Exploring the impact of different types of prior entrepreneurial experience on employer firm performance

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ABSTRACT

We investigate the impact of prior entrepreneurial experience on current performance of firms with employees (employer firms). We distinguish between external entrepreneurial experience obtained outside of the current firm and internal entrepreneurial experience obtained within the boundaries of the employer firm currently run. Regarding the latter we focus on a special type of prior internal experience, i.e. as an own-account worker before scaling up to employer firm. Theoretically, both types of prior entrepreneurial experience are associated with different processes of learning-by-doing. Empirically, we find that both external entrepreneurial experience and internal experience as an own-account worker enhance employer firm performance. Our results therefore imply that, for individuals without any prior entrepreneurial experience wishing to start a new firm, a lean start-up strategy (as an own-account worker) is to be preferred over a more resourceful strategy hiring employees from the start.

1. Introduction

The 'liability of newness' (Hannan & Freeman, 1989; Stinchcombe, 1965) which is manifested in the high risk of failure for new business start-ups is a major concern for entrepreneurs, financiers, employees hired in new ventures and policy makers seeking wealth and sustainable job creation. Although some authors report that there is an initial "honeymoon" period of a year or two in which business closures are relatively infrequent (Fichman & Levinthal, 1991; Frank, 1988; Jovanovic, 1982; Mahmood, 2000; Van Praag, 2003), more than half of business start-ups never survive to reach their 5th birthday (Bartelsman, Scarpetta, & Schivardi, 2005; Phillips & Kirchhoff, 1989) and in highly turbulent markets with a high foreign firm presence less than half survive to reach their 3rd birthday (Burke, Görg, & Hanley, 2008). Individual characteristics of the founder-manager have been extensively used to establish why some start-ups stop operating shortly after they started, while others survive (see, for example, Kalleberg & Leicht, 1991; Cooper, Gimeno-Gascon, & Woo, 1994; Boden & Nucci, 2000; Thornhill & Amit, 2003; Williams, 2004; Millán, Congregado, & Román, 2012, 2014a, 2014b).

In its most basic form, variations in firm performance across entrepreneurs are attributed to differences in entrepreneurial ability that entrepreneurs possess. This is the basis of the classic Lucas model of occupational choice (Lucas, 1978). However, this model is completely static in the sense that entrepreneurs are endowed with a certain level of entrepreneurial ability which does not change over the entrepreneur's lifetime. Although entrepreneurial talent is certainly an important determinant of firm performance (Bosma, Van Praag, Thurik, & De Wit, 2004), in everyday life there is also an important role of learning-by-doing (Jovanovic, 1982). Indeed, several studies show that entrepreneurial experience and business success are positively related (Bosma et al., 2004; Burke, FitzRoy, & Nolan, 2008; Millán et al., 2012; Shane, 2000; Staniewski, 2016). However, not many studies distinguish between different types of prior entrepreneurial experience (Ucbasaran, Westhead, Wright, & Flores, 2010). In the present paper we study employer firms (firms with employees) and distinguish between external entrepreneurial experience obtained outside of the current firm and (a special type of) internal entrepreneurial experience obtained within the boundaries of the employer firm currently run, i.e. as an own-account worker before scaling up to employer firm. In particular we investigate whether both types of entrepreneurial experience may enhance firm performance.

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It is important to distinguish between the two sorts of entrepreneurial experience because the specific relationship between prior internal entrepreneurial experience as an own-account worker and current firm performance as an employer firm, has important implications for those individuals without any prior entrepreneurial experience wishing to start a new firm (i.e., novice entrepreneurs). In particular, if internal experience as an own-account worker enhances firm performance later on in the firm life cycle when the firm has reached employer status, it would imply that for novice entrepreneurs, a lean start-up strategy (as an own-account worker) is to be preferred over a more resourceful strategy hiring employees from the start.

As far as new-firm start-ups by novice entrepreneurs are concerned, we are thus comparing the relative value for firm performance of a lean start-up strategy (starting small, i.e. as an own-account worker) versus a more resourceful strategy (hiring employees from the start). Elements of the latter strategy that may positively influence firm performance are a reduction of resource constraints (Corradin & Popov, 2015; Fairlie & Krashinsky, 2012; Schmalz, Sraer, & Thesmar, 2017; Stucki, 2014) and starting closer to the industry Minimum Efficient Scale (MES) (Johnson, 2007). The conundrum is that these strategies involve greater scale of operations and hence greater exposure to risk by business start-ups. The greater exposure to the negative consequences of risk-taking is only worth taking if the gains in success are sufficiently high. This typically occurs in the context of globalization and the ICT revolution (Kreiser & Davis, 2010) which have caused the economic value of new ideas to become far more uncertain in modern "entrepreneurial" economies compared to the old "managed" economies (Audretsch & Thurik, 2001, 2004).

So necessarily this paper examines the alternative "skinny" small pilot launch entry strategy which is also used in an attempt to enhance performance and manage risk. Thus, before making strong sunk cost investments, new firms might optimally start operations at a small scale and only exercise an expansion investment option if circumstances prove to be favourable (Cabral, 1995). Adopting a lean or frugal approach to business can often help engender an efficiency culture in the firm as well as limit the risk by only committing the minimal amount of resources to test a new innovation before deciding any combination of scaling-up, altering the innovation to better fit the market or realising that it is better to focus on an alternative business opportunity/innovation (Bhide, 2000; Burke, 2009; Radjou, Prabhu, & Ahuja, 2012; Ries, 2011). So when starting a new business, it may be beneficial for entrepreneurs not to commit all of their resources all at once, but instead to try out a scaled down version of the business first and await market feedback before committing more resources. In support of this theory, Geroski (1995) reported that most new firms start with output less than the industry MES. Otherwise stated, it indicates the importance of path dependence on new venture performance (Coad, Frankish, Roberts, & Storey, 2013; Gruber, 2010).

In order for the lean pilot launch entry strategy to work as an effective learning strategy, the firms that use a prior lean state to explore an opportunity and that survive the initial start-up stage (despite being poorly resourced) before subsequently having enough information in order to decide to embark or not on more resourceful start-up, must at least outperform entrepreneurs who skip this prior lean-learning phase and start-up resourced from the outset. We test this necessary condition by analyzing a sample of employer entrepreneurs and investigating whether those employer entrepreneurs who initially started out small (i.e. without employees) but later on hired personnel, can generate extra value added over and above that created by employers who employed other workers from the start onwards (thereby committing a higher amount of labour resources immediately at start-up). In addition, one must also acknowledge the possibility that the relevant skills and judgment ability which are learned in the lean start-up phase can also be acquired through external entrepreneurial experience obtained in a prior firm. Therefore we distinguish between resourceful start-ups (i.e. with employees) by novice entrepreneurs and by experienced entrepreneurs.

As performance indicators we use survival (both firm survival and survival as an employer) and earnings (net earnings of the employer entrepreneur). We use data from the European Community Household Panel (ECHP), a longitudinal panel on individuals in households in the EU-15 during the period 1994–2001. This panel data base tracks the labour market status of individuals over time, distinguishing between the statuses own-account worker (self-employed with no employees), employer, paid employment, unemployment and inactivity. This allows us to establish the "starting status" of the employer, i.e. the labour market status immediately before becoming an employer entrepreneur. In particular, when an individual switches from own-account worker to employer (in the same firm), it is implied that the employer entrepreneur initially started the business on her own, i.e., the entrepreneur used a skinny, lean or pilot launch strategy. We estimate survival and earnings equations for employers using the starting status as main explanatory variable.

The paper follows a conventional structure. We initially examine relevant theory and derive testable hypotheses relating the impact of different types of prior entrepreneurial experience on various measures of new venture performance. We then review the data and outline the methodology. This section is followed by an outline of the results and the conclusions of the paper.

2. Theory and hypotheses

In the present section we will discuss different types of prior entrepreneurial experience (internal versus external) and show how these relate to different learning processes and different types of human capital obtained. These diverse channels of human capital development, in turn, may differently influence employer firm performance. Although in this paper we focus on the importance of prior entrepreneurial experience, we also acknowledge the important role of formal education for obtaining human capital relevant for running a business (Unger, Rauch, Frese, & Rosenbusch, 2011).

2.1. Different types of human capital for different types of entrepreneurial experience

Table 1 distinguishes between five possible labour market statuses

Table 1

Linking internal and external prior entrepreneurial experience to different types of human capital.

Previous activity: $t-1$	General entrepreneurial human capital	Employer managerial skills	Venture-specific human capital
Internal entrepreneurial experience			
Pilot launch/own-account work in the same firm	+		+
External entrepreneurial experience			
Own-account work in a different firm	+		
Employer in a different firm	+	+	
No entrepreneurial experience			
Paid employment		(+)	
Non-employment			

that entrepreneurs may have immediately before becoming an employer entrepreneur, ranging from *no prior entrepreneurial experience* (when the employer entrepreneur was previously in wage-employment or non-employment) to *external entrepreneurial experience* in a different firm (either as an own-account worker or an employer) to *internal entrepreneurial experience* as an own-account worker.

The columns of the table distinguish between different types of human capital obtained through different types of learning processes that labour market participants undergo during different labour market experiences. First, general entrepreneurial human capital relates to knowledge and skills that entrepreneurs need to have to successfully run a business, i.e. to deal with the following challenges and risks that new businesses face: (1) the *technology risk* that the firm may not actually be able to create the product or service offering that is envisaged prior to production (Wu & Wu, 2014); (2) the *key resources risk* involving the capability of the entrepreneur to secure 'make or break' pivotal resources in the market such as a licence permit, a necessary ingredient, legitimacy or even a distribution route to market (Finney, Campbell, & Powell, 2005); (3) the *market gap risk* that the scale of a customer problem/need that is being solved is not as great as imagined and/or that it is, but there simply are not as many of this type of customers as previously imagined; and (4) the *competition risk* that other businesses with a competitive advantage exploit the same market gap.

The general entrepreneurial human capital that is needed to overcome the above challenges is typically obtained in a learning-by-doing process that entrepreneurs go through when actually running a business, i.e. by prior entrepreneurial experience. In general, one may expect that individuals with more entrepreneurial experience have obtained higher levels of general entrepreneurial human capital. This type of human capital can be obtained by entrepreneurial experience obtained inside or outside the employer firm currently runs. Moreover, it can be obtained in businesses with or without employees (see Table 1).

Second, one specific type of human capital relates to the ability to manage a firm with employees, i.e. employer managerial skills. Such skills are required to overcome the *managerial risk* relating to the ability of the founders of the new venture to manage the organizational and financial challenges associated with start-up, growth and professionalization of a business as it develops (Flamholtz & Brzezinski, 2016). In particular, once a firm reaches a certain size, it is necessary for managers to develop and implement basic day-to-day operational systems, in such areas as accounting, billing, personnel recruiting and training (Flamholtz, 1995). Moreover, to secure the long-term viability of the firm, management systems related to planning, organization and control need to be developed, as well as a corporate culture. A specific challenge for employer firm managers is to keep their operational and management systems up to speed with the development of the firm so as to avoid "growing pains" (Flamholtz & Brzezinski, 2016).

Unlike general entrepreneurial human capital, these types of skills cannot be obtained by working as an own-account worker. Instead, employer managerial skills are learned by running an employer firm and actually experiencing the challenges associated with managing a sizable and growing organization. As Table 1 shows, for a minority of employees (e.g. division managers in large companies), it may be possible to obtain such experience also when in paid employment (hence the plus in brackets in the middle column).

The third type of human capital considered is venture-specific human capital, and specifically, venture-specific human capital obtained during a prior lean stage of the firm where only limited resources are utilised (i.e. as an own-account worker and so without employee resources). As the term suggests, venture-specific human capital relates to the venture currently run. It relates to firm-specific knowledge such as the value of the idea underlying the firm, the ability of the entrepreneur to exploit the specific idea, etc. Oftentimes this knowledge is not static but it develops over time through a learning process. For instance, only when running a firm, an entrepreneur may find out whether or not he or she is actually able to realise the initial business

plan (i.e. whether he or she has the required entrepreneurial ability; Jovanovic, 1982), and only by running a firm, the entrepreneur may increase his or her ability to run the firm and his or her knowledge about the market in which the entrepreneur operates. In highly uncertain environments such as today's "entrepreneurial" economies (Audretsch & Thurik, 2004), this learning process is very important as initial estimates of one's ability or of the market situation are often incorrect. A lean start-up strategy may then be a cost-efficient way of obtaining this venture-specific human capital. In particular, those lean start-ups that survive the initial stages of the firm life-cycle, once they commit more resources, will be able to invest their capital in a more informed way (compared to firms using a resourceful entry strategy) because they can benefit from market feedback obtained during the initial stages of the firm life-cycle. They can also use this lean experience period to enhance their own entrepreneurial capability by using the lean period as a low risk/cost real business experience which enables them to discover and develop their own business/creative talent, as well as their business idea and ultimately better align/develop the business to target a better opportunity and with enhanced capability than would have been possible without going through this lean period/process.

In this regard, a lean start-up strategy is particularly useful in markets where late mover advantages exist where businesses can free-ride on earlier innovations of other businesses (Burke, 2009; Lévesque, Minniti, & Shepherd, 2009). In this setting it is not always the most innovative entrepreneur who is successful but often the entrepreneur who makes an incremental improvement to the innovation which at the margin is sufficient to attract a big response from consumers — "solving the last 10% of the consumer problem" (Burke, 2009). This perspective extends Knightian (1921) risk taking and Schumpeterian (1934) innovation to embrace Kirzner's (1973) 'alertness to opportunities' and Nelson and Winter's (1982) evolutionary innovation. It introduces a role for 'learning by doing', 'discovery by doing' (Jovanovic, 1982) and "opportunity creation" (Alvarez & Barney, 2007; Miller, 2007; Wood & McKinley, 2010, 2017) as determinants of post start-up performance (Shepherd, Douglas, & Shanley, 2000). This implies that profit opportunities for new ventures are often discovered and developed on an incremental, sequential and evolutionary basis rather than in big "once-off" eureka moment prior to start-up (Alvarez & Barney, 2007; Ardichvili, Cardozo, & Ray, 2003; Baron, 2006; Bhide, 2000; Burke, 2009; Bygrave, 1993). This, in turn, favours the lean start-up, as it does not use its financial resources all at once at the start of the firm but instead saves up some resources to be able to switch direction of the firm if circumstances require to do so or if unforeseen opportunities emerge. The incremental and evolutionary nature of innovation has also much resonance with the effectuation literature which emphasises a 'discovery by doing' rather than a pre start-up planning process (Sarasvathy, 2001, 2008; Corbett, 2007; Read & Dolmans, 2012). In a similar fashion to Jovanovic (1982) the effectuation literature assumes that this discovery process is as much about the evaluation of the entrepreneur's abilities as it is about discovering an opportunity. In summary, there is a significant body of theory and evidence to indicate that particular market circumstances may favour a small pilot launch strategy as part of a start-up process that, all going well, leads to fully resourced start-up (Blank, 2013).

Finally, it is important to mention that not all entrepreneurs starting out small, i.e. "lean", do so deliberately. Many firms start out small due to resource constraints (Evans & Jovanovic, 1989; Salunke, Weerawardena, & McColl-Kennedy, 2013). Recent research shows that excess financial (cash) resources may benefit firm performance but also that excess human resources may actually hamper firm performance as human resources are more difficult to redeploy (Paeleman & Vanacker, 2015; Vanacker, Collewaert, & Zahra, 2017). Hence, starting out lean due to resource constraints may actually be a blessing in disguise, at least when constraints in terms of human resources (number of employees) are considered.

2.2. Hypotheses

Based on the discussion above we will now derive a number of hypotheses related to the value of different types of entrepreneurial experience for employer firm performance. Because of its possible implications for the start-up size strategy of novice entrepreneurs, we are particularly interested in the value of internal entrepreneurial experience as an own-account worker. Therefore we will develop and test hypotheses comparing this form of entrepreneurial experience with other forms.

As discussed above, and as Table 1 shows, entrepreneurs with internal entrepreneurial experience as an own-account worker (i.e. entrepreneurs who used a lean start-up strategy) possess venture-specific human capital. In comparison with new employer entrepreneurs without any form of entrepreneurial experience (i.e. those who were previously in paid employment or non-employment), entrepreneurial human capital is thus higher for entrepreneurs with internal entrepreneurial experience. Although starting directly with employees has its advantages as well — in particular such firms are typically less resource constrained, we believe that the various advantages associated with a lean start-up dominate. Therefore our first hypothesis reads as follows.

H1. Employer entrepreneurs with prior internal entrepreneurial experience as an own-account worker perform better than those without any prior entrepreneurial experience.

When comparing employer entrepreneurs with prior internal and external experience as an own-account worker (i.e. in the same firm or in a different firm), Table 1 shows that, although both types possess general entrepreneurial human capital, the former type additionally possesses venture-specific human capital, which is particularly relevant for firm performance of the current firm. We therefore hypothesise:

H2. Employer entrepreneurs with prior internal entrepreneurial experience as an own-account worker perform better than those with external experience as an own-account worker.

Finally, when comparing employer entrepreneurs with prior internal experience as an own-account worker with employer entrepreneurs with previous experience as an employer in a different firm, Table 1 shows that both possess general entrepreneurial human capital. Moreover, as discussed in the previous subsection, we also see in Table 1 that the former type possesses venture-specific human capital whereas the latter type possesses employer managerial skills. Although it is not a priori clear which type of human capital is more relevant for firm performance, we consider that venture-specific human capital may be slightly more important, as it implies the entrepreneur already had experience in running its current firm before he or she became an employer. We hypothesise:

H3. Employer entrepreneurs with prior internal entrepreneurial experience as an own-account worker perform better than those with external experience as an employer.

Our measures of firm performance are survival and earnings. Regarding survival, in the next subsection we will draw out an important theoretical distinction between firm survival and employer survival which is relevant for our empirical analysis and for policy.

2.3. Firm survival versus employer survival

Finally, we draw a distinction between firm survival and employer survival. Most of the literature on survival concerns firm survival. We make a subtle but important distinction between firm and employer survival. Besides estimating the impact of entry strategy on firm survival, we will also consider the impact on employer survival, which may be considered a more performance related measure of survival. It is possible for an employer firm to retrench or downsize to a non-employing "own account" business without closure of the firm. In most of our subsequent analysis this is an exit (from employer status) and entails job destruction even though the firm itself survives. We believe that understanding the impact of firm start-up size strategy on this employer exit is of particular interest to entrepreneurs, investors, employees and policy makers who all have a vested interest in sustainable job creation directly or as a useful performance indicator of sustainable value creation. Shane (2000) noted that entrepreneurs usually choose a venture which draws on their own career experience. Burke, FitzRoy, and Nolan (2008) show that experience in self-employment early in life increases the time spent in self-employment later in a person's career. Drawing on these themes we postulate that one might expect to see a "boomerang effect" where employer businesses that emerge from own account firms are more likely to downsize back to own account status if business conditions warrant it rather than choose to exit (i.e., close down the business). This is because these entrepreneurs have prior experience in running an own account business and also have previously demonstrated a commitment to running a business at this smallest of scales. Likewise, experience as an employer or employee immediately prior to employer start-up implies career specific experience/expertise (and hence the greatest outside option is likely to reside) in these alternate careers so that if the employer start-up underperforms these entrepreneurs are more likely to exit back to these careers rather than downsize. This leads to our final hypothesis.

H4. Relative to employer start-ups, employer businesses that began life as own account start-ups are more likely to downsize back to own account status rather than closing down the business.

3. Data and methodology

3.1. Data

The panel data which we use are taken from the European Community Household Panel (ECHP).[1] The ECHP is a standardized multi-purpose annual longitudinal survey carried out at the level of the EU-15[2] covering the period 1994–2001. It was centrally designed and coordinated by the Statistical Office of the European Communities (Eurostat). Every year, all members of the selected households in each country are interviewed about demographics, education, labor market status and outcomes. The same questionnaire is used for all countries and years (see Peracchi, 2002, for a discussion).

From the self-reported annual labor market status information we construct a variable that indicates whether one is an entrepreneur in each of the years.[3] Entrepreneurship is equated to business ownership and a distinction is made, on an annual basis, between business owners with and without employees. Entrepreneurs without personnel are labeled own-account workers and those with employees, employer entrepreneurs. The data further allow a distinction between non-employment and paid employment. Hence, each individual is observed in a particular year in one of these four labor market statuses.

The sample which we use is restricted to individuals who have been observed as employer entrepreneurs in at least one of the years 1994–2001. We further restrict the sample to men and women aged 18 to 65. As usual, the agricultural industries are excluded from the analysis because of structural sector differences with the rest of the economy.

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[1] The ECHP data are used with the permission of Eurostat (contract ECHP/2006/09, held with the Universidad de Huelva).

[2] Sweden is excluded from the analyses due to missing values for relevant variables.

[3] The labor market status is observed once per year. Within-year changes in status are not registered.

3.2. Defining and explaining business performance of employer entrepreneurs

We are interested in explaining variations in the business performance of employer entrepreneurs who originally started the business on their own (pilot launch) as compared to other starting statuses. We consider the following three performance measures (i) 'duration as an employer entrepreneur in the same firm'; (ii) 'business duration since becoming an employer entrepreneur'; and (iii) 'earnings as an employer entrepreneur'.

The survival probabilities as an employer (where downsizing back to own account worker status is considered a separate exit category) and of the business itself (where downsizing back to own account worker status is not considered an exit as the business still continues) are estimated using competing risk survival models (Cox & Oakes, 1984; David & Moeschberger, 1978). For our first measure of performance, we distinguish four competing exit destinations from the status of employer entrepreneur: to own-account work in the same firm, to set up a new business (either as an own-account worker or as employer), to paid employment and to non-employment (either unemployed or inactive). For our second measure, however, only the three last-mentioned hazards are considered whereas a switch to own-account worker in the same firm is still considered a survival situation, since the business did not indeed close.

Both survival models are also estimated in a single risk framework, combining all exit routes into a single category. For the estimation of both survival models we use discrete time (i.e., logistic) specifications. We do so because the survival data we use are grouped into discrete intervals of time (years as entrepreneur). In this case, spell lengths may be summarized using the set of positive integers (1, 2, 3, 4, and so on), and the observations on the transition process are summarized discretely rather than continuously.[4]

Data on (net) earnings of the employer entrepreneur are also taken from the ECHP. Earnings equations are estimated by means of Tobit regressions. We use *Tobit* because a considerable proportion of observations (about 22%) are zeros. In these cases the employer entrepreneur only earns just enough to cover business expenses.[5]

Our regression equations are all of the following form: $y_{it} = f(z_{i, \tau_i - 1}, x_{it})$ where y_{it} is the dependent variable for employer i in year t, $z_{i, \tau_i - 1}$ is a vector of dummy variables indicating the starting status of the employer (see the next section below), and x_{it} is a vector of control variables. The indicator τ_i reflects the year that entrepreneur i first operated as an employer, so that the starting status is measured in year $\tau_i - 1$.

More details about our econometric framework are provided in the Appendix (Section A.1). For the exact definitions of the dependent variables used in the various exercises, as well as those of the independent variables, we also refer to the Appendix (Section A.2).

3.3. Main explanatory variables: starting status of the employer

Given the particular purposes of this study, our main explanatory variables are a set of dummy variables that identify the starting status of the employer, i.e. the labour market status immediately before becoming an employer. In particular, when an individual switches from own-account worker to employer (in the same firm), it is implied that the employer initially started the business on her own (pilot or lean launch). Other starting statuses are employer entrepreneur in a different firm, own-account worker in a different firm, paid-employment, and non-employment.

3.4. Control variables

The empirical models include a set of explanatory variables at the individual (micro) level that are known to influence entrepreneurial performance (see Parker, 2009; Millán et al., 2012, for overviews). Thus, the regression equations include controls for gender, age, cohabiting status, and the number of (young) children in the household. In addition, we estimate the association between the individual education level of the entrepreneurs and their performance. We distinguish by means of a set of dummy variables secondary and tertiary education levels from primary education. We expect positive associations between education and business performance (Burke, FitzRoy, & Nolan, 2000; Van Praag, Witteloostuijn, & Sluis, 2009; Unger et al., 2011) and between business experience and performance (Staniewski, 2016). Accordingly, the impact of the duration of the spell (as an employer) on the exit probabilities is also tested (business experience increases with the duration of the spell and, hence, the hazard decreases with duration — note that this variable covers internal entrepreneurial experience as an employer). Finally, in each case, we included business sector and country dummies to control for industry and country effects, respectively. All variables presented are taken from the ECHP.

3.5. Methodology to test the hypotheses

We test hypotheses H1–H3 using two performance measures, survival and earnings. Regarding survival, we estimate both employer and firm survival models as described in Section 'Defining and explaining business performance of employer entrepreneurs', and consider the coefficients for the dummy variables reflecting the impact on performance of their associated starting statuses (i.e. the labour market status immediately prior to becoming an employer). In doing so, we use the starting status 'own-account worker in the same firm' (pilot/lean launch) as the reference category and analyze the coefficients of the other starting statuses (see Section 'Main explanatory variables: starting status of the employer') relative to the reference category. Specifically, starting statuses "paid employment" and "non-employment" refer to hypothesis H1, 'own-account worker in a different firm' refers to hypothesis H2 and 'employer entrepreneur in a different firm' refers to hypothesis H3. In a similar fashion we also analyze the coefficients for the various starting statuses when estimating our (net) earnings equations for the employer entrepreneurs in our sample, where the starting status associated with prior internal entrepreneurial experience as an own-account worker is again the reference category.

To test hypothesis H4 we will analyze the results for the competing risk model for the duration as an employer entrepreneur (in the same firm). If the hypothesis holds, employer exits towards the status of own-account worker in the same firm should happen more often (ceteris paribus) for employers who originally started out on their own (i.e. those who used a pilot launch) than for employers who started immediately with employees (all other starting statuses). At the same time, employer exits to the other statuses (self-employment in a different firm, paid employment or non-employment), all of which imply closure of the business, should occur less often for those employer entrepreneurs who originally started on their own account, relative to employer entrepreneurs who started immediately with employees.

If such differences are indeed present, this should also be reflected in different results for the single risk survival models when the two different performance indicators 'duration as an employer entrepreneur in the same firm' and 'business duration since becoming an employer entrepreneur' are considered (see Section 'Defining and explaining business performance of employer entrepreneurs'). As explained before, for the first measure, switching from employer status to own account worker in the same firm is considered an exit whereas for the second

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[4] The survival analyses only include individuals who first became employer during the sample period (i.e. in the period 1994–2001). Therefore, there are no left-censored observations. The sample does include right-censored observations, though, besides completed employership spells. The right-censored observations are the spells that are still in progress in 2001.

[5] As a robustness check, we also ran the earnings equations using (clustered) OLS and using the between estimator, and estimation results are similar.

Table 2
Employer survival model — single risk model.

Independent variables (x)	Whole sample		Manufacturing sector		Construction sector		Services sector	
Predicted probability (y)	0.2290		0.2246		0.2139		0.2319	
	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.
Main predictors: *starting status*								
Own-account work in the same firm[b] (*ref.*)								
Employer in a different firm[b]	−0.0861	−5.13***	0.0174	0.28	−0.1008	−2.64***	−0.1000	−5.12***
Own-account work in a different firm[b]	0.0083	0.29	0.0751	0.83	−0.0138	−0.21	0.0045	0.13
Paid employment[b]	0.0272	1.91*	0.0430	1.11	0.0030	0.09	0.0300	1.69*
Non-employment[b]	0.0480	2.53**	0.0979	1.56	0.0392	0.83	0.0405	1.82*
Demographic characteristics								
Female[b]	0.0299	2.30**	0.1015	2.39**	0.0627	0.72	0.0189	1.34
Age	−0.0143	−3.64***	−0.0302	−2.79***	−0.0032	−0.35	−0.0140	−2.88***
Age squared	0.0002	3.61***	0.0004	2.91***	2.3E−05	0.20	0.0002	2.83***
Cohabiting[b]	−0.0217	−1.52	−0.0151	−0.39	−0.0032	−0.09	−0.0274	−1.58
Number of children under 14	−0.0015	−0.22	0.0153	0.84	0.0002	0.02	−0.0062	−0.76
Educational attainment								
Basic education[b] (*ref.*)								
Secondary education[b]	−0.0391	−3.05***	−0.0375	−1.11	−0.0688	−2.34**	−0.0368	−2.29**
Tertiary education[b]	−0.0401	−2.76***	0.0346	0.78	−0.0414	−1.11	−0.0521	−2.91***
Duration dependence								
Job tenure as employer	−0.1543	−14.71***	−0.1622	−4.25***	−0.1402	−6.03***	−0.1521	−11.55***
Business sector dummies	Yes[c]		Yes[d]		No		Yes[e]	
Country dummies	Yes		Yes		Yes		Yes	
Number of observations	6893		1066		1215		4612	
Number of spells	3769		557		634		2578	
Number of censored spells	2021		286		344		1391	
Number of completed spells	1748		271		290		1187	

Notes: Standard errors are clustered to control for intra-individual correlation.

[a] For continuous variables, dy/dx captures marginal effects for sample means. In the context of dummy variables, it reflects the impact for a discrete change of the dummy variable from 0 to 1.

[b] Dummy variable.

[c] 17 categories; *ref*. Mining and quarrying + Electricity, gas and water supply.

[d] 7 categories; *ref*. Mining and quarrying + Electricity, gas and water supply.

[e] 9 categories; *ref*. Other community, social and personal service activities; private households with employed persons; extra-territorial organizations and bodies.

[*] $0.1 > p \geq 0.05$.

[**] $0.05 > p \geq 0.01$.

[***] $p < 0.01$.

measure, it is not. Hence, if exit behaviour towards this category (own-account worker in the same firm) is different for employers who used a pilot launch, results for the single risk models for the two performance indicators should also differ.

We conclude this section with two final comments on limitations to our methodology. First, we only consider own-account workers who eventually make it to the status of employer entrepreneur. Even though we will show in the next section that in certain conditions these entrepreneurs perform better than employer start-ups, it does not mean that own-account workers perform better per se. Hence, our analysis only relates to entrepreneurial strategies where, sooner or later, employing personnel (or more generally, growth) is part of the strategy. Our study does not consider the success of solo self-employment strategies where obtaining an income for the entrepreneur herself is the main target. Second, in the paper we adopt a common practice in the literature in interpreting exit from self-employment as firm exit. While this is normally the case, one must treat the results with a note of caution as some firms may survive after the entrepreneur exits.

4. Results

Table 2 presents the results of the single risk model for employer survival (in the same firm). The reference category for the starting status variable is 'own-account work in the same firm', i.e. the pilot launch strategy. For the whole sample estimates it can be seen that, in line with hypothesis H1, employers who started from paid employment or non-employment (i.e., without prior entrepreneurial experience),

have respectively 12% and 21% higher exit chances (i.e. lower survival as an employer) than employers who originally started small (as an own account worker).[6] The higher exit chances for these groups seem to hold particularly for services industries. Compared to the starting statuses own-account work in a different firm and especially employer in a different firm (both of which imply prior external entrepreneurial experience), employer survival chances of those using a pilot/lean launch are equally good at best, and in some cases worse. Hence, these results do not support hypotheses H2 and H3. Instead, the business performance gains from going through a lean phase can also be achieved from prior entrepreneurial experience in other ventures, particularly in employer firms. In general, results from Table 2 suggest a positive effect on employer survival of both internal and external prior entrepreneurial experience.

Table 3 enables a more detailed analysis of the single risk results, by separating out the results by different exit categories (competing risk model). We see that results for the exit 'own-account work in the same firm' are different from the three other exit categories. Employer entrepreneurs who originally started as an own account worker have a significantly higher chance of returning back to this status (i.e. downsizing back to own account worker) compared to employer entrepreneurs with all other starting statuses. When considering the three other exits, all of which imply closure of the business, survival chances of employers who used a pilot launch are significantly higher than for employers starting with personnel but without entrepreneurial

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[6] Calculated as 0.0272/0.2290 and 0.0480/0.2290, respectively, see Table 2.

Table 3
Employer survival model — competing risks model.

Final state	Own-account work in the same firm		Self-employment in a different firm		Paid employment		Non-employment	
Predicted probability (y)	0.0551		0.0234		0.0791		0.0270	
Independent variables (x)	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.
Main predictors: *starting status*								
Own-account work in the same firm[b] (*ref.*)								
Employer in a different firm[b]	− 0.0393	− 6.89***	− 0.0104	− 2.00**	0.0003	0.02	0.0144	1.50
Own-account work in a different firm[b]	− 0.0154	− 1.76*	0.0039	0.37	0.0254	0.98	0.0355	1.78*
Paid employment[b]	− 0.0507	− 8.81***	0.0126	2.51**	0.0879	7.31***	0.0131	2.10**
Non-employment	− 0.0324	− 6.18***	0.0205	2.38**	0.0545	3.16***	0.0582	4.00***
Demographic characteristics								
Female[b]	0.0110	1.67*	− 0.0072	− 2.25**	− 0.0100	− 1.38	0.0334	5.54***
Age	− 0.0012	− 0.61	− 0.0006	− 0.56	− 0.0019	− 0.81	− 0.0056	− 5.00***
Age squared	1.1E − 05	0.48	3.4E − 06	0.25	1.5E − 05	0.51	7.7E − 05	5.81***
Cohabiting[b]	− 0.0050	− 0.72	− 0.0020	− 0.50	− 0.0110	− 1.24	− 0.0017	− 0.36
Number of children under 14	− 0.0008	− 0.28	− 0.0030	− 1.47	− 0.0001	− 0.03	0.0018	0.87
Educational attainment								
Basic education[b] (*ref.*)								
Secondary education[b]	− 0.0129	− 2.26**	− 0.0004	− 0.11	− 0.0129	− 1.71*	− 0.0068	− 1.74*
Tertiary education[b]	− 0.0130	− 2.00**	0.0021	0.50	− 0.0037	− 0.41	− 0.0166	− 3.81***
Duration dependence								
Job tenure as employer	− 0.0208	− 4.33***	− 0.0186	− 5.39***	− 0.0712	− 10.93***	− 0.0225	− 6.62***
Business sector dummies	Yes							
Country dummies	Yes							
Number of observations	6893							
Number of spells	3769							
Number of censored spells	2021							
Number of completed spells	540		250		677		281	

Notes: Standard errors are clustered to control for intra-individual correlation.

  [a] For continuous variables, dy/dx captures marginal effects for sample means. In the context of dummy variables, it reflects the impact for a discrete change of the dummy variable from 0 to 1.

  [b] Dummy variable.

  * $0.1 > p \geq 0.05$.

  ** $0.05 > p \geq 0.01$.

  *** $p < 0.01$.

experience (starting statuses paid employment and non-employment). Hence compared to this group of employers, employers using a pilot launch are more likely to downsize back to own account status rather than closing the business altogether. These results strongly support hypothesis H4.

When we now look at Table 4, where firm survival is considered instead of survival as an employer entrepreneur in the same firm, we see that results are much more pronounced. Employers who originally started as an own account worker perform much better than those who started-up with personnel from paid employment or non-employment statuses, supporting hypothesis H1. Note that coefficients and significance levels are now much higher than in Table 2, which considers employer survival. In particular, for firm survival, employers who started-up with personnel from paid employment or non-employment statuses have respectively 96% and 112% higher exit chances than employers who originally started as an own account worker.[7]

Regarding hypothesis H2, we note that starting status own-account work in a different firm is associated with a significantly higher chance of firm exit (mainly caused by the services sector), supporting hypothesis H2. In contrast, employer firm experience in a different firm does not significantly influence firm survival (relative to a lean start-up strategy), hence these results do not support hypothesis H3.

Table 4 also shows that firm survival chances of employer start-ups with starting statuses that imply prior external entrepreneurial experience (i.e. employer in a different firm or own-account work in a different firm), are between 39% and 104% higher than for employer start-ups without prior entrepreneurial experience.[8] This points at the

importance of entrepreneurship related human capital.

Table 5 shows the results from the earnings equations. When considering the whole sample estimation, it is clear that earnings for those employers who originally started small (as own account worker) are between two and three times those of employers with all other prior statuses.[9] These results therefore strongly support hypotheses H1, H2 and H3. The earnings differentials are especially pronounced for services industries and the construction sector.

Table 5 also shows that earnings of employer entrepreneurs with starting statuses that imply prior entrepreneurial experience (i.e. employer in a different firm or own-account work in a different firm), are between 75% and 100% higher than for employer businesses without prior entrepreneurial experience.[10] Earnings differentials are especially pronounced for manufacturing industries. These results again point at the importance of entrepreneurship related human capital.

In summary, hypothesis H1, stating that internal entrepreneurial experience as own-account worker positively influences employer firm performance when compared to no prior experience, is supported for all three performance measures (employer survival, firm survival and earnings); hypothesis H2, comparing internal and external own-account experience, is partly supported (for firm survival and earnings); while hypothesis H3, comparing internal own-account experience with external employer experience, is only weakly supported (only for earnings

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[7] Calculated as 0.1331/0.1454 and 0.1634/0.1454, respectively, see Table 4.

[8] Calculated as (0.1331 − 0.0763)/0.1454 and (0.1634 − 0.0117)/0.1454,

(*footnote continued*)
respectively, see Table 4.

[9] As the marginal effects in Table 5 relate to logarithms, the reported effects can be directly interpreted in terms of percentages: −0.9999 for employer in a different firm and −2.0020 for paid employment corresponding to 100% and 200% higher incomes for employers who started as own-account worker. See Table 5.

[10] Calculated as 1.9780–1.2276 and 2.0020–0.9999, respectively, see Table 5.

Table 4
Firm survival model — single risk model.

Independent variables (x)	Whole sample		Manufacturing sector		Construction sector		Services sector	
Predicted probability (y)	0.1454		0.1342		0.1157		0.1525	
	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.
Main predictors: *starting status*								
Own-account work in the same firm[b] (*ref.*)								
Employer in a different firm[b]	0.0117	0.61	0.0634	1.05	−0.0049	−0.12	0.0052	0.23
Own-account work in a different firm[b]	0.0763	2.23**	0.0452	0.55	0.0734	0.91	0.0865	2.02**
Paid employment[b]	0.1331	9.09***	0.1028	3.06***	0.0994	3.36***	0.1460	7.64***
Non-employment[b]	0.1634	7.04***	0.1332	2.13**	0.1283	2.24**	0.1725	6.20***
Demographic characteristics								
Female[b]	0.0160	1.54	0.0710	2.16**	−0.0568	−1.24	0.0110	0.96
Age	−0.0119	−3.88***	−0.0258	−3.37***	−0.0041	−0.62	−0.0111	−2.84***
Age squared	1.5E−04	3.96***	3.2E−04	3.49***	4.6E−05	0.56	1.4E−04	2.89***
Cohabiting[b]	−0.0150	−1.31	−0.0243	−0.79	−0.0136	−0.53	−0.0149	−1.05
Number of children under 14	−0.0002	−0.04	0.0158	1.15	0.0112	1.02	−0.0061	−0.88
Educational attainment								
Basic education[b] (*ref.*)								
Secondary education[b]	−0.0210	−2.03**	−0.0077	−0.30	−0.0396	−1.81*	−0.0181	−1.36
Tertiary education[b]	−0.0214	−1.83*	0.0531	1.47	−0.0304	−1.12	−0.0268	−1.81*
Duration dependence								
Job tenure as employer	−0.1224	−14.21***	−0.1184	−5.72***	−0.1094	−4.30***	−0.1196	−10.92***
Business sector dummies	Yes[c]		Yes[d]		No		Yes[e]	
Country dummies	Yes		Yes		Yes		Yes	
Number of observations	6893		1066		1215		4612	
Number of spells	3769		557		634		2578	
Number of censored spells	2561		373		450		1738	
Number of completed spells	1208		184		184		840	

Notes: Standard errors are clustered to control for intra-individual correlation.

[a] For continuous variables, dy/dx captures marginal effects for sample means. In the context of dummy variables, it reflects the impact for a discrete change of the dummy variable from 0 to 1.

[b] Dummy variable.

[c] 17 categories; *ref.* Mining and quarrying + Electricity, gas and water supply.

[d] 7 categories; *ref.* Mining and quarrying + Electricity, gas and water supply.

[e] 9 categories; *ref.* Other community, social and personal service activities; private households with employed persons; extra-territorial organizations and bodies.

* $0.1 > p \geq 0.05$.

** $0.05 > p \geq 0.01$.

*** $p < 0.01$.

but not for the two survival measures).

4.1. Robustness test

As far as prior internal entrepreneurial experience on a lean basis is concerned, in this paper we have operationalised the threshold between "lean" and "resourceful" to be the difference between own-account worker (no employees) and employer entrepreneur (one or more employees). However, one may argue that firms with one or just a few employees are also lean and may thus also reap the fruits of operating in a lean way. As a robustness test, we therefore investigate whether we find similar benefits of operating "lean" when we define lean firms to also include firms with 1 to 4 employees.[11] Accordingly, we define "resourceful" as having more than four employees, and hence we estimate survival and earnings models on the subsample of firms that have four or more employees. Moreover, the starting statuses associated with operating on a small scale (either in one's own firm or in another firm) now refer to running firms with 0–4 employees (rather than own-account worker) while the starting status "employer" is replaced by employer in a firm with more than four employees.

Results for the single risk survival models and earnings models are in Tables 6–8 in the Appendix.[12] When restricting our performance measure from Table 2 to 'duration as an employer entrepreneur *of at least 5 employees* in the same firm' (see Table 6 in the Appendix, Section A.3), we observe that, in contrast to Table 2, the coefficients for starting statuses "paid employment" and "non-employment" are not significant. Hence, for survival as an employer firm of at least five employees, it does not make a difference whether the current state was preceded by a period of running the same firm with 0–4 employees, or whether the firm had five or more employees immediately from the start. In other words, when defining "lean" to also include situations where the entrepreneur already has 1 to 4 employees, the benefits of starting lean, which were very clear in Table 2, are not visible any more. This evidence suggests that the advantages of starting lean only materialize when starting alone (without employees).

These results highlight that effective lean start-up can often be confined to the smallest form of business i.e. own-account self-employed. Indeed, Coad, Nielsen, and Timmermans (2017) argue that the first hire "constitutes the single biggest growth event facing any growing firm" (p. 25), as if effectively doubles the workforce and it involves paying wages and additional labour costs such as insurance and social security contributions as well as opportunity costs for the entrepreneur training the first employee. In a similar vein, Désiage, Duhautois, and Redor (2011) discuss the existence of a *one-employee threshold* for firms with no employees related to the cost of managing a first employee and to legal constraints, such as restrictions on layoffs. Désiage et al. (2011) demonstrate the existence of the threshold empirically by showing that the probability for non-employers to hire a first employee is lower than the probability for employers to hire

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[11] In our data base, the number of employees for employer entrepreneurs is given in categories, 1–4 being the smallest group.

[12] Whole sample. Sector-specific results as well as competing risk survival model results are available on request.

Table 5
Earnings as employer (Tobit estimations).

Independent variables (x)	Whole sample		Manufacturing sector		Construction sector		Services sector	
	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.	dy/dx[a]	t-Stat.
Main predictors: starting status								
Own-account work in the same firm[b] (*ref.*)								
Employer in a different firm[b]	−0.9999	−4.31***	0.4064	0.68	−1.0303	−2.48**	−1.2364	−4.21***
Own-account work in a different firm[b]	−1.2276	−3.31***	0.2882	0.47	−2.1400	−3.05***	−1.4763	−2.89***
Paid employment[b]	−2.0020	−10.46***	−1.6196	−3.39***	−2.0123	−5.10***	−2.0325	−8.31***
Non-employment[b]	−1.9780	−8.20***	−1.1785	−1.87*	−1.9328	−3.78***	−2.1953	−7.37***
Demographic characteristics								
Female[b]	−1.0058	−5.16***	−1.6628	−3.10***	−0.7222	−0.67	−0.9371	−4.42***
Age	0.2261	3.69***	0.4901	3.14***	0.2235	1.77*	0.1733	2.26**
Age squared	−0.0027	−3.63***	−0.0060	−3.25***	−0.0025	−1.75*	−0.0020	−2.10**
Cohabiting[b]	0.1705	0.83	0.6984	1.23	0.6941	1.51	−0.0437	−0.18
Number of children under 14	0.0359	0.37	−0.0692	−0.27	0.0270	0.17	0.0643	0.50
Educational attainment								
Basic education[b] (*ref.*)								
Secondary education[b]	0.3213	1.60	0.2097	0.45	0.5600	1.16	0.2800	1.12
Tertiary education[b]	0.4177	1.84*	0.0633	0.11	0.7030	1.38	0.4201	1.47
Duration dependence								
Job tenure as employer	1.4891	12.46***	1.3163	3.87***	1.6010	6.40***	1.4582	10.07***
Business sector dummies	Yes[c]		Yes[d]		No		Yes[e]	
Country dummies	Yes		Yes		Yes		Yes	
Number of observations	5063		818		898		3347	
Number of left-censored observations	1109		193		148		768	
Number of individuals	2565		452		449		1790	

Notes: Standard errors are clustered to control for intra-individual correlation.

[a] dy/dx captures marginal effects on the uncensored latent variable, not the observed outcome. Given our dependent variable is expressed in natural logarithms, these effects can be interpreted as the percent change in earnings with respect to predicted earnings for sample means in case of continuous variables. In the context of dummy variables, it reflects the percent change in earnings for a discrete change of the dummy variable from 0 to 1.

[b] Dummy variable.

[c] 17 categories; *ref.* Mining and quarrying + Electricity, gas and water supply.

[d] 7 categories; *ref.* Mining and quarrying + Electricity, gas and water supply.

[e] 9 categories; *ref.* Other community, social and personal service activities; private households with employed persons; extra-territorial organizations and bodies.

* $0.1 > p \geq 0.05$.

** $0.05 > p \geq 0.01$.

*** $p < 0.01$.

additional employees.

Similarly, when considering firm survival in Table 7, although the pilot launch strategy is found to be associated with significantly higher survival chances than resourceful start-ups without entrepreneurial experience, the effects are weaker compared to Table 4. In particular, for firm survival, employers with at least 5 employees who started-up from paid employment or non-employment statuses have respectively 56% and 72% higher exit chances than employers who started lean (versus 96% and 112% in Table 4). These results again suggest that the advantages of starting lean are stronger when starting alone.

Finally, also for earnings (Table 8) we see that the negative coefficients become smaller in magnitude (compared to Table 5) when defining lean to also include situations where the entrepreneur employs one to four employees, pointing again in the same direction.

5. Discussion and conclusions

We have investigated the impact of prior entrepreneurial experience on current performance of employer firms. We have distinguished between external entrepreneurial experience obtained outside of the current firm and internal entrepreneurial experience obtained within the boundaries of the employer firm currently run. Regarding the latter we have focused on a special type of prior internal experience, i.e. as an own-account worker before scaling up to employer firm (i.e. internal entrepreneurial experience obtained during a lean start-up phase). Theoretically, we have shown that internal and external prior entrepreneurial experience is associated with different processes of learning-by-doing. Empirically, we have found that both external entrepreneurial experience and internal experience as an own-account

worker enhance employer firm performance.

Regarding internal entrepreneurial experience, we have shown that lean start-ups that made it to the stage of employer firms, outperform unexperienced employer entrepreneurs that started resourced from the outset. Our results therefore imply that, for ambitious individuals without any prior entrepreneurial experience wishing to start a new firm, i.e. novice entrepreneurs, a lean start-up learning strategy (as an own-account worker) is to be preferred over a more resourceful strategy hiring employees from the start. Lean start-up is a low cost strategy to overcome the challenges related to starting and running a new firm which minimises financial requirements, lowers risk and enhances flexibility plus often entails holding back some financial resources for the unforeseen thereby enabling business to be more agile and if necessary pivot if the evolving contextual circumstances require it. Although our results apply to own-account start-ups that evolve to become employers, data constraints do not permit us to test the wider question of whether on average lean start-up strategy is more effective than "big bang" start-ups — an answer which requires data on pilot launches that do not evolve to become employer businesses.

Our empirical analysis also shows that external prior entrepreneurial experience positively affects survival and earnings (compared to entrepreneurs without any previous experience). This shows that the business performance gains from going through a lean phase can also be achieved from prior entrepreneurial experience in other ventures, particularly in employer firms. These results underline the importance of human capital related to employer managerial skills, i.e. the ability of the entrepreneur to manage the organizational and financial challenges associated with start-up, growth and professionalization of a business as it develops (Flamholtz & Brzezinski, 2016).

Hence, although previous employer experience in an external firm and internal entrepreneurial experience obtained during a lean start-up phase imply different learning processes, apparently both are capable of achieving discovery, development and creativity gains in entrepreneurship necessary to improve firm performance. From a sustainable job creation perspective our results indicate that the most durable employment created by start-ups is likely to come from either lean start-ups or by employer start-ups launched by experienced entrepreneurs.

Finally, we also provide empirical evidence supporting the hypothesis that relative to employer start-ups, employer businesses that began life as own account start-ups are more likely to downsize back to own account status rather than closing down the business altogether.

Future research may employ more precise indicators of start-ups being lean or resourceful, for instance in terms of actual investment quantities being made at the time of start-up. It would also be useful to have more detailed data which can to some extent unpack (i.e. separate out and attribute to each) the extent to which the effectiveness of the lean start-up strategy can be attributed to its constituent parts comprising discovery and development of both the business opportunity and the entrepreneur's/venture's own capabilities to exploit it. However, in this paper we provide the much needed generic statistical evidence on the scale of rewards that can be achieved when lean entry strategy is successful. Therefore, we believe that this new evidence is of significant practical importance to entrepreneurs — in particular novice entrepreneurs, and those engaged in new venture strategy as well as stakeholders interested in the creation of sustainable jobs.

Appendix

A.1. Econometric framework

A.1.1. Survival analysis[13]

This section focuses on our first measure of performance, i.e., survival as an employer entrepreneur. For our second measure, i.e., survival of the business itself, the discussion is analogous to that which follows below. Due to the nature of our data (survival spells are recorded in *years* — i.e. we have grouped duration data), discrete time specifications are considered. The length of the spell, T, is therefore assumed to be a discrete random variable.A.1.1.1. Survival as employer entrepreneur: single risk model. We observe an individual i's spell from period $k = 1$ through to the end of the jth period, at which point individual i's spell is either complete ($c_i = 1$) or right censored ($c_i = 0$). The discrete hazard is

$$h_{ij} = Pr(T_i = j \mid T_i \geq j),$$

where h_{ij} is the probability of being employer entrepreneur for exactly j years relative to the group of individuals who have been employer entrepreneur for at least j years.

The parametric model considered is a logistic hazard of the form

$$h_{ij} = Pr(T_i = j \mid T_i \geq j, z_{\tau_i - 1}, x_{ij}, u_i) = F(\alpha' z_{\tau_i - 1} + \beta' x_{ij} + \gamma \ln(j) + u_i),$$

where $z_{\tau_i} - 1$ is a vector of dummy variables indicating the starting status of the employer (see Section 'Main explanatory variables: starting status of the employer' for details), x_{ij} is a vector of conditioning variables, strictly exogenous (time-varying covariates); u_i is a disturbance term; and $\ln(j)$ captures duration dependence. Finally F denotes the logistic cumulative distribution function.

Therefore, the likelihood contribution of a censored spell is given by

$$L_i = Pr(T_i > j) = S_i(j) = \prod_{k=1}^{j} (1 - h_{ik}),$$

while the contribution to the likelihood function of a complete spell is

$$L_i = Pr(T_i = j) = h_{ij} S_i(j - 1) = \frac{h_{ij}}{1 - h_{ij}} \prod_{k=1}^{j} (1 - h_{ik}).$$

Thus, the likelihood for the whole sample is

$$L_i = \left(\frac{h_{ij}}{1 - h_{ij}} \right)^{c_i} \prod_{k=1}^{j} (1 - h_{ik}) = \left(\frac{h_{ij}}{1 - h_{ij}} \right)^{c_i} S_i(j).$$

A.1.1.2. Survival as employer entrepreneur: competing risks model. We consider the possibility of exit from employer entrepreneur to one of the four following destination states: to own-account work in the same firm, to set up a new business (either as an own-account worker or as employer), to paid employment and to non-employment (either unemployed or inactive). Our reference category is the group of censored observations, as usual.[14] With the assumption of independence of the destination-specific hazard rates, the discrete hazard rate for exit at time j to any of the two destinations is simply the sum of the destination-specific discrete hazard rates.

$$h_{ij} = h_{ij}^{OA} + h_{ij}^{NF} + h_{ij}^{PE} + h_{ij}^{NE},$$

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[13] This section draws especially on the *Stephen P. Jenkins' Lecture Notes* corresponding to the course *Survival Analysis* by Stephen P. Jenkins, provided by the University of Essex Summer School, among other universities and institutions.

[14] For persons with censored spells, all observations are censored; for persons with a completed spell, all observations are censored except the final one.

where h_{ij}^{OA}, h_{ij}^{NF}, h_{ij}^{PE}, and h_{ij}^{NE} are the hazard rates of experiencing a transition from employer entrepreneurship to own-account work in the same firm, to set up a new firm, to paid-employment and to non-employment, respectively. Thus, there are five types of likelihood contributions for the discrete time model, the first one referring to the censored case and the other four corresponding to the different exits.

Therefore, the likelihood contribution of a censored spell is given by

$$L_i^C = S_i(j),$$

while for $m = OA$, NF, PE and NE the contributions to the likelihood function of a complete spell are

$$L_i^m = \frac{h_{ij}^m}{1 - h_{ij}} \prod_{k=1}^{j} (1 - h_{ik}) = \frac{h_{ij}^m}{1 - h_{ij}} S_i(j)$$

and the likelihood for the whole sample is

$$L_i = (\prod_m (L_i^m)^{\delta^m})(L_i^C)^{1 - \sum_m \delta^m} = \left(\prod_m \left(\frac{h_{ij}^m}{1 - h_{ij}} \right)^{\delta^m} \right) \prod_{k=1}^{j} (1 - h_{ik}),$$

where δ^m is a destination-specific censoring indicator that equals 1 if individual i exits to state m and 0 otherwise (exit to another destination or censored).

We assume a particular form for the destination-specific hazards:

$$h_{ik}^m = \frac{\exp(\alpha_m' z_{\tau_i - 1} + \beta_m' x_{ik} + \gamma_m \ln(k))}{1 + \sum_m \exp(\alpha_m' z_{\tau_i - 1} + \beta_m' x_{ik} + \gamma_m \ln(k))}$$

For the given hazard rate described above, the individual worker's likelihood contribution has the same form as the likelihood of a standard multinomial logit model (Allison, 1982).

A.1.2. Earnings equations: the Tobit model

As noted before, there are several observations where the earnings as an employer entrepreneur – our third performance measure – are zero. This feature violates the linearity assumption so that the least squares method is clearly inappropriate. As usual under these circumstances, we will estimate a Tobit model (Tobin, 1958):

$$y_{it}^* = \alpha' z_{\tau_i - 1} + \beta' x_{it} + u_i,$$

where y_{it}^* is a latent variable measuring earnings as employer entrepreneur which is only observed if these earnings are positive (and assumed to be normally distributed), $z_{\tau_i} - 1$ is a vector of dummy variables indicating the starting status of the employer, x_{it} is a vector of conditioning variables, strictly exogenous and u_i is a disturbance term. Thus, we define a random variable y_{it} that is observed and that transforms the original variable (y_{it}^*):

$$y_{it} = y_{it}^* \text{ if } y_{it}^* > 0$$

$$y_{it} = 0 \text{ if } y_{it}^* \leq 0$$

With censored data, the joint distribution of the sample observations is a mixture of continuous and discrete distribution functions. In this case, the discrete observations (censored) contribute to the likelihood function with its probability, and the continuous observations (non-censored) contribute with its density function. Therefore, the likelihood function for a *Tobit* model can be written as

$$L = \prod_{y_{it}=0} \left[1 - \Phi\left(\frac{\alpha' z_{\tau_i - 1} + \beta' x_{it}}{\sigma} \right) \right] \cdot \prod_{y_{it}>0} \left[\varphi\left(\frac{y_{it} - (\alpha' z_{\tau_i - 1} + \beta' x_{it})}{} \right) \right],$$

where Φ and φ are the distribution and density function respectively of the standard normal variable.

A.2. Variable definitions.

Variable	Description
Dependent variables	
Survival as employer (single risk)	Dependent variable equals 1 for individuals who are employer in period $t - 1$ and exit employership (in the same firm) in period t. The variable equals 0 for individuals who are employer (in the same firm) in periods $t - 1$ and t, or the information about the labor market status in t is censored.
Survival as employer (competing risk)	Dependent variable equals 1 for individuals who are employer in period $t - 1$ and downsize their business by becoming own-account worker in period t. The variable equals 2 for individuals who are employer in period $t - 1$ and set up a new business (either as an own-account worker or as employer) in period t. The variable equals 3 for individuals who are employer in period $t - 1$ and enter paid employment in period t. The variable equals 4 for individuals who are employer in period $t - 1$ and enter unemployment or inactivity in period t. Finally, the variable equals 0 for individuals who are employer in periods $t - 1$ and t, or the information about the labor market status in t is censored.
Firm survival (single risk)	Dependent variable equals 1 for individuals who are employer in period $t - 1$ and stop running the business in period t. The variable equals 0 for individuals who are employer in period $t - 1$ and remain running the business (either as an own-account worker or as employer) in period t, or the information about the labor market status in t is censored.

Firm survival (competing risk)	Dependent variable equals 1 for individuals who are employer in period $t-1$ and set up a new business (either as an own-account worker or as employer) in period t. The variable equals 2 for individuals who are employer in period $t-1$ and enter paid employment in period t. The variable equals 3 for individuals who are employer in period $t-1$ and enter unemployment or inactivity in period t. Finally, the variable equals 0 for individuals who are employer in period $t-1$ and remain running the business (either as an own-account worker or as employer) in period t, or the information about the labor market status in t is censored.
Earnings as self-employed	Self-employment incomes earned during the year prior to the interview, converted to average € of 1996 by means of Purchasing Power Parity (across countries) and Harmonised Consumer Price Index (over time). This variable is expressed in natural logarithms.

Independent variables
Main predictors: *starting status*

Own-account work in the same firm (*ref.*)	Dummy equals 1 for individuals who started their employership spell from own-account work in the same firm (pilot launch).
Employer in a different firm	Dummy equals 1 for individuals who started their employership spell from employership in a different firm.
Own-account work in a different firm	Dummy equals 1 for individuals who started their employership spell from own-account work in a different firm.
Paid employment	Dummy equals 1 for individuals who started their employership spell from paid employment.
Non-employment	Dummy equals 1 for individuals who started their employership spell from non-employment (either unemployment or inactivity).

Demographic characteristics

Female	Dummy equals 1 for females.
Age	Age reported by the individual.
Cohabiting	Dummy equals 1 for cohabiting individuals.
Number of children under 14	Number of children younger than 14 living within the household.

Educational attainment

Basic education (*ref.*)	Dummy equals 1 for individuals with less than second stage of secondary level education (ISCED-1997, 0-2).
Secondary education	Dummy equals 1 for individuals with second stage of secondary level education (ISCED-1997, 3).
Tertiary education	Dummy equals 1 for individuals with recognized third level education (ISCED-1997, 5 or 6).

Duration dependence

Job tenure as employer	Number of years as employer. Variable expressed in natural logarithms.
Business sector dummies	17 dummies equalling 1 for individuals whose codes of main activity of the local unit of the business, by means of the Nomenclature of Economic Activities (NACE-93), are the following: C + E Mining and quarrying + Electricity, gas and water supply. DA Manufacture of food products, beverages and tobacco. DB + DC Manufacture of textiles, clothing and leather products. DD + DE Manufacture off wood and paper products; publishing and printing. DF-DI Manufacture of coke, refined petroleum/chemicals/rubber/plastic and other non-metallic mineral products. DJ + DK Manufacture of metal products, machinery and equipment. DL-DN Other manufacturing. F Construction G Wholesale and retail trade; repair of motor vehicles, motorcycles and personal/household goods. H Hotels and restaurants. I Transport, storage and communication. J Financial intermediation. K Real estate, renting and business activities. L Public administration and defence; compulsory social security. M Education. N Health and social work. O–Q Other community, social and personal service activities; private households with employed persons; extra-territorial organizations and bodies.
Country dummies	13 dummies equaling 1 for individuals living in the named country: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, and the United Kingdom.

A.3. Robustness checks

Table 6
Employer (> 4 employees) survival model — single risk model.

	Whole sample		
Predicted probability (*y*)	0.3215		
Independent variables (*x*)	*dy/dx*[a]	*t*-Stat.	
Main predictors: *starting status*			
Own-account worker or employer (1–4 employees) in the same firm[b] (*ref.*)			
Employer (> 4 employees) in a different firm[b]	− 0.1117	− 2.57	**
Own-account worker or employer (1–4 employees) in a different firm[b]	− 0.0127	− 0.22	
Paid employment[b]	− 0.0248	− 0.65	
Non-employment[b]	0.0025	0.06	
Demographic characteristics			
Female[b]	0.0181	0.66	
Age	− 0.0125	− 1.47	
Age squared	0.0001	1.42	
Cohabiting[b]	− 0.0274	− 0.87	
Number of children under 14	0.0033	0.23	
Educational attainment			
Basic education[b] (*ref.*)			
Secondary education[b]	− 0.0501	− 1.74	*
Tertiary education[b]	− 0.0852	− 2.76	***
Duration dependence			
Job tenure as employer (> 4 employees)	− 0.1544	− 6.53	***
Business sector dummies	Yes[c]		
Country dummies	Yes		
Number of observations	1985		
Number of spells	1197		
Number of censored spells	526		
Number of completed spells	671		

Notes: Standard errors are clustered to control for intra-individual correlation.
[a] For continuous variables, *dy/dx* captures marginal effects for sample means. In the context of dummy variables, it reflects the impact for a discrete change of the dummy variable from 0 to 1.
[b] Dummy variable.
[c] 17 categories; *ref.* Mining and quarrying + Electricity, gas and water supply.
* $0.1 > p \geq 0.05$.
** $0.05 > p \geq 0.01$.
*** $p < 0.01$.

Table 7
Firm (> 4 employees) survival model — single risk model.

	Whole sample		
Predicted probability (*y*)	0.1934		
Independent variables (*x*)	*dy/dx*[a]	*t*-Stat.	
Main predictors: *starting status*			
Own-account worker or employer (1–4 employees) in the same firm[b] (*ref.*)			
Employer (> 4 employees) in a different firm[b]	0.0333	0.63	
Own-account worker or employer (1–4 employees) in a different firm[b]	0.0113	0.19	
Paid employment[b]	0.1091	3.17	***
Non-employment[b]	0.1397	2.64	***
Demographic characteristics			
Female[b]	0.0536	2.26	**
Age	− 0.0116	− 1.72	*
Age squared	0.0001	1.82	*
Cohabiting[b]	− 0.0132	− 0.52	

Table 7 (*continued*)

	Whole sample	
Predicted probability (*y*)	0.1934	
Independent variables (*x*)	*dy/dx*[a]	*t*-Stat.
Number of children under 14	− 0.0138	− 1.12	
Educational attainment			
Basic education[b] (*ref.*)			
Secondary education[b]	− 0.0271	− 1.17	
Tertiary education[b]	− 0.0422	− 1.70	*
Duration dependence			
Job tenure as employer (> 4 employees)	− 0.1570	− 7.63	***
Business sector dummies	Yes[c]		
Country dummies	Yes		
Number of observations	1985		
Number of spells	1197		
Number of censored spells	751		
Number of completed spells	446		

Notes: Standard errors are clustered to control for intra-individual correlation.

[a] For continuous variables, *dy/dx* captures marginal effects for sample means. In the context of dummy variables, it reflects the impact for a discrete change of the dummy variable from 0 to 1.

[b] Dummy variable.

[c] 17 categories; *ref.* Mining and quarrying + Electricity, gas and water supply.

* $0.1 > p \geq 0.05$.

** $0.05 > p \geq 0.01$.

*** $p < 0.01$.

Table 8
Earnings as employer (> 4 employees) (Tobit estimations).

	Whole sample	
Independent variables (*x*)	*dy/dx*[a]	*t*-Stat.
Main predictors: starting status			
Own-account worker or employer (1–4 employees) in the same firm[b] (*ref.*)			
Employer (> 4 employees) in a different firm[b]	− 0.1910	− 0.38	*
Own-account worker or employer (1–4 employees) in a different firm[b]	− 0.8607	− 1.17	
Paid employment[b]	− 1.6542	− 3.66	***
Non-employment[b]	− 1.3777	− 2.45	**
Demographic characteristics			
Female[b]	− 1.3883	− 3.35	***
Age	0.3454	2.72	***
Age squared	− 0.0041	− 2.73	***
Cohabiting[b]	0.0872	0.20	
Number of children under 14	0.4480	2.32	**
Educational attainment			
Basic education[b] (*ref.*)			
Secondary education[b]	0.3513	0.78	
Tertiary education[b]	0.9254	1.98	**
Duration dependence			
Job tenure as employer (> 4 employees)	1.7327	6.86	***
Business sector dummies	Yes[c]		
Country dummies	Yes		
Number of observations	1514		
Number of left-censored observations	400		

(*continued on next page*)

Table 8 (*continued*)

Independent variables (x)	Whole sample	
	dy/dx[a]	*t*-Stat.
Number of individuals	1114	

Notes: Standard errors are clustered to control for intra-individual correlation.

[a] dy/dx captures marginal effects on the uncensored latent variable, not the observed outcome. Given our dependent variable is expressed in natural logarithms, these effects can be interpreted as the percent change in earnings with respect to predicted earnings for sample means in case of continuous variables. In the context of dummy variables, it reflects the percent change in earnings for a discrete change of the dummy variable from 0 to 1.

[b] Dummy variable.

[c] 17 categories; *ref*. Mining and quarrying + Electricity, gas and water supply.

[*] $0.1 > p \geq 0.05$.

[**] $0.05 > p \geq 0.01$.

[***] $p < 0.01$.

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