An empirical analysis of cooperative creation, survival compared to capitalist firms and survival between different co-op types in the United Kingdom

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Supervisor: ████████████████

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Abstract

Cooperatives are democratically controlled enterprises functioning in market economies and are prevalent in the United Kingdom. What sets them apart from regular capitalist firms is the fact that they relegate decision making to the entirety of their workers/owners as opposed to only listening and considering the opinions of owners/shareholders. This paper seeks to test three things. Firstly, it asks the question: why are cooperatives created? Secondly, an analysis of hazard ratios and survival are presented when discussing co-ops compared to capitalist firms. Finally, an exploratory analysis examines the differences in survival rates and hazard ratios of different types of cooperatives. The analysis is relegated to the United Kingdom and is empirical. Statistical methods such as linear regression and Cox proportional hazards models are used in the empirical analyses. The main conclusions to be drawn from the paper are threefold. Firstly, Cooperatives are created during times of disillusionment with capitalism and unemployment. Secondly, democratically controlled firms have lower hazard ratios and survive better in market economies than regular capitalist firms during a five-year period. Finally, it is shown that consumer cooperatives have smaller hazard ratios and tend to survive at higher rates than worker co-operatives during a five-year period.

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I.   Introduction

The year 2012 has been declared the international year of cooperatives by the UN, highlighting the positive effects they have done on communities and economies (Cheney et al. 2014). What is interesting about these organisations is that they differ from what we traditionally in our capitalist society would consider to be a company. Rather than the top-down solution to business, where bosses and shareholders control the enterprise, co-ops emphasise democratic control and a bottom-up approach to managing a business. The purpose of this study is threefold: firstly, it aims to explain why a person would embark on a venture of creating a co-operative with variables such as disaffection with the capitalist system as well as unemployment playing a positive effect on creation of co-ops. Secondly, the survival and hazard rates of cooperatives (DF) and traditional capitalist firms (CF) is analysed to determine which type of company survives better in the market economy. Finally, an exploratory analysis on different co-op types and their survival and hazard rates is analysed to determine the most successful types of co-operatives and why they survive longer than their counterparts. The analysis for all three sections is empirical and relegated to the United Kingdom. This paper also seeks to contribute to the lack of literature in the field of research on capitalism and cooperatives by offering confirmatory analyses in the first two sections and exploratory analysis in the third section. An empirical section will offer a literature review first, followed by the methodology and data descriptions, empirical results, discussion, limitations and suggestions for further research. All of the data manipulations and analyses have been done with Stata 16. To allow for scrutiny and replication of the analysis, all of the datasets and code are available online[1] (Anonymous, 2020).

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[1] For the direct link to the depository see Notes

Definitions

To begin with an accurate analysis of cooperatives, one has to define them. For this paper, the definition of a co-op is based on the definition given by the International Cooperative alliance (n.d.):

> 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.

This shall be the working definition of cooperatives as an umbrella term for democratically controlled enterprises. A traditional business then is defined by a lack of democratic control of the members/workers of the enterprise. To further this definition, a traditional business is also considered to be owned by its shareholders/leaders, who are private individuals (Barkley Rosser Jr and Rosser, 2004, p.7). This is done in order to clear up any misreading of the study as some may claim that because co-ops as well as CF's function in market economies dominated by private property, that would make them capitalist as well. This is because of the widespread mis(conception) that free markets are only possible in capitalist economies, however this way of thinking is inherently flawed, as free market economies have been advocated by anti-capitalist theorists as well (Bockman, 2011). The study seeks to highlight the differences in organisational structure, either democratic or capitalist. Of course, it must also be mentioned that amid worker-owners in co-ops there may be a minority of non-owning hired workers (Ben-Ner, 1988, p. 8). Even so, since only a minority of hired workers do not have decision power over the firm it does not diminish the distinction between a firm where the majority have sway over what happens to it and one where only a small fraction of shareholders and owners dictate the direction of the company.

II.　　Reasons for cooperative creation

Cooperatives are an organisational alternative to traditional capitalist firms, however, what motivates someone to embark on a venture to create a co-op as opposed to a CF? There are, of course a myriad of them and the full discussion of the question is beyond the scope of this paper. Rather, the reasons discussed in this section will be more ideological and economical in their nature: a growing dissatisfaction with the current capitalist system and an increase in unemployment.

Literature on disaffection with the capitalist economic system and unemployment

The theoretical conception of why a cooperative would be created can be derived from the seminal works of Karl Marx (1848;1867). In the *Communist Manifesto* Marx (1848, p.14) proposes the idea that the history of all of society is the history of class struggle. It is assumed that by and large the capitalist economic system is divided into two opposing classes: the bourgeoisie (owners of the means of production and employers of workers) and proletarians (those who work for the capitalists and do not own the means of production). This relationship is categorised as exploitative by Marx (1848;1867) as capitalists extract surplus value from the workers, depriving them of the full value of their labour to expand their own gains. The exploitation leads to antagonisms, which pit the worker against the capitalist. The way, then, for the relationship to be absolved of antagonisms is for workers to own the means of production themselves. This is where the link between Marxist theory and cooperatives intersects, as the voluntary association and democratic member self-management of co-ops gives them more and sometimes even full control over the workplace, meaning that the workers are in control of the means of production. The antagonisms that lead to the unrest of the workers, however, are controlled by other ways in capitalist economies To begin with, there are material aspects

that states can utilise such as creating social safety nets to the majority of the working population[2] or outright military crackdown on persons who seek to have a democratic say in the economy (Lenin, 1917). There are also ideological aspects of control that capitalist societies use to entrench their ideologies. The one discussed in this paper has been coined by the late theorist Mark Fisher (2009) in his seminal work *Capitalist Realism: Is There no Alternative?*. The term "Capitalist Realism" as defined by Fisher (2009, p.8) is

> The widespread sense that not only is capitalism the only viable political and economic system, but also that it is now impossible even to *imagine* a coherent alternative to it.

Examples of this way of thinking can be seen in the work of Fukuyama (1989), who theorises that after the fall of the Soviet Union, the ideological evolution of human societies has ended, with democratic Western liberal capitalism coming out on top as the universal and best human system. Indeed, this way of conceptualising the world is diagnosed as the realism that pervades out societies today by Fisher. However, it does not have to be the only way to conceptualise politics and the economy. Fisher (2009, p. 22) writes that one way that capitalist realism can be threatened is to show that it is inconsistent or untenable. One of the ways it can be made vulnerable is via crises, the main example here being the 2008 financial crisis, which engulfed most of the world and was compared to the 1929-1933 Great Depression in terms of its magnitude and effects (Eigner and Umlauft, 2015). The aftermath of the financial crash of 2008 in the UK resulted in the newly appointed Conservative-Liberal Democrat coalition imposing austerity measures which, the working persons believed, disproportionately affected their livelihoods in the negative sense (Mustafa, 2011). The dissolution of social safety nets that served to sustain working

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[2] These allow for the majority to live comfortable lives and as such mitigate the antagonisms of exploitative capitalist working conditions.

persons enough so they would not feel that their relationship towards the rulers of capital was inherently antagonistic had begun to be eroded away and as such, alternatives could begin to flourish in the economic sphere and capitalist realism challenged with that. One of these alternatives could of course be forming a cooperative that provides democratic control over the workplace for its workers, mitigating class antagonisms and giving a voice to those who felt disenfranchised by lack of control over their workspaces. Given the analysis presented by Fisher and Marx and the crisis that had recently affected the United Kingdom I hypothesise that more people will break away from capitalist realism, forming cooperatives as an alternative mode of economic organisation during the years that the crisis is taking place, and after it. This is due to the system that contains class antagonisms failing to do so as well as the imposition of austerity measures after the crisis, further eroding capitalist realism as well as creating a disaffection with dominant mode of production, which leads to an increase of cooperative creation as an alternative. The first hypothesis then is:

H1: During crisis years and the years after a crisis the number of created cooperatives will increase

The increase in unemployment that accompanied the crisis can also be another factor in facilitating cooperative creation. As more and more potential employers are put out of business, the more workers are left without jobs and some could decide to band together in the formation of a DF whilst sharing the initial costs of setting up a business together by either starting the firm from scratch or buying it from their former employer after the firm has bankrupted. Indeed, this is supported by empirical literature. Ben-Ner (1988, p.9-10) shows that the relationship between unemployment increases and the increase in the number of worker-owned firms created is positive. This is further examined in the study by also showing how many new conventional capitalist firms were created as unemployment

was going up. The relationship is again positive, however, comparatively the growth for cooperative numbers is much higher than for CF growth (Ben-Ner, 1988). This idea, though, has not been touched upon much in empirical literature. For this, it is imperative to check the validity of such claims and to try to replicate the limited finding of empirical literature. The formulated hypothesis is:

H2: Increases in unemployment have a positive relationship with the increase in number of co-ops created

Methodology and data

To test these hypotheses a linear regression model has been created to observe how crisis years as well as unemployment increases impact cooperative creation during the timeframe between 2000 and 2018 with both years included. The linear regression model has been chosen because in the Ben-Ner study (1988, p 9-10) the increases in unemployment and co-op creation seem to have a lineal positive relationship. For disaffection this is also acceptable, since there has not been any empirical literature surrounding the question as of the writing of this paper, and as such there is no justification for supporting complex models to analyse the first hypothesis. As such, the simplest OLS model was judged adequate for the study. The data for unemployment UK has been gathered from Statista (Clark, 2019). The data for co-ops has been collected from their open data portal (Co-operatives UK, 2019a). Table 1[3] shows the variables in depth. The years during crisis have been chosen as 2008 and 2009 due to the fact that in the UK the recession was active during both of them (Office for National Statistics, 2018). It is argued that the disillusionment with capitalism is at its baseline value (0) during the years before the crisis, with it increasing more during the crisis itself (1) and culminating in

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[3] See Appendix

the years after the crisis (2) as more and more people get affected by the economic

hardships caused by the current economic system's failures to provide adequate working

conditions and living standards. As both explanatory variables could suffer from the

multicollinearity problem with unemployment being a cause for disaffection with capitalism

as well as years after crisis predicting unemployment increases, diagnostic measures such

as the Variance Inflation Factor (VIF) have been implemented for the model to test for the

increase in variance that possible multicollinearity may create. To test for the accuracy of

the model, prediction errors and out of sample errors for the model are presented later in

the empirical results.

Empirical model

Table 2. Unemployment-Disaffection model for cooperative creation

	B	SE	VIF	p-value
Unemployment increase	32.25	6.47	1.22	0.000
Disaffection with capitalism	52.12	8.76	1.22	0.000
Observations	19			
R^2	0.867			
RMSE	32.63			

Before discussing the model in depth, it should be noted for an easier interpretation that

the mean number of cooperatives created during a year is 224 when rounded, with the

biggest number of co-ops created being 374 during the year 2013 and the smallest

number being 110 in 2006. Table 2 shows us that the model gives support for both

hypotheses with both independent variables showing a positive relationship between them

and an increase in the number of created cooperatives. Both values are highly statistically

significant (p<0.001). A one percent increase in unemployment is associated with a

creation of 32 extra cooperatives during that year. In regard to the disaffection with the

current economic system it is found that a one unit increase in dissatisfaction with

capitalism is associated with 52 extra cooperatives created during that year. This means, that in the years after the crisis 104 extra cooperatives are expected than in the years before the recession which is a 46% increase when compared to the mean of co-ops created during an individual year. Diagnostics on the model have also been performed to see how it performs. The Variance Inflation Factory (VIF) for both of the variables is 1.22 which shows a slight increase in the variance of the model because of independent variable collinearity. However, this is not a huge problem as models are deemed to be problematic if VIF for the variables exceeds 5 or 10 (Kutner et al. 2004; Sheather, 2009). The given R-squared value suggests that the independent variables explain around 87% of the variance of the dependent variable, showing a good fit of the model. The root mean squared error (RMSE) has also been presented to show the amount prediction error present in the model. To analyse this more closely one must look at Table 3 as it shows the prediction errors and out of sample errors for each individual observation.

Table 3. Individual Prediction and Out of sample errors for the Unemployment-Disaffection model

Year	Unemployment (%)	Crisis Year[1]	Prediction Error	Out of Sample Error
2000	5.4	B	-18.83	-21.38
2001	5.1	B	.84	.95
2002	5.2	B	39.62	44.92
2003	5	B	24.06	27.35
2004	4.8	B	31.51	36.03
2005	4.8	B	2.51	2.88
2006	5.4	B	-44.83	-50.9
2007	5.3	B	1.39	1.58
2008	5.7	D	-32.63	-34.47
2009	7.6	D	-39.91	-48.63
2010	7.9	A	-54.71	-68.06
2011	8.1	A	26.84	34.49
2012	8	A	27.07	34.2
2013	7.6	A	43.97	52.59
2014	6.2	A	-3.88	-4.35
2015	5.4	A	36.92	43.11
2016	4.9	A	-21.96	-27.18
2017	4.4	A	6.17	8.34
2018	4.1	A	-24.16	-35.04

[1]B-Before Crisis, D-During Crisis, A-After Crisis

It can be seen that the model performs reasonably well at predicting the number of cooperatives that will be created each year. It is worth noting that the model predicted more cooperatives created during crisis years than there actually were. This can be explained in the sense that the effects of the crisis were not fully present, with austerity measures starting to be imposed during 2010 (Muller, 2019). This assumption has further grounding if one looks at the years after the imposition of austerity (2011-2018) with more cooperatives being created during those years (except 2014, 2016 and 2018) than predicted. It may be that unemployment and disaffection with capitalism may play a bigger role in cooperative creation than shown by the model, or it could be a myriad of other reasons that were not considered in this model affecting this increase in co-ops.

Discussion: Widening the understanding of co-op creation

There are multitudes of reasons that co-ops can and are formed in market economies, and disaffection with the capitalist mode of production and unemployment increases do seem to affect the creation of co-ops. Whilst the findings suggest a positive relationship, there is a little amount of literature that tackles with both hypotheses. For disaffection it is only a theoretical and historical analysis that has been put forth (Marx, 1848;1867, Fisher, 2009). In the Marxian sense, class antagonisms do seem to cause uproars during periods of economic hardship, which the 2008-9 crisis exemplified for the United Kingdom. As such, it is reasonable to assume that as co-ops do provide more worker control and are to some extent opposed to the capitalist mode of production that workers would choose to join or create a DF in order to either advance their own interests of wanting a more egalitarian workplace where they are able to foster change via their own vote and have more say on day to day matters. Ideological aspects can also be conceptualised as there may indeed be those who consider themselves fundamentally opposed to capitalism and could not in the moral sense work in a firm where it is the shareholder-owners making all of the

decisions. Opposition to authoritarian[4] rule of corporations is not only a Marxian stance; democratic theory also approaches this issue on the side of the cooperatives. Dahl (1985, p.135), one of the most important democratic theorists of our time, gives his ideas on the matter:

> Members of any association for whom the assumptions of the democratic process are valid have a right to govern themselves by means of the democratic process (…) We therefore see no convincing reasons why we should not exercise our right to the democratic process just as we have already done in the government of the state.

It would make sense that both ideological camps would be interested in creating co-ops but for different reasons: Marxists because it is a way to subvert the capitalist economic structure and democratic theorists because it is a way to extend democratic privileges to the economic sphere as well as the political. Both of these ideological camps can be filled by newcomers when the capitalist realism of Fisher (2009) is broken down by crises that shows for some that the capitalist business is an unsustainable idea and therefore one should seek alternatives to it. Persons could become Marxist in this sense when they are conscious of their exploitation by the capitalist class as layoffs and decreases in wages show that their needs are not being met by the ruling elite of a firm. For the same reason others could be made into companions for democratic theory by crises in the sense that they show just how little influence a lower or middle class person has when a business fails because of mismanagements of the global market economy by the minority of owners. This could lead a person to believe that democracy is essential in the economic sphere like in the political sphere for an inclusive society as well as better management of

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[4] Authoritarian in the sense that the persons at the top make all of the decisions in a capitalist firm with little to no input from workers

the world economy. There are also counter arguments that could be made. Perhaps co-ops are created at higher rates after the crisis because of recognitions from world renowned organisations? After all, the UN declared 2012 to be the International Year of Cooperatives and gave them lots of attention, holding conferences and publishing various research papers about DF's (Cheney et al. 2014). This, of course, only feeds into the argument as declaring a year to the co-ops after an economic crisis could be one of the ways in which capitalist realism is challenged by the UN acknowledging that alternatives to capitalist modes of production have contributed significantly to our welfare. It does seem then that theoretically disaffection with capitalism does indeed foster a growth in cooperative numbers, however, there do not seem to be any empirical studies as of the writing of this paper specifically focusing on disaffection with capitalism and creation of cooperatives. As this is the case, it is important to conduct more studies on this topic to see if the results of the hypotheses hold up to scrutiny and are replicable. For unemployment increases one again finds a shortage of empirical literature to draw upon, though this study does find evidence for ideas put forth in Ben-Ner's (1988) work that unemployment does indeed play a factor in facilitating the growth of the numbers of co-op enterprises. The idea makes sense intuitively as the more workers get laid off, the more they could be able to organise together to form enterprises or buy failing ones from their former bosses during times of economic hardship. The effect is increased by the recent advancements in availability of education have increased the entrepreneurial skills of regular workers (Ben-Ner, 1988, p.22). Even so, capital supply constraints for co-ops are prevalent (Perotin, 2004, p.83). This effect would be increased during crises years when one could expect a high unemployment as many of the unemployed workers would not have capital saved up or a consistent way to get more due to the very nature of being unemployed.

Limitations

Even though the theory is consistent with the data, there are aspects of the model that could be improved in future research. Firstly, direct variables, gauging disaffection with capitalism should be used. To my knowledge, there exists no survey that deals with that question in the UK and has been done during the timeframe that this model was run. The model could also have benefitted from control variables like the wealth of the UK, availability of education to workers and their education level to control for co-op creation. This would have allowed to more accurately predict the results as well as test some of the other claims about co-op creation in the research literature.

Further research

As this is a relatively unresearched area, the first idea would be to conduct more empirical and theoretical studies on this topic in order to see if the proof for the hypotheses can be replicable. For variables, it is imperative that surveys about the disaffection with capitalism conducted every year be done in order to provide more accurate disaffection variables. Furthermore, studies that control for other reasons for co-op creation are welcome to test the validity of the results and to come to more accurate conclusions.

III.   DF and CF survival comparisons

As the reasons for co-op creation have been discussed, it is time to see how they are able to survive versus traditionally managed firms. This section deals with the hazard ratios and survival rates between DF's and CF's

Literature on cooperative versus traditional firm survival

Better cooperative survival and lower hazard rates are backed by empirical literature, however it mostly seems to focus on worker cooperatives. Ben-Ner (1988) conducted a

study that compared worker cooperatives and capitalist firms in the United Kingdom during the timeframe of 1974-1986. An estimation of hazard rates for both types of firms was made. It was found that worker cooperatives were much more likely to survive at all age points than traditional capitalist firms. For Perotin (2004, p. 78) the focus was on a cohort of French firms. Hazard rates were again estimated for both types of firms with worker cooperatives coming out on top again with a survival rate of 75% compared to 60% of all French firms combined after the initial four years of creation (in the fifth year following their establishment). A more extensive study in terms of categories was done by Monteiro and Stewart (2015) which examined cooperatives compared to capitalist firms in Portugal. The studies show that at all age points during a five-year period, cooperatives enjoyed greater survival chances than their capitalist counterparts. To be more precise, Monteiro and Stewart (2015, p. 110) estimated that around 97% of tested cooperatives had survived 5 years or more, 84% for 20 years or more and 63% had survived for 50 years or more. For traditional firms the respective percentages were approximately 80%, 45% and 20%. This was explained by showing that consumer and supplier cooperatives had lower exit probabilities than CFs, which contributed to their increased survival chances. However, when going into more depth of the different categories it was found that worker cooperatives had similar exit probabilities compared to capitalist firms though this was based on a small sample of worker co-ops. A more explanatory empirical study was done when comparing DFs and CFs in Uruguay by Burdin and Dean (2009) which stipulates that the enterprises differ substantially in their economic behaviours with increases in profit corresponding to bigger increases of wages for cooperatives than capitalist firms as well as that cooperative employment is more resistant to price shocks than in their capitalist counterparts. It offers empirical evidence to explain why cooperatives are more resilient, as higher wages and more stable employment opportunities can be seen as incentives for

why a person would choose to continue to work in a co-op rather than go to a capitalist firm. This could give members more enthusiasm to keep the company going. The difference in survival rates is further contrasted by Audretsch (1991, p.443) who found that around 50% of all businesses in the US die before the age of 6. Similar figures were reported in the UK by Disney et al. (2003). After review of the academic literature it can be seen that it suggests that cooperatives are better at surviving after their birth than traditional capitalist enterprises. It is noted, that most of the papers focus on worker cooperatives with some adding consumer firms to the analysis and as such are limited when looking at the entirety of DF and CF comparisons. The hypotheses are:

H1: Cooperatives will have lower hazard rates than traditional capitalist firms in the first five years of their existence

H2: Cooperative survival rates for five years will be between 75 and 97 percent

H3: Traditional firm survival for five years will be between 50 and 80 percent

The first hypothesis is based on the conclusions of (Ben-Ner, 1988; Perotin, 2004), both of whom conclude the survival rates for cooperatives are higher than those for traditional capitalist firms. The second hypothesis is based on Prerotin (2004) estimating co-op survival at around 75% after five years of existence and Monteiro and Stewart (2015) whom conclude that the DF survival rate after five years is 97%. As such, I believe that cooperative survival in the UK will be between those two numbers. The third hypothesis is based on Audretsch (1991) and Monteiro and Stewart (2015) who placed traditional firm survival rates after 5 years of existence at 50 and 80 percent, respectively. Thus, I believe that in the UK the survival rates will be between 50 and 80 percent.

Methodology and data

This section examines the survival rates of cooperatives and traditional capitalist firms for enterprises born in the year 2012 through the time frame of the years 2012-17. The Cox proportional hazards model has been chosen as the go-to model for this analysis. It is a regression model that tests the association between survival time of an individual (in this case a business) and one or more predictor variables (Cox, 1972). The model produces a hazard ratio that is to be interpreted as a weighted average of the true hazard ratios over a selected time period (Stensrud and Hernan, 2020). This is more complicated than regular OLS or logit regressions and has been chosen because I specifically want to test the hazards involved in different business types, which the simpler regression models simply cannot do to the accuracy that the Cox model can. Discussing the data, it must be mentioned that enterprise births and deaths have been defined in accordance with the British ONS definition that was used for the 2017 business demography report (Office for National Statistics, 2019). A birth is identified as a business that existed in the year t but was not present in the year t-1 or t-2. A death is identified as a business which was active in year t but was not active in year t+1 or t+2. As such, a business is deemed to have survived the year if it was active and/or born in the year t and still active in the year t+1. Data for cooperatives have been gathered from the Co-Operatives UK open organisational datasets (Co-operatives UK, 2019a) and data for traditional firms has been gathered from the ONS business demography data (Office for National Statistics, 2019). Some corrections have been made to the merged dataset as some cooperatives can are labelled as businesses and as such appear in the ONS data. These comprised 90 cooperatives and they have been removed from the traditional company data[5]. After cleaning the

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[5] Survival times for these cooperatives was checked and 90 of the individual businesses which had the same survival times were removed from the ONS data

dataset, the number of DF's in the dataset is 370 and the number of CF's is 269,160.

Variable descriptions and coding can be seen in depth in Table 1.

Empirical model

An interesting note before beginning is that when applying the definitions of firm survival

rates to the cooperative data it was found, as demonstrated by Table 4, that the entire

sample of democratic firms survived their first year. This is quite interesting as the report of

Co-operatives UK (2019b, p.4) stipulates that 95.6% of the sample had survived their first

year of existence.

Table 4. Survival by firm
type

Survival Time (years)	CF	DF
0	23,338	0
1	46,759	16
2	39,063	18
3	24,230	16
4	19,560	34
5	116,210	286
Total	269,160	370

Table 5. Cox porportional hazrds model on firm survival

	Hazard ratio
Cooperative	0.312^{***}
	(0.034)
Observations	269530

Exponentiated coefficients; Standard errors in parentheses
$^{*} p < 0.05,$ $^{**} p < 0.01,$ $^{***} p < 0.001$

This could be a mistake on the part of Co-operatives UK in the sense that they may have

calculated the survival rates differently than in the ONS data. As the nuances of the data

have been discussed, it is time to move on to the model itself. From Table 5 it can be seen

that the hazard ratio is much lower on average for cooperatives compared to capitalist

firms (a 69% difference). The result is highly statistically significant (p<0.001). It seems

then that the first hypothesis is proven by the Cox proportional hazards model: Cooperatives do indeed have lower hazard rates than traditional capitalist firms. A point of note here is that testing the proportional hazards assumption yielded mixed results. The proportional hazards test was statistically significant, which suggests a violation of the it, however when illustrating it graphically, another trend emerges. When comparing the Kaplan-Meyer observed survival curves to the Cox predicted survival curves it can be seen that the predicted survival curves are close to the actual survival curves, which would mean that the proportional hazards assumption cannot be rejected.

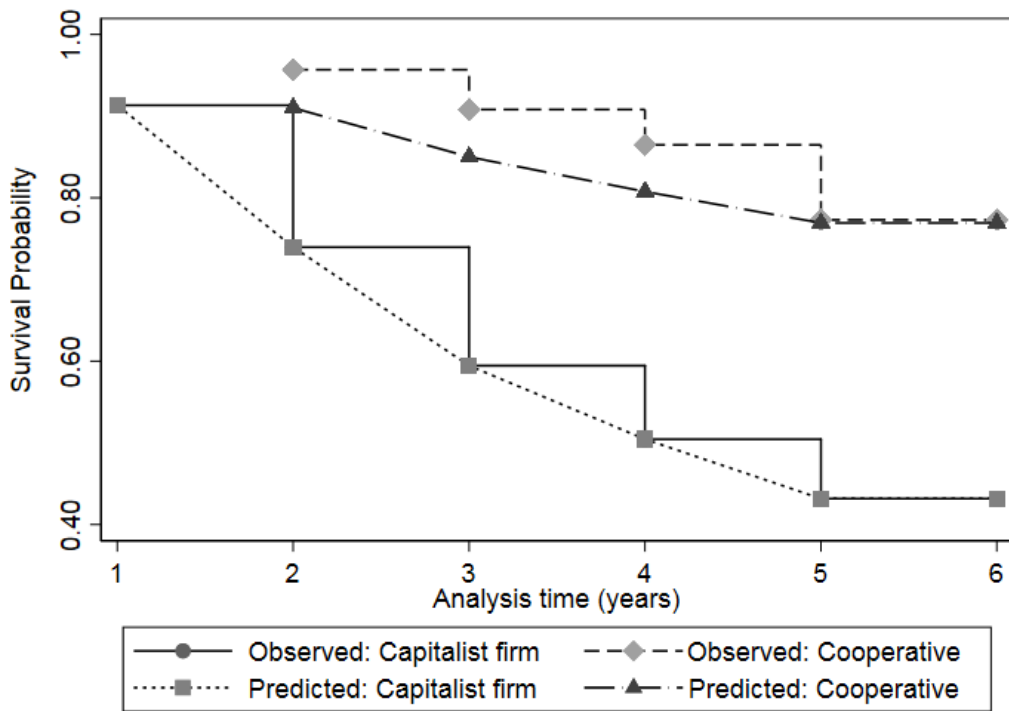Figure 1. Kaplan-Meyer curves compared to Cox predicted survival curves

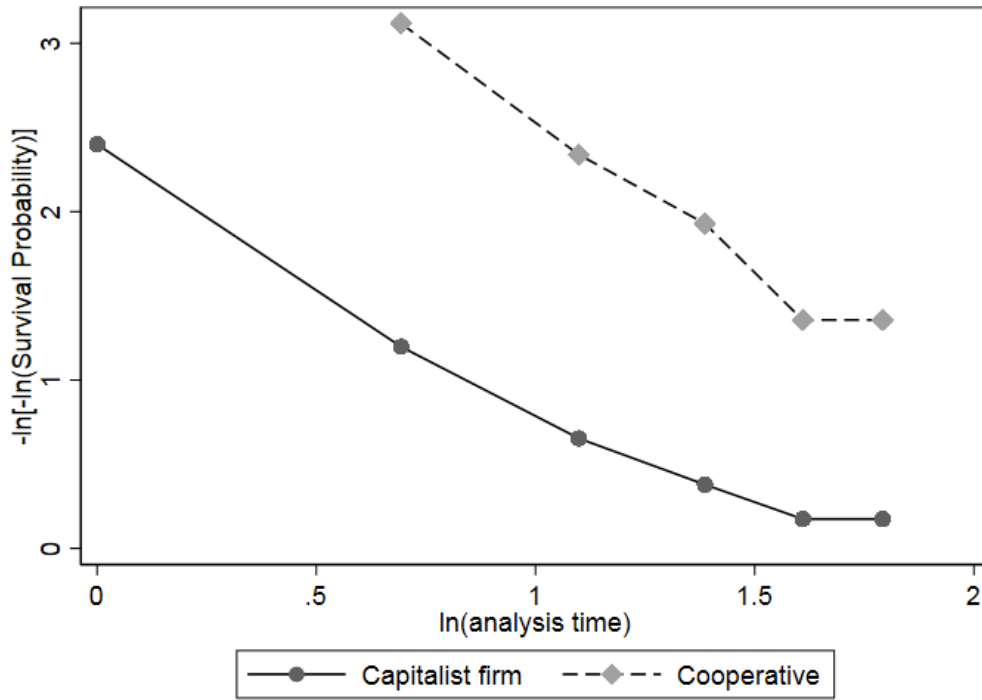Figure 2. Log-log plot of survival probability

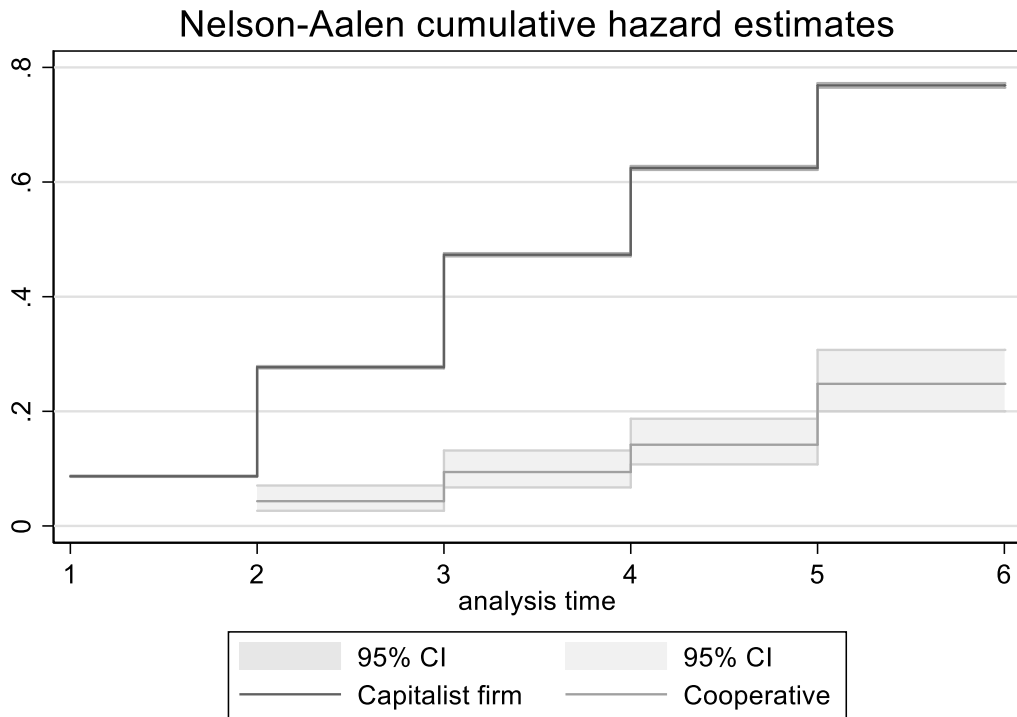Figure 3. Cumulative hazard rates for both types of firms

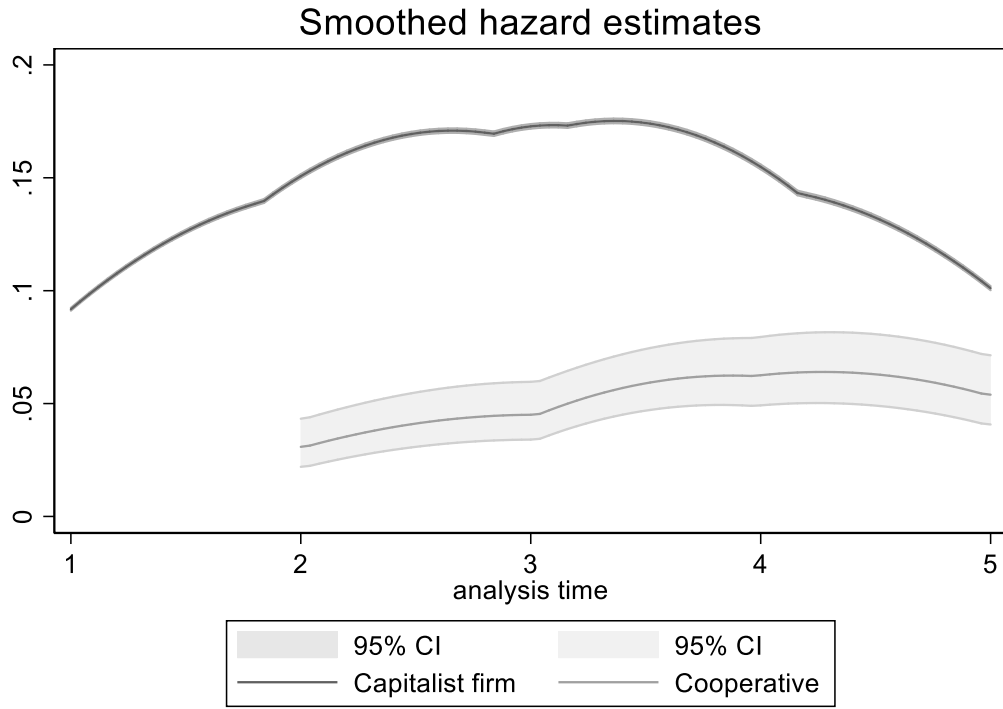Figure 4. Smoothed hazard estimates for both types of firms

Smoothed hazard estimates
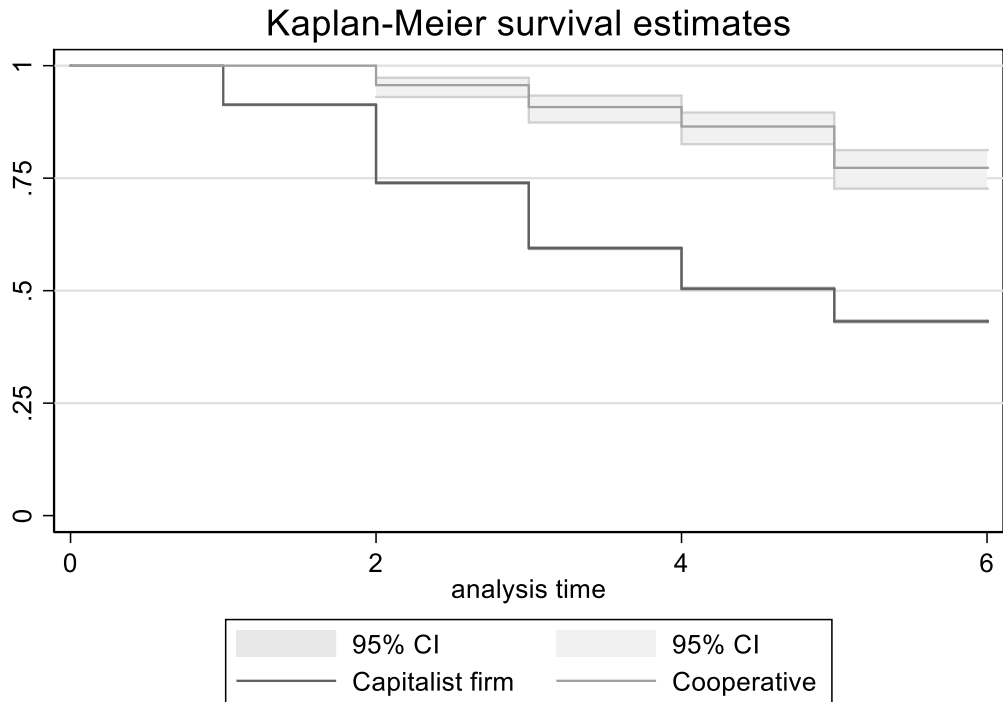
Figure 5. Kaplan-Meier survival estimates for capitalist firms and cooperatives

Kaplan-Meier survival estimates

The results are demonstrated by Figure 1. The graphical inaccuracies between the observed and predicted survival probabilities for cooperatives may be affected by the small sample size.[6] The proportional hazards assumption seems to have not been violated when graphing survival probability on a log-log plot as well. Figure 2 shows this, and as the lines of survival probability for both firms seem to be roughly parallel, which suggests no violation of the proportional hazards assumption. More information on firm survival can be found looking at Figure 3, which illustrates the cumulative hazards of the two types of companies over a five-year period. It can be seen that the cumulative hazards of CF's after five years of creation is around 0.77 and for DF's it is 0.25. These numbers show the probability of the business failing over the five-year period for each subject one or multiple times (Cleves, et al. 2008, p.15). Seeing as it is unlikely for one business to fail multiple times within a five-year span, it would be better to interpret these findings as a probability for a capitalist firm to survive its first five years being at 0.23 and 0.75 for a cooperative. This shows that democratically controlled firms have a much higher probability at surviving the first five years than their traditional counterparts. To go into more depth concerning hazard rates one must look at Figure 4. In it, the smoothed hazard estimates for every year which can be seen with the hazards being higher at all age points for conventional companies when compared to democratically owned ones. However, different trends in hazards for both types of companies can be seen. For capitalist firms the hazard increases until year three and begins to decrease after that with the hazard rate for the fifth year becoming similar to that of year one. This is in sharp contrast to Evans (1987), who proposes that the risk for firms to fail decreases with age. The data here shows that the hazard rates do not increase or decrease monotonically for conventional firms but instead

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[6] At the time of writing of this paper there seems to be no way to go back in time and increase the co-op sample size for a more accurate analysis.

form a sort of inverted U-shape. This has been described by scholars such as Bruderl and

Schussler (1990), who have found that the risk for a firm to fail increases during the first

few years of existence and then decreases. For cooperatives Figure 4 shows lower overall

hazard rates for cooperatives compared to traditional firms, with risk increasing from years

two to four and decreasing slightly during year five. Year one is excluded, since the entire

sample of cooperatives survived it. The hazard rates for DF's are similar to the ones

produced by Ben-Ner (1988, p.19) except that in the hazard rates for cooperatives

decreasing after year three rather than after year four as is in the current data. It can be

seen that the current data on hazard rates are on a large part consistent with the existing

literature on company survival. The data also proves the first hypothesis, which suggests

that cooperatives have a lower hazard rate than traditional capitalist firms in the first five

years of their existence. Moving on to the second and third hypotheses. The Kaplan-Meier

survival curves for both company types are illustrated by Figure 5. From it, it can be seen

that 43% of traditional companies survived the initial five-year period since their creation,

whereas 77% of cooperatives did. This proves only the second hypothesis, with survival

rates for coops being between 75% and 97%, but it does not prove the third hypothesis,

with even the most pessimistic prediction of company survival (50%) being higher than the

actual survival rate of traditional companies by seven percent. This is not very surprising

as the hazard rates discussed previously indicated a major difference in risks for traditional

businesses when compared to cooperatives. In conclusion, it has been shown that

hypotheses one and two have been proven by the given data, with hazard rates being

considerably lower for cooperatives than traditional businesses as well as cooperative

survival after five years being 77% which is consistent with the current literature.

Hypothesis three, however, was rejected with projections of conventional company

survival shown in the research literature being higher than the actual survival rates for UK capitalist firms.

Discussion: Why do cooperatives survive at higher rates?

It has been shown that co-ops have lower hazard ratios and higher survival percentages than traditional firms, this section seeks to explain why such differences exist as a 34% difference between survival rates is rather high in the business world. If capitalist firms had the same survival rate as co-ops, that would have resulted in around 91,500 more businesses surviving in the UK over a five-year period if they were started in 2012.

The first explanation is increased productivity in cooperatives. The logic goes that since in market economies profit is one of the deciding factors in business survival, firms whose workers[7] are more productive will accumulate more money, allowing them to survive by not going bankrupt. A meta-analysis of 74 studies on labour managed firms[8] and participatory capitalist firms[9] by Doucouliagos (1995) found that worker participation, profit sharing and worker ownership contributed were positively correlated with productivity in democratically owned companies in the majority of cases. For participatory capitalist firms, correlations between productivity and the independent variables were smaller, sometimes even negative and less statistically significant than for democratically owned firms. This showed that DF's outshined CF's in terms of productivity which was correlated with increased worker participation in a firm. It must be kept in note, that firms with high labour union influence and capitalist firms with no participatory measures for their employees were not included in this study. However, given that labour managed firms beat CF's with

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[7] Workers in this section are used to define all employees of cooperatives, not just those for the category of "worker cooperative"

[8] Defined as a company in which all of the workers are able to participate in managing the firm and have one vote per person (Doucouliagos, 1995, p.59)

[9] Defined as a company which are hierarchical in structure but implement one or more participation schemes for its employees (Doucouliagos, 1995, p.59)

participatory measures when it comes to productivity, it would not seem likely that CF's which do not allow workers to participate in its management would have increased productivity. Secondly, it was shown by Doucouliagos (1995) that these correlations are positive, but not very high, showing that the effect of worker participation one productivity is positive, but does not tell the whole story when talking about productivity differences between the firms. The positive correlations, however, can be explained theoretically. The correlation between productivity and workplace democracy can be understood as having a causal link also in the sense that the elimination of antagonisms between workers and owners in the workplace creates a better place for labour and allows for a more productive work environment. This is explained very well by Craig and Pencavel (1995, p. 125) who show that in regular companies, owners can and do choose policies which enhance the welfare of the owners/shareholders at the detriment of workers. The idea is further analysed by Dahl (1985, p. 100, 105, 109) who argues that an owner of a company with their high wages, pensions and benefits is unlikely to experience any negative effects on their person from a bad economic situation on mismanagement of the business. Thus, it is very probable that owners in capitalist firms are more likely to act irresponsibly, endangering the workers they currently have employed, furthering the divide between owner and employee. Employee owned companies, by their design, remove this conflict and as such, worker cooperation and the collaboration between workers and management becomes more positive and humane, leading to an increase in productivity. This is demonstrated by Greenberg (1986, p. 41) who concludes that workers in a democratically controlled firm are more likely to cooperate than those in a conventional business and to help each other manifesting in more fluid work boundaries where one worker will help another with a task to facilitate the collective growth of the workplace. This makes sense as an individual would have more interest in furthering a collective in which the increase of

profit goes directly to the worker rather than to a shareholder not directly involved in the production process. These factors in turn create more incentive to work and therefore increases productivity, allowing the business to thrive longer.

Worker management may not only be linked to productivity, but also to better management of the firm during economically turbulent years, increasing the likelihood of the firm surviving. An analysis of DF's and CF's in Uruguay has shown that when faced with economic hardships, co-ops and capitalist firms behave differently in regard to economic shocks (Burdin and Dean, 2009, p. 526). Whilst a crisis for both types of companies results in a decrease in wages and employees, capitalist firms suffer more by having a much higher level of layoffs due to their inabilities to establish credible commitments between workers and owners. Cooperatives, by contrast, do not suffer as many layoffs due to their unique control structure that can employ more egalitarian ways of dealing with crises. One of these is demonstrated by Zirakzabeh (1990, p.118) who shows that during economic crises, workers vote voluntarily to reduce their own wages in order to sustain their companies' profitability and long-term survival. This allows for the collective to continue working productively with minimal layoffs during crisis situations and thus, keep the company going. The same issue can be viewed from a psychological lens through the social identity theory. Social identity theory is defined as a framework that analyses in-group bias through the idea that individuals seek to increase their self-esteem via memberships in various social groups (e.g. family, social or economic class, country) (Tajfel and Turner, 1979). This can create conflicts between various social groups, if one is perceived to be dangerous and/or adverse to another. In this, instance, the place of conflict is the workplace and the two social identities at play are economic classes – the workers of a company and its owners. In capitalist firms, these two identities are mostly non-interchangeable. Only the owners may be considered workers and owners since they

own the company and some can also do work for it, however the workers in the company do no own it and as such are absent from categorising themselves as both owners and workers. Of course, it is worth mentioning that not every person may choose to identify themselves with one or both of these classes, though literature exists that confirms the idea that class distinctions are present in workplace relationships (Marx, 1848;1867, Dahl, 1985). This distinction between worker and owner in a CF creates conflicts and animosity between the two camps. Consider the reduction of wages or layoffs from the previous discussion. In a social identity perspective, layoffs from a capitalist firm would create two adverse effects: one in the relationship between classes and one between the worker class itself. For the former an animosity might arise between worker and owner due to the fact that workers have no say in who gets laid off and cannot vote for other measures of tackling crises and/or reducing wages. Therefore, the owner class is perceived to be dangerous by employees, who see themselves and their group as being negatively affected. For inter-worker relations layoffs and wage reductions have a similar effect. Since during a crisis the scarcity of resources is exacerbated, and with layoffs and reductions of wages being independent of worker control, alienation between the workers themselves occurs. In essence, a Hobbesian war of all against all becomes the norm between employees as each seeks to survive and is more likely to do damage to the other in order to get ahead due to limited workspaces and wage benefits. By contrast cooperatives harmonise the identities of worker and owner by making each member contribute both labour and capital into the enterprise. Thus, animosities are minimised during crisis years. Democratic ownership means that members would be much less likely to support layoffs as they themselves would be in danger, instead preferring other methods, that ensure minimal loss of employment, such as the reduction of wages to all (Zirakzabeh, 1990, p.118).

Limitations

It does seem that the data can be explained theoretically, though the empirical model itself could be improved for the future. Firstly, the absence of control variables such as profit and number of employees/members could not be added into the model because they were not present in the ONS business demography data. Because of this, there may be inaccuracies in hazard rate calculation of both companies. Secondly, the model showed mixed results about the proportional hazards assumption, which is a core concept of the Cox model. On the one hand, the mathematical test showed that the assumption is violated, however, when assessed graphically, it was shown that there seems to be no violation of the assumption. This can make the results of the model suspect, but more data on this is required to see if it is truly the case and the results are consistent with the academic literature on the subject.

Further research

As it stands, the results of the model show a very significand difference between co-op and CF survival and hazard rates and as such, it is imperative, for both the economy and science to conduct more studies on this topic as higher survival rates and productivity for a company should be in every societies' best interest as it could guarantee more stable employment and generally better working conditions for employees. The area of co-op research is still under-developed in economics and more research on this topic would allow for a better understanding of DF's and through that, reforms to our economic structure may take place.

IV. Cooperatives in depth

It has been mentioned that cooperatives do not follow one uniform structure (save for the fact that they are democratically managed and/or owned) or purpose. In this section the study looks at the implications of co-operative survival based on various organisational types. The organisation co-op dataset lists nine categories of ownership classification in its dataset which are defined as follows by the Co-operatives UK (2019b) open data guide:

Co-operatives – members of cooperatives who are in themselves cooperatives (Co-operatives UK).

Community of Interest – Individuals or organisations which share a common interest or characteristic that defines their membership (Energy coops, community shops, supporters trusts).

Consumers – Cooperatives in which members are individuals who purchase goods or services from the co-operative itself (Consumer and retail societies, social clubs, sports clubs)

Employee Trust – Members are employees with at least 75% stake in ownership via a trust or similar legal entity (Most often but not always employee buyout schemes).

Enterprises – Members are legal entities, this excludes self-employed persons, that use the cooperative to collectively conduct their activities (Agricultural co-ops).

Multi-stakeholder – Membership is made up from multiple member categories, including individuals and/or businesses who join the cooperative to work towards a common aim (School trusts, leisure trusts, housing associations).

Self-Employed – Members are individuals who use the cooperative to collectively support or conduct their business activities (Freelance cooperatives, collective business services).

Tenants – Members are individuals who rent directly or have shared ownership in a property or multiple properties (Tenant-run housing cooperatives, residents' associations).

Workers – Members are individuals who work for and share ownership of the cooperative (Retail worker cooperatives).

Lack of literature on survival of different cooperative types

Regrettably, there exists very little literature that compares survival rates between different cooperative ownership classifications. The only types that have been compared are worker and consumer cooperatives. Sommer et al. (1984) compare the two ownership types. However, their concern is not associated with survival rates, rather they analyse the reasons of why persons choose to join either type of co-op. For consumer cooperatives the main reason seems to be price savings, whereas for worker co-ops the main reason seems to be the wish for more control over the workplace (Sommer et al., 1984, p. 147). From this data it is impossible to form hypotheses about the survival length of worker and consumer cooperatives as well as other types of DF's and as such this section is focused more on exploratory analysis rather than the confirmatory analysis seen in previous sections. As such, no hypotheses are presented.

Methodology and data

To keep hazard ratio data consistent with the previous section of survival analysis, Cox proportional hazards models are again used to gauge the survival rates of the different enterprises. The dataset is a modified version of the Co-operatives UK organisations dataset (Co-operatives UK, 2019a). It is also important to mention that the Co-operatives

dataset is limited in the sense that deaths of enterprises had only begun to be recorded from the year 2011. To adjust for this four distinct samples of co-ops which were created in years 2011, 2012, 2013 and 2014 will be analysed. This is done, as the dataset only extends to the year 2019 and to keep analysis consistent, hazard ratios and survival rates of five years are used to analyse the enterprises. Moving on it is also important to mention that two of the categories of ownership have been excluded: Co-operatives and Employee Trust. The former for the fact that it includes umbrella co-operatives that contain others and as such are not relevant to individual level enterprise analysis. The latter, however, are excluded due to only containing a sample size of 1, making the category irrelevant to the analysis. Furthermore, it must be noted that the sample sizes for each of the types of DF's is relatively small as the number of co-ops created during each year ranges from 336 to 259. Dividing this small sample into even smaller categories poses the risk of making the analysis spurious due to small sizes for each of the categories. Table 1 shows the variables that have been used in this sections' analysis. Consumer co-ops have been selected as a reference category in the model since they are a familiar category, that has been examined in research literature and is easier to interpret.

Empirical model

Table 6 shows the model specifics. It can be seen that in the 2011 cohort there is no significant relationship between consumer co-op survival rates when compared to different types, except for worker co-ops which have hazard ratios that are around 4 times higher than those for consumer firms. This means that a worker co-op started in the year 2011 is 4 times more likely to fail than a consumer co-op on average. The value is highly statistically significant (p<0.001). When discussing the 2012 cohort the same pattern emerges with worker co-ops having hazard rations that are around 5 times higher than those for the reference category on average. The value remains highly statistically

significant. There is also now a significant difference between the reference category and tenant co-ops. The latter is around 3 times more likely to fail than the former on average.

Table 6. Cox proportional hazards model on different co-op survival

	2011	2012	2013	2014
Community of Interest	0.779 (0.294)	1.714 (0.700)	1.237 (0.454)	5.067* (3.767)
Enterprise	1.155 (0.735)	2.241 (1.517)	1.026 (0.675)	5.294 (5.294)
Multi-Stakeholder	1.114 (0.516)	0.959 (0.466)	0.913 (0.399)	3.159 (2.533)
Self-Employed	1.527 (0.972)	2.526 (1.710)	0.726 (0.562)	9.878** (8.267)
Tenant	0.730 (0.552)	3.126* (1.689)	1.069 (0.703)	7.941* (7.941)
Worker	3.908*** (1.339)	4.812*** (1.932)	1.499 (0.711)	8.582** (6.710)
N	319	311	336	259

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The value is statistically significant ($p<0.05$). Moving on to the 2013 cohort, it seems that there is no significant relationship in hazard ratios between consumer and other types of co-ops. Finally, for the 2014 sample it can be seen that community of interest, self-employed, tenant and worker co-ops all have higher hazard ratios than consumer firms (approx. 5, 10, 8 and 8.5 times more likely to fail on average respectively). All values are statistically significant. After further testing, it seems that all of the models do not seem to have violated the proportional hazards assumption. Judging from Table 6, it seems that the only pattern that seems to form is one where worker co-ops are more likely than

consumer co-ops to fail. For this, figures for hazard rates and survival graphs are provided[10].

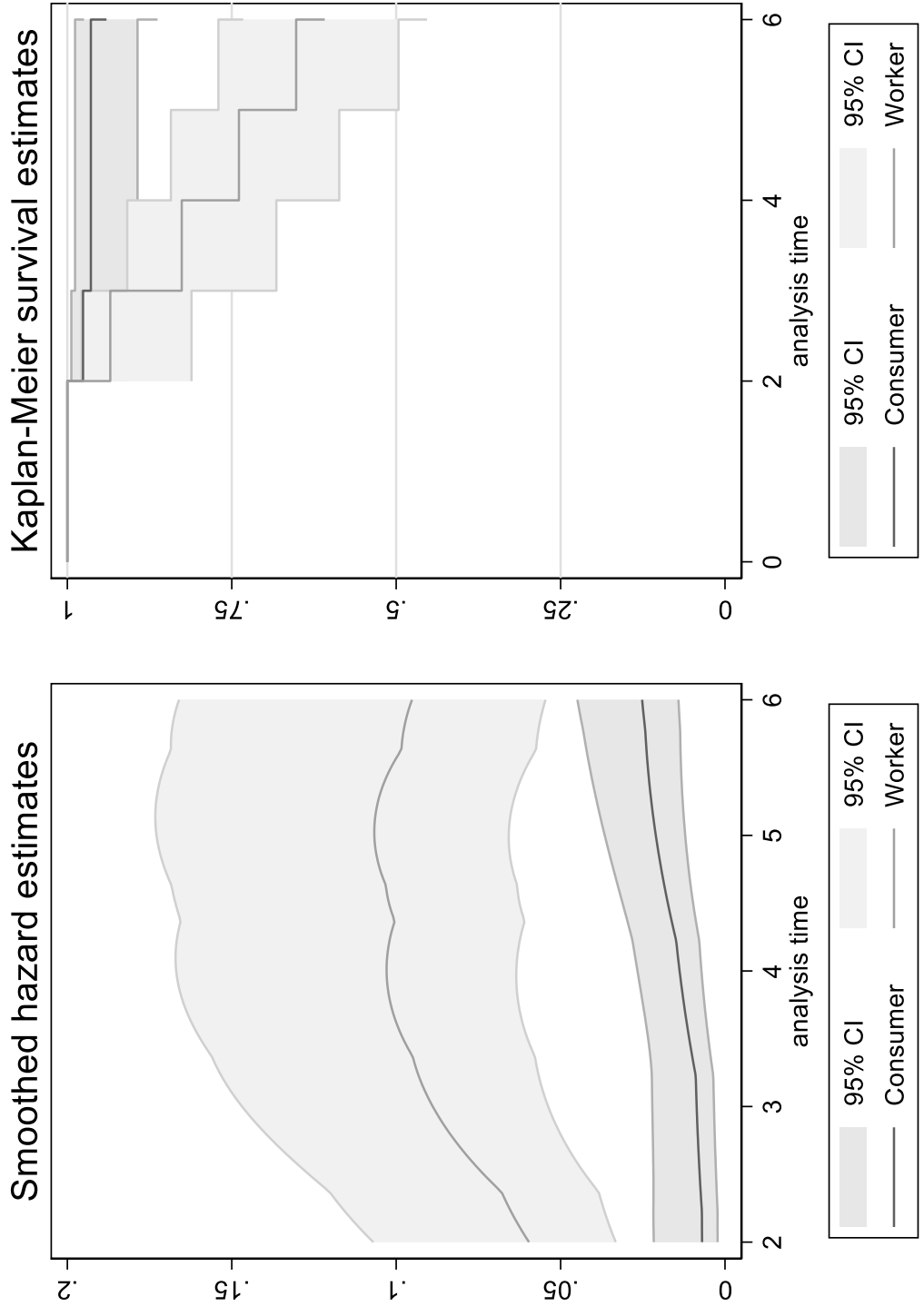Figure 6. Hazard rates and Kaplan-Meyer survival graph for the 2011 cohort

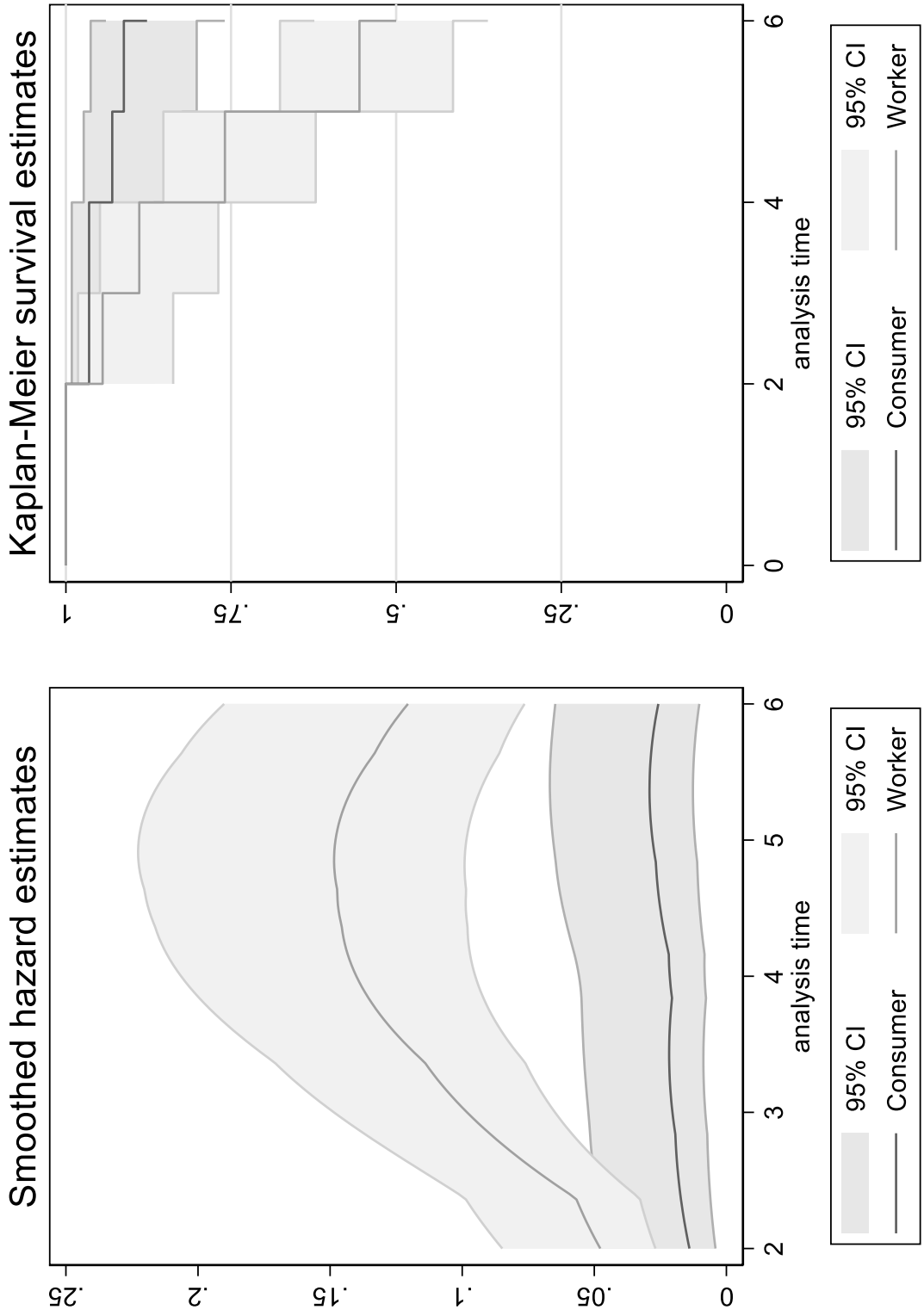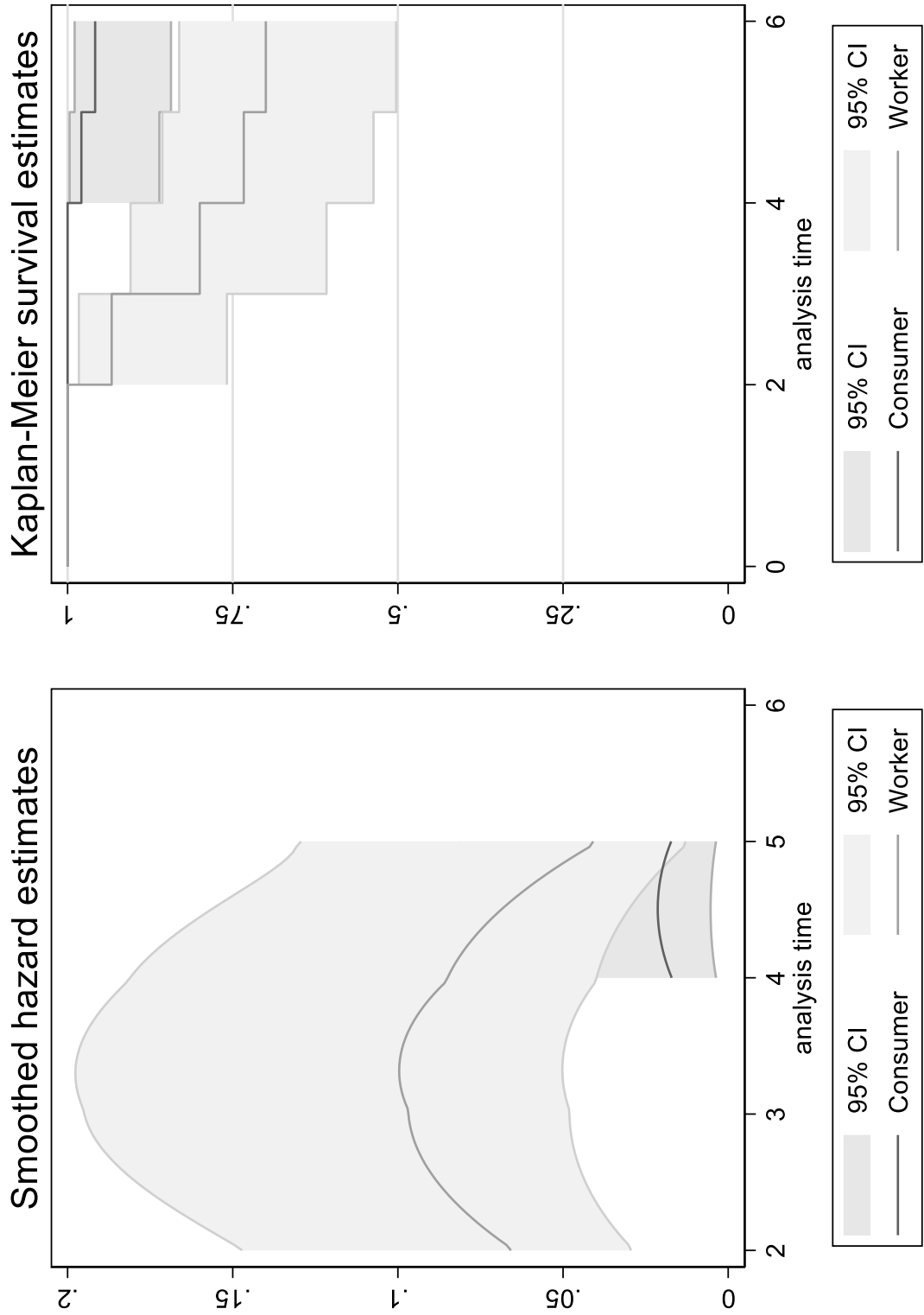Figure 7. Hazard rates and Kaplan-Meyer survival graph for the 2012 cohort

Figure 8. Hazard rates and Kaplan-Meyer survival graph for the 2014 cohort

From Figures 6, 7 and 8 it can be seen how each type of cooperative survives and their hazard rates during each of the years. Consumer firms survive at much higher rates than worker enterprises. After 5 years in existence, the 2011, 2012 and 2014 cohorts of consumer DF's had survival rates of 96%, 91% and 96% respectively. Worker enterprises, by contrast had survival rates of 65%, 56% and 70% for the same years. As for hazard rates, it seems that for worker enterprises it increases significantly in the initial 3-4 years of creation and then goes down. Consumer enterprises, by contrast do not have a steep increase in hazard rates during the initial five years of creation, however the rate does increase beyond the five years of creation. The exception being the year 2014, where hazard rates for consumer cooperatives were only present during the fourth and fifth year of their life, which suggests that in the early stages, consumer co-ops have almost no chances of failure. Examining the two co-op types further, it is important to note that the co-operatives tend to exist in different sectors of the economy.

Table 7. Co-op types by sector (created in years 2011-2014)

Sector	Consumer firm	Worker firm
Agriculture	1	5
Arts and culture	1	7
Digital, Media and communication	3	16
Education	0	12
Energy and Environment	0	2
Finance	9	2
Food service, Accommodation and Pubs	0	7
Health and Social Care	0	9
Housing	0	4
Manufacturing	0	13
Membership associations, Social Clubs and Trade Unions	187	6
Professional and Legal services	0	20
Retail	20	18
Sports and recreation	7	1
Transport	1	1
Other	16	12
Total	245	135

Table 7 illustrates this and from the data it can be seen that consumer firms operate largely as membership associations, social clubs and trade unions, whilst worker firms are more dispersed in different sectors with the most populous ones being, professional and legal services, retail, communication and manufacturing. This indicates that there may be an effect on how survival rates may be affected by sector; however, as this is not part of the empirical model, it will be addressed in the discussion section.

Discussion: Are industrial sectors responsible for different co-op survival rates?

As there is hardly any literature on different cooperative types, there is not much to go into in terms of empirical or theoretical results. Examining the sectors in which the two types of co-ops operate might offer more depth. Table 7 contains the sectors that the 2011-2014 cohorts operated in. What can be seen is that most consumer firms operate as membership associations, social clubs or trade unions. Worker firms, by contrast, operate in many different sectors. What is interesting is that consumer firms operate in sectors which are not as subject to market pressures than worker firms. It seems that consumer co-ops focus more on connecting persons of similar interests, be it from membership associations, social clubs or trade unions. Thus, the sectors would not be ones that operate on a profit-oriented basis, which would not subject them to the randomness of the market. Worker co-ops, however, operate in sectors where market pressures would be more severe on a business (i.e. retail, manufacturing, legal services). This shows that sector may factor into survival rates. As that is a huge topic on its own, it is not feasible to discuss it here in detail. If market pressures force businesses survive less and consumer co-ops are not very much affected by it, would it be reasonable to assume that comparisons between co-ops and capitalist firms would rest more on sector than ownership? To this the answer is no, as five-year survival rates for worker co-ops, which

operate under the same market pressures as regular capitalist firms is still higher (64%[11] compared to 43%). This is somewhat offset by high confidence intervals for worker co-ops; however, the general trend seems to indicate that around a 21% difference between the two types of firms is observed, which is quite significant in the business world and would result in around 56 thousand more traditional businesses surviving the five year period in the United Kingdom if they had the same survival rates as the worker co-ops.

Limitations

As this analysis is exploratory, it was not possible to suggest very complex models that accounted for different ways co-ops could be affected instead of co-op type. There was also a small sample size for all cohorts and that has affected confidence intervals quite drastically, which stifles the accuracy of the model and analysis.

Further research

The preliminary research has proven to be fruitful and as such more research on this topic is highly encouraged. In the future, adding industry section and other control variables to achieve more accurate results is recommended. Sample sizes may remain small, so it is important to note as it may provide a less accurate empirical analysis; however, for the time being, this seems to be the only way to conduct research into different co-operative types.

V.   Conclusions

This paper has primarily focused on three topics related to co-operatives: their creation, their comparison to capitalist firms and comparisons between different co-op types.

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[11] Average for the worker co-op survival rates of the 2011, 2012 and 2014 cohorts

The first section tried to view co-op creation as influenced by two factors: unemployment and disaffection with the current capitalist system. The empirical model found support for the ideas that both increases in disaffection and unemployment caused a higher growth of cooperatives. A further discussion was presented that shower that disaffection with capitalism is caused by events that show that the idea of capitalism being the only viable system in the world today is challenged (such as the 2008-9 financial crash) and the inherently exploitative relationship that is created by industrial relations under capitalism, which can be viewed from either a Marxian or Democratic theory perspective. Unemployment itself may be a part of the dominant economic system and leads to an increase of co-operative numbers; however, these two factors seem to be only weakly collinear.

The second section showed that the 2012 cohort of created businesses and co-ops had significantly different hazard ratios and survival rates. It was found that on average, co-ops have a hazard ratio that is 69% lower than that for the traditional business. In terms of survival, it is seen that 43% of traditional companies survive the 5-year period, whereas 77% of co-ops do. This is a massive difference between the two cohorts and shows that the co-op model does indeed exist as a more stable alternative to capitalist firms in the market economy. Reasons for why are bountiful, but the two that have been discussed were better productivity that is generated by increased co-operation that co-ops offer and better responses to crises, which prioritise keeping as much of the workforce of the business employed as opposed to capitalist firms, which can suffer massive layoffs during crises, affecting workers economically and psychologically.

The third section contributed to the exploratory research around cooperatives and tried to see how hazard ratios and survival rates differ for different types of co-ops. It was found, that the only generalisable pattern was between consumer and worker firms. Consumer

co-ops performed better survival-wise with their hazard ratios indicating that they are on average 6 times better at surviving than worker enterprises as well as having a five-year survival rate of 94% as opposed to worker companies with a 64% five-year survival. The difference here can be explained by sector, as worker co-ops tend to operate in sectors where survival is more dominated by gaining profit, whereas consumer co-ops operate more in sectors that are concerned with organising persons, which means profit may not be the deciding factor in survival.

All of these topics are promising paths for research into the economy, however, they are woefully under-research and with this paper it is hoped that a significant contribution has been made to co-op research as well as that it will inspire more research into the topic.

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VII. Appendix

Table 1. Variables used during the analysis and their descriptions

Section	Variable	Label	Type	Description
III	*coopscreated*	Number of Co-ops created	Dependent	The number of co-operatives created during a given year
III	*unemployment*	Unemployment increase	Independent	Unemployment increase during a given year
III	*aftercrisis*	Disaffection with capitalism	Independent	Years before, during or after the 2008-2009 economic crisis. Higher value denotes higher disaffection with the current economic system
III	*year*	Year	Contextual	Denotes the given year for the data
IV	*diedonyear*	Died on year	Dependent	Denotes the year of the lifespan during which the enterprise died
IV	*regstat*	Registration status	Dependent	Denotes whether the enterprise is alive (1) or dead (0)
IV	*organisation*	Cooperative	Independent	Denotes the type of organisation an enterprise is. 0 for "Capitalist firm", 1 for "Cooperative"
V	*diedonyear*	Died on year	Dependent	Denotes the year of the lifespan during which the enterprise died
V	*regstat*	Registration status	Dependent	Denotes whether the enterprise is alive (1) or dead (0)
V	*ownership*	Ownership Classification	Independent	Denotes the ownership classification of a cooperative
V	*yrcreated*	Year created	Contextual	Denotes which year the enterprise was created on

VIII. Notes

Data and the do files for the replication can be found via this direct link:

https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/I35KU4