method recommended by Hosmer and Lemeshow (1999). In order to confirm our results, we also conducted an automated variable selection using an iterative algorithm to resolve non-linear equations based on the Akaike information criterion (AIC) and proposed in the *glmulti* R package (Calcagno et Mazancourt, 2010). This approach is nonetheless exploratory and non-predictive. This means we only study the influence of financial determinants from the year preceding the occurrence of the event.

2.3 Choice of variables and sample description

The dependent variable in the model is the occurrence of an event – **exit** – during the time lapse considered (one year). We consider that an organisation has exited if its status in the database is “inactive” for any reason other than going into hibernation (Disney et al., 2003 ; Zingales, 1998), and that the event occurs during the year in which the status changes from “active” to “inactive”.

The objective of the analysis is to test the influence of ownership structure on survival. The first variable is therefore the dichotomous variable **COOP**, which distinguishes between non-cooperatives (0) and cooperatives (1).

It is also necessary to control for whether this influence exists in the presence of the determinants of survival identified by previous research. These determinants can come in many forms.

It is generally recognised that the rate of failure is higher during times of economic crisis, which means a *de facto* reduction in the likelihood of survival. Similarly, the mortality rate of firms is lower during a growth phase in their sector than during a maturity phase (Agarwal et al., 2002). Our observation period, which covers the economic and financial crisis of 2008, includes the binary variable **period**, which distinguishes between the years before the crisis (2002-2008; variable takes a value of 0) and after the crisis (2009-2014; variable takes a value of 1). In all survival studies, two characteristics associated with the firm are systematically present in the form of control variables: age and size. While these two aspects were the subject of debate in the 1980s and 1990s, it is now recognised that companies face a higher risk of failure in their early years and when they are small in size (Agarwal et al., 2002 ; Audretsch et Mahmood, 1995 ; Freeman et al., 1983 ; Mata et Portugal, 1994). The model therefore includes the variable **age**, representing the age of the firm at the time when the occurrence (or non-occurrence) of the event is studied. It also includes the variable **size**, measured using a logarithm of sales. Internationalising a firm’s business makes it possible to operate on several different markets and thereby benefit from the favourable effect of risk diversification (Wagner, 2012). This makes a firm less dependent on economic conditions and fluctuations in demand in its home country (Bridges et Guariglia, 2008), thus allowing it to better absorb shocks (provided the different economies

are independent). To integrate this aspect into the model, we used the binary variable *export*, which takes a value of 0 if the firm does not export and 1 if it does.

Generally speaking, financial health can influence survival. It is therefore necessary to control for it using five criteria: liquidity, solvency, profitability, activity and financial structure. Given that our objective was to compare cooperatives with traditional firms, we chose the financial variables used in earlier studies to compare the performance of these two types of organisation.⁸ We thereby measured the influence of the financial variables from the year before the event occurred using the eight financial ratios presented in Table 2.

The presence of panel data often raises the problem of extreme values (Kremp, 1995). In order to limit their influence, we therefore winsorized the data (Campbell et al., 2008), which involves setting all outliers to the nearest quantile (1% and 99%).

Table 2. Variables used and descriptive statistics

Given the significant level of dispersion, the values presented for each financial ratio are medians. Because the base assumptions in the Student's tests for the equality of the means (equality of variances and normal distribution) were not satisfied, we carried out Wilcoxon's non-parametric distribution equality test.

Variable	Name	Measure used	COOP	NON COOP	W-test
Age	Age		35	7	0.000
Turnover	Size	Average turnover in k€ (log)	3359	340	0.000
Export	Export	Binary variable (firm does or does not export)	1%	21%	0.000
Profitability	PROF	Net income / Turnover	0.37%	1.92%	0.000
Return on assets	ROA	Operating income / Operating assets	1.28%	6.88%	0.000
Return on equity	ROE	Net income / Shareholders equity	0.73%	11.49%	0.000
Financial leverage	FDSE	Financial debts / Shareholders equity	0.38	0.26	0.000
Total indebtedness	TDTA	Total debts / Total assets	0.17	0.18	0.557
Repayment ratio	FDCF	Financial debts / Cash flow	3.12	0.85	0.000
Liquidity	LIQGEN	Current assets / Current debts	1.61	1.11	0.000
Solvability	SOLV	Operating income / Cost of debt	0.40	1.65	0.000
Period	period	Binary variable (1 for 2009-2014)			
Ownership structure	COOP	Binary variable (1 for cooperatives)			
TOTAL NUMBER OF FIRMS			2 721	85 703	

We observe significant differences between the cooperatives and traditional firms for the variables used. The cooperatives are significantly older than the non-cooperatives. This appears to support the view that they have a greater capacity for survival over time. However, this phenomenon may also be explained by the higher number of traditional firms created before and during the observation period

⁸ (Chen et al., 1985 ; Gentzoglani, 1997 ; Hardesty et Salgia, 2004 ; Harris et Fulton, 1996 ; Hind, 1994 ; Lerman et Parliament, 1990 ; Notta et Vlachvei, 2007 ; Parliament et al., 1989 ; Soboh et al., 2011 ; Venieris, 1989)

(may explain the difference in the average ages). The cooperatives in our sample are also significantly larger (in terms of revenue) than the non-cooperatives.

The cooperatives have a noticeably different financial profile to that of the traditional firms. They appear less profitable and less cost-effective, which confirms the absence of a profit maximisation objective. It should also be noted that they display a level of indebtedness comparable to the traditional firms, but that their capacity for reimbursement is weaker, as is their level of solvency. Similarly, the cooperatives have greater leverage, which may be a reflection of the difficulties they face when it comes to raising capital. A specific financial study of cooperatives is therefore justified at this stage.

3. Results

Using our database of financial data for the companies that exited and those that remained active between 2002 and 2014, we constructed cloglog-type discrete-time survival models. Our two initial hypotheses were tested on the overall sample, made up of cooperatives and non-cooperatives. Our third hypothesis was tested using two new models, each relating to a subsample: cooperatives and traditional firms.

3.1 Influence of ownership structure on the exit of organisations

To test the influence of ownership structure on the exit likelihood of an organisation, four models were established. The results are presented in Table 3. As well as the variable *cooperative*, the first model (Model 1) also includes the traditional determinants of survival identified in the existing literature. We note that most of these determinants are significant, in line with the results obtained in previous studies. The negative coefficient of the variable *period* indicates that the exit likelihood is higher in the period 2009-2014, thus confirming the influence of the 2008 economic crisis. However, we note from the model that having a cooperative (or, inversely, traditional) structure has no influence on survival.

Previous research studies have highlighted the importance of moving beyond the exit/survival duality by accounting for the different possible exit paths facing organisations (Åstebro et Winter, 2012 ; He et al., 2010 ; Powell et Yawson, 2012). Furthermore, agricultural cooperatives have undergone significant concentration in recent years, leading many of them to merge with others. The influence of these exit paths on the survival of the organisations in our sample was tested by introducing the variable *exit*⁹ into the regression in order to distinguish between organisations that exited by liquidation and those that exited by merger (Model 2). In this model, the variable *cooperative* is

⁹ This nominal variable is equal to 0 if the organisation does not exit, 1 if it is liquidated, 2 if it merges, and 3 if it exits for some other unspecified reason. The reference exit path is "dissolution". A value of 0 for this variable allows us to retain within the sample those organisations that did not exit.

significant. This finding confirms the need to account for the exit path of organisations if we are to understand the influence of ownership structure on survival. In this vein, two other models were tested by applying the same regression as the one used in the first model, but this time only accounting for organisations that were liquidated (Model 3) and then those that merged (Model 4).

Table 3. Influence of ownership structure on survival depending on exit path

The four cloglog models were tested on the overall sample. The conditions of validity of each one were confirmed. No multicollinearity problems were detected, all of the VIF values were lower than 10, and tolerance was higher than 0.65 in each case (Field et al., 2012). Analysis of the residues revealed that no extreme value had a significant influence on the models (Stevens, 2009). The assumption of error independence was also satisfied. It is therefore possible to interpret the effect of the explanatory variables on the exit likelihood of an organisation.

	<u>Model 1</u>			<u>Model 2</u>			<u>Model 3 - Liquidation</u>			<u>Model 4 - Merger</u>		
	coef	p		coef	p		coef	p		coef	p	
Intercept	3.581	0.000	***	-1.663	0.000	***	-5.524	0.000	***	-10.090	0.000	***
COOP	0.112	0.150		-0.345	0.000	***	-1.317	0.000	***	0.858	0.000	***
Age	-0.004	0.000	***	-0.001	0.347		-0.015	0.000	***	0.011	0.000	***
Size	-0.032	0.149		-0.249	0.000	***	0.540	0.000	***	1.252	0.000	***
Export	-0.566	0.000	***	-0.427	0.000	***	-0.415	0.000	***	-0.068	0.541	
FDCF	-0.005	0.000	***	-0.003	0.003	***	-0.007	0.000	***	-0.011	0.058	*
FDSE	-0.018	0.000	***	-0.012	0.000	***	-0.019	0.000	***	-0.054	0.001	***
LIQGEN	-0.006	0.302		0.041	0.000	***	-0.235	0.000	***	-0.024	0.517	
SOLV	-0.001	0.000	***	-0.001	0.000	***	-0.001	0.000	***	-0.002	0.007	***
ROA	-0.048	0.002	***	-0.044	0.002	***	-0.018	0.461		-0.206	0.034	**
ROE	-0.178	0.000	***	-0.077	0.002	***	-0.210	0.000	***	-0.020	0.632	
PROF	-1.002	0.000	***	-0.478	0.002	***	-1.618	0.000	***	-1.092	0.014	**
TDTA	0.000	0.999		-0.144	0.000	***	0.546	0.000	***	-0.867	0.002	***
period	0.330	0.000	***	0.952	0.000	***	-0.442	0.000	***	-1.552	0.000	***
Exit = 0				-2.476	0.000	***						
Exit = liquidation				0.085	0.000	***						
Exit = merger				1.548	0.000	***						
AIC	76 082			58 416			31 294			4 700		
Degrees of freedo	341 241			341 224			335 823			333 354		
Null deviance	77 697			77 681			32 661			5 638		
Residual dev.	76 054			58 382			31 266			4 672		

*** significant to a threshold of 1%, **significant to a threshold of 5%, * significant to a threshold of 10%

The coefficient associated with the variable *cooperative* is significant in Models 2, 3 and 4, thus confirming that ownership structure has an influence on survival when the exit path is taken into account. This coefficient is negative in the case of liquidations (Model 3) and positive in the case of mergers (Model 4). The cooperative structure therefore has a positive influence on the probability that an organisation will exit by merger and a negative influence on the probability of an exit by liquidation. In comparison to traditional firms, the risk that cooperatives will exit by merger is 2.36 times higher

(Model 4). However, the risk of this happening by liquidation is 0.27 times lower (Model 3).¹⁰ These results are significant to a threshold of 1%.

Analysis of the control variables in Models 3 and 4 produced surprising results: exports decrease the likelihood of an exit by liquidation but do not appear to influence the likelihood of an exit by merger; age has a negative influence on the former of these two likelihoods and a positive influence on the latter; and size increases the likelihood of an exit by either path. These results can be explained by the fact that there is a mix of cooperatives and non-cooperatives in the sample. Yet cooperatives, which are more likely to exit by liquidation, are larger in size and younger. Similarly, cooperatives exit by merger more than traditional firms but almost never engage in exports. This reinforces the argument for different approaches to cooperatives and traditional companies.

It is not yet relevant to study the financial ratios, since we put forward the hypothesis that the financial determinants of survival are different for cooperatives and traditional firms.

3.2 Ownership structure, financial determinants and exits

To test the third hypothesis, the sample was divided into two subgroups: cooperatives and traditional firms. The objective was twofold: validate the relevance of the financial determinants of survival identified in the literature in relation to traditional firms, and test their influence in the case of cooperatives. Two distinct models were developed for this purpose. For each of the two subgroups, a “complete” model containing all of the financial determinants and control variables (age, size, export and period) was tested first of all. We then conducted an automated variable selection using an iterative algorithm based on the AIC. This left us with a model that was adjusted to each population.

Once again, all conditions of validity are satisfied and the coefficients of both models can be interpreted. The results clearly demonstrate that the determinants of survival are different in the case of traditional firms and cooperatives (Models 5 and 6). The majority of financial determinants identified in the literature (6 ratios out of 8) allow us to differentiate between traditional firms that survive and those that do not; only three of them are significant to a threshold of 5% in the case of cooperatives.

¹⁰ In a cloglog-type model, the coefficients are log hazards. To interpret them, their exponential must be calculated.

Table 4. Exit determinants for companies and cooperatives

The two cloglog models presented here were tested on the two subsamples (traditional firms = NON COOP and cooperatives = COOP). The conditions of validity are satisfied.

	<u>Model 5 - NON COOP</u>			<u>Model 6 - COOP</u>		
	coef	p		coef	p	
Intercept	-3.329	0.000	***	-4.549	0.000	***
Age	-0.004	0.000	***			
Size	-0.041	0.073	*	0.199	0.028	**
Export	-0.580	0.000	***			
FDCF	-0.005	0.000	***	-0.016	0.004	***
FDSE	-0.018	0.000	***			
PROF	-0.993	0.000	***	-2.423	0.000	***
ROA	-0.047	0.002	***			
ROE	-0.182	0.000	***	0.686	0.064	*
SOLV	-0.001	0.000	***	-0.003	0.011	**
period	0.338	0.000	***			
AIC	74 070			1 988		
DF	331 292			9 946		
Null deviance	75 678			2 013		
Residual dev.	74 048			1 976		

*** significant at the threshold of 1%, ** of 5%, * of 10%

In the case of traditional firms, we find that exports, size and age are positively correlated with survival, in line with previous research findings. The period also influences the exit likelihood: traditional firms face an exit risk that is 1.4 times higher during the period 2009-2014. As expected, the most cost-effective (ROA and ROE), profitable (PROF) and solvent companies (SOLV) are those with the highest likelihood of survival. The negative coefficient of the indebtedness (FDSE) and reimbursement ratios (FDCF) appears to indicate that a high level of debt is positively linked to survival as it is a sign that the organisation has no difficulty accessing bank financing.

The traditional financial determinants of survival are less useful when it comes to differentiating between cooperatives that survive and those that do not. Few of them can be used to explain survival rates and few are significant to a threshold of 5%. Profitability and solvency reduce the risk of an exit, but interpreting the reimbursement ratio (FDCF) remains problematic, as the negative coefficient indicates that a high ratio reduces this risk. Finally, cost-effectiveness appears to increase the risk of an exit but only to a threshold of 10%. The size of cooperatives appears to be positively correlated with exits. Given that the previous results show that cooperatives usually exit by merger, this might mean that it is those already engaged in a strategy to reach a critical mass that end up merging with another structure. This would suggest that the largest cooperatives exit by merger. Like Rousselière and Joly (2011), we found no relationship between age and exits in the case of cooperatives.

Due to the difficulty of interpreting the financial ratios of cooperatives, once it has been linked with the previous findings in the literature which highlight the specific connection between the cooperative model and mergers, we constructed two new models. In Model 7, the financial variables were selected only taking into account exits by liquidation, while Model 8 only considers exits by merger.

Table 5. Exit determinants for cooperatives for each exit path

The cloglog models were tested on the sample of cooperatives based on the different exit paths: Model 7 excludes those organisations that exited for any reason other than liquidation, while Model 8 excludes those that exited for any reason other than a merger. The conditions of validity are satisfied.

	<u>Model 7 - COOP Liquidation</u>			<u>Model 8 - COOP Merger</u>		
	coef	p		coef	p	
Intercept	-4.645	0.000	***	-6.297	0.000	***
Age	-0.032	0.002	***	0.002	0.622	
Export				-0.378	0.052	
Size				0.477	0.000	***
PROF	-2.719	0.003	***	-1.719	0.068	*
ROE				1.064	0.027	**
period	-0.671	0.098	*			
AIC	350			1 271		
Degrees of freedom	10 736			10 758		
Null deviance	365			1 282		
Residual deviance	342			1 259		

*** significant at the threshold of 1%, ** of 5%, * of 10%

Model 7 shows that older and more profitable cooperatives are less likely to exit by liquidation. It therefore appears that the relationship between age and exits depends on consideration for the exit path. This model also highlights the fact that cooperatives are less likely to experience liquidation in 2009-2014 than in 2002-2008, which reflects a certain resilience to the crisis. Model 8 confirms the link between size and the likelihood of a merger and indicates that cost-effectiveness is positively correlated with the likelihood of an exit by merger. It also reveals that the most profitable cooperatives are less likely to merge, although this result is only significant to a threshold of 10%.

4. Discussion and conclusion

The objective of this research was to test the link between ownership structure and survival. We began by comparing cooperatives to traditional firms. We then focused more specifically on the determinants of the survival of cooperatives.

We have shown that in the case of cooperatives, survival and exit cannot simply be opposed. Although the general trend in the overall sample reveals a higher likelihood of exit by liquidation, cooperatives

are different in that they tend to exit by merger. To study the survival capacity of cooperatives, it appears essential to take into account not only their exit path but also the objective being pursued by cooperatives that merge.

In terms of liquidation, the results show that the cooperative ownership structure reduces the likelihood of an exit (Model 3). Furthermore, this likelihood was lower in 2009-2014 (Model 7), suggesting a certain level of resilience among cooperatives to the 2008 economic crisis. However, these results are counterbalanced by a higher likelihood of an exit by merger for the observation period as a whole (Model 4). This indicates that the survival rates of cooperatives depend on their exit path, thus validating Hypotheses 2, 2a and 2b. But these findings do not allow us to make a general conclusion about the survival capacity of cooperatives (H1). There are two opposing views of mergers in the literature. The first sees them as a response to financial constraints (Chaddad et Cook, 2007 ; Richards et Manfredo, 2003), while the second interprets them as a strategy for external growth (Krogt van der et al., 2007 ; Melia-Marti et Martinez-Garcia, 2015). The difficulty lies in evaluating the nature of mergers. Some authors have focused on their offensive or defensive nature (Saisset et Cheriet, 2012). Here, they are interested in the determinants of the merger: financial constraints, governance inadequacies, veritable strategic project, etc. and the ways in which they come about. In this study, we found that merging cooperatives are generally larger, with lower levels of profitability but better cost-effectiveness. It is difficult to use these elements alone to draw conclusions about the nature of these mergers: they do not provide sufficiently detailed information and are based on traditional financial ratios that do not account for value redistribution in cooperatives. This makes it challenging to reach a conclusion about the nature of mergers. But is it their nature or their ultimate aim that is most important? A cooperative is *“an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise”*.¹¹ In this respect, mergers allow their members to continue contributing their production to an organisation which they own and control democratically. They therefore make it possible to adhere to the primary purpose of the cooperative structure. Indeed, we could refer to redeployment rather than exit and the importance of the underlying causes of this redeployment. In conclusion, it appears that the survival capacity of cooperatives largely depends on the prevailing interpretation of the merger.

In the French agricultural cooperative sector, agricultural cooperatives can be found less and less in their pure form (Forestier et Mauget, 2000). They are increasingly developing in the form of complex groups with subsidiaries established under traditional commercial law, and partnerships and alliances

¹¹ Definition given by the *International Cooperative Alliance* in 1995.

between cooperatives are becoming more and more common. These trends can be explained by the increased level of competition that is forcing cooperatives to adapt their strategies (Iliopoulos, 2015). However, this requires substantial financial resources. The use of subsidiary structures is therefore considered an appropriate way to consolidate competitive positions (Filippi et Triboulet, 2011). For a few years now, there has been a substantial shift towards concentration and the rise of cooperative groups (Koulytchizky et Mauget, 2003). Reaching a critical mass is sometimes seen as one of the conditions for the survival of cooperatives (Triboulet et Filippi, 2014). This change in the cooperative sector has seen market shares sustained (around 40%) and steadily rising revenue despite an unfavourable economic climate (source: Coop de France). The fall in the number of cooperatives has not therefore undermined the economic importance of the agricultural cooperative sector, and the view that exits in fact represent a redeployment of business is plausible. This allows us to draw a favourable conclusion about the heightened capacity for survival of French agricultural cooperatives.

The final hypothesis (H3) was that traditional financial ratios are not suited to survival analysis in the case of cooperatives as they fail to take into account the specific value redistribution in cooperative organisations. By constructing specific models for cooperatives and non-cooperatives, we highlighted two phenomena: the determinants of survival are different for traditional firms and cooperatives; and traditional financial ratios have a negligible role in distinguishing between cooperatives that survive and those that do not. The latter of these two findings remains valid once the effect of specific exits by merger has been eliminated. Selecting the determinants of exit by liquidation only (Model 7) clearly reveals that traditional financial ratios cannot be considered as exits determinants in the case of cooperatives. Hypothesis 3 is therefore validated: the mechanism for value redistribution in cooperatives means it is inappropriate to use these ratios to study their survival. These results partly explain the disparity between the popularity of cooperatives and their marginalisation in the literature. Cooperatives have been studied from a perspective that does not accurately reflect their real strengths and have therefore been overlooked by researchers.

This study provides the first empirical basis for the theoretical debate surrounding the survival of cooperatives. In a sector in which cooperatives have a strong presence, it sheds light on the survival of these organisations. Three significant contributions have been made. First, we have shown that cooperatives are less likely to face liquidation than traditional firms, and that exits by merger can be seen as a way to redeploy business, thus confirming the hypothesis that cooperatives are more resilient. Second, we have highlighted the importance of moving beyond the survival/exit duality and taking into account the specific relationship between cooperatives and mergers. Third, we have shown traditional financial ratios to be inadequate for the study of cooperatives and their survival.

These contributions pave the way for new research avenues. We constructed different models to reflect the different exit paths. One way to confirm our results would be to construct a model of competing risks (Åstebro et Winter, 2012 ; He et al., 2010) in which the effects of the variables on the different exit paths can be studied simultaneously. Similarly, the literature highlights the role of market orientation and therefore of immaterial investments in the performance of cooperatives (Agirre et al., 2014 ; Benos et al., 2015 ; Beverland, 2007). However, the lack of availability of data on cooperatives meant that we were unable to test the link between immaterial investments and survival. Finally, we concluded that traditional financial ratios do not accurately reflect the performance and sustainability of cooperatives over time. While it has been widely recognised that cooperatives pursue objectives far beyond profit maximisation, it is nonetheless true that they are above all businesses operating in an increasingly competitive environment in which economic viability is not an option. It is therefore necessary to better understand the financial behaviour of cooperatives in order to emphasise the economic specificities of these organisations and assess their value accordingly.

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