

Are Worker Cooperatives in the UK Liable to the Issue of Adolescence?

Georgina O'Sullivan

Historically, the cooperative movement in its various global forms has been surrounded by debate. Within existing literature, most empirical exploration has been focussed on countries outside of the UK. As such, little is known about worker cooperatives in the UK. Using new data, with a maximum of 3,287 observations across 10 years, this dissertation aims to add to the literature by closely examining the survival rates and nonparametric hazard curves of worker cooperatives in the UK, broken down by geographical location and industry. These comparisons will be drawn in order to assess whether geographical and industry differences influence the survival chances and hazard rates of worker cooperatives in the UK.

1. Introduction

"In the world today, the main form of enterprise in capitalist and socialist countries is based on renting human beings ... In the alternative type of firm, employment by the firm is replaced with membership in the firm ... Democracy can be married with private property in the workplace; the result of the union is the democratic worker-owned firm." (Ellerman, 1990, pp. 64-68)

Despite the 6,796 independent cooperatives with a cumulative 15 million members currently known to exist in the United Kingdom (UK), cooperatives represent a small proportion of all firms (Cooperatives UK, 2015). The inception of the modern cooperative movement in the UK is often identified with the Rochdale Pioneers of 1844 (Holyoake, 1857; Cole, 1944), however, cooperation in its early forms has been traced back further to the late 1700s, where cooperation was developed as a response to the unfair working conditions experienced by the poor during this period (Birchall, 1994). Worker cooperatives¹ have since grown in number and recognition with some, such as the John Lewis Partnership and Suma Wholefoods, having developed into well-known, well-regarded brands and household names. Cooperatives in countries such as France and Uruguay enjoy advantageous tax breaks and incentives. However, UK worker cooperatives do not². As such, worker cooperatives have continued to be created in the UK as an alternative way of working.

Labour-managed firms are defined as having all, or at least most, of their capital owned by their employees. This could be through either individual or collective ownership, or a combination of the two. All employees may become members or owners, regardless of their position in the firm. As a minimum, most employees are members in a labour-managed firm. Furthermore, each member possesses the right to vote regardless of the amount of the firm's capital they own. They are able to exercise their voting rights in, for example, the appointment of directors and key strategic decisions. Levels of democracy do vary across labour-managed firms of different sizes, as obtaining consensus in larger firms could be more difficult. Another key differentiator between worker cooperatives and more traditional firms is that their members, rather than external shareholders, benefit from profit share schemes.

Much like the introduction to an economy of any new innovation, the development of worker cooperatives in modern economies has sparked considerable debate. A significant proportion of earlier literature was predominantly theoretical. Further, a significant proportion of the empirical work which followed has focussed on productivity, comparing labour-managed firms with cooperatives of other groups, and with their capitalist counterparts (see Estrin *et al.*, 1987; Berman and Berman, 1989; Craig and Pencavel, 1995; Jones, 2007; Fakhfakh *et al.*, 2012). Less attention has been directed towards the

¹ The terms 'cooperative', 'worker cooperative', 'worker-managed' and 'labour-managed' firm are used interchangeably throughout this dissertation unless otherwise specified.

² Information communicated to the author by Cooperatives UK on 16th March 2016.

creation and survivability of worker cooperatives. To add to this, due to differences in the availability of data, most studies have focussed on other countries and not the UK. As such, this dissertation aims to harness two areas of speculation which have, historically, been relatively untouched. This will be achieved through the analysis of the liability of adolescence in UK labour-managed firms, which will be used to determine whether this applies to them. Using new Cooperatives UK data, which details at least 3,287 observations of worker cooperatives, nonparametric hazard curves will be estimated, with the data being subdivided into groups by geographical location. These will be compared with the overall group average curve. This exercise will be repeated, but instead by dividing the data by industry group as defined by Cooperatives UK. This will provide evidence in order to reasonably conclude whether, firstly, worker cooperatives are subject to the liability of adolescence and, secondly, how their hazard and survivability rates vary depending on geographical location and industry. Due to the nature of the analysis method, this dissertation may speculate, but not give an empirical explanation, as to why certain trends are observed.

The next section will provide context to this dissertation by summarising the theoretical debate surrounding the business of cooperation and surveying the existing cooperative survival literature of particular interest, which enables the conclusion that nonparametric analysis is an appropriate method. Section 3 presents the theoretical hypotheses for this dissertation and the limitations encountered. A thorough description of the data used and the method are detailed in Section 4. Descriptive statistics are discussed in Section 5 to provide a landscape of business in the UK. Section 5 also details the analysis results, which indicate that worker cooperatives in the UK are faced with a liability of adolescence and that the length of the honeymoon period experienced as well as survival rates varies between geographies and industries. However, a combination of the relatively low number of observations in certain groups and the fact that nonparametric analyses cannot offer a thorough investigation into external factors which influence survival means that these results warrant further investigation, either by a proportional hazard model or as and when more data become available.

2. The theoretical debate and existing literature

2.1 The theoretical debate

Theoretical assumptions in the earlier literature surrounding worker cooperatives were traditionally pessimistic, comprising general opinions that this type of firm could not be deemed a viable alternative to the conventional capitalist firm due to an innate inability to maintain the same level of efficiency. In the context of firm survivability, inefficiency arguments are important to understand as, intuitively, it could be argued that an inefficient firm is deemed more likely to fail. Criticism of worker cooperatives is well developed within theoretical literature, referring to factors such as the free-rider problem

(Alchian and Demsetz, 1972), a slow and cumbersome decision-making process, which is rife with conflict (Hansmann 1990; Blair *et al.*, 2000) and the inability of workers to gather sufficient capital to operate efficiently (Ben-Ner, 1984; Miyazaki, 1984). There is also a school of thought suggesting that worker-managed firms will degenerate over time into the capitalist form, a theory of which Avner Ben-Ner (1984) is a key proponent. Ben-Ner claims that worker cooperatives are incentivised to hire fewer members in favour of regular employees who are paid a wage, rather than with profits. This is because profits per member will be maintained at a higher level for the increasingly small number of members in the long run. Eventually there will be no members, only employees and shareholders. Dow (2003) reinforces this argument by stating that, in a successful worker cooperative rising in value, membership would become increasingly expensive and could result in employees not being able to afford to buy shares. As such, retiring members would not be replaced by new members, but rather with regular employees.

However, counterarguments that residual surplus and ownership rights do in fact provide an incentive are plentiful and are summarised by Park *et al.* (2004). These arguments comprise the likelihood of cooperative members working harder to receive higher pay as a result of higher productivity, peer pressure along with a lower cost of monitoring that would counteract the effects of free-riding, a greater willingness to pass on private information to other members, a probable reduction in leaver and absenteeism rates (Freeman, 1978), an increase in intrinsic motivation through possession of voting rights, more informed strategic decisions, which are easier to implement due to the mandate of the members being prevalent, and the improbability of the risk aversion of members posing a real threat to success if cooperative cultures are developed in certain geographies. As will be discussed in Section 2.2, many theoretical arguments against worker cooperatives have been empirically disproven, highlighting a clear opportunity to investigate further.

2.2 Existing literature

Survivability analysis is used in economics to ascertain the patterns behind firm failure. Studies are generally similar in their approach but often yield drastically different results (see Audretsch, 1991; Mata and Portugal, 1994; Disney *et al.*, 2003; Cefis and Marsili, 2005; Strotmann, 2007). These analyses have been extended to worker cooperatives as more data has become available over recent decades, but with little attention paid to the UK due to a lack of readily available data. As such, this review of the key literature focusses on cooperative survival evidence from France and Uruguay. Firstly, Virginie Pérotin's (2004) paper is of particular focus because of the theory proposed behind the liability of adolescence and the nonparametric method of analysis. Then, Pérotin's (2006) paper highlighting why location is of particular importance to start-up labour-managed firms will be discussed. Finally, an overview of Gabriel Burdín's (2014) paper will offer an explanation as to why industry differences

should be considered and also an alternative form of survivability analysis through parametric modelling, which will demonstrate that the rationale behind observed trends could be estimated through reference to the findings contained herein.

Firstly, Pérotin (2004), referencing Freeman *et al.* (1983), Evans (1987) and Singh *et al.* (1986), finds that a group of earlier papers evidence a negative relationship between the age of firms and closure rates, confirming a liability of newness which, as per Stinchcombe's (1965) definition, is such that new organisations face a multitude of problems associated with their newly founded entity, making them prone to failure. However, subsequent papers have found the initial risk of closure faced by cooperatives to be low in the year following creation, with closure risk then increasing within the years of adolescence, before gradually decreasing (Pérotin cites Staber, 1989; Russell and Hannemann, 1992). Through analysis of data for 2,740 French worker cooperatives (Sociétés Cooperatives de Production – SCOPs) between 1977 and 1993, and all French firms between 1989 and 2000, Pérotin examines survivability differences between cooperative and conventional firm populations.

It is firstly hypothesised that SCOPs may be protected from the liability of newness and instead faced with a liability of adolescence as a result of the added protections of initial resource levels and costs, levels of financial investment, and the enthusiasm and commitment of members. All firms will use their initial resources to survive, with senior managers closely monitoring performance and making strategic decisions to establish and maintain a successful business. The availability of only imperfect information regarding future firm performance may result in management being hesitant to abandon their business and exit the market (Brüdel and Schüssler, 1990). Varied levels of initial resources and information may therefore explain differences in the length of the “honeymoon period” (low closure risk at creation). These factors could differ between start-up cooperatives and conventional firms as, although worker cooperatives may face greater entry barriers, they are on average larger than conventional firms (Pérotin, 2016) and will opt to modify pay levels before employment in times of hardship (Craig and Pencavel, 1992; Pencavel *et al.*, 2006; Burdín and Dean, 2009). It can therefore be reasonably hypothesised that cooperatives may be able to operate at a lower cost than regular firms during the infancy period, better protecting themselves from the liability of newness. Worker cooperatives may, however, face higher entry barriers to cheap finance. Pérotin (2006) notes that, generally, labour-managed firms are not well known around the world. Where information is poor, barriers to entry will be higher because financial lenders will be more likely to consider a start-up worker cooperative as a higher risk investment than a conventional firm. To a degree, this negative effect may be partially counterbalanced by the exploitation of a bigger pool of collective capital, given that worker cooperatives are usually bigger in size. Notwithstanding this, it cannot be concluded with certainty that this will completely negate the higher cost of finance.

Pérotin (2004) also underlines the importance of psychology and personal, non-financial investments made during the formation of worker cooperatives. Cooperatives are commonly created as an alternative form of establishment, with a core of democratic ideals which are deeply embedded in not only the culture of the organisation, but the ethos of the members. A collective of individuals with strong, aligned beliefs regarding cooperation may contribute to decreasing the risk of early closure, even if poor performance is observed. There is much to be said for the strength of collective psychological commitment. This collective may be less willing to concede and wind-up than one entrepreneur or leader who is the sole decision maker, even if both groups benefit from the same level of information. Cooperatives do not face the same bottom-line mentality that can be more prevalent in conventional firms, as operating for profits can be seen as a secondary function behind ensuring the continued existence of the firm for the benefit of its members. Naturally, external shareholders would be more prone to profit-driven short-termism than internal stakeholders with significant financial interests in their own firm.

Pérotin combines these hypotheses with the French SCOP dataset to estimate nonparametric hazard curves, with hazard defined as the risk of closure given the firm has survived up to that point in time. With all SCOPs grouped together, Pérotin finds a clear trend indicating a liability of adolescence, with the estimated hazard rate low in the first years following creation and peaking during years three and four. The hazard rate subsequently declines to stabilise at near 10%. The nonparametric hazard curves for all French firms, however, show a monotonic negative relationship between age and death rates, as expected by the theory of the liability of newness. This therefore confirms the hypothesis that, in their first year, cooperatives in France may be protected from closure risk as a result of the added incentives to succeed.

Secondly, Pérotin (2006) highlights the importance of location for cooperative entry and survival. When deciding whether to enter the market or not, cooperatives, as with conventional firms, must consider demand for their product or service and whether expected demand can result in profits. However, cooperatives are faced with two more entry barriers, being massive information barriers and, as a result, the increased cost of credit. Therefore, it would be logical to enter a market where cooperatives are already populous, so that these barriers are reduced. However, if there are too many, competition may become too fierce, so Pérotin predicts a quadratic effect on cooperative density. Pérotin creates her estimation using a sample of French data, limited by its small number of observations. It is found that cooperative entry and survival is positively associated with density to a certain point, but beyond then success rates fall, confirming a quadratic density effect. Notably, Pérotin also finds that cooperatives tend to be created in times of economic hardship as hypothesised by Vanek (1977) and Ben-Ner (1984).

A further form of survivability analysis is conducted by Burdín (2014), whose paper questions whether worker cooperatives are more likely to fail than conventional firms, and whether this offers an explanation as to why so few labour-managed firms exist in comparison. Burdín cites reasons similar to the arguments made by Pérotin as to why cooperatives might experience different survival patterns to conventional firms, such as market asymmetries and differences in start up cost. Through analysing data covering the total population of conventional and labour-managed firms in Uruguay from 1997 to 2009, an empirical assessment is performed. Burdín begins his analysis of firms in Uruguay by estimating and comparing the nonparametric hazard curves of labour-managed and conventional firms, with a liability of adolescence being confirmed for both groups. It is found that cooperative survival rates vary across industries, with those in the Retail Trade-Services group faring better than those in Manufacturing-Transport-Construction. Burdín does note, however, that nonparametric hazard curves are limited given that they do not offer an explanation of factors which might affect firm survival. Furthermore, the sample assessed contained a small proportion of labour managed firms, and so cohort-sector-specific estimates could well be imprecise. To account for external factors, Burdín examines the time elapsed between entry and exit, and estimates a Cox proportional hazard model. The results signify that labour-managed firms have a 25% higher survival chance than their capitalist counterparts. Moreover, survival is positively associated with the average firm wage at entry, as well as there being a material negative relationship between initial firm size and the hazard of exit. The same model is then used to compare labour-managed firms and capitalist firms within different industries, in order to rule out the possibility that the observed disparities might be present due to unique demand volatility characteristics. Even with industry effects considered, the results are similar with the hazard of exit being 24% lower for labour-managed firms.

This examination of the key literature supports the hypotheses that worker cooperatives in the UK will themselves face a liability in adolescence, however, this curve will not reflect all types of cooperative, with geographical and industry differences proposed. These hypotheses will be discussed in more detail in Section 3.1. The examination of key literature also underlines the suitability for the use of nonparametric hazard curves in analysing base trends in firm survivability. For a more accurate assessment, a Cox proportional hazard model would be required, however, there are inherent limitations built in to this model unless specific data are harvested. This dissertation therefore will not seek to conclusively explain the reasons behind certain observed trends in survivability for UK worker cooperatives.

3. Hypotheses and Limitations

3.1 Hypotheses

Given the absence of extensive recent research into worker cooperatives in the UK, survivability analysis provides a strong foundation upon which a hypothesis can be built. This dissertation hypothesises that worker cooperatives in the UK will experience a honeymoon period and a delayed peak in hazard, as per the liability of adolescence.

Furthermore, it is proposed that hazard rates for worker cooperatives will vary across industries possibly due to sector characteristics and differences in demand volatility, with risks expected to be greater for firms in industries where uncertainty is prevalent, such as the construction industry (The Financial Times, 2016). It is also proposed that there will be differences in hazard rates across geographical regions of the UK, potentially due to density effects as per Pérotin (2006). However, as nonparametric analysis will be used, external factors will not be tested and can only be speculated.

3.2 Limitations

The limitations of this model are implicit in the assumptions for nonparametric analysis, being that there may be external factors influencing survivability other than firm industry and location. It should also be highlighted that the effects of the 2007 global financial crisis may have skewed the data and affected survival rates disproportionately. Trends can be explored, and reasons speculated, but not empirically explained with strong degrees of confidence with a nonparametric model. Thorough explanations would require further empirical analysis with more specific data which is beyond the scope of this dissertation. This dissertation is also limited by its use of a relatively small number of observations in some groups for reasons which are explained in Section 4.1.

Due to restrictions placed on incorporation and dissolution data of the whole population of UK firms, nonparametric curves will not be estimated for all firms. Whilst this will limit the understanding of cooperative survival compared to conventional firms, descriptive statistics from the Office for National Statistics are referenced throughout Section 5 to provide an understanding of the business landscape in the UK for the last decade.

4. Data and method

4.1 Data

The core dataset for this dissertation with information regarding worker cooperatives in the UK was communicated to Professor Virginie Pérotin of Leeds University Business School by Cooperatives UK, the network for Britain's cooperative businesses. Company names and addresses were removed from

the original dataset in order to eliminate the possibility of association of confidential information with a company.

Incorporation data is available from the turn of the 20th Century until the end of 2015. However, due to the inconsistent electronic documentation of dissolution data prior to 2006, incorporation and dissolution dates before 2006 have been omitted in order for reliable results to be generated. This dissertation will therefore examine ten years of data between 2006 and 2015. This data details incorporation and dissolution dates of cooperatives from a maximum of 3,287 observations, 398 of which dissolved during the analysis period, which is used for analysis by geographical location.

The sample is reduced to 2,162 observations for analysis by industry, due to some worker cooperatives still awaiting their standard industrial classification by the end of the analysis period. Industries are defined as per their allocation by Cooperatives UK. Of the 2,162 observations, 252 are failed worker cooperatives. Where industry groups were particularly small, they were grouped with the most similar industry or industries in order to increase the reliability of estimates.

4.2 Method

Survival analysis describes the time elapsed between firm birth and death, and as such the dependent variable is time. Standard econometric techniques are not appropriate due to right-censoring, meaning that firm closure will not occur for all firms within the observed analysis period. In other words, at the final point of observation time, right-censored firms were still alive. These firms are considered to be at risk for the six months following the end of the observation period. As per Lawless (2003), the risk of a firm closing during a period of time given it has survived until then is given by the following hazard function:

$$h(t) = \Pr(T = t | T \geq t) = \frac{f(t)}{S(t)} \quad (1)$$

Where T , a non-negative value representing time between firm birth and death, is a continuous random variable with the probability density function $f(t)$ and cumulative distribution function $F(t) = \Pr\{T < t\}$ which gives the probability that death has occurred by time t , and $S(t)$ is the survival function.

This dissertation will firstly estimate Kaplan-Meier curves for worker cooperatives. The Kaplan-Meier estimator, a nonparametric estimate of the survivor function, measures the fraction of firms surviving for a certain amount of time after birth. As per Cleves *et al.* (2008), the Kaplan-Meier estimator is given by:

$$\hat{S}(t) = \prod_{j:t_j < t} \frac{n_j - d_j}{n_j} \quad (2)$$

Where $n_j = \sum I(t'_i \geq t_j)$ is the number of firms at risk at time t_j and d_j is the number of lifetimes. Kaplan-Meier estimates will then be used to estimate the hazard function by smoothing the Nelson-Aelan cumulative hazard with a kernel smoother. If the hazard contribution, $\Delta\hat{H}(t_j)$, for each observed time of firm death is define as:

$$\Delta\hat{H}(t_j) = \hat{H}(t_j) - \hat{H}(t_{j-1}) \quad (3)$$

Then the smoothed hazard, $\hat{h}(t_j)$, can be estimated using:

$$\hat{h}(t_j) = b^{-1} \sum_{j=1}^D K_t\left(\frac{t-t_j}{b}\right) \Delta\hat{H}(t_j) \quad (4)$$

For a given kernel function K_t and bandwidth b , with the summation over the D times that failure occurs. Using these equations, Kaplan-Meier and smoothed hazard curves will be estimated for worker cooperatives by geographical location and by industry. Grouped and separate estimates will be given in order to assess differences between separated industries and geographies from their respective group average.

5.0 Descriptive statistics and results

5.1 Descriptive statistics

To better understand the landscape faced by businesses in the UK before moving to the discussion of the nonparametric analysis results, descriptive statistics have been produced comparing the incorporation and dissolution numbers of cooperatives and all firms, as shown in Table 1.

Important to note here is, firstly, that cooperatives represent a very small proportion of firm incorporations and dissolutions in the UK, accounting for less than 1% of each total respectively. The reason for this remains unclear, however, a low density of firms could be a contributing factor as well as worker cooperatives not being well-known forms of business, as per the discussion in Section 2.2.

Notably, in the years following the global financial crisis the number of cooperatives incorporated did not reduce drastically as one might expect, especially given the larger decreases in the incorporation of all firms. However, in more economically stable years, cooperative incorporations fell whereas the number of incorporations for all firms grew. This complements the hypothesis proposed by Ben-Ner (1984) and Vanek (1977) that the creation of worker cooperatives is countercyclical, with more being created in times of economic hardship. However, it is possible that many of the new firms created are micro firms with between one and ten employees, but further economic analysis would be needed to support this.

Table 1: The UK Business Landscape, 2006 – 2014

| Year | Incorporated | | Dissolved | |
|-------|--------------|-----------|-----------|-----------|
| | Coops | All firms | Coops | All firms |
| 2006 | 368 | 255,530 | 21 | 207,125 |
| 2007 | 412 | 280,730 | 40 | 223,600 |
| 2008 | 425 | 267,445 | 159 | 222,560 |
| 2009 | 392 | 236,030 | 176 | 277,435 |
| 2010 | 384 | 235,145 | 404 | 248,595 |
| 2011 | 465 | 261,370 | 613 | 229,525 |
| 2012 | 297 | 269,565 | 688 | 252,400 |
| 2013 | 207 | 346,485 | 655 | 237,625 |
| 2014 | 179 | 350,585 | 405 | 245,835 |
| Total | 3,129 | 2,502,885 | 3,161 | 2,144,700 |

Source(s): ONS (2011, 2014); Coops computed from Cooperatives UK data, 2006 – 2014 sample.

The number of cooperatives dissolving grows steadily until 2009 with the number increasing relatively drastically from 2010 to 2012 before beginning to decrease slightly again until the end of the observation period. Dissolution rates for all UK firms fluctuate more than cooperatives and, as such, no clear pattern emerges. However, given that the peak dissolution number for all firms occurs in 2009 immediately after the market crash, and the peak for cooperatives is not until 2012, it could be argued that cooperatives do not survive as well in times of relative economic prosperity. Of course, descriptive statistics cannot provide a thorough understanding of this and further econometric investigation would be required.

Tables 2 and 3 show the breakdown of worker cooperatives as per their geographical location and industry.

Table 2: Cooperative Populations by Location

| Location | Total incorporated | Total dissolved | % dissolved | Right-censored |
|-------------------|--------------------|-----------------|-------------|----------------|
| East Anglia | 99 | 15 | 15% | 84 |
| East Midlands | 169 | 25 | 15% | 144 |
| Northern Ireland | 21 | 3 | 14% | 18 |
| Northeast England | 518 | 55 | 11% | 463 |
| Northwest England | 472 | 61 | 13% | 411 |
| Scotland | 284 | 57 | 20% | 227 |
| Southeast England | 750 | 79 | 11% | 671 |
| Southwest England | 536 | 66 | 12% | 470 |
| Wales | 186 | 17 | 9% | 169 |
| West Midlands | 252 | 20 | 8% | 232 |
| Total | 3,287 | 398 | 12% | 2,889 |

Source(s): Computed from Cooperatives UK data, 2006 – 2015 sample. *Notes:* Only firms incorporated and dissolved in the observation period are included, with any previous incorporations omitted. % dissolved is the percentage of those incorporated which closed during the observation period. Right-censored are those firms which were still alive at the end of the observation period.

Worker cooperative incorporations are more common in the South of England than in any other location in the UK, with the Southeast and Southwest combined accounting for just under 40% of the

total incorporations in the sample. The Northwest and Northeast of England combined account for a further 30% of incorporations, although given that Northern England has a history of cooperation (Birchall, 1994) this is not necessarily unexpected. Northern Ireland accounts for the smallest proportion of incorporations at less than 1% of the sample. It is unclear why these figures emerge, and although they could be attributed to density effects, this cannot be tested with confidence in this sample as any cooperatives incorporated before 2006 are not included.

It might be hypothesised that the South of England would see the lowest dissolution rates given the high incorporation rates and probable high density of cooperatives, but the West Midlands and Wales saw the lowest proportion of dissolutions during the observation period. The highest proportion of dissolutions is observed in Scotland with 20% of worker cooperatives incorporated between 2006 and 2015 failing by the end of 2015.

Table 3: Cooperative Populations by Industry

| Location | Total incorporated | Total dissolved | % dissolved | Right-censored |
|----------------------------------------------------------------------|--------------------|-----------------|-------------|----------------|
| Agriculture | 129 | 23 | 18% | 106 |
| Arts, Culture, Sports, Recreation | 318 | 30 | 9% | 288 |
| Finance, Real Estate, Professional Services, Admin Support | 306 | 44 | 14% | 262 |
| Human Health and Social Care, Defence, Education | 210 | 45 | 21% | 165 |
| Manufacturing, Construction, Waste Management, Mining | 250 | 22 | 9% | 228 |
| Membership Groups, Trade Unions, Other | 535 | 41 | 8% | 494 |
| Retail, Hospitality, Transport, Digital Media and Telecommunications | 414 | 47 | 11% | 367 |
| Total | 2,162 | 252 | 12% | 1,910 |

Source(s): Computed from Cooperatives UK data, 2006 – 2015 sample. *Notes:* Only firms incorporated and dissolved in the observation period are included, with any previous incorporations omitted. Firms awaiting classification are omitted. % dissolved is the percentage of those incorporated which closed during the observation period. Right-censored are those firms which were still alive at the end of the observation period. Industry descriptions are as per the Cooperatives UK data.

The industry with the most incorporations is Membership Groups, Trade Unions and Other, which could include political groups, religious organisations and other service activities, for example. Given the economic turbulence recently experienced by the UK and factors such as psychological commitment and a stronger willingness to preserve jobs, it is not unexpected that so many of these types of organisations were created and so relatively few failed in this period. The industry with the fewest incorporations is Agriculture, which also experiences one of the highest dissolution rates.

The industry with the most incorporations is Membership Groups, Trade Unions and Other, which could include political groups, religious organisations and other service activities, for example. Given the economic turbulence recently experienced by the UK and factors such as psychological commitment and a stronger willingness to preserve jobs, it is not unexpected that so many of these types of organisations were created and so relatively few failed in this period. The industry with the fewest incorporations is Agriculture, which also experiences one of the highest dissolution rates.

5.2 Comparison of worker cooperatives by geographical location

The comparison of worker cooperatives by geographical location uses the full sample of 3,287 observations from 2006 to 2015. The results are shown in Figure 1. The vertical axis of the smoothed hazard curves gives the estimated risk of closing at an age, given that the firm has survived until then with the correction for right-censoring, and the horizontal axis gives the time period in years. The vertical axis of the Kaplan-Meier graphs represents the proportion of firms surviving at a given age. All firms at analysis time zero survive because they have just been born, hence the starting point of (0, 1.00). The horizontal axis represents the age reached by the firm.

In Panel 1a, the smoothed hazard estimate for the group suggests a liability of adolescence for worker cooperatives with a honeymoon period of approximately four years. Hazard peaks between the third and fourth year and, notably, peaks for a second time between years five and six before dramatically declining thereafter. Given that the data only spans ten years, it cannot be concluded from these results whether the hazard rate stabilises at a certain point. However, the last observed hazard rate at just less than seven years is at approximately 1.9%, which is exceptionally low. More sense can be made of this when considering the grouped Kaplan-Meier survival estimate. The proportion of firms surviving over time declines slightly quicker in the first four years and less so thereafter, stabilising at approximately 80%, which is much higher than the figures reported by the ONS for all firms. These statistics show that, of all UK firms born in 2006, only 45% survived beyond five years, and in 2009 this figure drops to 41.7% surviving beyond five years (ONS 2011, 2014. See Appendix 1). This supports the argument that cooperatives survive at least as well, if not better, than conventional firms, and warrants further empirical investigation.

Panel 1a also includes Kaplan-Meier estimates of the group by geographical location. This confirms the hypothesis that survival rates vary across geographical locations which warrants a more detailed discussion. Panels 1b to 1k of Figure 1 show each location with Kaplan-Meier curves on separate graphs, as well as their own smoothed hazard estimates.

For East Anglia, the smoothed hazard estimate shows the hazard peaking between the third and fourth year at just under 3.2% and declining before then peaking again slightly before the end of the fifth year.

The shape is similar to the overall group curve, but the hazard rates are generally higher. The proportion of cooperatives surviving in East Anglia as given by the Kaplan-Meier estimate is slightly lower than that for the group at each time interval, but follows a similar slight downward trend with around 76% of cooperatives surviving by the end of the observation period. East Anglia saw a relatively low number of incorporations, so density effects as per Pérotin (2006) might explain the comparatively lower survival rates.

The East Midlands' smoothed hazard estimate is a different shape to the overall group and grows steadily until the fourth year and then sharply between years four and five to approximately 5%. The Kaplan-Meier estimate also sees a more drastic drop in the proportion of firms surviving between approximately years three and six before stabilising at around 76%. The East Midlands experienced a relatively low number of incorporations when compared with other areas of the UK and so like with East Anglia, low density could potentially explain the low survival rates. However, survival rates are still exceptionally high.

Northern Ireland is a case of particular interest, because it sees the largest stray from the group mean. The smoothed hazard estimate dips in at around year three and then grows dramatically in the following six months, which might suggest a liability of maturity if the upward trend were to continue. The Kaplan-Meier survival estimate for Northern Ireland sees a generally dramatic decrease in the proportion surviving between years one and four, dropping from 100% to just over 50%. The sample for Northern Ireland is small and the standard errors become large for years three and four. As such, the reliability of these estimates is questionable. However, Northern Ireland saw the lowest number of incorporations so perhaps a low density of worker cooperatives is not supporting survival.

The Northeast of England experiences a clear liability of adolescence, with two peaks at around three and six years and a dramatic drop in the hazard rate in between to a low of around 1.3%. The Kaplan-Meier estimate is similar to the group estimate. The Northwest of England is similar to the Northeast in that it experiences two peaks in hazard, one at around year three and the other at around year five although for the Northwest the peak hazard rates are slightly higher, with the peak at just under 2.6%. The two hazard peaks are worth considering further given that these locations saw relatively high numbers of incorporation. When considering the fact that Northern England is associated with the early cooperative movement (Birchall 1994), it could be expected that density would be high. A second period of hazard therefore could be due to too many firms beginning to occupy the area as proposed by quadratic density effects and warrants further investigation.

After Northern Ireland, the group with the largest variation from the population mean is Scotland. The smoothed hazard curve does bear a strong resemblance to the overall population with the first, largest peak at around year four and a second around year six, but the hazard rates are generally higher, with

the highest point at around 5%. The Kaplan-Meier estimate for Scotland lies below the population curve throughout the analysis period and experiences a more dramatic decrease in survival rates. Scotland saw a decent number of incorporations but experienced the highest percentage of dissolutions. This could be due to a low or quadratic density effect.

Southeast and Southwest England experienced the largest number of worker cooperative incorporations throughout the analysis period. It is therefore unsurprising that both of their Kaplan-Meier estimates are similar to the overall population mean, given that they have a large combined weighting and influence on that mean. The shapes of the smoothed hazard curves are also similar and show a clear liability of adolescence with both experiencing their highest peak in around year three. However, unlike the Southwest and the overall group, the Southeast does not experience such a large second peak and it seems that the hazard rate is beginning to stabilise. Density could be interpreted to be approaching the optimal level here.

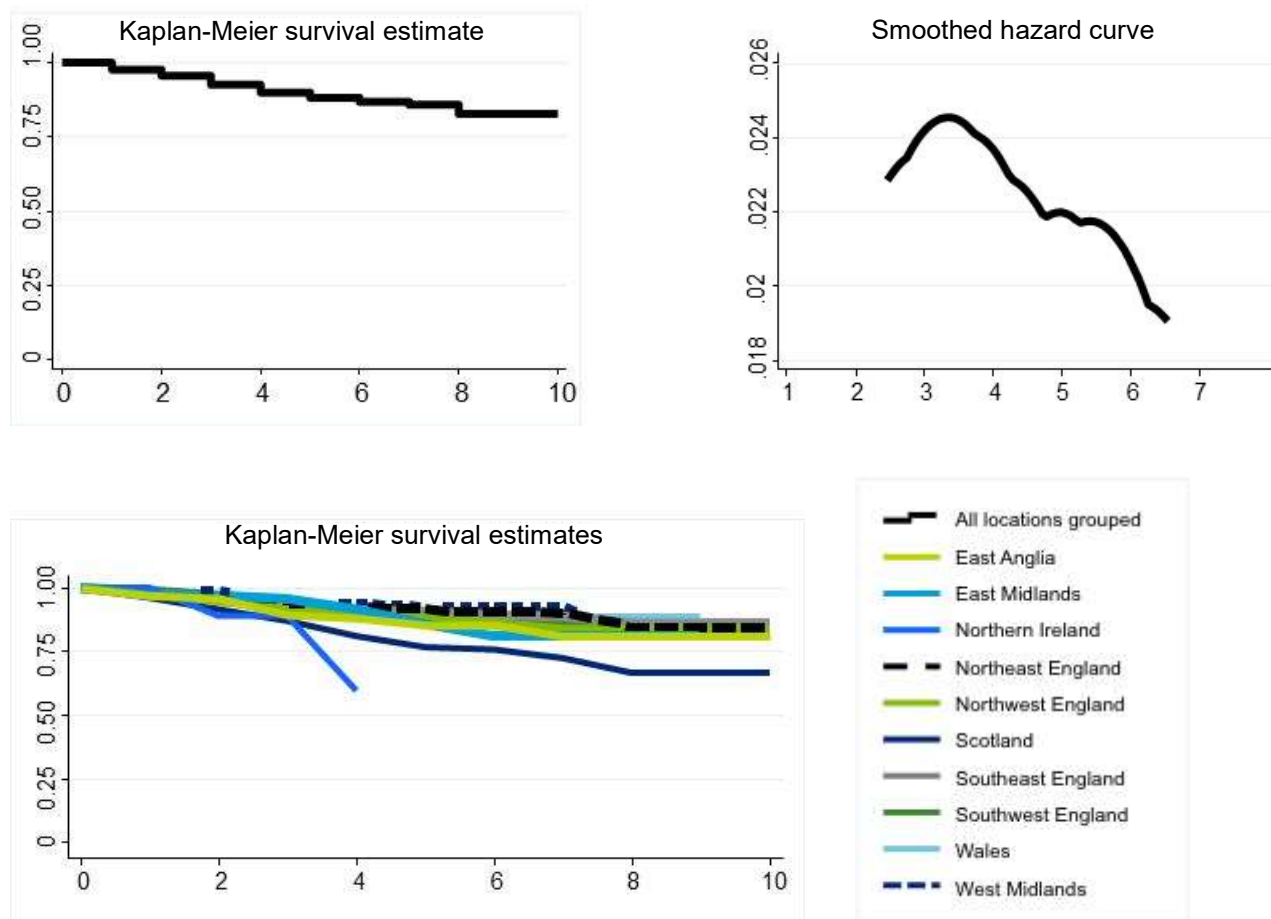
Wales demonstrates a clear liability in adolescence, with the peak hazard at around year three. Wales is one of the only groups whose Kaplan-Meier estimate ends above the group average with around 90% of the sample surviving until the end of the observation period. This might contradict density theory, however given the size and human population of Wales, the relative density could be high.

The West Midlands, similarly to Northern Ireland, could be showing the beginnings of a liability of maturity with hazard continuing to increase with time. The West Midlands is home to many manufacturing companies, an industry which suffered greatly during the economic crisis. The West Midlands' curves are similar to those of the Manufacturing, Construction, Waste Management, Mining industry (Figure 2f) so it could be argued that the overpopulation of this area with firms of a volatile industry is affecting the results disproportionately.

Whilst, with these results, it can be reasonably concluded that cooperatives across all locations experience a liability of adolescence, and that hazard and survival rates vary for worker cooperatives in the UK depending on their geographical location, caution must be exercised. As per the limitations in Section 3.2, the number of observations for the population as a whole is small particularly for some locations such as Northern Ireland, affecting the reliability of the results. Moreover, although external factors such as density could be affecting these results, nonparametric estimates cannot account for these. However, survival rates for most locations are still exceptionally high compared to national figures for all firms, thus it appears labour-managed firms survive well in the UK.

Figure 1: Smoothed Hazard and Kaplan-Meier Curves of UK Worker Cooperatives by Geographical Location

1a. Grouped data



1b. East Anglia

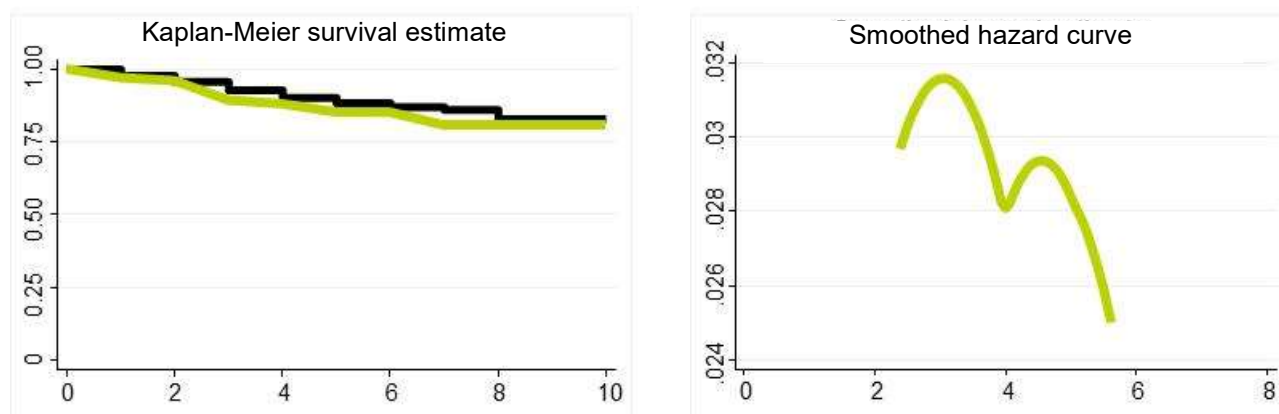
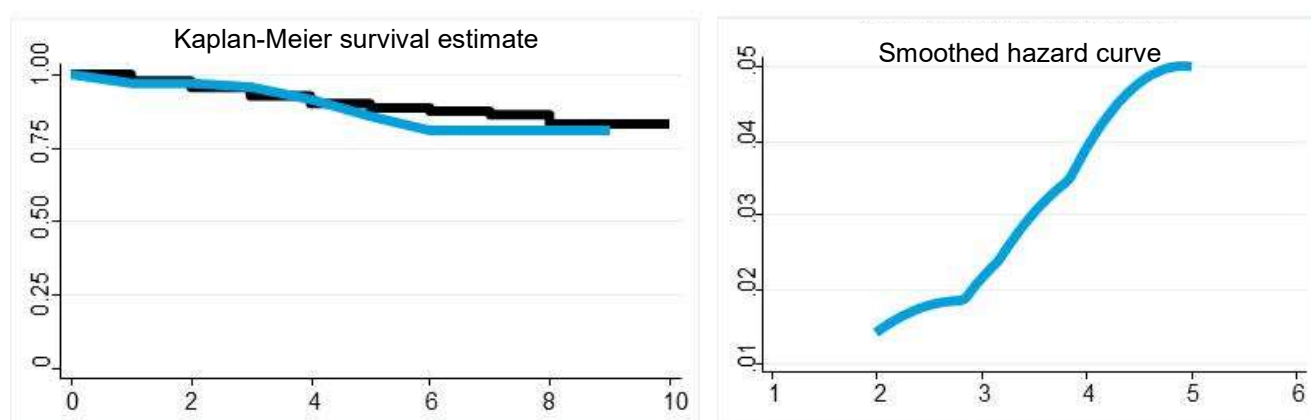
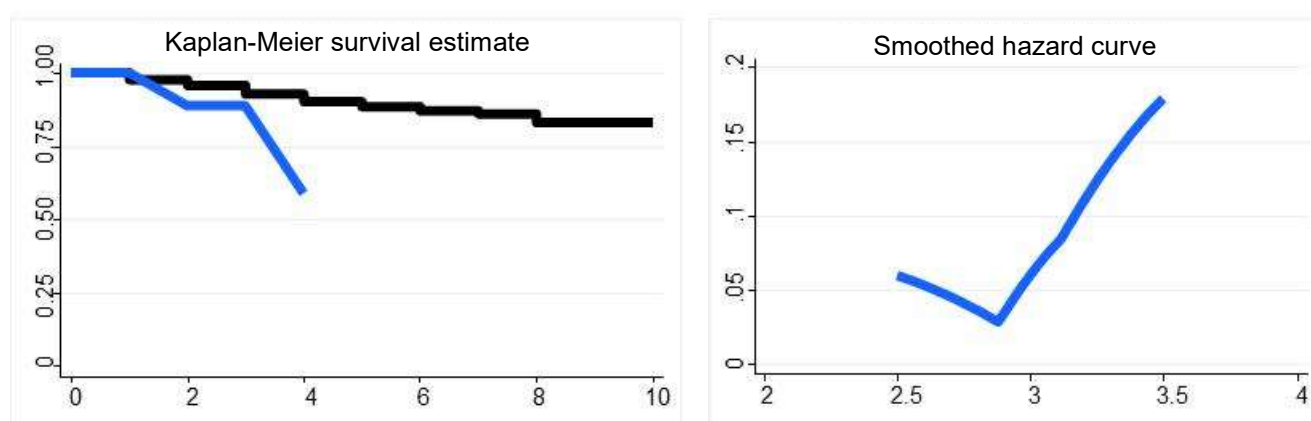


Figure 1: continued

1c. East Midlands



1d. Northern Ireland



1e. Northeast England

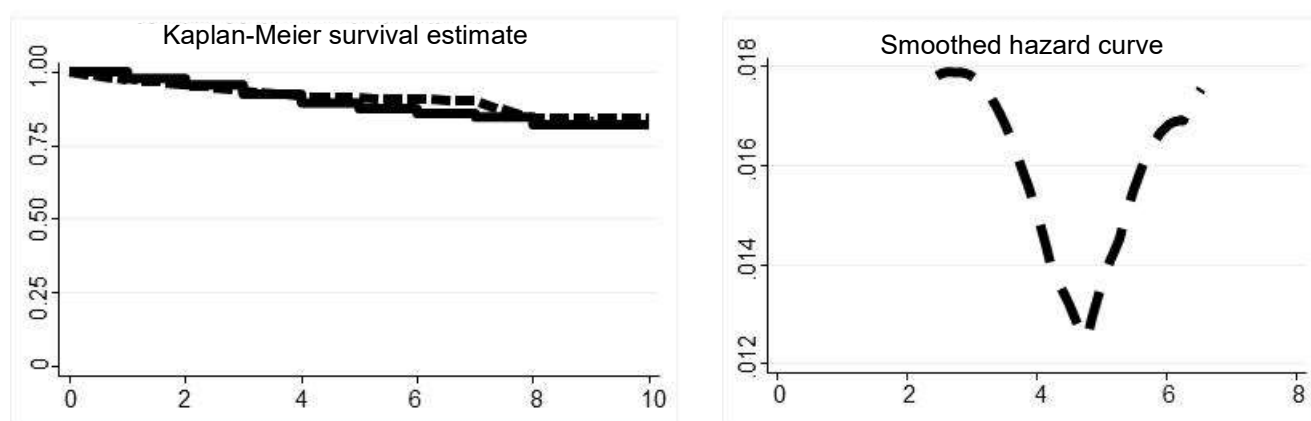
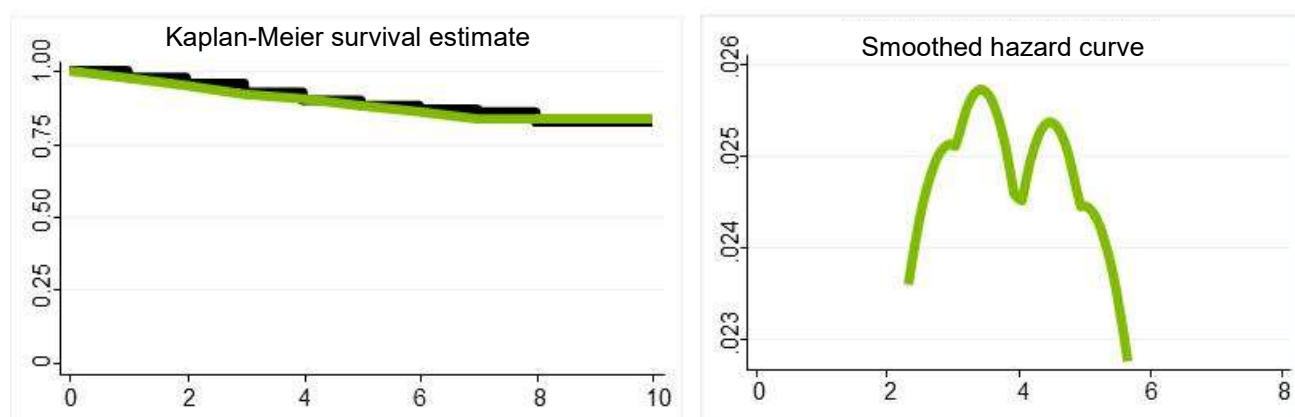
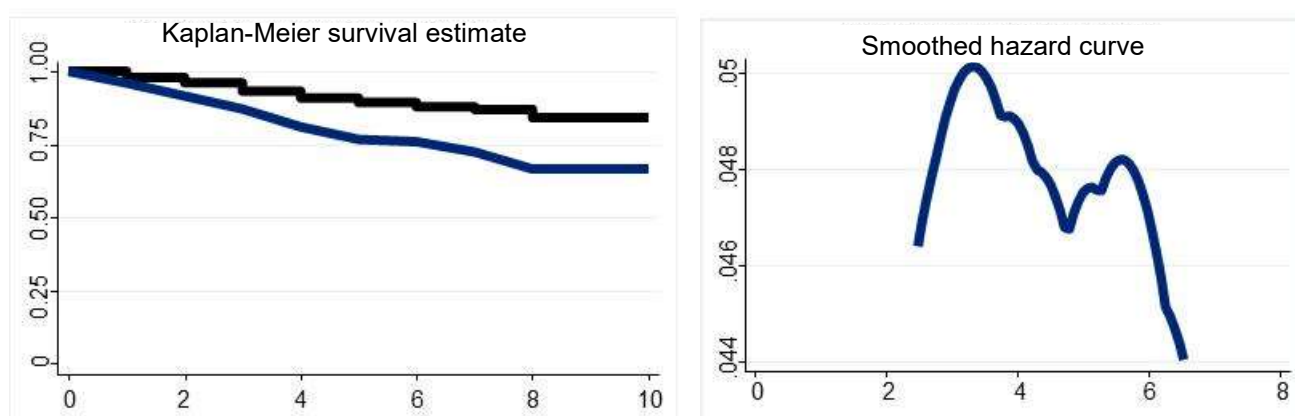


Figure 1: continued

1f. Northwest England



1g. Scotland



1h. Southeast England

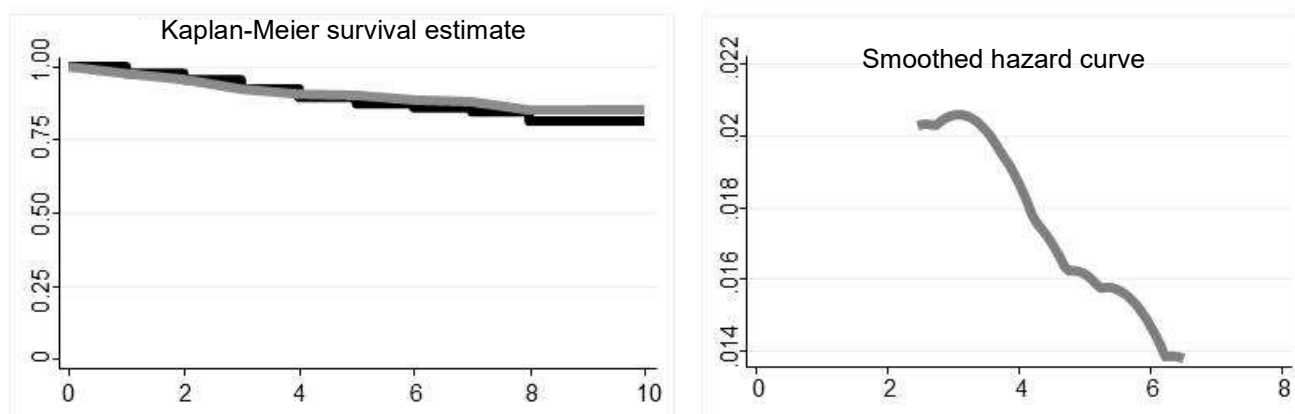
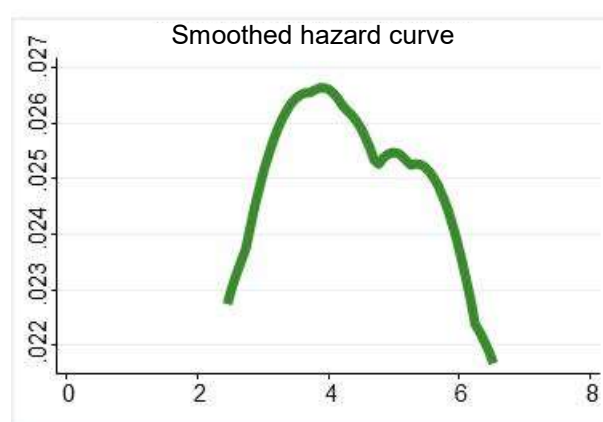
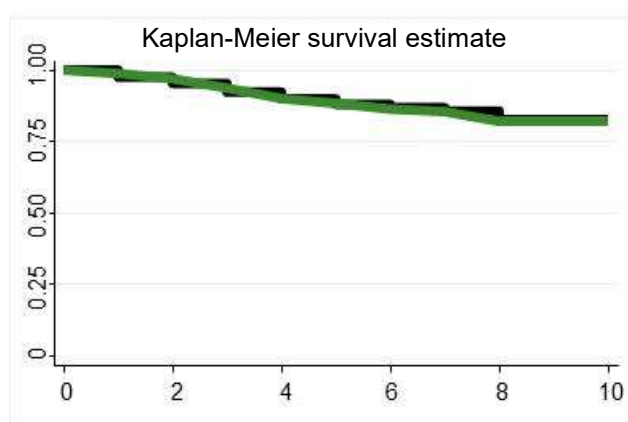
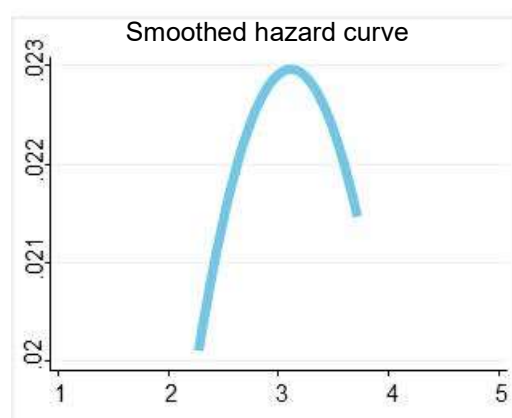
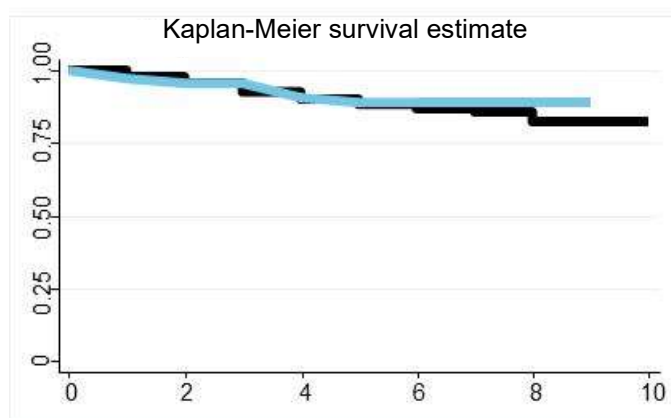


Figure 1: continued

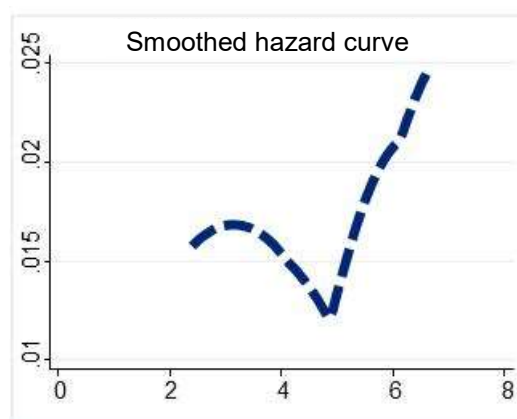
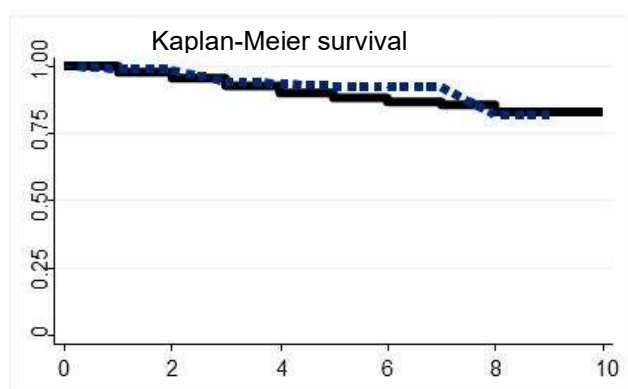
1i. Southwest England



1j. Wales



1k. West Midlands



5.3 Comparison of worker cooperatives by industry

The comparison of worker cooperatives by industry uses a reduced sample of 2,162 observations and the results are shown in Figure 2, with axes descriptions as before in Section 5.2. The reduction in the sample changes the shape of the overall group smoothed hazard curve. Growth to the first peak at year four is dramatic, but the hazard rate then fluctuates between years four and six. It has a second peak which accounts for the highest hazard rate at 2.2% in year six. The hazard rate then begins to decrease at a similar rate to which it grew to the first peak. It would not be prudent to make assumptions about the stabilisation of the hazard rate until more data become available. The overall group hazard rate, despite the reduction in sample size, is similar to that of the previous group, with a slight decrease year-on-year in the survival rate of cooperatives until it stabilises in year eight. A graph of Kaplan-Meier estimates separated by industry is also included. It is clear from this graph that survival rates differ depending on industry so an exploration into each industry's survival and hazard curves is necessary.

Firstly, the Agriculture industry experiences a rise in hazard with slight fluctuations until around year five, peaking at just under 4%. From this point, hazard begins to fall. The Kaplan-Meier estimate for Agriculture lies below that of the overall group throughout the analysis period, and decreases between years two and seven before stabilising at over 75%. Given that Agriculture has the smallest sample size, this could be due to a lack of density, but further empirical analysis would be necessary to substantiate this. Furthermore, agriculture as an industry has suffered in recent years due to crippling production costs, poor weather and disease (The Guardian, 2013), so the volatility of the industry could have affected these results.

As with the overall group average, worker cooperatives in the Arts, Culture, Sports and Recreation industry see a hazard curve with two peaks. However, for this industry it is the first peak which is largest at over 1.9% in around year three. The hazard rate then drops slightly until peaking again at a lower rate of around 1.85% between years four and five. This industry fares better than the population average in terms of the Kaplan-Meier survival estimates. Survival rates are similar until around year seven, when survival rates for the Arts, Culture, Sports and Recreation industry stabilise at around 90%, which is exceptionally high. This industry saw a relatively high number of incorporations, so the density effect could potentially be at an optimal point.

The Finance, Real Estate, Professional Services and Admin Support industry exhibits a clear liability of adolescence. The hazard rate increases with some fluctuations to its peak at around year 6 with a hazard rate of over 2.8%. The Kaplan-Meier estimate for this industry of worker cooperatives follows a similar pattern to that of the overall group, but lies just below the overall group curve throughout most of the analysis period. The effects of the global financial crisis do not seem to have negatively

affected survival for cooperatives in this industry, despite the effects felt by conventional firms (Adair *et al.*, 2014), which is consistent with the line of argument that cooperatives survive better than conventional firms in times of economic hardship.

The Human Health and Social Care, Defence and Education industry experiences the most dramatic change from the overall group average both in terms of the smoothed hazard estimate and the Kaplan-Meier estimate. The hazard rate grows slightly from the second year before beginning to decrease until around year five. The Kaplan-Meier estimate lies closely below that of the group average until year seven, but by the end of the analysis period, just over 50% of cooperatives in this industry survive. This industry saw a low number of incorporations during the analysis period, so the observed patterns could be due to a lack of density, which itself could be attributed to the fact that healthcare, defence and education in the UK are largely associated with the Public Sector.

The Manufacturing, Construction, Waste Management and Mining industry's smoothed hazard curve could suggest a liability of maturity, but even so the industry experiences low hazard rates with its maximum at around 4%. The survival rate for firms in this industry, as per the Kaplan-Meier estimates, remain similar to that of the overall group average and by the end of the sample, around 75% of those Manufacturing, Construction, Waste Management and Mining firms incorporated during the analysis period survive. This industry has been marred by big name closures and financial difficulty, such as Rover (The Guardian, 2005) and more recently, Tata Steel (BBC, 2016), but for cooperatives this industry appears relatively stable. This is consistent with the idea that cooperatives are good job preservers and survive better than conventional firms.

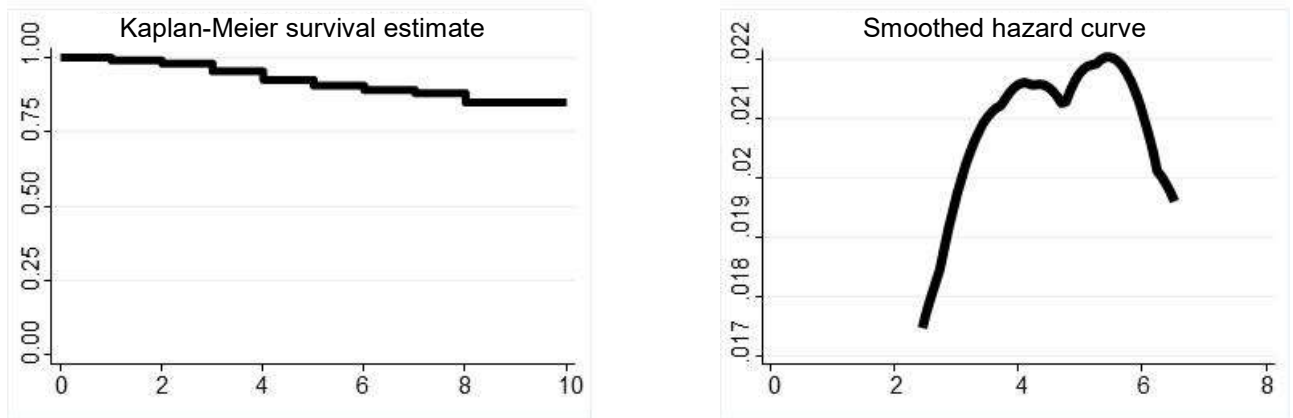
The Retail, Hospitality, Transport and Digital Media and Telecommunications industry experiences hazard and survival rates most similar to the overall group average. The hazard rate grows until just after year four where it peaks at 2.2%, drops slightly, and then peaks again before beginning to decrease. The Kaplan-Meier estimate is similar to that of the overall group average. This group saw the second highest number of incorporations and as such, the density of firms in this industry could be having a positive effect on survival.

Worker cooperates in the Member Groups, Trade Unions and Other industry appear to fare best. The smooth hazard curve exhibits a clear liability of adolescence with a peak of around 1.7% at year four. The Kaplan-Meier curve shows that survivability rates decrease only very slightly between years two and four. Around 90% of firms in the sample are still alive by the end of the analysis period. Given that cooperatives are associated with democratic ideals and job preservation, it could be expected that this group would fare well given the purpose of trade unions.

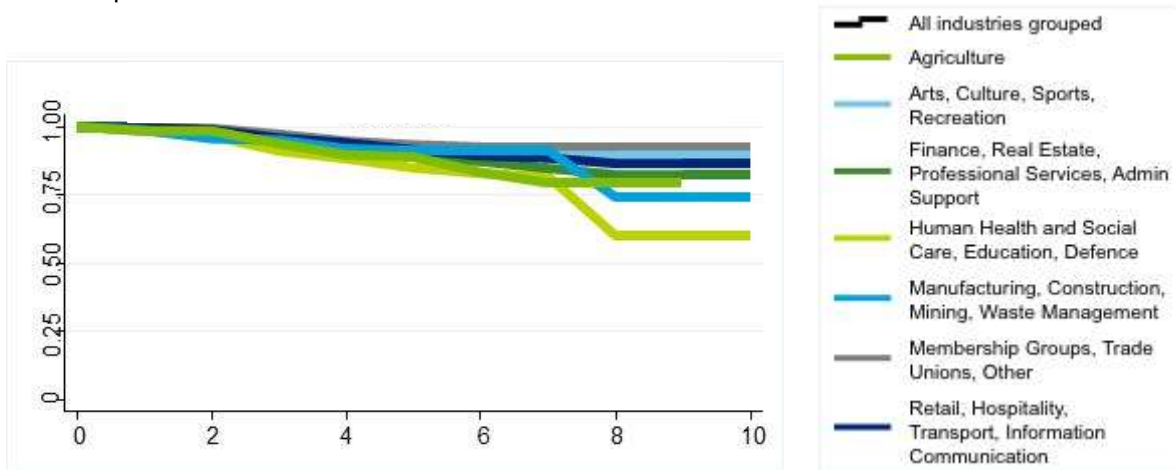
From these results it can be reasonably concluded that, as well as worker cooperatives in all industries exhibiting a liability of adolescence, survival chances also depend on the industry in which the cooperative operates. It should be reinforced here that survival rates, although varied, are generally exceptionally high, which supports the theory that cooperatives survive better than conventional firms. However, causes of observed trends are speculative only, so caution in drawing conclusions need be exercised, given the limitations of this model.

Figure 2: Smoothed Hazard and Kaplan-Meier Curves of UK Worker Cooperatives by Industry

2a. Grouped data



Kaplan-Meier survival estimates



2b. Agriculture

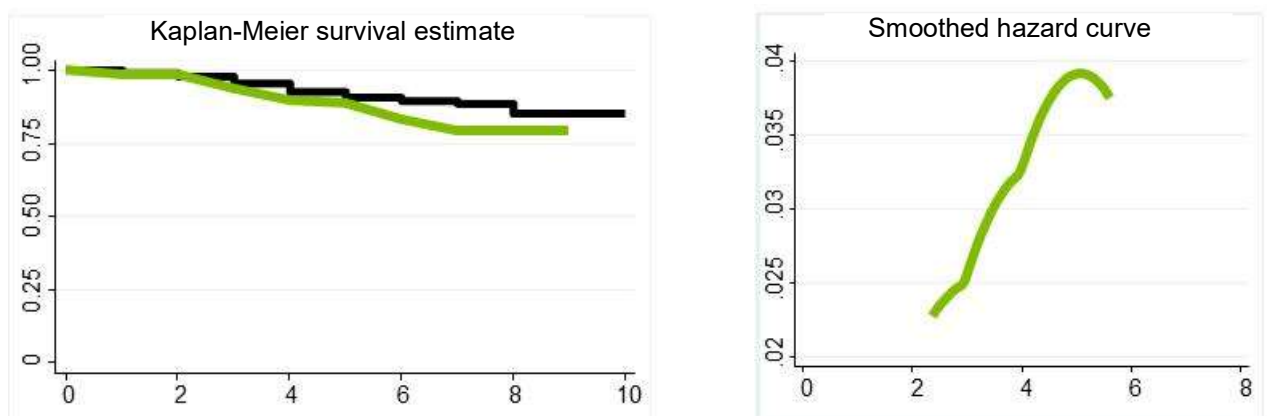
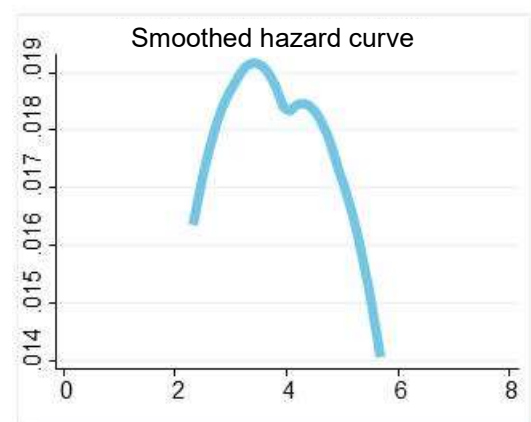
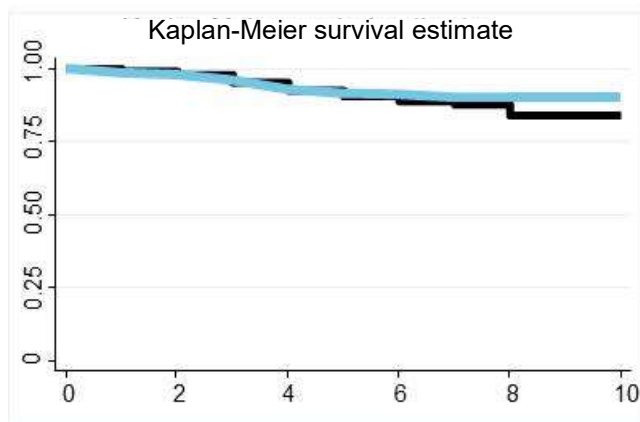
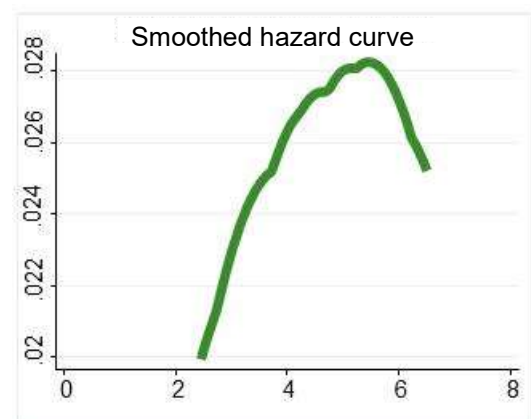
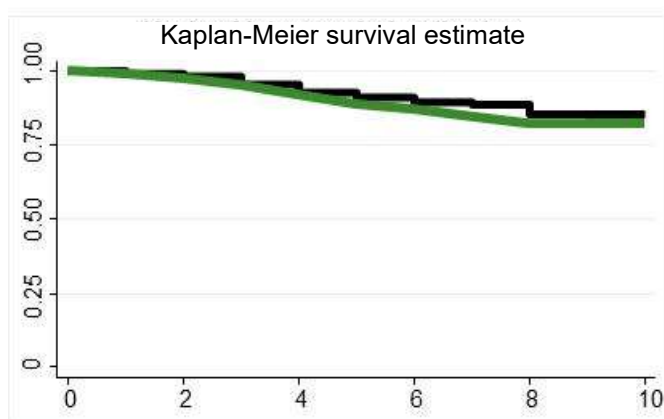


Figure 2: continued

2c. Arts, Culture, Sports, Recreation



2d. Finance, Real Estate, Professional Services, Admin Support



2e. Human Health and Social Care, Education, Defence

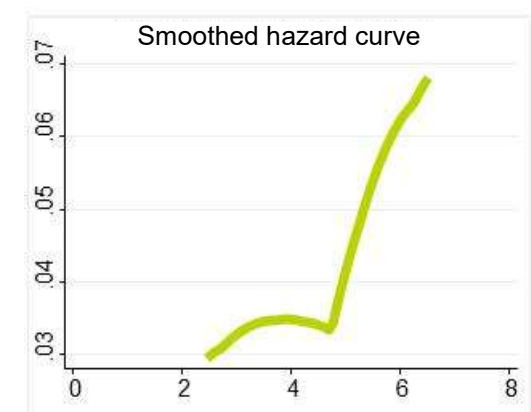
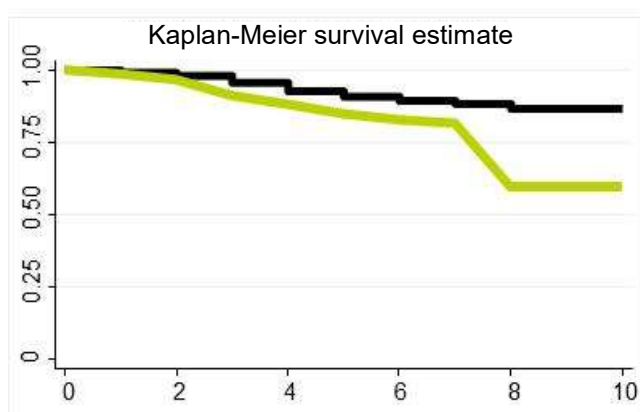
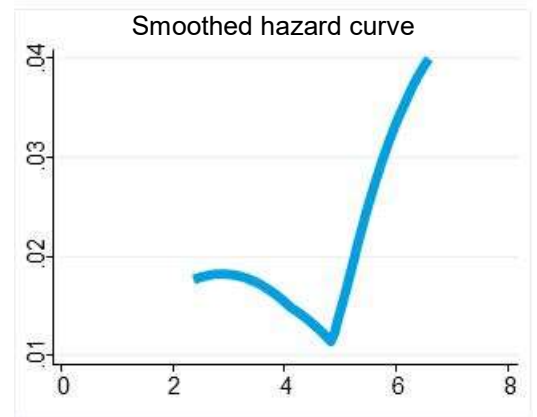
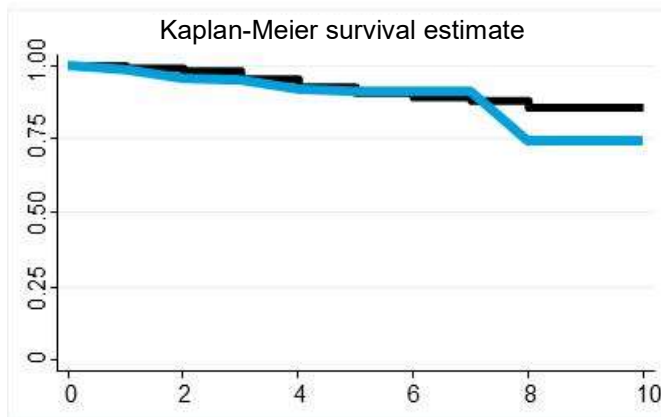
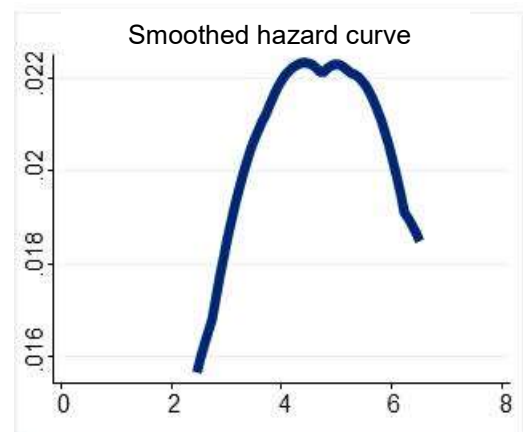
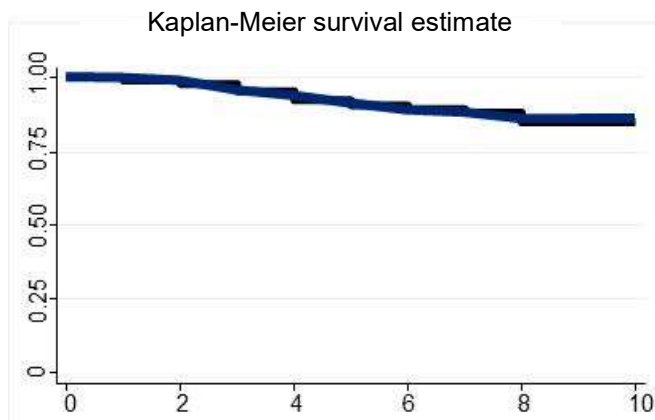


Figure 2: continued

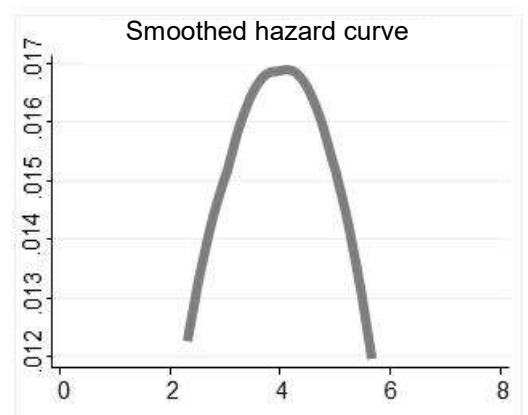
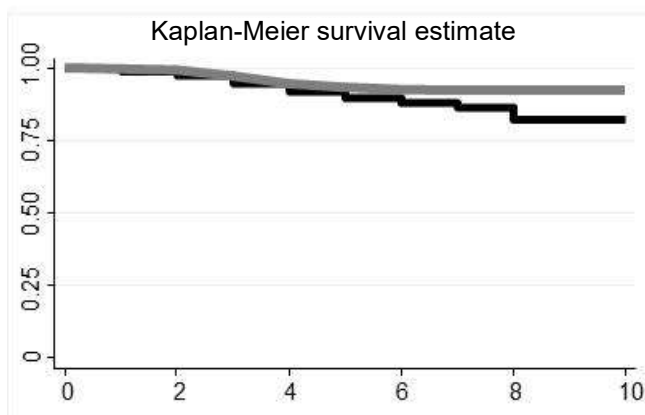
2f. Manufacturing, Construction, Waste Management, Mining



2g. Retail, Hospitality, Transport, Digital Media and Telecommunications



2h. Membership Groups, Trade Unions, Other



6. Conclusion

This statistical analysis has examined the hazard and survival rates of worker cooperatives in the UK. Analysis of the theoretical debate in Section 2 demonstrated that, before considering empirical analysis, there are polarising opinions as to the viability of cooperation as a way of working, which consequently inspired much empirical work over recent decades. However, survival analysis of worker cooperatives has been rare and, furthermore, little is known about worker cooperatives in the UK. One of the main theoretical perspectives as proposed by Pérotin (2004) suggests that worker cooperatives are likely to experience a liability of adolescence instead of a liability of newness as experienced by conventional firms. This can be attributed to differences in the levels of start-up size and costs, as well as the enthusiasm and commitment of members. Pérotin (2006) finds that geographical location is an important factor when considering cooperative survival due to information barriers, and Burdín (2014) proposes that worker cooperatives will experience different hazard rates depending on their industry. Consequently, in order to better understand the business of cooperation in the UK, this dissertation uses survival analysis to estimate nonparametric hazard curves for cooperatives by industry and by location.

The results in Section 5 provide evidence suggesting that worker cooperatives in the UK are faced with the liability of adolescence. In addition, there is evidence to suggest that hazard and survival rates vary across geographical locations, with worker cooperatives experiencing their best survival rates in Wales and the worst survival rates in Northern Ireland, although the latter could be an imprecise estimate. There is evidence to suggest that worker cooperatives in different industries experience different hazard patterns and survival rates. Survival rates are highest for cooperatives in the Membership Groups, Trade Unions and Other industry and lowest for Human Health and Social Care, Education and Defence. Comparisons of descriptive statistics also suggest that worker cooperatives may survive better than conventional firms in the UK, however, due to a lack of readily accessible data, a thorough analysis of this is not possible. Furthermore, the conclusions that can be drawn from the results are limited, due to the relatively small sample size and the fact that nonparametric tools for analysis cannot account for external factors which might affect firm survivability. Nonetheless, it appears that worker cooperatives survive well in the UK, thus a pertinent question remains as to why there are so few.

Bibliography

- Adair, A., Berry, J., Haran, M., Lloyd, G., and McGreal, S. 2014. *The Global Financial Crisis: Impact on Property Markets in the UK and Ireland*. Ulster: The University of Ulster. [Online]. [Accessed: 25th April 2016].
Available at: <https://www.researchgate.net/publication/253951034> *The Global Financial Crisis Impact on Property Markets in the UK and Ireland*
- Alchian, A.A., and Demsetz, H. 1972. Production, Information Costs and Economic Organization. *American Economic Review*. **62**(5), pp. 777-795.
- Audretsch, D. 1991. New-Firm Survival and the Technological Regime. *Review of Economics and Statistics*. **120**(2), pp. 701-728.
- BBC. 2016. Tata Steel Plans to Sell Loss-making UK Plants. BBC. [Online]. [Accessed: 25th April 2016].
Available at: <http://www.bbc.co.uk/news/business-35922046>
- Ben-Ner, A. 1984. On the Stability of the Cooperative Type of Organisation. *Journal of Comparative Economics*. **8**(3), pp. 247-260.
- Berman, K.V., and Berman, M.D. 1989. An Empirical Test of the Theory of the Labor-Managed Firm. *Journal of Comparative Economics*. **13**(2), pp. 281-300.
- Birchall, J. 1994. *Co-op: The People's Business*. Manchester: Manchester University Press.
- Blair, M., Kruse, D. and Blasi, J. 2000. Employee Ownership: An Unstable Form or a Stabilizing Force? In M. Blair and T. Kochan (Eds.), *The New Relationship: Human Capital in the American Corporation*. Washington DC: Bookings.
- Brüdel, J., and Schüssler, R. 1990. Organizational Mortality: The Liability of Newness and Adolescence. *Administrative Science Quarterly*. **35**(3), pp. 530-547.
- Burdín, G. 2014. Are worker-managed firms less likely to fail than conventional enterprises? Evidence from Uruguay. *Industrial and Labor Relations Review*. **67**(1), pp. 202-238.
- Burdín, G., and Dean, A. 2009. New Evidence on Wages and Employment in Worker Co-operatives Compared with Capitalist Firms. *Journal of Comparative Economics*. **37**(4), pp. 517-533.
- Cefis, E., and Marsili, O. 2005. A Matter of Life and Death: Innovation and Firm Survival. *Industrial and Corporate Change*. **14**(6), pp. 1167-1192.
- Cleves, M., Gould, W.W., Gutierrez, R.G., and Marchenko, Y. 2008. *An Introduction to Survival Analysis Using Stata*. 2nd ed. Texas: Stata Press.
- Cole, G.D.H. 1944. *A Century of Co-operation*. London: George Allen and Unwin Ltd.
- Cooperatives UK. 2015. *The UK Co-operative Economy 2015: An Ownership Agenda for Britain*. [Online]. [Accessed: 1st March 2016].
Available at: http://www.uk.coop/sites/default/files/uploads/attachments/co-op_economy_2015.pdf
- Craig, B., and Pencavel, J. 1992. The Behaviour of Worker Co-operatives: The Plywood Companies of the Pacific Northwest. *American Economic Review*. **82**(5), pp. 1083-1105.
- Craig, B., and Pencavel, J. 1995. Participation and Productivity: A Comparison of Worker Cooperatives and Conventional Firms in the Plywood Industry. *Brookings Papers: Microeconomics*, pp. 121-160.
- Disney, R.H., Haskel, J., and Heden, Y. 2003. Entry, Exit and Establishment Survival in UK Manufacturing. *Journal of Industrial Economics*. **51**(1), pp. 91-112.

- Dow, G. 2003. *Governing the Firm: Workers' Control in Theory and Practice*. New York and Cambridge: Cambridge University Press
- Ellerman, D.P. 1990. *The Democratic Worker-owned Firm*. London: Unwin Hyman Ltd.
- Estrin, S., Jones, D.C., and Svejnar, J. 1987. The Productivity Effects of Worker Participation: Producer Cooperatives in Western Economies. *Journal of Comparative Economics*. **11**(1), pp. 40-61
- Evans, D.S. 1987. The Relationship Between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries." *Journal of Industrial Economics*. **35**(4), pp. 567-581.
- Fakhfakh, F., Pérotin, V., and Gago, M. 2012. Productivity, Capital and Labor in Labor-Managed and Conventional Firms in France. *Industrial and Labor Relations Review*. **65**(4), pp. 847-879.
- Cadman, E. 2016. The Financial Times. Economic Uncertainty Hits UK Construction Industry. *The Financial Times*. [Online]. [Accessed: 20th March 2016].
Available at: <http://www.ft.com/cms/s/0/e4ad2814-e05f-11e5-9217-6ae3733a2cd1.html#axzz43uxBQ5Go>
- Freeman, R.B. 1978. Job Satisfaction as an Economic Variable. *American Economic Review*. **68**(2), pp. 135-141.
- Freeman, J., Carroll, G.R., and Hannan, M.T. 1983. The Liability of Newness: Age Dependence in Organizational Death Rates. *American Sociological Review*. **48**(5), pp. 692-710.
- The Guardian, 2005. How Rover Reached the End of the Road. *The Guardian*. [Online]. [Accessed: 25th April 2016].
Available at: <http://www.theguardian.com/business/2005/apr/10/politics.motoring>
- Rayner, J. 2013. Britain's farming crisis: 'People don't realise how tough everything is'. *The Guardian*. [Online]. [Accessed: 25th April 2016].
Available at: <http://www.theguardian.com/environment/2013/mar/16/britain-farming-crisis-how-tough>
- Hansmann, H. 1990. *The Ownership of Enterprise*. Cambridge, Mass: Harvard University Press
- Holyoake, G.J. 1857. *Self-help by the People: the History of the Rochdale Pioneers*. 10th ed. London: George Allen and Unwin Ltd.
- Jones, D.C. 2007. The Productive Efficiency of Italian Producer Cooperatives: Evidence from Conventional and Cooperative Firms. *Advances in the Economic Analysis of Participatory and Labour Managed Firms*. **10**, pp.3-28.
- Lawless, J.F. 2003. *Statistical Models and Methods for Lifetime Data*. 2nd ed. New York: John Wiley & Sons, Inc.
- Mata, J., and Portugal, P. 1994. Life Duration of New Firms. *Journal of Industrial Economics*. **42**(3), pp. 227-245.
- Miyazaki, H. 1984. On Success and Dissolution of the Labor-Managed Firm in the Capitalist Economy. *Journal of Political Economy*. **94**(5), pp. 909-931.
- ONS. 2011. *Business Demography*. Office for National Statistics. [Online]. [Accessed: 1st March 2016].
Available at: http://webarchive.nationalarchives.gov.uk/20160105160709/http://ons.gov.uk/ons/dcp171778_291893.pdf
- ONS. 2014. *Business Demography*. Office for National Statistics. [Online]. [Accessed: 1st March 2016].
Available from: http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171778_425087.pdf

- Park, R., Kruse, D., and Sesil, J. 2004. Does Employee Ownership Enhance Firm Survival? *Advances in the Economic Analysis of Participatory and Labor-Managed Firms*. **8**, pp. 3-34.
- Pencavel, J., Pistaferri, L., and Schivardi, F. 2006. Wages, Employment and Capital in Capitalist and Worker-Owned Firms. *Industrial and Labor Relations Review*. **60**(1), pp. 23-44.
- Pérotin, V. 2004. Early Cooperative Survival: The Liability of Adolescence. *Advances in the Economic Analysis of Participatory and Labor-Managed Firms*. **8**, pp. 67-86.
- Pérotin, V. 2006. Entry, Exit and the Business Cycle: Are Co-operatives Different? *Journal of Comparative Economics*. **34**(2), pp. 295-316.
- Pérotin, V. 2016. What Do We Really Know About Worker Cooperatives? Cooperatives UK. [Online]. [Accessed: 4th April 2016].
Available at: https://www.uk.coop/sites/default/files/uploads/attachments/worker_co-op_report.pdf
- Russell, R., and Hannemann, R. 1992. Cooperatives and the Business Cycle: the Israeli Case. *Journal of Comparative Economics*. **16**(4), pp. 701-715.
- Staber, U. 1989. Age-Dependence and Historical Effects on the Failure Rates of Worker Cooperatives: An Event-History Analysis. *Economic and Industrial Democracy*. **10**(1), pp. 59-80.
- Stinchcome, A. 1965. Social Structure and Organization. In J.C. March (ed.), *Handbook of Organizations*. Chicago: Rand McNally.
- Singh, J.V., Tucker, D.J. and House, R.J. 1986. Organizational Legitimacy and the Liability of Newness. *Administrative Science Quarterly*. **31**, pp. 171-193.
- Strotmann, H. 2007. Entrepreneurial Survival. *Small Business Economics*. **28**(1), pp. 84-101.
- Vanek, J. 1977. *The Labor-Managed Economy*. New York: Cornell University Press.

Appendix

Year-on-Year Survival of all UK Firms, (%)

| Survival to | Year of birth | | | | | | | |
|-------------|---------------|------|------|------|------|------|------|------|
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| 1 year | 96.5 | 95.4 | 92 | 90.8 | 86.7 | 93.1 | 91.2 | 93.5 |
| 2 years | 80.7 | 81.1 | 74 | 73.8 | 72.5 | 75.6 | 73.8 | - |
| 3 years | 66.2 | 63 | 58 | 59.6 | 57.1 | 60.5 | - | - |
| 4 years | 53.2 | 52 | - | 48.9 | 48.1 | - | - | - |
| 5 years | 45 | - | - | 41.7 | - | - | - | - |

Source(s): ONS (2011, 2014).

Notes: Table gives the percentage of firms surviving to 1-5 years from the year they were born, for example 45% of firms born in 2006 survived for at least 5 years.