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No particular action needed? A necessary condition analysis of gestation activities and firm emergence



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A B S T R A C T

Nascent entrepreneurs' gestation activities are crucial for firm emergence. Compelled by a partial understanding of these activities as *sufficient* conditions, however, scholars drifted into a wild-goose chase to track down increasingly complex activity configurations. No study has ever examined gestation activities as *necessary* conditions for firm emergence – i.e., whether the absence of any particular gestation activity precludes firm emergence? We use the harmonized PSED dataset across four countries (N = 3537) to present a Necessary Condition Analysis (NCA) of gestation activities. Challenging deep-rooted assumptions on the role of entrepreneurial action, our findings extend the literature on the emergence of new firms.

1. Introduction

“What do entrepreneurs do when starting up businesses?” is a research question that has occupied entrepreneurship scholars for years (e.g. Gartner, 1988; Carter et al., 1996). The assumption that entrepreneurial action is a crucial building block in the emergence of new firms has become central for our understanding entrepreneurship (e.g. McMullen and Shepherd, 2006; Autio et al., 2013; Dimov, 2011; Klein, 2008; Venkataraman et al., 2012). Yet, next to bold declarations that “*entrepreneurship requires action*” (McMullen and Shepherd, 2006: 132), even scholars that recognize entrepreneurs as the active element in new venture creation often wonder about “*just what is it that they do?*” (Baron, 2007: 168). Consequently, a number of large international research projects – generally known as panel study of entrepreneurial dynamics (PSED) – have attempted to understand entrepreneurial action through investigations of gestation activities – different behaviors commonly taken by nascent entrepreneurs during their startup processes (e.g., doing initial market research, setting up a cofounding team, asking for funding) (Gartner et al., 2004; Reynolds et al., 2005; Gartner and Shaver, 2012; Davidsson and Gordon, 2012; Reynolds, 2016a).

Despite conventional wisdom and broad scholarly agreement that gestation activities do matter, empirically speaking, the jury is still out on the relative importance of each individual activity, as well as how complex configurations of gestation activities shape entrepreneurial outcomes. Scholars have even started to explore certain patterns and timing issues around constellations of activities, but again, without clear results accumulating across studies (e.g. Liao and Welsch, 2008; Gordon, 2012; Reynolds, 2016a). In sum, prior research seem to have reached an empirical dead-end in trying to identify gestation activities as sufficient conditions for firm emergence, that is – we still don't know what complex combinations of single conditions are more likely to explain firm emergence (e.g. Lichtenstein et al., 2007; Gartner and Shaver, 2012).

In the current paper, we suggest to a shift in the logic of examination from one of sufficiency to that of necessity (Dul, 2016a).

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Such a shift entails moving away from convoluted interaction models and towards the identification of simple bottlenecks and constraints that may prevent firm emergence from occurring. This is crucial because “although single sufficient conditions to produce the outcome normally do not exist, single necessary conditions that allow the outcome to occur are widespread” (Dul, 2016b: 1516). Indeed, if entrepreneurial action does matter so much (e.g. McMullen and Shepherd, 2006) and given the relative universal nature of gestation activities across organizations and industries (Liao and Welsch, 2008), then at least some activities and/or some level of activity should be necessary for firm emergence to occur. We therefore aim to offer a number of important contributions to the literature by exploring whether (1) certain gestation activities; (2) a certain number of gestation activities; and (3) certain categories of gestation activities, are necessary for firm emergence to occur. For our empirical tests, we apply a new methodological technique termed ‘Necessary Condition Analysis’ (NCA) (Dul, 2016a) on a recently harmonized datasets of nascent entrepreneurs across four countries (Reynolds et al., 2016b). NCA is particularly useful in situations where several predictors (e.g., gestation activities) contribute to the desired outcome (e.g., firm emergence) but none of the predictors is sufficient. In such instances, NCA can identify both critical predictors and critical levels of these predictors that *must* be present to achieve the desired outcome (Dul, 2016a).

2. Gestation activities and firm emergence – a brief review

More than 150 journal articles have been published by 2016 on the basis of longitudinal studies of the firm startup process, such as the US Panel Study of Entrepreneurial Dynamics (US PSED I collected in 1998–2004; US PSED II 2005–2008),¹ the Comprehensive Australian Study of Entrepreneurial Emergence (CAUSEE 2007–2013), the Swedish Panel Study of Entrepreneurial Dynamics and the Norwegian PSED study. Adopting a similar design protocol (so-called PSED protocol), each of these studies has followed several hundred startup efforts over 12–72 months. Many of these studies deal, in one way or another, with nascent entrepreneurs’ gestation activities and more than a few have specifically focused on one, some, or all gestation activities, as well as their occurrence, sequence, or paths as predictors of entrepreneurial outcomes.

Several observations can be made from the previous attempts to explore and make sense of the role of gestation activities in firm emergence. First, gestation activities do matter and in fact, it seems that “what nascent entrepreneurs do may be more important than whom they are and what product-markets they intend to serve” (Tornikoski and Newbert, 2007: 313). In addition, there is empirical evidence that creating a business entails activities that are common across organizational and industry settings (Liao and Welsch, 2008). Second, conceptualizing gestation activities as sufficient causes, studies found that the more gestation activities completed the more likely is firm emergence (e.g., Carter et al., 1996; Shane and Delmar, 2004; Lichtenstein et al., 2007; Brush et al., 2008; Edelman and Yli-Renko 2010). Third, results regarding specific activities are inconsistent (e.g., Reynolds, 2016a), and even scholars that claim to identify single activities as critical have not adopted appropriate analytical tools to test for necessity. Thus, some activities, like business planning for example, have been considered more important than others for firm emergence, but empirical evidence remains inconclusive (Delmar and Shane, 2003, 2004; Honig and Samuelsson, 2012, 2014; Delmar, 2015; Davidsson, 2015). Fourth, the theoretical concept of firm emergence can be operationalized in various ways (Van de Ven, 2007), including perceptions of being operational, first sales, profit, etc. And finally, both the occurrence as well as the sequence of gestation activities are still not well understood (e.g., Gordon, 2012; Hak, Jaspers and Dul, 2013).

Despite this progress, so far, studies of gestation activities have been concerned with sufficient conditions for firm emergence and assumed an additive causality, meaning that if one gestation activity is absent, the likelihood of firm emergence will be reduced, an effect that might be compensated by doing more of the other activities. As Carter et al., (1996: 161) put it more than 20 years ago: “Nascent entrepreneurs who were able to start a business were more aggressive in making their businesses real [...] they undertook more activities than those individuals who did not start their businesses”. More recently, Gordon (2012: 25) repeats this message: “In all model specifications [...] more active ventures were more likely to persist in the process, as well as become operational”. In contrast, our study is investigating necessary conditions for firm emergence to occur.² This distinction is important because while a sufficient cause may ensure that the desired outcome exists, “without the necessary cause, the outcome will not exist” (Dul, 2016a: 11).

3. Methodology

3.1. Data and measurement

In this paper, we use data from five longitudinal studies of the firm startup process conducted in four different countries: the US Panel Study of Entrepreneurial Dynamics (two separate studies: US PSED I conducted between 1998–2004, N = 779; US PSED II conducted in 2005–2008, N = 1071), the Comprehensive Australian Study of Entrepreneurial Emergence (CAUSEE study conducted in 2007–2013, N = 605), the Swedish Panel Study of Entrepreneurial Dynamics (1998–2000, N = 577) and the Chinese Panel Study of Entrepreneurial Dynamics (N = 505). Each of these studies includes a cohort of nascent entrepreneurs that are representative samples of startups in their respective countries. The data from these studies has been harmonized into a dataset of 3537 active nascent entrepreneurs described in Reynolds (2016a). The details of the harmonization process are available in Reynolds et al.

¹ For more information on the US PSED studies and the PSED protocol, please visit: <http://www.psed.isr.umich.edu/psed/documentation>.

² See also Hak et al. (2013) who in reviewing different methodologies, including NCA, used gestation activities data as illustration for their methodological discussion.

(2016b).

We use this dataset to track the firm startup process, to identify if and when a particular gestation activity was carried out and whether the startup process leads to the emergence of a new firm. The data includes information about eighteen gestation activities, such as receiving financial support, organizing a startup team and registering the firm. Consistent with recommendations by Davidsson and Gordon (2012) and because we wanted to avoid problems related to subjective interpretations and cross-cultural variation in the meaning of critical terms like ‘operating’, ‘inactive’, or ‘still trying’, we operationalized the criteria for the emergence of a new firm as reaching initial profits (see Reynolds, 2017 for a detailed discussion of these issues).

We then aimed to determine whether any gestation activity is necessary to reach profits within twenty-four months after entry into the startup process. According to Reynolds (2016a), the major difference between those nascent entrepreneurs reaching profit and those disengaging from the new firm startup process occurs between 6 and 24 months after entry. The choice of twenty-four months keeps any threats of right censoring at a minimum (Dimov, 2010) while it enables us to study a startup pace that is admissible to most entrepreneurs (Reynolds, 2016a), thereby increasing the relevance of any practical implications from our study.

To identify the date of entry into the gestation process, we adopt Reynolds (2016a) approach in that to qualify as a nascent entrepreneur, a respondent is required to perform at least two gestation activities within a period of 12 months. The date of the first of these two activities is used as the date of entry into the firm startup process. Note, however, that while for inclusion in our sample it is necessary to perform at least two gestation activities in total within a period of 12 months, these activities are not strictly necessary to achieve profits at 24 months (i.e., the subject of our analysis).

3.2. Analytical strategy

We adopt Necessary Condition Analysis (NCA), introduced by Dul (2016a), as the analytical technique.³ The purpose of NCA is to identify if there is a critical (necessary) determinant for an outcome to happen. For example, having reached legal voting age is a necessary condition for voting. Age, however, is not a sufficient condition as voting likelihood has been found to be explained by attitudes and knowledge, among other factors (Cohen and Chaffee, 2013). The logic of NCA is thus different from linear thinking, which seeks to assess whether an increase in the predictor variable is associated with an increase in the outcome variable. Recent applications of NCA method have looked at, for instance, whether intelligence is a necessary condition for creativity (Karwowski, Dul, Gralewski, Jauk, Jankowska, Gajda, Chruszczewski and Benedek, 2016). In comparison to other techniques, like the often-used fsQCA, that allow identification of necessity in kind (e.g., “condition X is necessary or not for outcome Y”), NCA adds another concern for necessary relationships *in degree* (e.g., “a specific level of condition X is necessary or not for a specific level of outcome Y”) (Vis and Dul, 2016). This is crucial given our interest in the *number* of gestation activities performed next to just any single activity as a condition for firm emergence.

In designing this study, we were therefore interested in (1) whether any of the known gestation activities is a necessary condition for reaching profits at 24 months – or in other words, whether *not* performing a gestation activity can prevent reaching initial profits; (2) whether a certain number of gestation activities is a necessary condition for reaching profits at 24 months; and (3) whether certain categories of gestation activities are necessary for reaching profits at 24 months. This is, as far as we know, the first ever use of this new method in entrepreneurship research.

4. Findings

The results of NCA on profit at 24 months show that none of the individual gestation activities is a necessary condition for having profit at 24 months across the separate country samples and the combined sample (Table 1). For all individual gestation activities, the NCA effect size (CR-FDH) is below the $d = 0.1$ threshold value recommended by Dul (2016a). Conversely, not performing one of the eighteen gestation activities does not prevent firm emergence operationalized as initial profit at 24 months.

We then turned to look at the number of gestation activities and whether a nascent entrepreneur needs to perform a minimum number of gestation activities for achieving initial profit at 24 months. Because we adopted the inclusion criteria proposed by Reynolds (2016a) and required that a nascent entrepreneur needs to perform at least two gestation activities in total within a period of 12 months to be included in our sample, the lowest possible number of gestation activities is two in our study. For Australia, Sweden, USA PSED1 and China, the analysis does not suggest that a threshold number of activities exist to reach profit (Fig. 1). In other words, in Australia, Sweden, USA PSED 1 and China a nascent entrepreneur must perform two of the possible gestation activities to be included in our sample and it is possible to reach profits without further activities. For USA PSED 2 study, without performing at least three activities, there is guaranteed failure of achieving initial profits at 24 months. Overall, our findings suggest that some level of activity is required for firm emergence within the chosen period of time.

Finally, we used the six categories of activities empirically induced from the same harmonized dataset and put forward by Reynolds (2016a) to test whether a particular category of activities would be a necessary condition for reaching profit at 24 months. The categories included in the analysis were public presence, operations, infrastructure, planning, funding, and complexity. We considered a category as active when at least one activity representing it was performed. Our findings show that none of the six categories was a necessary condition for reaching profit at 24 months.

³ More information about the method can be found in <https://www.erim.eur.nl/centres/necessary-condition-analysis>.

Table 1
Results of necessary condition analysis on profit at 24 months (individual gestation activities).

	Effect size					
	Australia	Sweden	US I	US II	China	Overall
Patent, trademark or copyright applied	0.000	0.000	0.000	0.000	0.000	0.000
Outside funding from institutions or external people received	0.000	0.000	0.000	0.000	0.000	0.000
Employees or managers hired	0.000	0.000	0.000	0.000	0.000	0.000
Financial institutions or other people asked for funding	0.000	0.000	0.000	0.000	0.000	0.000
Credit from suppliers established	0.000	0.000	0.000	0.000	0.000	0.000
A phone listing for the business acquired	0.000	0.000	0.000	0.000	0.000	0.000
Major items equipment, facilities or property purchased, leased or rented	0.000	0.000	0.000	0.000	0.000	0.000
Devoted full time to business	0.000	0.000	0.000	0.000	0.000	0.000
Marketing or promotion activities started	0.000	0.000	0.000	0.000	0.000	0.000
Material, supplies, inventory purchased	0.000	0.000	0.000	0.000	0.000	0.000
Startup team organized	0.000	0.000	0.000	0.000	0.000	0.000
Effort made to define the market opportunity	0.000	0.000	0.000	0.000	0.000	0.000
A business plan prepared	0.000	0.000	0.000	0.000	0.000	0.000
Financial projections prepared	0.000	0.000	0.000	0.000	0.000	0.000
Own money has been invested into the business	0.000	0.000	0.000	0.000	0.000	0.000
New firm registered	0.000	0.000	0.000	0.000	0.000	0.000
Reporting first sales	0.000	0.000	0.000	0.000	0.000	0.000
Worked on a model or prototype for delivery of the product or service	0.000	0.000	0.000	0.000	0.000	0.000

Note: The NCA approach was applied using two different techniques (the step function CE-FDH and the straight line CR-FDH). The results in both techniques are consistent. Effective threshold: 0.0–0.1 (small effect); 0.1–0.3 (medium effect), 0.3–0.5 (large effect); 0.5–1 (very large effect).

4.1. Robustness tests and post-hoc analysis

To verify the robustness of our results we ran three additional tests associated respectively with potential left censoring issues, choice of dependent variable, and sample choice. First, our tests revealed no issues related to left censoring as our results were robust when we captured entrepreneurs reaching profit 36 and 72 months after entry instead of at 24 months. Second, we also checked whether our results were similar if we changed the depending variable from reaching profit to reaching sales, and again, we obtained robust results. Finally, we repeated our analysis on a sub-sample of the harmonized dataset that excluded those entrepreneurs who reported having reached profit three or more months before the date of the screening survey. When testing our results on the sub-sample we obtain robust results.⁴ Thus, overall our results seem to be robust and not sensitive to left censoring issues, choice of dependent variable, or choice of sample.

5. Discussion and conclusion

Our necessary condition analysis of gestation activities provides several interesting new insights. Despite a strong behavioral paradigm in entrepreneurship research and the ongoing emphasis put on entrepreneurial action in research (e.g. Gartner, 1988; Katz and Gartner, 1988; McMullen and Shepherd, 2006; Autio et al., 2013; Venkataraman et al., 2012), pedagogy (e.g. Neck et al., 2014) as well as popular culture (e.g. Ries, 2011), our study suggests that no particular gestation activities are necessary. Furthermore, only a low number of gestation activities is necessary for reaching initial profits at 24 months. This is very surprising given the assumption that gestation activities are universally important across organizations and industries (Liao and Welsch, 2008). Our unexpected results provide reasons to for future theoretical and empirical work to reconsider long-standing assumptions about the role of gestation activities in firm emergence.

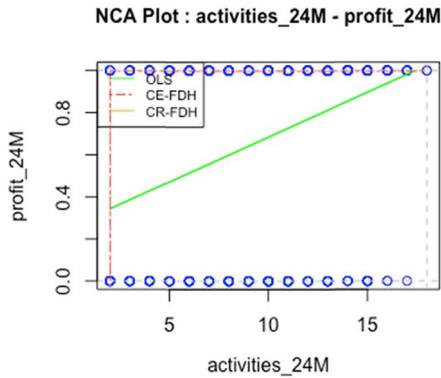
First, our results that ‘no particular action is necessary’ may suggest a revisit of the generic nature of gestation activities. Perhaps the assumption about their generic nature is unrealistic? The PSED-protocol was developed in the mid-1990s in relation to first US PSED and potentially some of the activities are not aligned with today’s entrepreneurial challenges and activities. In addition, there are gestation activities that are not covered within the PSED-protocol.

Second, our results lead to questioning whether necessary conditions can be found in more homogenous samples. Even though our findings were relatively stable across countries, the heterogeneity of each country sample might eliminate certain necessary gestation activities existing in some specific contexts (cf. Davidsson and Gordon, 2012). For instance, it might be that in particular industries or in certain types of businesses, some gestation activities would indeed be necessary.

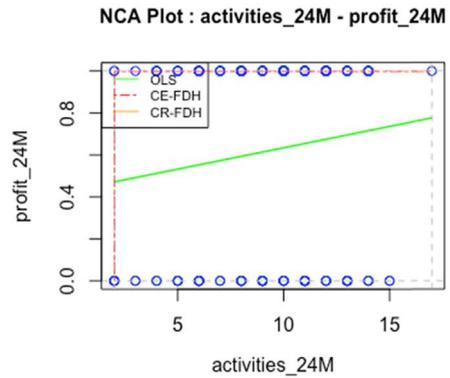
Finally, our ‘no particular action necessary’ finding also calls for theoretical reconsideration of the bold declarations that “*entrepreneurship requires action*” (McMullen and Shepherd, 2006: 132). This is not to say that entrepreneurial action is not important but rather that we need to distinguish between what are necessary actions and what are sufficient actions for firm emergence. Although this distinction can be occasionally found in the literature, it is often not accompanied with appropriate analytical technique to

⁴ The results on the full data set and the sub-sample differ only with respect to Chinese sample. For the Chinese sample, we find that sales is a necessary condition for reaching profits a 24 months.

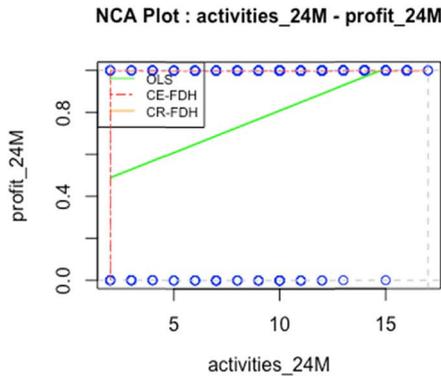
Overall sample



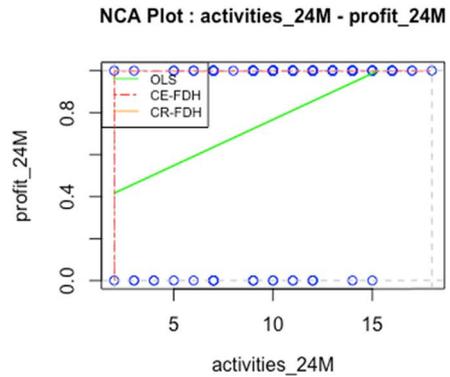
Australia



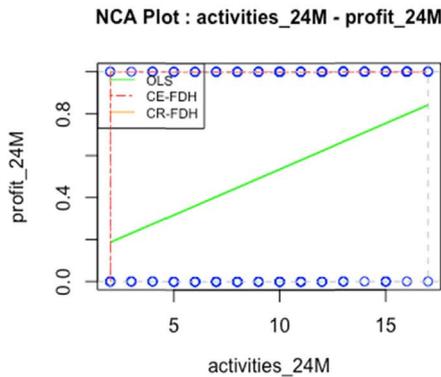
Sweden



China



US 1999



US 2005

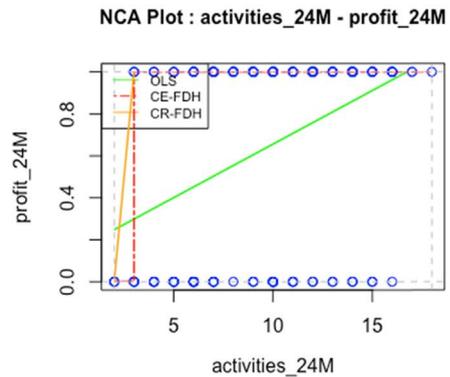


Fig. 1. Results of necessary condition analysis on profit at 24 months using the number of gestation activities. Note: The presence of an empty zone in the upper left hand corner of these graphs indicates that there is a necessary number of gestation activities needed to reach profit. As an example, for the overall sample the ceiling line (CE-FDH) indicates that a minimum of two gestation activities are needed to achieve initial profits.

identify such necessary conditions (e.g. Autio et al., 2013: 1348).

That said, we propose that future research can circumvent these limitations and will focus on explicitly distinguishing between necessary and sufficient conditions in entrepreneurship. We thus also anticipate a new stream of research to further explore the necessary conditions of firm emergence, including new gestation activities to be identified, new combination of activities to be theorized and tested, and a refined focus on contextual differences that might extend the work we present here.

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