Spinoffs, Parents, and Cluster Dynamics: Evidence from the Italian Motorcycle Industry

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Introduction

Spinoffs are new firms originating from existing companies within the same industry (Klepper, 2007). In the last 15 years there has been an increasing attention towards these firms, because in many different sectors they showed superior performance when compared to other new firms and also because they characterized in a quite peculiar way the dynamics of important clusters such as the Silicon Valley or the Detroit area (Klepper, 2009). Recent empirical and theoretical contributions (Boschma, 2015; Cusmano et al., 2015; Morrison and Boschma, 2017) have enriched the picture by including in their analytical framework additional factors such as social capital, competition, and related variety, confirming the importance of spinoffs for cluster formation and evolution, but also suggesting a relevant role for local institutional factors.

A minor stream in the spinoff literature has looked at the phenomenon from a different perspective, highlighting a potential "dark side" of spinoff generation: the (supposedly) negative effect of spinoffs generation on the performance of the parent firm. There are at least two reasons to hypothesize a negative impact of spinoffs on the parent: first, people leaving the parent firm determine a loss of human capital, that can be quite severe in knowledge intensive settings especially when it is difficult to find adequate substitutes. Second, the spinoff becomes a close market competitor of the parent, especially in those industry contexts where the opportunities for differentiation are limited. Early empirical evidence on this topic has confirmed these hypotheses: spinoff generation harms parent survival chances in both the legal services (Philips, 2002; Campbell et al., 2012) and the accounting industry (Wezel et al., 2006), and the effect is stronger when individuals with higher human capital leave the parent, and when the new firm is located in the same context of the parent.

More recent works, however, have suggested that spinoff generation can also be a positive event for the parent, to the extent that it reinforces corporate coherence and reduces the amount of conflict within a firm (McKendrick et al., 2009; Ioannou, 2014). In manufacturing industries such as automobiles and disk drives, the loss of human capital and increasing competition effects are mitigated by the possibility to find easily some substitutes for leaving employees and by the existence of multiple niches that reduce the competition threat. McKendrick et al. (2009) provide also anecdotal evidence about the signalling effect of spinoffs success to attract people in the parent organization.

In this paper, we claim that the possibility to find adequate substitutes for routines and capabilities disrupted by spinoff generation is very important in determining the performance of parent firms, and we show that the institutional and economic context can be a fundamental element in this process. More specifically, we show that differences in political economy rules changing over time and differences in the patterns of labor mobility changing across space contributed to determine whether spinoff generation had a positive effect on the parent performance or not. To this purpose, we exploit a novel dataset of the Italian motorcycle industry (1893-1993) that allows us to identify spinoffs and parents over a long period of time and both within and outside three industrial clusters, and to investigate the environmental elements favouring or hindering parent survival.

Our preliminary results show that spinoff generation improved survival chances of parent firms, but also that these patterns of survival were different across time and space. Spinoff generation in the Fascist regime did not determine any survival advantage for parent firms, especially after the autarchy policy was implemented in the 1930s. Moreover, two industrial clusters presented quite different patterns: the Motorvalley cluster showed an additional positive effect on parents, whereas in the Turin area the generation of spinoff was associated to a lower performance.

Methodology

Our data include 869 motorcycle companies in Italy in the period 1893-1993, with information about the year of foundation of a company, the ending year of production, the location of the company (city level), and founders background. Firm-level data have been complemented with economic and social data on population, regional employment in the manufacturing sector, school enrollment and regional GDP, extracted from multiple historical sources. Boschma and Morrison (2017) provide additional information about these data sources.

The analysis is limited to 668 companies that commercialized at least one motorcycle product on the market before 1993. The remaining companies either entered the industry after 1993 (7 firms) or limited their activity to the production of prototypes or race motorcycles (194 firms).

To test our hypothes about the survival of firms, we use the Cox proportional hazard regression model. As other hazard models, the Cox model allows to study the relation between a set of explanatory variables describing firm characteristics and the survival rate of a population, taking into account the specific structure of duration data. However, the Cox model is different from other hazard models because it is semi-parametric, that is it does not impose any restriction on the shape of the baseline hazard function.

The construction of the dependent variable and the control explanatory variables closely follows the methodology used in similar studies about spinoffs (Klepper 2007; Ioannou, 2014) and in particular by Boschma and Morrison (2017). Firm survival is computed as the difference between the year of exit (i.e. last year of production) and the year of entry (i.e. first year of production). Based on this variable, the hazard rate is computed for each period of analysis. Acquisitions are treated as exits. Mergers are treated as exits if the company name disappears or the location of the firm changes. If a firm changes name for reasons different from M&A (e.g. when one of the founders leaves the firm), the firm is treated as continuing.

Control explanatory variables include all characteristics that have been used by Boschma and Morrison (2017). Specifically, we distinguish four types of founders background: spinoffs, which are firms founded by employees of companies already active in the same industry; experienced firms, that is the firms which enter an industry by diversifying their portfolio of products/activities from related industries; experienced entrepreneurs, that are individuals that have worked in firms from related industries; inexperienced firms, that include all companies with no prior experience in the same industry or in related industries, as well as the cases for which the founder background is unknown. From previous evidence, we expect that firms in the last category are outperformed by firms belonging to the other three categories. To check these effects, we coded four dummy variables: each of these variables takes value 1 if the entrant firms falls in the specific founder background category described by the variable, and 0 otherwise. Since the four variables completely partition the data, we include in the model only the first three categories (Spinoff, Experienced firm, Experienced entrant), and we treat inexperienced firms as the reference category. In the case of spinoffs, we also include a variable(Parent Duration) describing the performance of the parent firm, which is measured by its number of years of production.

A second group of variables controls for the effect of entry timing. In the specific case of the Italian motorcycle industry, it is possible to identify three distinct phases, characterized by different shakeouts. To control for these effects, we coded three time cohort dummy variables. The first dummy (Before WW1) takes value 1 for firms entering before World War 1, (i.e. between 1893 and 1918), and 0 otherwise. The second dummy (Between wars) takes value 1 for firms entering

between the two wars (i.e. from 1919 to 1945), and 0 otherwise. The last dummy (Post WW2) takes value 1 for the cohort of all remaining firms (i.e. those entering between 1946 and 1993), and 0 otherwise. Also in this case, the three variables completely partition the data. Therefore, we include in our regression models only the first two dummies, and we leave the last cohort as reference category. Moreover, since the effect of time of entry on the hazard is not constant over time, we also included time varying covariates given by the interaction of time of entry variables with time. A third group of variables controls for the effect of geographic location. From our data, as well as from historical accounts, it has been possible to identify three clusters in the industry, that overall account for 60% of the firms that entered the industry. Therefore, we created three dummy variables: the first one (Motorvalley) takes value 1 if the firm was located in the provinces of Bologna or Modena, and 0 otherwise, and it includes 11% of the firms; the second dummy (Milan area) takes value 1 if the firm was located in the provinces of Milan, Varese, and Pavia, and 0 otherwise, and it includes 29% of the entrants; the third dummy (Turin area) takes value 1 if the firm was located in province of Turin, and 0 otherwise, and it includes about 20% of the firms. Firms located in other areas of Italy are used as reference category. To take into account more general location effects, we also include some more controls: the number of active motorcycle firms at the regional level (Industry density), and the regional employment in the mechanic sector (Related variety), to account for localization economies from the same or related industries; the relative number of inhabitants in the region (Population), to account for urbanization economies; the school enrolment rate in the region (Education), to account for the effect of human capital; regional gross domestic product per capita (Regional GDP), to account for the level of economic development. All these variables are time invariant and are measured at the entry period.

Our explanatory variables refer to the generation of spinoffs by parent firms. First, we use a dummy variable to code for spinoff generation (Spinoff generation): it takes value 1 for firms that generate a spinoff, starting from the period in which the spinoff occurs, and until the parent firm exits; it takes the value 0 for parent firms before they generate the first spinoff, and for all firms that never generate a spinoff. Second, we use a clock variable (Spinoff clock) that starts from the period in which a spinoff occurs, and increases by one unit in each of the following periods; if a new spinoff occurs in the same parent, the variable is reset to 1 and then it starts increasing again. To check for the role of institutional factors in the relation between spinoff generation and survival, we use multiple interaction terms. First, we interact both Spinoff generation and Spinoff clock variables with cluster dummies (Spingen Motorvalley, Spingen Milan, Spingen Turin; Spinclcok Motorvalley, Spinclock Milan, Spinclock Turin). Second, we also interact the two main variables with temporal dummies. However, in this case the relevant period is when the spinoff occurs, that is: Spingen Before WW1 refers to generation of spinoffs between 1893 and 1918, Spingen Btw Wars refers to generation of spinoffs between 1919 and 1945, and so on. Finally, we also consider two specific temporal variables (interacted with Spinoff generation and Spinoff clock variables) referring to the autarchic political economy by the Fascist regime: a wider definition (from 1930 to 1945) and a stricter definition (from 1935 to 1945).

Results

The results of our analysis are reported in Table 1 and Table 2. All models report estimation of hazard ratios: values below 1 (above 1) indicate higher (lower) survival chances associated to that factor. Model 1 reports the results of a regression including only control variables: the magnitude and statistical significance of the effects is analogous to what reported by Boschma and Morrison

(2017). A few variables that are of minor interest for this paper have been included in the analysis, but are not reported here for lack of space (see the note at the bottom of each table).

As expected, experienced firms, entrepreneurs and spinoffs have better survival chances comparet to inexperienced entrants. Spinoffs from better parents enjoy further survival advantages. Entry cohort dummies indicate that firms founded before WW1 and between WW1 and WW2 have a higher hazard rate than firms entering after WW2. Moreover, the coefficient of the cohorts interacting with time suggest that the hazard related to time of entry changes with age, and specifically that firms in the earlier cohorts have a lower hazard at older ages as compared to those in the latest cohort. Finally, we also notice that among the three cluster dummies, only Motorvalley is significant, indicating that firms located in this area enjoyed survival advantages when compared to firms in the rest of Italy.

In Models 2 to 4 we introduce the main variables to study the effect of spinoff generation on parent survival. Coherently with previous evidence in manufacturing industries, we find that a spinoff generation event reduces the hazard of exit for parent firms. The effect is still present, but less precise, if we introduce a clock variable in the analysis, which is not significant, neither in absolute value (Model 3) nor in the logarithmic transformation (Model 4). Models 5 to 7 introduce the interactions between the spinoff generation even dummy and the time cohort dummies (modified to take into account spinoff generation rather than entry). The results show that the positive effect of spinoff generation is in general true for events occurring either until WW1 or after WW2, but not between wars. This interpretation is confirmed by the results of Model 8, in which we include only the three interacting variables and we omit the general spinoff generation dummy. However, in the following analysis, we use the specification of Model 6, which is more compact, but still captures the highlighted effect. In Model 9, we add again the clock variable (also interacted with the Between Wars dummy): both variables are not significant, whereas the main effects are confirmed.

Model 10 and 11 test whether our ideas about the role of the institutional and economic context are supported. Between the two World Wars, Italy was ruled by the Fascist regime. However, economic policy measures changed quite dramatically over time, and shifted from laissez-faire to corporatism. In the early 1930s several protectionistic policies were implemented following the 1929 economic crisis, and from 1935 full autarchy was pursued by the government. These measures had a potentially strong impact on motorcycle producers, because imports of engines from foreign manufacturers were relatively common at that time, and allowed firms to stay in the market even if they missed engine capabilities. So, our hypothesis is that the policy change had a negative effect on parents generating spinoff in the autarchy period, because it made more difficult to find alternative solutions to the capabilities disruption induced by spinoff formation. To test this hypothesis, we split the Spingen Btw Wars variable in two dummies, coding spinoff generation before and after autarchy measures. Using both a stricter (from 1935, Model 10) and a wider (from 1930) definition of the autarchy period, we find a negative and significant effect for spinoff generation events occurring after autarchy, and no effect for spinoff occurring between the two wars, but before autarchy.

Table 2 reports the results of regressions where interactions between location in industrial clusters and spinoff generation events are included. The dummies for the Motorvalley and Milan area are not significant; however, the dummy for spinoffs occurring in the Turin area indicates a negative effect on survival for firms located in this cluster. Models 4 to 6 introduce also spinoff clock interactions, and present very interesting results: spinoff events occurring in the Motorvalley determine a positive survival effect on the parents, which declines over time; those occurring in the

Turin area present a higher hazard rate, increasing over time; finally, the coefficients for the Milan area are not statistically significant. Model 7 confirms the previous results when both Motorvalley and Turin area variables are included in the analysis. Model 8 is a full model where also the temporal effect about the between wars period is included: results about temporal and spatial variables still hold in this model. Finally, as a robustness check we also estimate our model using a Gompertz specification for the baseline hazard function (Model 9), and we include variables about autarchy in models with spatial effects (Models 10 and 11).

Conclusions

In this paper, we showed that in the Italian motorcycle industry spinoff generation has positive effects on the survival chances of parents, confirming results from previous studies on manufacturing industries. We also show that this positive effect depends on the institutional and economic context. Parents generating a spinoff between the two World Wars, and more specifically in the autarchy period set by the Fascist government did not enjoy any advantage. Similarly, firms located in the Turin area that generated a spinoff did not get any advantage, and actually had lower survival chances: the Turin area was characterized by a crowding out effect due to the presence of a strong competing industry (i.e. automobiles) and especially by its leader (FIAT), that made more difficult to find proper substitutes for leaving employees. On the contrary, parent firms in the Motorvalley area enjoyed further advantages from spinoff generation, possibly due to the high labour mobility across firms and related industries that characterized this area.

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Table 1. Hazard ratios of the Hazard Model (Cox Proportional Hazard Regression). Italian Motorcycle Producers, 1893-1993. Baseline models and temporal interactions.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Spinoff Generation		0.701**	0.661*	0.672	0.707*	0.444**	0.932		0.308***	0.442**	0.438**
		(0.121)	(0.142)	(0.251)	(0.138)	(0.156)	(0.159)		(0.0979)	(0.155)	(0.153)
Spingen before WW1					0.927			0.681***			
					(0.205)			(0.0609)			
Spingen btwWars						2.244*		0.995	3.434***		
						(0.998)		(0.177)	(1.040)		
Spingen after WW2							0.402*	0.379**			
							(0.196)	(0.154)			
Spinoff Clock			1.007	1.023					1.034		
			(0.0136)	(0.157)					(0.0392)		
Spinclock BtwWars									0.961		
									(0.0356)		
Spingen BefAut										2.145	1.905
										(1.031)	(0.893)
Spingen Autarchy										2.594***	3.403***
										(0.897)	(1.461)
Spinoff	0.488***	0.507***	0.504***	0.506***	0.506***	0.482***	0.486***	0.482***	0.483***	0.484***	0.465***
	(0.0921)	(0.0873)	(0.0893)	(0.0893)	(0.0862)	(0.0849)	(0.0853)	(0.0849)	(0.0868)	(0.0849)	(0.0807)
Experienced Entrant	0.588***	0.590***	0.591***	0.591***	0.591***	0.590***	0.584***	0.587***	0.590***	0.591***	0.591***
	(0.0400)	(0.0415)	(0.0416)	(0.0417)	(0.0415)	(0.0418)	(0.0407)	(0.0410)	(0.0424)	(0.0418)	(0.0405)
Experienced Firm	0.444***	0.443***	0.444***	0.443***	0.443***	0.446***	0.443***	0.445***	0.444***	0.446***	0.444***
	(0.0412)	(0.0408)	(0.0409)	(0.0409)	(0.0410)	(0.0402)	(0.0398)	(0.0400)	(0.0391)	(0.0398)	(0.0396)
Parent Duration	0.990**	0.990***	0.990**	0.990**	0.990***	0.991**	0.991**	0.991**	0.991**	0.991**	0.991**
	(0.00424)	(0.00395)	(0.00411)	(0.00408)	(0.00392)	(0.00393)	(0.00387)	(0.00389)	(0.00406)	(0.00393)	(0.00390)
Motorvalley	0.714***	0.725***	0.726***	0.726***	0.725***	0.704***	0.705***	0.702***	0.705***	0.702***	0.698***
	(0.0854)	(0.0887)	(0.0893)	(0.0889)	(0.0889)	(0.0887)	(0.0880)	(0.0885)	(0.0890)	(0.0891)	(0.0882)
Turin area	0.923	0.925	0.928	0.925	0.925	0.929	0.932	0.931	0.924	0.928	0.926
	(0.0683)	(0.0651)	(0.0633)	(0.0639)	(0.0649)	(0.0660)	(0.0679)	(0.0668)	(0.0685)	(0.0665)	(0.0654)
Milan area	0.847	0.866	0.867	0.866	0.867	0.876	0.863	0.870	0.876	0.876	0.880
	(0.0958)	(0.0913)	(0.0895)	(0.0908)	(0.0924)	(0.0949)	(0.0934)	(0.0951)	(0.0964)	(0.0952)	(0.0967)
Entry before WW1	3.692***	3.622***	3.639***	3.624***	3.626***	3.749***	3.719***	3.748***	3.696***	3.739***	3.722***
	(0.467)	(0.438)	(0.450)	(0.443)	(0.435)	(0.461)	(0.459)	(0.463)	(0.461)	(0.463)	(0.480)
Entry btw Wars	1.994***	1.987***	1.983***	1.987***	1.986***	1.964***	1.971***	1.966***	1.944***	1.962***	1.969***
	(0.252)	(0.248)	(0.248)	(0.248)	(0.248)	(0.248)	(0.252)	(0.251)	(0.252)	(0.250)	(0.255)
Entry before WW1 * T	0.965***	0.966***	0.965***	0.966***	0.966***	0.958***	0.957***	0.957***	0.962***	0.959***	0.959***
	(0.00946)	(0.00869)	(0.00935)	(0.00891)	(0.00873)	(0.00808)	(0.00813)	(0.00845)	(0.00619)	(0.00797)	(0.00792)
Entry btw Wars * T	0.977**	0.978**	0.979**	0.978**	0.978**	0.976**	0.976**	0.976**	0.977**	0.976**	0.975**
	(0.0110)	(0.0108)	(0.0106)	(0.0108)	(0.0108)	(0.0106)	(0.0106)	(0.0107)	(0.0107)	(0.0106)	(0.0103)
Observations	641	641	641	641	641	641	641	641	641	641	641

Note: five more variables are included as controls in all regressions, but not reported for lack of space. They are: regional GDP (***), industry density (***), population, related variety (***), education (***).
Standard errors clustered at the province level in parentheses.
*** $p < 0.01$; ** $p < 0.05$; * $p<0.1$

Table 2. Hazard ratios of the Hazard Model (Cox Proportional Hazard Model and Gompertz Model). Italian Motorcycle Producers, 1893-1993. Spatial interactions and robustness checks.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Spinoff Generation	0.718	0.553***	0.746	0.730	0.501***	0.936	0.527***	0.297***	0.270***	0.423**	0.438***
	(0.157)	(0.0985)	(0.225)	(0.188)	(0.0912)	(0.403)	(0.108)	(0.0890)	(0.0782)	(0.147)	(0.116)
Spingen btwWars								3.331**	2.188**		
								(1.608)	(0.842)		
Spingen Motorvalley	0.880			0.421**			0.592*	0.378**	0.468*	0.893	0.364**
	(0.286)			(0.169)			(0.171)	(0.157)	(0.187)	(0.209)	(0.152)
Spingen Turin		2.721***			1.673**		1.589**	0.954	1.719	2.005***	0.917
		(0.516)			(0.368)		(0.372)	(0.306)	(0.590)	(0.519)	(0.320)
Spingen Milan			0.865			0.526					
			(0.327)			(0.280)					
Spinoff Clock				0.999	1.011	0.975	1.002	1.030	1.050		0.995
				(0.0169)	(0.0119)	(0.0367)	(0.0145)	(0.0412)	(0.0436)		(0.0194)
Spinclock BtwWars								0.955	0.955		
								(0.0305)	(0.0322)		
Spinclock Motorvalley				1.071***			1.064***	1.083***	1.064***		1.082***
				(0.0254)			(0.0239)	(0.0292)	(0.0146)		(0.0318)
Spinclock Turin					1.119***		1.129***	1.144***	1.098***		1.159***
					(0.0199)		(0.0183)	(0.0169)	(0.0157)		(0.0174)
Spinclock Milan						1.049					
						(0.0431)					
Spingen BefAut										1.794	1.812
										(0.883)	(1.075)
Spingen Autarchy										2.148*	2.786*
										(0.892)	(1.458)
Spinoff	0.511***	0.517***	0.505***	0.501***	0.516***	0.503***	0.505***	0.492***	0.475***	0.502***	0.494***
	(0.0926)	(0.0970)	(0.0854)	(0.0940)	(0.0998)	(0.0856)	(0.0992)	(0.0990)	(0.101)	(0.0943)	(0.0996)
Experienced Entrant	0.590***	0.583***	0.591***	0.590***	0.583***	0.592***	0.584***	0.585***	0.552***	0.585***	0.586***
	(0.0422)	(0.0438)	(0.0413)	(0.0419)	(0.0439)	(0.0419)	(0.0433)	(0.0429)	(0.0427)	(0.0434)	(0.0419)
Experienced Firm	0.443***	0.440***	0.442***	0.443***	0.441***	0.444***	0.440***	0.441***	0.405***	0.442***	0.442***
	(0.0410)	(0.0401)	(0.0405)	(0.0416)	(0.0405)	(0.0409)	(0.0409)	(0.0391)	(0.0346)	(0.0393)	(0.0398)
Parent Duration	0.990**	0.989**	0.990***	0.990**	0.990**	0.990**	0.990**	0.990**	0.990**	0.990**	0.990**
	(0.00412)	(0.00418)	(0.00394)	(0.00428)	(0.00430)	(0.00400)	(0.00432)	(0.00440)	(0.00441)	(0.00421)	(0.00440)
Motorvalley	0.732**	0.732**	0.723***	0.733**	0.733**	0.718**	0.727**	0.722**	0.715***	0.718**	0.719**
	(0.0964)	(0.0903)	(0.0897)	(0.0970)	(0.0910)	(0.0928)	(0.0959)	(0.0943)	(0.0921)	(0.0943)	(0.0946)
Turin area	0.924	0.890*	0.921	0.921	0.895*	0.933	0.890*	0.893	0.895	0.900	0.896
	(0.0644)	(0.0607)	(0.0611)	(0.0627)	(0.0597)	(0.0584)	(0.0597)	(0.0662)	(0.0655)	(0.0641)	(0.0629)
Milan area	0.864	0.874	0.871	0.864	0.876	0.883	0.877	0.878	0.880	0.878	0.878
	(0.0899)	(0.0939)	(0.0987)	(0.0907)	(0.0917)	(0.0919)	(0.0952)	(0.0995)	(0.0856)	(0.0957)	(0.0971)
Entry before WW1	3.626***	3.603***	3.613***	3.627***	3.620***	3.701***	3.598***	3.635***	3.028***	3.684***	3.677***
	(0.435)	(0.439)	(0.446)	(0.439)	(0.453)	(0.458)	(0.444)	(0.486)	(0.432)	(0.486)	(0.504)
Entry btw Wars	1.991***	1.968***	1.984***	2.008***	1.963***	1.967***	1.978***	1.964***	1.703***	1.952***	1.978***
	(0.245)	(0.253)	(0.250)	(0.264)	(0.254)	(0.249)	(0.270)	(0.281)	(0.215)	(0.257)	(0.284)
Observations	641	641	641	641	641	641	641	641	641	641	641

Note: five more variables are included as controls in all regressions, but not reported for lack of space. They are: regional GDP (***), industry density (***), population, related variety (***), education (***), entry cohorts with time interactions (***).
Standard errors clustered at the province level in parentheses.
*** p < 0.01; ** p < 0.05; * p<0.1