A matter of time: Reconfiguration and firm survival

Alessandro Lucini Paioni
University of Bath
School of Management
alp48@bath.ac.uk

Orietta Marsili
University of Bath
School of Management
o.marsili@bath.ac.uk

Elena Cefis
University of Bergamo
Department of Management, Economics and Quantitative Methods
elena.cefis@unibg.it

Panos Desyllas
University of Bath
School of Management
p.desyllas@bath.ac.uk

Abstract

A matter of time: Reconfiguration and firm survival
Alessandro Lucini Paioni (University of Bath, School of Management)
Year of enrolment: 10/2017, Expected final date: 10/2020
E-mail: A.Lucini.Paioni@bath.ac.uk

Abstract

From an evolutionary perspective, firm survival is regarded as the end result of a process of natural selection and organisational adaption (Hannan and Freeman, 1977; Nelson and Winter, 1982). While earlier studies have explored the antecedents of firm survival as a state revealing the success or failure of firms (among the others: Audretsch, 1991; Br?derl et al., 1992; Cefis and Marsili, 2012; Josefy et al., 2017), less attention has been devoted to the forms in which the process of adaption unfolds over time. Strategy scholars have emphasised that firms adapt to changing competitive environments by reconfiguring their structures and resources (Hannan and Freeman, 1984; Galunic and Rodan, 1998), in particular by means of acquisitions of other companies, divestitures and restructuring of their units.
(Karim and Capron, 2016). In this tradition, it has been observed that this whole process of structural reconfiguration helps large and established firms to achieve synergies and promote innovation through recombination and renewal of their resources portfolio (Karim, 2006; Karim, 2009; Karim and Kaul, 2015; Girod and Whittington, 2017). While this literature focuses on large corporations, it also recognises that entrepreneurial firms face pressures to reconfigure too (Karim, 2006). A rapid reconfiguration can help new and small firms to overcome their fragility due to their liabilities (Stinchcombe, 1965; Freeman et al., 1983; Br?derl and Schussler, 1990) and survive in the face of intense selective pressure. On the other side, too rapid reconfiguration can undermine the cumulative and path-dependent process of knowledge accumulation and the emergence of routines (Amburgey et al., 1993). In this paper, we explore how different forms and timing of reconfiguration affect the survival likelihood of entrepreneurial firms. For this purpose, we first map the different forms, sequences and timing of reconfiguration which takes place in the first few years after the creation of new firms. Second, we analyse the transition and timing of reconfiguration events that lead to the survival or exit of the new firms. We apply novel event-history analysis techniques, accounting for the entire sequences of events instead of the only endpoints. In the analysis, we use micro-data on the population of new independent limited-liability companies created in 2011 in the Netherlands, observed longitudinally up to January 2019. By drawing on the Business Register of all firms operating in the Netherlands, by the Central Bureau of Statistics Netherlands, we are able to identify monthly transition events of acquisition, divestment, restructuring and change of legal/strategic identity which can precede the exit events. Our preliminary results show that newly created firms do reconfigure in all forms and they do so rapidly after start-up. The most common reconfiguration sequence is represented by disinvestments following acquisitions.

References

A matter of time: Reconfiguration and firm survival

Alessandro Lucini-Paioni* (University of Bath)  
Elena Cefis (University of Bergamo)  
Panos Desyllas (University of Bath)  
Orietta Marsili (University of Bath)

Preliminary draft. Please do not circulate without authors’ consent.

Abstract

While scholars have well investigated the determinants of new firms’ survival, we know little about how survival is related to the process of reconfiguration that new firms may undertake in the first years after creation as they define and develop their resources configuration structure. The concept of reconfiguration has been investigated in the strategic management literature mainly for large, public firms. In this paper, we draw on this literature to explore reconfiguration at the early stage of a firm’s life cycle as expression of the process of adaptation that help new firms to survive. Our goals are to map the reconfiguration of new companies, to investigate how such adaptation process unfolds over time, and ultimately to examine which reconfigurative paths are the most valuable in terms of survival. We analyse a cohort of private limited liabilities companies up to 8 years after entry. The data are taken from the Dutch General Annual Business Register, produced by the Central Bureau of Statistics Netherlands. We apply event-history analysis techniques, accounting for sequences of events instead of exit event(s) only. Our preliminary results show that newly created firms do reconfigure in all forms and they do so rapidly after start-up. The distribution of reconfigurative events appears strongly skewed, with the majority of firms reconfiguring through a single event and a minority of firms constantly transforming over time. The most common reconfiguration sequence is represented by disinvestments following acquisitions. This is also the quickest form of reconfiguration. Ultimately, while firms undergoing repeated restructurings have the highest probability of exit in their immediate aftermath, firms acquiring other firms benefit from the lowest probability of exit.

JEL codes: C41, G34, M13
1. Introduction

Firm survival has been a topic of great interest in both the managerial and economic fields. According to the evolutionary theory of the firm, firm survival can be interpreted as the end result of the processes of natural selection and organisational adaption (Hannan and Freeman, 1977; Nelson and Winter, 1982). From an ecological perspective, firm survive because selected according to their fit with a turbulent environment (Hannan and Freeman, 1984). Selection is the passive retention mechanism through which the economic system preserves desirable firms’ characteristics at the population level (Aldrich and Auster, 1986). In this tradition, the determinants of firm survival have been analysed in relation to firm age and size (Dunne et al., 1988; Evans, 1987; Hall, 1986; Mata and Portugal, 1994; Thompson, 2005). Entrepreneurial firms are identified as the most fragile category, given their limited amounts of resources, relationships and legitimacy (Aldrich and Auster, 1986; Bruderl and Schussler, 1990; Stinchcombe, 1965) undermining their position in the environment.

From a neo-Schumpeterian perspective (Nelson and Winter, 1977; Nelson and Winter, 1982), firms survive because they learn and adapt to external changes (Levitt and March, 1988), and by doing so they alter their selection environment. In this tradition, the effects of learning and adaptation on firm survival have been analysed in the form of the effects of the introduction of various forms of innovation (Schumpeter, 1934). However, innovation intertwines with other forms of more structural change that redefine firms’ resources and consequently their opportunities for long term performance (Karim and Kaul, 2015; Kaul, 2012). This process of structural transformation is punctuated by events (e.g. acquisitions, restructuring, disinvestments) which alter, in a discontinuous way, the resources configuration structure of the firm. As such, it may affect firm survival. This process has been understudied in the literature on firm survival, which instead has explored the antecedents of firm survival as a state revealing the success or failure of firms (among the others: (Audretsch, 1991; Brüderl et al., 1992; Cefis and Marsili, 2012; DeTienne et al., 2015; Schary, 1991), rather than a process of adaption unfolding over time. In order to fill this gap, we drawn on insights from strategic management about the process of resources reconfiguration, and explore how different paths of discrete events of resources reconfiguration over time (in terms of their type, sequence and timing) may lead to either the exit or survival of firms. In this approach, we interpret firm survival as a dynamic process of transformation underpinning the ability of firms to adapt to external changes.

The process of resource reconfiguration can be especially important for new firms, because their structure is still fluid and emergent. Compared to establish firms, new firms are still in the process of discovering and organising their resources configuration structure. Furthermore, this process may have a critical impact on long-term survival of new firms. While new firms may well get successfully
started with limited resources, their continued development is contingent on their ability to transform and update over time their resource base (Wiklund and Shepherd, 2009). Hence, we investigate the processes of transformation that ‘accompanies’ adaptation at the early stages of a firm’s life cycle. We analyse a cohort of private limited liabilities companies up to 8 years after entry. The data are taken from the Dutch General Annual Business Register, produced by the Central Bureau of Statistics Netherlands. The paper is structured as follows. Section 2 depicts a preliminary theoretical framework. Section 3 and 4 describe the data and method used. In section 5 we present and discuss some preliminary results. Finally, section 6 contains conclusions and some limitations, which can be addressed in future work.

2. Theoretical framework

Strategy scholars have emphasised that firms adapt to changing competitive environments by reconfiguring their structures and resources (Galunic and Rodan, 1998; Hannan and Freeman, 1984), in particular by means of acquisitions of other companies, divestitures and restructuring of their units (Karim and Capron, 2016). In this tradition, it has been observed that this whole process of structural reconfiguration helps large and established firms to achieve synergies and promote innovation through recombination and renewal of their resources portfolio (Girod and Whittington, 2017a; Karim, 2006, 2009; Karim and Kaul, 2015). While strategic management scholars focus preferentially on large corporations, they also recognise that entrepreneurial firms face pressures to reconfigure too (Karim, 2006). Little is known on how new firms reorganise and adapt in their first years after entry. While new firms have less resources to devote to change and adaptation, the lack of established routines and structures makes them more flexible and malleable. Therefore, in spite of their fragility, entrepreneurial firms are more flexible and adaptable with respect to established incumbents. Moreover, a rapid reconfiguration can help new and small firms to overcome their fragility due to their liabilities (Bruderl and Schussler, 1990; Freeman et al., 1983; Stinchcombe, 1965) and survive in the face of intense selective pressure. On the other side, too rapid reconfiguration can undermine the cumulative and path-dependent process of knowledge accumulation and the emergence of routines (Amburgey et al., 1993; Kelly and Amburgey, 1991). A second limitation of the reconfiguration literature is that such processes are not observed in their completeness (Feldman, forthcoming; Karim, 2006), i.e. whether the outcome of reconfigurations is indeed successful, leading to the survival of the firm. Furthermore, the existing literature focused on acquisitions and divestitures as the key determinants of firm reconfiguration (Karim, 2009; Karim and Mitchell, 2000). However, scholars started to explore whether there are other events that can further compose such process
(Feldman, forthcoming), such as spin-offs (Bennett and Feldman, 2017) or divestitures (Vidal and Mitchell, 2015, 2018). Finally, even if reconfiguration has been defined as a proactive, strategic and purposeful experimentation with structure and resources (Karim and Capron, 2016), this process cannot be entirely designed a-priori. As argued by (Mintzberg, 1987) “an organization can have a pattern (or realized strategy) without knowing it, let alone making it explicit” (p.67). Therefore, observing how firms actually behaved how successful were the realized actions can prove to be particularly revealing. In this paper we aim at exploring which forms of reconfiguration take place in the first few years after the creation of new firms, how quickly they intertwine and unfold, and how they affect the survival likelihood of entrepreneurial firms.

2.1. Reconfiguration and new firms

In the case of young firms survival is strongly influenced by the initial stock of resources and their configuration (Geroski et al., 2010; Hannan and Freeman, 1984). The uniqueness/heterogeneity of firms depends on what resources they have and on how entrepreneurs/managers use them (Penrose, 1959). The entrepreneur plays a particularly crucial role in new ventures (Kraaijenbrink et al., 2010), because resources have to be discovered and coordinated in the pursuit of recognised opportunities (Alvarez and Busenitz, 2001; Barney et al., 2001; Foss et al., 2008). However, while resources at entry have been proven to exert a long lasting ‘imprinting’ effect on firm survival (Geroski et al., 2010), new firms have to adapt, reshape and update their resource bases in response to market feedbacks, competitive pressures and environmental conditions. In particular, firms do not only learn and innovate building on existing knowledge (Kogut and Zander, 1992), but also develop and/or access new resources, integrating them thanks to combinative capabilities (Galunic and Rodan, 1998).

The principal mechanism through which firms obtain new resources is their internal development. The internal development of resources, while being the most immediate way to produce new resources, is however characterized by path-dependency (Nelson and Winter, 1982). Moreover, learning limitations can limit the scope of the creation of new resources and consequently their value (Cohen and Levinthal, 1990). Therefore, managers often rely on the external acquisition of new resources (Wiklund and Shepherd, 2009). However, the effectiveness of such market mechanism can be hampered by knowledge-based and socially embedded resources. Consequently, firms are incentive to rely on both internally and externally developed new resources which have to be coordinated and integrated together with the existing ones (Wiklund and Shepherd, 2009). This cannot happen without the reconfiguration of the existing resource base, which is ultimately a dynamic capability firms must develop (Helfat and Eisenhardt, 2004; McKelvie and Davidsson, 2009;
Reconfiguration involves “decisions on which resources to transfer, retain, and/or divest” (Wiklund and Shepherd, 2009, p.196). This purposeful reorientation of resources aims at improving their utilization and to foster innovation (Kogut and Zander, 1992). Reconfiguration is therefore the process through which firms renew such resources or develop new combinations of them.

In principle, the concept of reconfiguration builds upon the resource-based view of the firm (Barney, 1991; Penrose, 1959; Wernerfelt, 1984, 1995). However, routines and resources are often tacit, embedded, dispersed in specific social contexts and co-specialized (Galunic and Rodan, 1998; Nelson and Winter, 1982). Such ‘incorporeal’ resources pose a limitation to analytical investigation (Kellermanns et al., 2016). Identifying, confining them into observations and tracking their evolution and interactions over time is a non-trivial task, particularly for broader, quantitative studies. Strategy scholars investigated more granular movements of resources by looking at structural processes of change through which firms add, remove or redeploy business units (Girod and Whittington, 2015, 2017b; Karim, 2006; Karim and Capron, 2016). The concept of reconfiguration has been recently proposed in the literature (Karim, 2006; Karim and Capron, 2016; Karim and Mitchell, 2004) with the goal of providing a general framework to investigate how organisations alter their resource base and structure and what consequences this implies. Generally, it refers “to firms adding to their current stock (of resources, units, and business activities), removing from this stock, and recombining or redeploying what is within this stock” (Karim and Capron, 2016, p.56; Karin, 2009). The reconfiguration of units is inherently interconnected with the reconfiguration of resources, since the acquisition, divestiture and restructuring of units implies also the reconfiguration of the underlying resources and routines.

Reconfiguration is a fundamental form of adaptation (Karim and Capron, 2016). Firms evolve by exploiting their reconfigurative ability (Helfat and Peteraf, 2015) to recombine the resources they already have, by discarding them and by adding new ones through their internal development or external acquisition. Reconfiguration encompasses those development activities that aim at overcoming resistance to change and at aligning resources with firms’ choice of innovating, contracting or expanding (Helfat and Peteraf, 2015; Karim and Capron, 2016). Reconfiguration is a valuable source of flexibility, which becomes fundamental in unpredictable and turbulent economic environments (Folta et al., 2016). Adapting to changes in environmental conditions frequently requires the acquisition of new assets or resources (Capron and Mitchell, 2009) or the modification of the existing ones through learning or innovation (Zollo and Winter, 2002). Strategy scholars tend to see reconfiguration as a matter of large, publicly traded corporations (Wiklund and Shepherd,
However, both established and entrepreneurial firms face pressures to reconfigure (Karim, 2006). In particular, new firms represent a novel analytical perspective which can prove fruitful. First, new firms, outside few exceptions, represent the extreme case in which they are themselves the business unit. New firms are less complex and changes are of relative greater importance (McKelvie and Davidsson, 2009). This provides a much clearer and simplified analytical context to explore the consequences of reconfiguration. Moreover, they benefit from a reduced buffer of resources shielding from the consequences of missteps. This highlights even further the prominence of an effective recombination of both external and internal resources (Wiklund and Shepherd, 2009).

As formerly argued by Vidal and Mitchell, "attempting to develop a set of tightly argued hypothesis in this context would be ambiguous, at best" (2018, p.152). A detailed theoretical framing is hindered by the complexity and heterogeneity of the phenomenon itself. Conversely, an exploratory investigation, guided by the existing work in the field, could prove more fruitful (Vidal and Mitchell, 2018). The lack of a theoretical benchmark also opens the opportunity to draw from other theoretical lenses (such as organizational ecology), through which scholars have previously investigated such transformative phenomenon from different, but often complementary points of view. Therefore, we articulate our investigation around three, overarching themes: the type of organization we actually observe, their timing, and their effect on exit and survival.

### 2.2. Type of reorganization

First, we aim at mapping the forms of reconfiguration. The initial type of reconfiguration considered is the acquisition of other firms and their following incorporation and assimilation. Acquisitions play a crucial role in reconfigurative processes by allowing firms to incorporate new resources without incurring in time diseconomies or facing learning constraints (Capron et al., 1998). Furthermore, they can not only be used to deepen to resource base of the firm, by acquiring closely related and complementary resources, but also to extend it, by acquiring different and unfamiliar ones (Karim and Mitchell, 2000). However, other forms of reconfiguration have been considered in the literature, like the combination of spin-offs followed by acquisitions (Bennett and Feldman, 2017), for which different explanations have been advanced, from refocusing motives to investors’ preference for acquisitions performed by leaner firms. Furthermore, scholars have recently investigated the role played by divestitures. While divestitures were mainly considered in the analysis of restructuring processes undertaken by inefficient or atrophic firms (Bowman and Singh, 1993; Bowman et al., 1999; Markides, 1995), recent studies proposed that divestitures are a more common phenomenon (Vidal and Mitchell, 2015, 2018). In particular, Vidal and Mitchell propose that firms can benefit
from divestitures through a complementary Penrose effect, as divestitures free resources, such as financial ones or managerial capabilities, which can be used differently within the firm. Finally, firms might also rely on the same type of reconfiguration repeatedly. In order to change, firms must develop “modification routines” and practices (Nelson and Winter, 1982, p.17). Such routines govern the process organisational change and introduce path-dependency into it. First, it is a form of learning by doing, as “organisations learn to change by changing” (Amburgey et al., 1993, p.58). Second, they create a “competency trap” (Levitt and March, 1988, p.328): organisations attempt to overcome problems using known solutions before trying out new ones.

It is therefore of interest to explore and understand how frequent these events are and whether other forms of reconfiguration actually exist (Feldman, forthcoming).

### 2.3. Timing

Outside the type of reorganization adopted by the firm, it interesting to understand how quickly it happens. According to the strategic horizon literature, there is some evidence that those new firms that plan strategically in advance do it for a period of around 1-2 years (Kraus et al., 2008; Maguire et al., 2007; Risseeuw and Masurel, 1994). However, scholars also argued that firms cannot know a-priori what strategic path they will actually be able to follow (Mintzberg, 1987). Some further insights can be drawn from the organisational ecology literature. A seemingly counterintuitive consequence of the theory of organisational inertia is the concept of inertial “momentum” (Amburgey et al., 1993; Amburgey and Miner, 1992; Kelly and Amburgey, 1991). The same inertial pressures hindering organisational transformation can be expected sustain the process of organisational change, once triggered. Inertia can set off a “uniform motion” of organisations (Kelly and Amburgey, 1991, p.335), fuelled by the definition of change routines (Nelson and Winter, 1982). Consequently, there are no clear indications about how quickly we should expect reconfigurations take place.

### 2.4. Effect on survival

From a purely theoretical point of view, it is difficult to predict a clear-cut effect of organisational change on survival. In the organizational ecology literature (Aldrich and Auster, 1986; Hannan and Freeman, 1977), change is triggered by a loss of fit with the environment, caused by unforeseen external shocks. Such negative circumstances, paired with the firms inertia (Hannan and Freeman,
1984), decrease the survival likelihood. Conversely, rational adaptation theories\(^1\) assume that the process of change is active, strategic and rationally planned and designed. Therefore, it is expected to improve firm’s conditions, to bolster favourable outcomes and to promote firm survival. Nonetheless, some guiding insights can be obtained from integrating the theory of relative inertia elaborated by Hannan and Freeman with theories on organisational learning and innovation (Amburgey, Kelly and Barnett, 1993). An initial, basic distinction can be done between small vs large and young vs old organisations. In the survival literature, age and size are fundamental predictors of organisational survival, both decreasing firms’ exit likelihood. When considering organisational change, age and size are supposed to decrease the likelihood of change too, because both of them are associated with higher levels of relative organisational inertia. The bigger an organisation, the more complex it is. Therefore, dismantling exiting routines, structures and internal or external social and productive networks can prove to be particularly challenging and problematic. Older organisations experience similar inertial pressures. Established firms are incentivized to continue using the established routines (Nelson and Winter, 1982) and their members have developed organisational specific skills and learning procedures (Becker, 1975). Organisations themselves are incentivized to pursue organisational specific investments. Moreover, established organisations are usually characterized by high level of institutionalization. In the words of Hannan and Freeman (1984), organisations “ossify” with age. While these factors make them more resilient against market exit, they make them more static too. Therefore, as a general consequence, reorganization is expected to decrease markedly the survival likelihood. “Reorganization robs an organization’s history of survival value” (Hannan and Freeman, 1984, p.160), recreating a liability of newness. The older, larger and more crystalized an organisation is, the more disruptive change is. On the other hand, however, the exit risk should be mitigated by the fact that this kind of organisations can devote more resources to transformation activities, e.g. in the form of better access to credit or skill pools.

For younger and smaller firms, the vice-versa holds. The same factors determining the liability of newness and adolescence (Stinchcombe, 1965; Brüderl and Schussler Freeman, Carroll and Hannan, 1993) increase the likelihood of change of younger and smaller organisations. Such organisations enjoy lower levels of inertia; they operate according to routines that are more malleable and a have more fluid relationships network. Furthermore, it can be argued that their initial “buffer” of resources composed by commitment, trust and capital investments (Fichman and Levinthal, 1988) can function as a (limited) pool of resources that firms use to adapt. The initial “honeymoon” period provides a

\(^1\) such as the resource-based theory (Pfeffer and Salanick, 1978), strategic choice theory (Bourgois, 1984; Child, 1972), organisational strategy theory (Miles et al., 1978; Mintzberg, 1984), organisational learning theory and the evolutionary theory (Cyert and March, 1963; March, 1981; Levinthal and March, 1981; Nelson and Winter, 1982).
safe window of time within which firms can change themselves, adapting to new or unseen threats and opportunities. These argumentations must however be related with the fact that they remain inherently more fragile. Therefore, “small organizations are not only more likely than large ones to attempt change, but are also more likely to die in the process” (Hannan and Freeman, 1984, p.163).

3. Data

In the analysis, we use micro-data on the population of new private limited-liabilities companies created in 2011 in the Netherlands. The data are drawn from the General Annual Business Register (ABR), a comprehensive database containing demographic information on the whole population of firms operating in The Netherlands. The database is produced, organised and managed by the Central Bureau of Statistics of The Netherlands (CBS). This rich database stores demographic information relative to firms. As reconfigurative events we consider the following ones:

- Acquisition of another firm.
- Divestiture of parts of the firm, which generate another productive unit independent of the firm. It can include spin-offs. The generating firm does not exit as immediate consequence of this event.
- Operational restructuring, implying changes to the productive structure of the firm.
- Organizational restructuring, implying a change of the core legal entity guiding the firm. It can coincide with a change of industrial sector of activity.

Due to the comparatively low number of operational restructuring events, in the econometric analysis we pool them with organizational restructuring ones. These events can concatenate in sequences and any of them can precede the exit. The ABR registers events with monthly frequency. The precision is remarkable, considering that the register is compiled also for fiscal purposes. A more fine-grained time could shed brighter light on how timely and reactively firms reconfigure. This is a consistent improvement compared to existing studies on reconfiguration, which mainly variations registered with yearly frequency (Karim, 2006; Karim and Kaul, 2015; Vidal and Mitchell, 2018).

Our initial sample is composed by of all firms entering the ABR in 2011. We then focus on greenfield entries only, excluding from the sample firms generated by previously existing organisations (e.g. spin-offs or mergers). We also exclude all firms that are part of a group and that operate primarily in non-commercial sectors. Firms deriving from previous organizations or belonging to a group have different knowledge and resource bases and are usually managed following previously established practices and routines. Moreover, access to an already formed network or higher levels of legitimacy
can grant them privileged access to additional resources (e.g. financial ones). Furthermore, we impose an additional restriction considering only ‘private limited liability companies’. This sample design aims to obtain a more homogeneous sample. The final sample is composed by 34,589 firms. Overall, we observe a total of 3,938 transformation events.

4. Method

The analysis is performed using survival models, also known as duration models. Survival analysis techniques are specifically designed to analyse processes dynamically unfolding over time, handling both left and right truncation. However, while survival analysis is usually employed to study exit events, our goal is to analyse (potential series of) reconfigurative events. Therefore, we specify models that account for sequences of events, instead of only their endpoint. Graphically, our analytical model can be depicted as in figure 1.

*Figure 1: reconfiguration and exit*

As it can be easily observed, there is a high degree of complexity. There is a high number of pathways that firms can follow. As we know from the descriptive analysis, not all of them are as frequent. However, it is interesting to understand whether they are also less meaningful in terms of survival.

Empirically, the quantities of interest in a survival analysis framework are two. The first one is the hazard rate, which is the instantaneous rate of transition between two events of interest. Mathematically, the hazard rate is defined as:
\[ \lambda_{ij}(t) = \lim_{\Delta t \to 0} \frac{Prob_{ij}(t \leq T < t + \Delta t | T \geq t)}{\Delta t} \]

where \( i \) and \( j \) represent the two events from and to which the firm is moving (e.g. from entry to exit) \( t \) is the starting time and \( \Delta t \) is an infinitesimal time increment. Since our data are discrete, the minimum time unit we can consider is 1 month. Because the hazard is an instantaneous measure of the rate of transition, usually calculated as an average across time, it is interesting to consider the actual probability of exit, which is a global measure of how the risk cumulates over time. Mathematically, it can be simply defined as:

\[ P_{ij}(s, t) = Prob(Z(t) = j | Z(s) = i) \]

where \( Z(t) \) is a stochastic process of time. In other words, \( P_{ij}(s, t) \) is the probability that a firm will move from state \( i \) to a state \( j \) over a given period of time \( (s, t) \). The probability is estimated as predictions building on the estimated hazards through the Aalen-Johansen estimator (Aalen and Johansen, 1978):

\[ \hat{P}(s, t) = \prod_{s}^{t} (I + d\hat{A}(u)) \]

where \( I \) is an identity matrix and \( A(du) \) is the Nelson-Aalen estimators matrix (Aalen, 1978), calculated as \( dA_{ij}(t) = Prob(Z(t + dt) = j | Z(t) = i) \) with \( i \neq j \) since \( A_{ii}(t) = -\sum_{j \neq i} A_{ij}(t) \). Both hazards and probabilities can be calculated conditional on a given set of covariates \( X \).

4.1. Variables

The dependent variable of interest, similarly to any survival analysis, is the time lapse between events of interest, among which we have exit. The independent variables considered in the calculation of the probabilities are the size of the firm in terms of number of employees, a set of sectoral dummies and the time (in months) separating the events of interest.

5. Results

5.1. Descriptive statistics

The final sample of firms is composed by 34589 firms. We follow them from entry (between January and December 2011) up to January 2019. Figure 2 depicts the Kaplan-Meyer survival function. The
survival rate over the whole time spell is 27.92%. Market selection is particularly strong in the first two years, were around half of the firms in the initial sample exits.

*Figure 2: Kaplan-Meier survival estimate*

Overall, we observe a total of 3938 transformation events. The most frequent events are acquisitions (31.59%) and organisational restructurings (38.59%). Operational restructurings are the minority, being only 296 events. Figure 3 plots the distribution of events across time, with quarterly frequency.

*Figure 3: Plot of events, quarterly*
The most striking feature is the peak of organizational restructurings registered over the first quarter of 2012, when not all firms are even 1 year old. In the business register, ‘entry’ is not the date of incorporation of the firm, but the one in which the first productive investment is performed. Therefore, the age of the firm in the ABR is the time spent in actual activity. However, it still remains an unexpected finding. The transformation activities of firms remain quite marked over the initial years, culminating in a second peak, registered during the first quarter of 2014. This peak is common to all events. After it, the number of events registered per quarter stabilizes. This could be interpreted as a reduction in firms’ dynamism. However, it should be kept in mind that, over time, the sample is characterized by consistent exits. Consequently, the observed slight reduction in firms’ transformations could also be interpreted as an increase in reorganization activities performed by a reducing set of more stable, active firms.

Table 1: Transition Probability Matrix

<table>
<thead>
<tr>
<th></th>
<th>org.restruct.</th>
<th>divestiture</th>
<th>acquisition</th>
<th>op.restruct.</th>
<th>exit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>entry</td>
<td>4.67</td>
<td>1.60</td>
<td>3.74</td>
<td>0.75</td>
<td>89.24</td>
<td>100.00</td>
</tr>
<tr>
<td>org.restruct.</td>
<td>18.57</td>
<td>14.73</td>
<td>3.19</td>
<td>2.42</td>
<td>61.10</td>
<td>100.00</td>
</tr>
<tr>
<td>divestiture</td>
<td>3.13</td>
<td>3.39</td>
<td>29.50</td>
<td>3.66</td>
<td>60.31</td>
<td>100.00</td>
</tr>
<tr>
<td>acquisition</td>
<td>13.00</td>
<td>40.03</td>
<td>11.67</td>
<td>5.17</td>
<td>30.13</td>
<td>100.00</td>
</tr>
<tr>
<td>op.restruct.</td>
<td>10.56</td>
<td>10.56</td>
<td>14.29</td>
<td>14.91</td>
<td>49.69</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>5.31</td>
<td>2.99</td>
<td>4.31</td>
<td>1.03</td>
<td>86.36</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 1, reporting the transition probability matrix of reconfigurative events, starts to shed light on reconfigurative sequences. The most diffused combination of events is acquisition followed by a divestiture. Almost 40% of firms that experience another event after performing an acquisition undergo a divestiture as direct subsequent event. The inverse combination is also quite diffused, with a 30% share. The third sequence with the highest relative frequency is the repetition of an organizational restructuring (19%). With some other exceptions, the remaining possible combinations of events are observed quite sparsely.

Table 2 reports descriptive statistics on the number of months separating directional pairs of events. It therefore enriches the transition matrix reported in Table 1 by adding the time dimension.
First it can be noticed that there is no “quicker” event happening after entry than exit itself. Half of the exits in the sample happens within 13 months. All the other events take places on average within 3 years from entry (around 2 and a half if the median is considered). If, vice-versa, we consider which transformations precede exit, we observe that, apart from entry, the closest is the organizational restructuring, with a median of less than one year (10 months), followed by the other event. Regarding pairs of reconfigurative events only, we can first observe that the slowest events are acquisitions following a divestiture (with a median of 32 months) or a restructuring (around 2 years). Conversely, the quickest are events of restructuring or divestitures following an acquisition, which take place respectively within 1 year or slightly after 1 year.

These statistics do not consider sequences of reconfiguration, but just single pairs of events. Further insights on potential, longer event arrays are obtained through sequence analysis techniques. However, the distribution the number of reconfigurative events is very skewed. Almost 71% of the firms perform a single reconfigurative event and 23% of the firms performing only 2 events. Figure 4 plots graphically the sequences of events performed by firms with at least one event (left graph)
and at least two (right graph). Again, it appears clear how the distribution of events is particularly skewed.

**Figure 4: sequence index plots**

![Sequence index plots](image)

In the multivariate analysis we therefore focus only up to 2 events following entry. Among them, as Table 3 shows, the most frequent sequences remain acquisition-divestiture (around 8%) and restructuring (around 5%).

**Table 3: frequencies, up to 2 events following entry**

<table>
<thead>
<tr>
<th># events</th>
<th>freq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>restr</td>
<td>1076</td>
</tr>
<tr>
<td>acq</td>
<td>618</td>
</tr>
<tr>
<td>divest</td>
<td>342</td>
</tr>
<tr>
<td>acq-divest</td>
<td>220</td>
</tr>
<tr>
<td>restr-restr</td>
<td>195</td>
</tr>
<tr>
<td>restr-divest</td>
<td>134</td>
</tr>
<tr>
<td>acq-divest</td>
<td>98</td>
</tr>
<tr>
<td>divest-acq</td>
<td>69</td>
</tr>
<tr>
<td>acq-acq</td>
<td>64</td>
</tr>
<tr>
<td>restr-acq</td>
<td>45</td>
</tr>
<tr>
<td>divest-restr</td>
<td>20</td>
</tr>
<tr>
<td>divest-divest</td>
<td>&lt;10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2891</strong></td>
</tr>
</tbody>
</table>
5.2. Predicted exit probabilities

To have a more complete understanding on how different reconfigurative trajectories affect survival, we now consider predicted probabilities of exit.

*Figure 5: predicted probability of exit, none or only 1 event*

Figure 5 depicts exit probabilities calculated for firms performing none or one reconfigurative event. Overall, it can be observed that firms undergoing restructuring, performing divestiture or remaining unchanged have very similar and rapidly surging probabilities of exit over the first 20 months. After the 20\textsuperscript{th} month, the probability of exit after restructuring overtakes the others and remains constantly above them. Conversely, exit after a divestiture remains markedly lower. All these probabilities increase at a slowing pace, suggesting the underlying rate of exit diminishes over time. Conversely, the probability of exit after an acquisition follows a different pattern. It does not only start later and remains abundantly below the others, but it also increases at an almost constant pace. This suggests that the underlying risk of exit after an acquisition remains more or less stable over time.

Figures 6-8 contain plots of exit probabilities for firms which perform at least 2 reconfigurative events. First, figure 6 considers sequences of events ending with a restructuring. It is interesting two observe how a sequence of two restructuring events increases abruptly the probability of exit in a few months up to 60\% and the keeps on growing at a slower pace. This suggests that firms undergoing restructuring either exit immediately, or are able to keep operating without further major issue. The combination divestiture-restructuring is quite rare and has incidence only after different years. On the other hand, acquisition-restructuring have a more marked impact on the probability of exit later on
time (starting around the 40th month). Similarly to the previous graph, the growth rate of the probability seems to diminish just marginally over time.

*Figure 6: predicted probability of exit, sequences ending in “restructuring”*

![Graph showing predicted probability of exit for restructuring sequences.]

*Figure 7: predicted probability of exit, sequences ending in “divestiture”*

![Graph showing predicted probability of exit for divestiture sequences.]

Figure 7 depicts probabilities connected with events sequences whose second event is a divestiture. The double divestiture sequence is omitted from the graph due to the paucity of observations. Both
acquisition-divestiture and restructuring-divestiture increase the probability of exit constantly over time, up to 60%, with the first being higher than the latter. Again, their inclination is steady, suggesting that the risk does not decrease over time. Finally, figure 8 presents sequences terminating with an acquisition. The acquisition-acquisition sequence is the one that grants the higher survival premium, followed by divestiture-acquisitions. Conversely, sequences starting with a restructuring, consistently with what observed before, have an abrupt increase in the exit probability after around 2 years and then slow down.

Figure 8: predicted probability of exit, sequences ending in “acquisition”

6. Conclusions

In this paper we investigate the process of reconfiguration that new firms may undertake in the first years after creation as they define and develop their resources configuration structure. The goal was to provide further evidence on the processes of transformation that ‘accompanies’ adaptation at the early stages of a firm’s life cycle. First, our preliminary results show that newly created firms do reconfigure in all forms and they do so rapidly after start-up. We find that the most diffused combination of events is acquisition followed by divestiture, with almost 40% of firms that experience another event after performing an acquisition undergo a divestiture. The inverse combination of divestiture followed by acquisition is also quite diffused, together with a repetition of organizational restructurings. The remaining possible combinations of events are observed quite sparsely. Second, we find that the quickest events are restructurings or divestitures following an acquisition, taking
place respectively within 1 year or slightly after 1 year in median. Conversely, the slowest events are acquisitions following a divestiture (with a median of 32 months) or a restructuring (around 2 years). Third, we observe that the category of firms with the highest probability of exit are the ones undergoing events of restructuring, particularly if repeated. Interestingly, in the latter case we find an abrupt surge in the probability of exit, which then softens over time. Also, we observe that firms performing acquisitions have the lowest probability of exit. In particular, while the risk of exit is lower than the others, it tends to increase over time more constantly than the ones associated with other combinations of events, suggesting that the underlying risk of exit associated with acquisitions remains stable over time.

There are some limitations to this study. First, we lack the motive, “why” firms do reconfigure. Additional information on the strategic vision driving firms’ transformation and on the purpose of these events could refine the results, elevating them towards a more causal interpretation. Second, this study would benefit from the inclusion of further, fine-grained firm-level data, e.g. founder’s characteristics or access to finance, which could shed further light on the mechanism and motive driving such configuration sequences. Third, the Business Register of the Netherlands, by construction and definition, has a national dimension. Therefore, we lack information on whether firms perform acquisitions or generate spin-offs internationally.
References


