
Student entrepreneurship and the university ecosystem: a multi-country empirical exploration

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Abstract: Using an embeddedness perspective, a model and hypotheses are developed concerning the impact of the university entrepreneurial context on student start-up activity. Results based on analysis of the GUESSS database from 25 countries demonstrate that students' involvement in entrepreneurship-related curricular programs and co-curricular activities at university is positively related, and financial support from university is negatively related, to start-up activities undertaken by students. Prior business experience moderates the relationships between student involvement in university initiatives and start-up activities. The negative relationship between financial support and start-up activities is positively moderated by business experience. Implications and directions for future research are discussed.

Keywords: curricular programs; co-curricular activities; embeddedness; financial support; start-up activities; student entrepreneurship; university context.

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1 Introduction

Entrepreneurship represents an important career option, offering opportunities to enjoy independence, develop multiple skills, reap financial benefits and contribute to economic development. For their part, universities across the globe have significantly expanded their curricular and co-curricular offerings in entrepreneurship (Dickson et al., 2008; Morris et al., 2013a). Yet, the number of college graduates starting ventures has not demonstrated commensurate growth (Sieger et al., 2014). Relatively low student start-up rates have been attributed to lack of financial resources, business skills and knowledge, infrastructure, support structures, mentorship and links to professional networks (Kew et al., 2013). There is also evidence, perhaps because of these trends, that universities are beginning to reconsider the effectiveness of their traditional approaches to entrepreneurship (Duval-Couetil, 2013; Hoskisson et al., 2011).

Evidence also suggests the decision to pursue an entrepreneurial path can be facilitated by supportive environments (Lee and Peterson, 2000; Toledano and Urbano, 2008). One approach to capturing such environments is through the development of 'entrepreneurial ecosystems'. In this context, an ecosystem is defined as an agglomeration of interconnected individuals, entities, and governance bodies in a given geographic area that collectively support entrepreneurial activity (Malecki, 2011). Such ecosystems are said to exist at national, regional, and community levels, while recent research has also examined university-level ecosystems (Fetters et al., 2010).

Isenberg (2010, 2014) posits that the creation of an ecosystem aimed at facilitating entrepreneurship is a key element in economic development. For their part, universities operate at two levels. They serve as one of the most valuable elements within regional ecosystems, while also operating their own internal ecosystems (Isenberg, 2011; WEF,

2014). At this internal level, the spirit of the educational environment, its shared values and norms, its leadership, and the internal infrastructure including curricular and co-curricular programming would seem to be important factors in developing and nurturing student entrepreneurial potential (Rideout and Gray, 2013). At the same time, modern universities vary considerably in the extent to which entrepreneurship has been embraced as an academic discipline or major area of study, and in their relative investments in developing learning climates that support the pursuit of entrepreneurial activity (Matlay, 2008; Morris et al., 2013a). As such, it would seem the university environment can serve to both constrain and enable entrepreneurial behaviours (Welter and Smallbone, 2011), while the extent of their impact, if any, remains unclear. This has led Fayolle and Liñán (2014) to call for further research on the role of institutions and the university context in affecting entrepreneurial behaviours.

The current research seeks to determine how student involvement in different types of entrepreneurship-related programs and activities provided by a university are associated with student start-up activity. The study contributes to the existing literature on nascent entrepreneurship and start-up behaviour in at least two ways. First, the study furthers our understanding of the impact of key elements of an entrepreneurial ecosystem within a university on student start-up activity. Previous studies emphasised the roles of business planning (Shane and Delmar, 2004), legitimacy (Zimmerman and Zeitz, 2002), institutions (Choi and Shepherd, 2004) and related variables on start-up activity, but have not examined such variables in a university context. Second, the study provides insights regarding the role of prior experience in moderating the impact of the university environment on start-up behaviour.

The paper proceeds as follows. We first examine the extant literature and develop the theoretical foundation for the study. Based on this foundation, a research model and set of hypotheses are formulated. The research design for an empirical study in which these hypotheses are tested is then presented, followed by a discussion of the results. Implications are drawn for theory development as well as for the design of the institutional environment within universities.

2 Theoretical background and research hypotheses

2.1 Entrepreneurship and the university ecosystem

Entrepreneurial behaviour is concerned with the discovery, evaluation and exploitation of an opportunity (Shane and Venkataraman, 2000). Any type of behaviour is comprised of a range of actions made by individuals in conjunction with personal preferences and external conditions. Scholars agree that the emergence of an organisational entity is a process made up of multiple start-up activities (Carter et al., 1996; Gartner et al., 2004; Lichtenstein et al., 2007), resulting in the activity-based perspective on venture creation (Liao et al., 2005). Nascent entrepreneurs are individuals who intend to create an organisation and who are in the process of pursuing multiple behavioural activities including product development, assembly of resources, organising operations, developing organisational boundaries, achieving initial sales and shipments, and so forth (Souitaris et al., 2007). Researchers assume that the more activities are done, the closer a nascent entrepreneur is to new venture creation (Alsos and Kolvereid, 1998; Carter et al., 1996)

because ‘the more time and efforts one devotes toward accomplishing a task, the more likely it is that the achievement of this task will occur’ (Gatewood et al., 1995, p.373).

The resources required for such activities can be significant and diverse (Hanlon and Saunders, 2007; Semrau and Werner, 2014). While entrepreneurship has been described as the ‘pursuit of opportunities without regard to the resources currently controlled’ (Stevenson and Jarillo, 1990, p.23), such a perspective begs the question of how one starts something when he or she has very little. Successful resource acquisition plays a crucial role in the creation of a sustainable venture (Hulsink and Koek, 2014). At the same time, the start-up process does not occur in a social vacuum (Danes et al., 2009; Steier, 2007). A key question concerns the role of the university context in providing or facilitating the generation of these resources. It would seem the university context could influence whether or not something gets started, while also shaping the nature of the emergent venture (Politis et al., 2012).

Do universities represent a viable source of the relevant resources and/or the knowledge regarding how to successfully access these resources? The university context would appear to be a rich potential reservoir of the knowledge and skills, networking possibilities, opportunities for deliberate practice, and even financial capital that are critical to entrepreneurial success (Guenther and Wagner, 2008; Robinson and Sexton, 1994; Shane, 2000; Zhao et al., 2005).

It has been argued that the university environment can be conceptualised as a potential entrepreneurial ecosystem (Fetters et al., 2010). Community-based ecosystems consist of such components as informal and formal networks, academic and government institutions, professional and support services, capital sources, a talent pool, and physical infrastructure (Neck et al., 2014). When applied in a university context, key components can include entrepreneurship course and degree offerings, engagement of alumni entrepreneurs, student incubators, prototype development services, seed funding to university start-ups, technology transfer services, and scholarly research, among others (Rideout and Gray, 2013). The very idea of an ecosystem is predicated on the dependence of these elements upon one another. Further, to function effectively, activities within an ecosystem require coordination and open communication, and are predicated on shared values and goals (Fetters et al., 2010).

A useful frame for examining the student operating within a university ecosystem is embeddedness theory (Granovetter, 1992). Embeddedness theory emphasises the role of networks of social relations, and the trust that is engendered through these relations, in determining purposive action by individuals (Granovetter, 1992). Here, behaviour is an outcome of the balanced influences of the rational actor and the social context. With student entrepreneurs, then, start-up activity is embedded within a university context. The impact of universities is a function of the social engagement of the student with the resource infrastructure (ecosystem).

Let us consider student interactions with three general areas that can be found within the university environment: curricular programming, co-curricular support activities, and financial resources for student entrepreneurs.

2.2 University curricular programming

Formal entrepreneurship-related coursework pursued by students is a component of human capital that assists in knowledge accumulation (Volery et al., 2013). Human capital refers to ‘the knowledge, skills, competences and other attributes embodied in individuals that are relevant to economic activity’ (OECD, 1998, p.9). It has proven to be

a critical element in successful venture creation, and is often captured by researchers using measures of education levels and existing entrepreneurial and managerial skills (Grichnik et al., 2014; Kirsch et al., 2009). Student nascent entrepreneurs typically lack such skills; therefore, the university represents a potential source of both entrepreneurship-related knowledge and associated skill development. To date, the evidence on the impact of entrepreneurship educational initiatives within universities is limited and mixed (Dickson et al., 2008; Matlay, 2008; Oosterbeek et al., 2010).

Entrepreneurship courses may assist in the accumulation of knowledge important for nascent entrepreneurs. In general, entrepreneurship education is found to positively impact human capital (Martin et al., 2013), and, specifically, to affect beliefs, capacity to exploit opportunities, and entrepreneurial knowledge (Volery et al., 2013). In addition, knowledge acquired from entrepreneurship-related courses can increase a student's ability to acquire resources. Further, certain start-up activities may be undertaken to satisfy entrepreneurship course requirements, such as identifying new business opportunities, interviewing customers and writing a business plan. Hence, a higher level of knowledge, skills and abilities can facilitate the start-up process and contribute to accomplishment of a larger scope of venture-related activities by students. This discussion leads us to our first hypothesis:

Hypothesis 1: The involvement of students in entrepreneurship-related curricular programs is positively related to the scope of their start-up activities.

2.3 University co-curricular programming

Co-curricular activities, which focus on learning efforts outside of the classroom, are increasingly an integral part of an entrepreneurship educational program (Morris et al., 2013b). They tend to be experiential in nature, where the student has an opportunity to apply the theory and content learned in the classroom (Kolb, 2014). They can serve to simulate key aspects of the entrepreneurial experience. Further, they offer students a chance to make mistakes and fail without serious repercussions.

Some co-curricular activities (e.g. business plan competitions, internships, and student incubators) focus on what Neck et al. (2014) refer to as deliberate practice, where the student is engaged in a meaningful performance. Deliberate practice can lead to expanded knowledge structures, greater self-confidence, and a greater likelihood of subsequent action. These and other co-curricular activities (e.g. entrepreneurial mentorships and coaching programs, speaker series, entrepreneurship clubs, entrepreneurship dormitories and learning communities) can provide students with opportunities to network with experts within the university, entrepreneurs, and other professionals. In the process, the students are able to build their reservoir of social capital, potentially gaining greater access to investors, suppliers, distributors, potential customers and other important resources (Florin et al., 2003). They are afforded opportunities to meet similar-minded students and potential partners. Granovetter (1992) claims that new organisations are socially constructed, resulting from actions of entrepreneurs who are embedded in personal networks. Social networks have been shown to be a critical element in transforming a business idea into an actual venture (Sequeira et al., 2007; Stuart and Sorenson, 2003).

Being situated in such an environment provides an exposure to diverse developments that can influence student entrepreneurial behaviour. Students can leverage these opportunities to address particular problems, activities and developmental steps leading

to the launch of their own venture. Further, individuals embedded in networks with those who have entrepreneurial experience tend to be more entrepreneurial themselves (Pirolo and Presutti, 2010). As a result, we posit that university co-curricular programming can provide students with needed information, knowledge, legitimacy, trust, and emotional support related to the entrepreneurial process and results in an increase in student start-up activities. This relationship is reflected in the following hypothesis:

Hypothesis 2: The involvement of students in entrepreneurship-related co-curricular activities is positively related to the scope of their start-up activities.

2.4 University financial support

Financial support is especially critical, even in relatively small amounts, in the start-up phase (Kim et al., 2006; Stuart and Sorenson, 2003). Werner (2007) identified two research streams in the extant literature: one devoted to the funding needs and constraints for start-ups and the other focused on possible elimination of these restrictions. While there exists a growing range of funding vehicles for entrepreneurs, the pre-seed stage of new venture creation continues to represent a gaping hole in the funding cycle (Schleinkofer and Schmude, 2013). Despite strong intentions, inability to access required financing is a common reason for exiting an entrepreneurial path (Meier and Pilgrim, 1994). And this problem is especially applicable to students who lack personal savings, collateral, and established credit histories. Family members, friends, personal credit cards, and savings are the most common sources of finance for students, and these regularly prove to be inadequate. However, a growing number of universities offer various types of seed funding, including equity and non-equity investments, loans, and small grants (Morris et al., 2013a).

Accordingly, students should be especially responsive to seed funding (and the associated requirements tied to such funding) available through university entrepreneurship programs. Knowing such funding is available gives them more incentive to pursue activities that can lead to a start-up, while absence of such knowledge can create what many consider to be the highest perceived barrier to launching a venture. Based on this discussion, we propose the following hypothesis:

Hypothesis 3: The provision by the university of financial support for entrepreneurial ventures is positively related to the scope of student start-up activities.

2.5 Prior business experience

There is evidence that experience plays an important role in facilitating early stages of the start-up process (Davidsson and Honig, 2003). Previous experience of students related to their venture concepts can suggest that they have already acquired important skills and tacit knowledge that can be applied as the venture unfolds. Their expectations are more realistic and they understand what works and what does not when dealing with multiple start-up tasks. The important role of prior business experience, and hence expertise, in entrepreneurial decision-making research has been well documented (e.g. Baron, 2009; Sarasvathy, 2001).

However, there remains a 'missing link' in the literature regarding the way previous business experience affects the impact university entrepreneurial activities have on venture creation by student entrepreneurs. While such experience might enable a student to better appreciate and grasp key learning elements, recognise the potential of network

connections and how to leverage them, and understand how to deploy seed capital provided by a university, the opposite effect may be more likely. Experience might tend to negate the theoretical content of the classroom, as students find it overly academic or otherwise believe they already have the answers. Experience can also serve as a substitute for the experiential learning available through co-curricular programming, lessening the impact of such programming on the student’s pursuit of various start-up activities. It can provide students with an already established network, lessening their need or appreciation for contacts available through the university ecosystem. In addition, the experienced student is likely to be more familiar with alternative sources of capital, some of which may offer advantages over that available through a university (e.g. larger amounts, fewer restrictions, access to follow up funding), suggesting university funding may have less impact on their behaviour. Thus, a positive interaction between previous experience and financial capital finds availability of such capital through the university having a stronger impact on the inexperienced student. This discussion also suggests that an interesting tension can exist between university-provided experiential learning as a substitute for prior business experience, and previous experience as a substitute for experiential learning. As a result, we propose the following set of hypotheses:

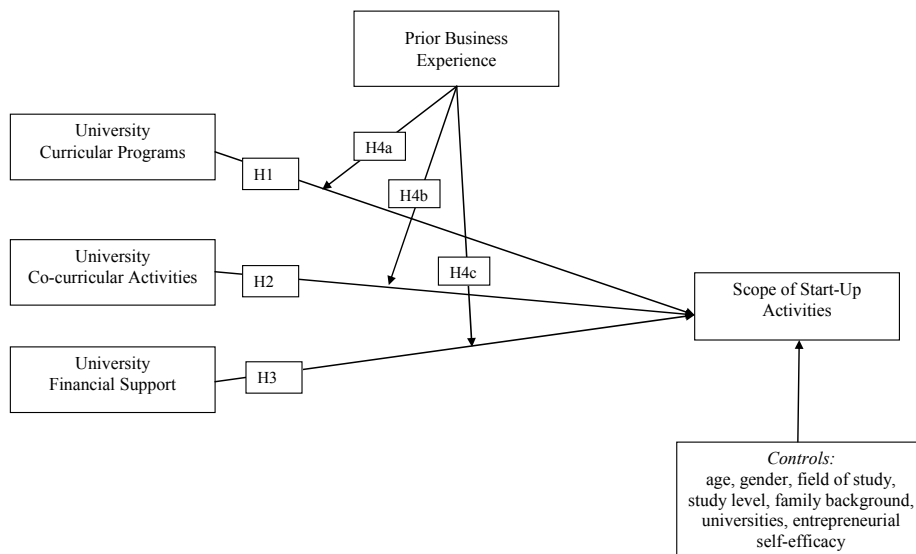
Hypothesis 4a: The effect of student involvement in entrepreneurship-related curricular programs on the scope of their start-up activities is stronger when students have no prior business experience.

Hypothesis 4b: The effect of student involvement in entrepreneurship-related co-curricular activities on the scope of their start-up activities is stronger when students have no prior business experience.

Hypothesis 4c: The effect of available university financial support programs on the scope of start-up activities is stronger when students have no prior business experience.

The overall theoretical model capturing these variables and hypotheses can be found in Figure 1.

Figure 1 Conceptual framework and hypotheses



3 Research methods

3.1 Sampling approach

A data set originating from the Global University Entrepreneurial Spirit Students' Survey (GUESSS) was utilised. GUESSS is an international research project organised by the Swiss Institute for Small Business and Entrepreneurship at the University of St. Gallen. Organised biannually since 2003, it surveys large cross-sections of students in different countries. In 2011, 93,265 students from 489 universities in 26 countries¹ took part in the survey, representing a response rate of 6.3%.

For the purpose of this study, we considered only the responses of students who have not started their own business yet and are considered to be 'intentional founders'. They are thinking about founding their own company but have not founded it yet. We excluded exchange students because of their potential lack of familiarity with a university where they spent only a few months. In addition, we eliminated those born before 1976, as our interest was in young intentional founders, and excluded universities where there were less than five responses. This resulted in a final sample of 31,927 respondents from 25 countries² and 282 universities. The average student in our sample was 24.1 years old (SD = 4.01) and 47% of respondents were female. The majority of the respondents were bachelor degree students (81.2%), and 35% reported studying business and economics. Just over half of the respondents (53.3%) indicated that their families included at least one parent who had been self-employed (see Table 1).

Table 1 Descriptive statistics

Variable	N	Mean	SD	Min	Max	Frequencies*	
						Categories	Percent
<i>Dependent variable</i>							
Scope of start-up activities	31,927	2.50	1.91	0	10		
<i>Controls</i>							
Age	31,927	24.1	4.01	14	36		
Gender	31,927	0.47	0.5	0	1	Female	47.17
Study level	31,927	0.81	0.39	0	1	Bachelor	81.20
Field of study	31,927	0.36	0.48	0	1	Business & Economics	35.65
Family background	31,927	0.53	0.5	0	1	Yes	53.31
Self-efficacy	31,927	5.32	0.99	1	7		
<i>Moderator</i>							
Previous experience	31,927	0.39	0.49	0	1	Yes	39.22
<i>University offerings</i>							
Curricular programs	31,927	3.96	1.84	0	8		
Co-curricular activities	31,927	1.98	1.13	0	5		
Financial support	31,927	0.42	0.29	0	1		

Notes: *Categorical variables only.

3.2 Measures employed

Dependent variable: To measure the scope of student start-up activities, we employed an approach consistent with existing attempts at assessing engagement with the entrepreneurial process (Stam et al., 2010; van der Zwan et al., 2010). Students were asked to reflect on steps taken to start their own businesses. They could choose among activities from the following list: ‘nothing done so far’, ‘thought of first business ideas’, ‘formulated business plan’, ‘identified market opportunity’, ‘looked for potential partners’, ‘purchased equipment’, ‘worked on product development’, ‘discussed with potential customers’, ‘asked financial institutions for funding’, and ‘decided on date of founding’. If students agreed with the answer, they chose ‘1’, if not ‘0’. From these choices, we calculated the sum of start-up activities undertaken. The first choice ‘nothing done so far’ was recoded so that ‘yes’ was coded as ‘0’ (hence, the maximum is 10, and the minimum level is 0). Among ‘intentional founders’ around 60% have undertaken from two to four start-up activities, slightly more than 3% have taken more than six steps. The maximum number of 10 was reported by only 0.11% of the sample (34 out of 31,927).

Independent variables: The measure of *university curricular programs* focused on the student’s obtained level of codified (explicit) knowledge. Respondents reported the absolute number of entrepreneurship-related courses attended by students during their studies, including the following: (1) entrepreneurship in general; (2) family firms; (3) financing entrepreneurial ventures; (4) technology entrepreneurship; (5) social entrepreneurship; (6) entrepreneurial marketing; (7) innovation and idea generation; (8) business planning; and (9) other. The *university co-curricular activities* measure emphasised entrepreneurship-related experiential learning offerings available outside of traditional coursework at the universities attended by students. This variable was measured as the absolute number of five offerings engaged in by students: (1) workshops/networking with experienced entrepreneurs; (2) contact platforms with potential investors; (3) business plan contests/workshops; (4) mentoring and coaching programs for entrepreneurs; and (5) a contact point for entrepreneurial issues. *University financial support* was codified as a dummy variable with a value of 1 if a student participated in university programs offering financial resources for student venture creation (in the form of seed funding or other financial support).

Moderator: Prior business experience was coded as a binary variable. Students were asked the following question: ‘Have you already engaged in professional work experiences that are relevant to your company to be founded?’ The answer ‘yes’ was coded as 1, and 0 if a student chose ‘no’. The variable was multiplied by each type of university offering to create three interaction terms.

Control variables: A range of individual student characteristics were used as control variables which can influence the scope of students’ start-up activities. The control variables included the following characteristics: age, gender, study level (bachelor/others), field of study (business/others), family background (entrepreneur in family) and entrepreneurial self-efficacy. The measure of self-efficacy or a belief in one’s ability to successfully perform the various roles and tasks of entrepreneurship (DeNoble et al., 1999) was based on Zhao et al. (2005). It included 11 items, with seven-point Likert-type response scale (1 = ‘completely unsure’ and 7 = ‘completely sure’). Students were asked about their degree of certainty in performing the following roles and tasks: ‘establish and achieve goals and objectives’, ‘generate new ideas’, ‘develop new products and services’, ‘perform financial analysis’, ‘reduce risk and uncertainty’, ‘take calculated risks’, ‘make

decisions under uncertainty and risk', 'manage time by setting goals', 'take responsibility for ideas and decisions', 'start my own firm', 'lead my own firm to success'. Exploratory factor analysis confirmed the unidimensional factor structure (*Eigen-value* = 5.27, *Cronbach's alpha* = 0.90). The importance of these variables for the entrepreneurial process has been confirmed by several studies (Arenius and Minniti, 2005; Bhandari, 2012; Sanchez-Famoso et al., 2015; van der Zwan et al., 2010).

3.3 *Statistical procedure*

Hierarchical regression analysis was used to test the hypotheses. The variables were added in the model step-by-step starting with control variables. With the dependent variable, the scope of start-up activities represents a count variable where we have all positive integers and rare events, as the maximum number of offerings were taken only by a few students. Here, the model was specified using the Poisson distribution. In addition, the standard errors at the university level were clustered to account for the possibility of non-independence of observation, as the observations (students) are nested within the universities. Multicollinearity was not a problem as the Variance Inflation Factor (VIF) was lower than 2, below the recommended maximum of 5, and this was reinforced by an examination of correlation coefficients among key variables (Debrulle et al., 2014; Hair, 1998).

4 **Results**

In Tables 1 and 2, descriptive statistics for and bivariate correlations among the variables included in the study are presented. The results of regression analyses are presented in Table 3. Based on a hierarchical regression procedure we started with the base model (Table 3, Model I) where only control variables were added, and continued with adding all other independent variables step by step (Models II–IX). As expected age had a positive and significant impact on the scope of start-up activities, while having an academic specialisation in 'business and economics' and being from a family with entrepreneurial background increased the chance for a higher number of start-up steps by students. For bachelor degree students and female students, the scope of start-up activities appeared to be lower. As expected, self-efficacy, which was positively associated with elements of the entrepreneurial ecosystem, had a positive effect on the number of start-up activities.

The results summarised in Table 3 indicate that involvement of students in university entrepreneurship-related curricular programs has a significant positive effect on the scope of start-up activities and the results are consistent across all specifications of the Model (Model I: $b = 0.026$, $p < 0.01$; Model V: $b = 0.020$, $p < 0.01$). Thus, the results support Hypothesis 1. Hypothesis 2 was also supported, as students' involvement in multiple entrepreneurship-related co-curricular activities organised by universities was associated with an increased scope of student start-up activities (Model III: $b = 0.042$, $p < 0.01$; Model V: $b = 0.036$, $p < 0.01$). The positive impact of university financial support was not supported (Hypothesis 3). In contrast, this variable had a significant negative impact on the scope of start-up activities (Model IV: $b = -0.050$, $p < 0.1$; Model V: $b = -0.135$, $p < 0.01$).

Table 2 Summary of correlations

<i>N</i>	<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>
1	Scope of start-up activities	1.00										
2	Age	0.12*	1.00									
3	Gender	-0.17*	-0.06*	1.00								
4	Study level	-0.03*	-0.28*	0.02*	1.00							
5	Field of study	0.05*	-0.09*	0.02*	0.007	1.00						
6	Family business	0.08*	-0.02*	0.006	0.06*	0.009	1.00					
8	Self-efficacy	0.25*	0.01*	-0.06*	0.15*	0.09*	0.10*	1.00				
7	Previous experience	0.24*	0.26*	-0.09*	-0.08*	-0.02*	0.06*	0.11*	1.00			
9	Curricular programs	0.12*	0.02*	-0.006	0.07*	0.21*	0.05*	0.20*	0.03*	1.00		
10	Co-curricular activities	0.12*	-0.01*	-0.003	0.11*	0.08*	0.07*	0.23*	0.03*	0.56*	1.00	
11	Financial support	0.02*	0.02*	0.05*	0.13*	-0.02*	0.03*	0.18*	0.004	0.31*	0.35*	1.00

Notes: *significance at the level $p < 0.05$.

Table 3 Estimates of the effects on the scope of start-up activities

<i>Variable</i>	<i>Model I</i>	<i>Model II</i>	<i>Model III</i>	<i>Model IV</i>	<i>Model V</i>	<i>Model VI</i>	<i>Model VII</i>	<i>Model VIII</i>
<i>Controls</i>								
Age	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.003)	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.002)
Gender	-0.216*** (0.010)	-0.216*** (0.010)	-0.216*** (0.010)	-0.215*** (0.010)	-0.212*** (0.010)	-0.213*** (0.010)	-0.212*** (0.010)	-0.211*** (0.010)
Study level	-0.071*** (0.022)	-0.077*** (0.023)	-0.080*** (0.022)	-0.066*** (0.020)	-0.071*** (0.020)	-0.070*** (0.020)	-0.071*** (0.020)	-0.072*** (0.020)
Field of study	0.060*** (0.011)	0.040*** (0.012)	0.053*** (0.011)	0.059*** (0.011)	0.036*** (0.011)	0.037*** (0.011)	0.037*** (0.011)	0.036*** (0.011)
Family background	0.076*** (0.009)	0.074*** (0.009)	0.072*** (0.009)	0.076*** (0.009)	0.071*** (0.009)	0.072*** (0.009)	0.072*** (0.009)	0.071*** (0.010)
Self-efficacy	0.177*** (0.014)	0.168*** (0.012)	0.166*** (0.011)	0.180*** (0.013)	0.169*** (0.010)	0.169*** (0.010)	0.169*** (0.010)	0.169*** (0.010)
<i>University offerings</i>								
Curricular programs		0.026*** (0.008)			0.020*** (0.006)	0.029*** (0.006)	0.020*** (0.006)	0.020*** (0.006)
Co-curricular activities			0.042*** (0.011)		0.036*** (0.007)	0.036*** (0.007)	0.044*** (0.007)	0.036*** (0.007)
Financial support				-0.050* (0.029)	-0.135*** (0.021)	-0.136*** (0.021)	-0.135*** (0.021)	-0.164*** (0.022)

Table 3 Estimates of the effects on the scope of start-up activities (continued)

Variable	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
Previous experience	0.285*** (0.010)	0.284*** (0.011)	0.284*** (0.011)	0.285*** (0.010)	0.282*** (0.011)	0.361*** (0.024)	0.316*** (0.022)	0.255*** (0.021)
Previous experience × curricular programs						-0.019*** (0.004)		
Previous experience × co-curricular activities							-0.016** (0.007)	
Previous experience × financial support								0.064* (0.035)
Regression function								
_cons	0.620*** (0.058)	0.543*** (0.080)	0.551*** (0.078)	0.631*** (0.060)	0.531*** (0.082)	0.493*** (0.079)	0.515*** (0.078)	0.545*** (0.079)
Wald χ^2	3107.34	3276.55	3245.06	3355.99	3629.46	3921.85	3883.53	3488.99
N	31927	31927	31927	31927	31927	31927	31927	31927

Notes: Prob > $\chi^2 = 0.0000$.
 *significance at the level $p < 0.10$; **significance at the level $p < 0.05$; ***significance at the level $p < 0.01$.

Turning to the moderator, Hypotheses 4a, 4b and 4c suggest a student's prior business experience can act as a negative moderator of the relationship between university entrepreneurial offerings and the scope of start-up activity. Prior experience was positively related to the scope of student start-up activities. As showed in the Models VI–VIII of Table 3, all moderation effects appeared significant but with only partial moderation because the main independent variables remained significant as well. Hypotheses 4a and 4b were clearly supported. Prior experience mitigated the relationship between student involvement in entrepreneurship-related curricular programs and the scope of start-up activities (Model VI: $b = -0.019$, $p < 0.01$). In addition, if students had prior business experience, it diminished the positive impact of student involvement in co-curricular activities on the scope of start-up activities (Model VII: $b = -0.016$, $p < 0.05$). At the same time, the estimated result of the interaction term between university financial support and previous experience was significant and positive (Model VIII: $b = 0.064$, $p < 0.1$). The finding for Hypothesis 4c was intriguing, as there was a negative and significant effect of student involvement in university financial support programs on the scope of start-up activities. However, the interaction term between prior experience and financial support positively affected this relationship by lessening the negative impact of financial support.

5 Discussion and implications

A central premise in the creation of university entrepreneurship programs is that entrepreneurship can be considered a learned phenomenon, and educators play a central role in this process (Dickson et al., 2008; Elenurm and Moisala, 2008). The educational environment can help students develop their self-efficacy and provide them with appropriate knowledge, skills and related resources to turn ideas into entrepreneurial actions (Pittaway and Cope, 2007; Solomon et al., 2002). This premise is supported by the current research. As such, this work contributes to the literatures on learning theory, and particularly experiential learning (Kolb, 2014; Neck et al., 2014; Politis et al., 2012), as well as work on the roles of different forms of capital on entrepreneurial behaviour (Davidsson and Honig, 2003; Florin et al., 2003; Witt, 2004). It also adds to the emerging work on entrepreneurial ecosystems and embeddedness (Fetters et al., 2010; Granovetter, 1992; Hastie, 2007; Tan et al., 2000).

The start-up activities of students embedded in a university context are impacted by the entrepreneurial programs and activities available from that context. However, our results reveal a more nuanced picture of the role of university entrepreneurial environment in the start-up process. With multiple curricular entrepreneurship-related programs, we found a significant and positive association with the scope of students' start-up activities. Through entrepreneurship courses students can be exposed to the multiple experiential exercises and tasks which enhance entrepreneurial behaviour. Courses can help students recognise opportunities and both generate and adapt viable business ideas. They can equip students with important tools for the start-up process, such as feasibility assessment rubrics, business plans, and risk mitigation approaches. The possession of such knowledge leads to a higher number of start-up activities undertaken by students.

The involvement of students in various co-curricular activities organised by university also has a positive and significant effect on the scope of student start-up

activities. The results provide empirical support for arguments regarding the value of deliberate practice and experiential learning as core elements of an entrepreneurship program (Morris et al., 2014; Neck et al., 2014). To the extent that co-curricular activities are a primary vehicle for students to develop social capital, the results are also consistent with Witt's (2004) argument that one's social network is a key success factor for start-ups. Others support the notion that having connections to others who started business increases the likelihood that a person will proceed down an entrepreneurial path (Davidsson and Honig, 2003; Liao et al., 2005). Beyond the curriculum, then, universities should have clear strategies for the provision of hands-on entrepreneurial experiences and social networking opportunities through co-curricular programming. A well-formulated portfolio of activities that balance types of experiences, the underlying competencies being developed, the kinds of participants, the contexts for interaction, and forms of interaction is important. In addition to such opportunities, providing guidance to students on how to build and leverage network relationships would seem critical.

Contrary to expectations, university financial support had a negative impact on the scope of student start-up activities. Such a possibility is suggested by Klyver and Schenkel (2013). Several factors can account for this finding. One possibility is that those who fail to receive such funding, which could be a significant number of students if the funding is limited, simply give up on pursuing key activities, especially more demanding activities, associated with venture creation. Alternatively, once money is obtained, students may tend to skip over key activities that they should be addressing, such as finalising a proper business plan or conducting market research, on the assumption that such activities are no longer important or required. The implication is that academic leaders may want to rethink how such funding programs are designed and managed. Smaller amounts of money in multiple forms (grants, loans, non-equity investments, equity investments) given to more students, and tied to completion of particular start-up activities, may prove to be more effective in enhancing the impact of university financing initiatives.

Our results indicate that the prior business experience diminishes the positive impact of university curricular programs and co-curricular activities as well as the negative impact of university financial capital. Prior experience can be a substitute for these university offerings because 'it enables would-be entrepreneurs to build up experience and acquire tacit knowledge in various fields' (Stuetzer et al., 2013, p.98). It can provide students with important skills and increase their feelings of confidence and independence. Entrepreneurial experience may lead students to believe that they know what to do in order to develop a new venture and they may have an already-established professional network. Alternatively, the content of the coursework and quality of the networking opportunities may be perceived by experienced entrepreneurs as less relevant for the accomplishment of key activities associated with venture creation. Yet with financial support, the experienced student may appreciate more the value of the financial resources and have a better sense of how to deploy those resources to the appropriate start-up activities. In short, they spend the money more wisely. Experienced people know that there is no such condition as 'enough money' for any start-up and they approach carefully all actions by considering potential costs and benefits.

Implications can also be drawn for policy-makers and university administrators as they allocate resources to higher education institutions. While the current study did not consider all the potential elements of a university ecosystem, evidence is provided of the value of a multifaceted approach to entrepreneurship that transcends the provision of

coursework, while also reinforcing the critical role played by coursework. Greater attention might be given to a total systems concept as investments are made in the development of entrepreneurship-related programs with universities, where individual components are not designed in isolation, but instead, the inter-relationships among these components and the complementary roles they play are considered. The strong correlations among the curricular, co-curricular and financial support elements reinforce the need for a systems approach. It is an approach that balances content, application, experiential elements, and specific provision of resources. The challenge in many entrepreneurship programs lies in finding ways to achieve such integration, or to effectively 'connect the dots'. Yet, the notion of an ecosystem becomes a questionable metaphor in a university context if the principles of integration, coordination, and balance among system components do not drive program design. An additional implication concerns assessment of university entrepreneurship ecosystems. Methods for measuring the impact of entrepreneurship education have tended to consider numbers of start-ups or the simple dichotomy of whether one does or does not start launch a venture. The entrepreneurial process is one that entails a wide range activities and events, many of which are path dependent (Lichtenstein et al., 2007). The current research points to the value of considering the entire sequence of activities engaged in by a student as they navigate the entrepreneurial pathway.

5.1 Limitations and further research directions

It is also important to consider the limitations of the study when interpreting our findings. First, we studied the impact of university offerings and start-up activities of students at one point of time due to the nature of the data set. However, the effect of university offerings can be more impactful later and the time aspect should be taken into account and investigated in future research. Students may opt to work for someone else before they actually launch a venture, or the educational efforts could result in an individual becoming a corporate entrepreneur, taking over a family business, or pursuing some other form of entrepreneurship. Second, the linkage between start-up activities engaged in and actual venture launches was not assessed here, and this issue opens an interesting future research direction. Further, university curricular programs, co-curricular activities and financial support were considered in the aggregate. There are likely sub-elements of each (e.g. with curricular programming, particular types of coursework or pedagogical approaches; with co-curricular programming, distinct approaches to or types of experiential or networking opportunities; and with financial support, different approaches to seed funding) that have differential impacts on student behaviour, an area scholars are encouraged to further investigate. Finally, the nature of a student's prior work experience warrants further investigation. The amount, qualities, and types of their experience may have implications both for how the student approaches and engages with the educational environment and the manner in which they approach start-up activities.

6 Conclusion

This study reinforces the importance of the university context in affecting student engagement in entrepreneurial activity. It helps advance the limited empirical research on the impact of university entrepreneurship initiatives related to curricular programs, co-

curricular activities and programs of financial support that facilitate the development of human, social and financial capital of students. In addition, we contribute to the research by providing more insight into the roles of student previous entrepreneurial experience in explaining the impact of university entrepreneurship programs and activities. We are one of the few to establish a link between university entrepreneurial offerings and student start-up activities. This provides a new pathway for researchers in the field of entrepreneurial education and student entrepreneurship.

The findings of this study suggest caution as universities continue to grow the mix of elements that constitute their entrepreneurial ecosystems. Students vary considerably in terms of their backgrounds, levels and types of experiences, and their relative self-efficacy when it comes to an entrepreneurial career. Simply offering entrepreneurship-related programs and activities without tailoring the design and delivery of the associated programs to reflect both the characteristics of students being targeted, and the particular activities related to venture start-up one wants students to pursue, may limit the effectiveness of university efforts. This appears to especially be the case with financial capital, where such programs appear to limit the scope of activities in which students engage. While having a seed funding program may help raise the visibility and enhance the reputation of an entrepreneurship program, and provide a vehicle to engage alumni and other external stakeholders who contribute to such funds, the impact of these types of initiatives on start-up activity may actually be counterproductive with those students lacking professional experience. The conclusion is not to eliminate such programs, but instead to better integrate them with other elements in the ecosystem, and to tie participation in such programs to completion of defined activities that surround venture start-up.

In sum, then, university ecosystems can have an important influence on the entrepreneurial behaviours of students, but must reflect the learning needs and styles of students. Experiential learning represents a critical component of the ecosystem, but is not an exclusive element, as its potential may be enhanced when it is coupled with other learning vehicles. Especially important in this regard are lecture, core content and opportunities to build social capital.

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References

- Alsos, G.A. and Kolvereid, L. (1998) 'The business gestation process of novice, serial, and parallel business founders', *Entrepreneurship: Theory & Practice*, Vol. 22, No. 4, pp.101–114.
- Arenius, P. and Minniti, M. (2005) 'Perceptual variables and nascent entrepreneurship', *Small Business Economics*, Vol. 24, No. 3, pp.233–247.
- Baron, R. (2009) 'Effectual versus predictive logics in entrepreneurial decision making: differences between experts and novices. Does experience in starting new ventures change the way entrepreneurs think? Perhaps, but for now, "caution" is essential', *Journal of Business Venturing*, Vol. 24, No. 4, pp.310–315.

- Bhandari, N.C. (2012) 'Relationship between students' gender, their own employment their parents' employment, and the students' intention for entrepreneurship', *Journal of Entrepreneurship Education*, Vol. 15, pp.133–144.
- Carter, N.M., Gartner, W.B. and Reynolds, P.D. (1996) 'Exploring start-up event sequences', *Journal of Business Venturing*, Vol. 11, No. 3, pp.151–166.
- Choi, Y.R. and Shepherd, D.A. (2004) 'Entrepreneurs' decisions to exploit opportunities', *Journal of Management*, Vol. 30, No. 3, pp.377–395.
- Danes, S.M., Stafford, K., Haynes, G. and Amarapurkar, S.S. (2009) 'Family capital of family firms: bridging human, social, and financial capital', *Family Business Review*, Vol. 22, No. 3, pp.199–215.
- Davidsson, P. and Honig, B. (2003) 'The role of social and human capital among nascent entrepreneurs', *Journal of Business Venturing*, Vol. 18, No. 3, pp.301–331.
- Debrulle, J., Maes, J. and Sels, L. (2014) 'Start-up absorptive capacity: does the owner's human and social capital matter?', *International Small Business Journal*, Vol. 32, No. 7, pp.777–801.
- DeNoble, A., Jung, D. and Ehrlich, S. (1999) 'Entrepreneurial self-efficacy: the development of a measure and its relationship to entrepreneurship', in Reynolds, P.D., Bygrave, W.D., Manigart, S., Mason, C.M., Meyer, G.D., Sapienza, H.J. and Shaver, K.G. (Eds): *Frontiers of Entrepreneurship Research*, Wellesley, Babson College, MA, pp.73–87.
- Dickson, P.H., Solomon, G.T. and Weaver, K.M. (2008) 'Entrepreneurial selection and success: does education matter?', *Journal of Small Business and Enterprise Development*, Vol. 15, No. 2, pp.239–258.
- Duval-Couetil, N. (2013) 'Assessing the impact of entrepreneurship education programs: challenges and approaches', *Journal of Small Business Management*, Vol. 51, No. 13, pp.394–409.
- Elenurm, T. and Moisala, A. (2008) 'Human resources for entrepreneurship: comparing orientations of Estonian and Finnish business students', *European Journal of International Management*, Vol. 2, No. 4, pp.454–470.
- Fayolle, A. and Liñán, F. (2014) 'The future of research on entrepreneurial intentions', *Journal of Business Research*, Vol. 67, No. 5, pp.663–666.
- Fetters, M., Greene, P.G. and Rice, M.P. (Eds) (2010) *The Development of University-Based Entrepreneurship Ecosystems: Global Practices*, Edward Elgar Publishing, Northampton, MA.
- Florin, J., Lubatkin, M. and Schulze, W. (2003) 'A social capital model of high-growth ventures', *Academy of Management Journal*, Vol. 46, No. 3, pp.374–384.
- Gartner, W.B., Carter, N.M. and Reynolds, P.D. (2004) 'Business start-up activities', in Gartner, W.B., Shaver, K., Carter, N. and Reynolds, P. (Eds): *The Handbook of Entrepreneurial Dynamics: The Process of Organization Creation*, Sage Series, Newbury Park, CA, pp.285–299.
- Gatewood, E.J., Shaver, K.G. and Gartner, W.B. (1995) 'A longitudinal study of cognitive factors influencing start-up behaviors and success at venture creation', *Journal of Business Venturing*, Vol. 10, No. 5, pp.371–391.
- Granovetter, M. (1992) 'Problems of explanation in economic sociology', in Nohria, N. and Eccles, R. (Eds): *Networks and Organizations: Structure, Form, and Action*, Harvard Business School Press, Boston, MA, pp.25–56.
- Grichnik, D., Brinckmann, J., Singh, L. and Manigart, S. (2014) 'Beyond environmental scarcity: human and social capital as driving forces of bootstrapping activities', *Journal of Business Venturing*, Vol. 29, No. 2, pp.310–326.
- Guenther, J. and Wagner, K. (2008) 'Getting out of the ivory tower – new perspectives on the entrepreneurial university', *European Journal of International Management*, Vol. 2, No. 4, pp.400–417.

- Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998) *Multivariate Data Analysis*, 5th ed., Prentice-Hall, Upper Saddle River, NJ.
- Hanlon, D. and Saunders, C. (2007) 'Marshaling resources to form small new ventures: toward a more holistic understanding of entrepreneurial support', *Entrepreneurship: Theory & Practice*, Vol. 31, No. 4, pp.619–641.
- Hoskisson, R., Covin, J., Volberda, H. and Johnson, R.A. (2011) 'Revitalizing entrepreneurship: the search for new research opportunities', *Journal of Management Studies*, Vol. 48, No. 6, pp.1141–1168.
- Hulsink, W. and Koek, D. (2014) 'The young, the fast and the furious: a study about the triggers and impediments of youth entrepreneurship', *International Journal of Entrepreneurship & Innovation Management*, Vol. 18, Nos. 2/3, pp.182–209.
- Isenberg, D. (2010) 'The big idea: how to start and entrepreneurial revolution', *Harvard Business Review*. Available online at: <https://hbr.org/2010/06/the-big-idea-how-to-start-an-entrepreneurial-revolution> (accessed on 29 June 2015).
- Isenberg, D. (2011) *The Entrepreneurial Ecosystem Strategy as a New Paradigm for Economic Policy: Principles for Cultivating Entrepreneurship*, Babson Entrepreneurship Ecosystem Project, Babson College, Babson Park, MA.
- Isenberg, D. (2014) 'What an entrepreneurship ecosystem actually is', *Harvard Business Review*. Available online at: <https://hbr.org/2014/05/what-an-entrepreneurial-ecosystem-actually-is/> (accessed on 29 June 2015).
- Kew, J., Herrington, M., Litovsky, Y. and Gale, H. (2013) *GEM YBI Youth Report: The State of Global Youth Entrepreneurship*, Global Entrepreneurship Research Association/Youth Business International, Cape Town.
- Kim, P.H., Aldrich, H.E. and Keister, L.A. (2006) 'Access (not) denied: the impact of financial, human, and cultural capital on entrepreneurial entry in the United States', *Small Business Economics*, Vol. 27, No. 1, pp.5–22.
- Kirsch, D., Goldfarb, B. and Gera, A. (2009) 'Form or substance: the role of business plans in venture capital decision making', *Strategic Management Journal*, Vol. 30, No. 5, pp.487–515.
- Klyver, K. and Schenkel, M.T. (2013) 'From resource access to use: exploring the impact of resource combinations on nascent entrepreneurship', *Journal of Small Business Management*, Vol. 51, No. 4, pp.539–556.
- Kolb, D.A. (2014) *Experiential Learning: Experience as the Source of Learning and Development*, Pearson Education, New York.
- Lee, S.M. and Peterson, S.J. (2000) 'Culture, entrepreneurial orientation, and global competitiveness', *Journal of World Business*, Vol. 35, No. 4, pp.401–416.
- Liao, J., Welsch, H. and Tan, W-L. (2005) 'Venture gestation paths of nascent entrepreneurs: exploring the temporal patterns', *The Journal of High Technology Management Research*, Vol. 16, No. 1, pp.1–22.
- Lichtenstein, B.B., Carter, N.M., Dooley, K.J. and Gartner, W.B. (2007) 'Complexity dynamics of nascent entrepreneurship', *Journal of Business Venturing*, Vol. 22, No. 2, pp.236–261.
- Malecki, E.J. (2011) 'Connecting local entrepreneurial ecosystems to global innovation networks: open innovation, double networks and knowledge integration', *International Journal of Entrepreneurship and Innovation Management*, Vol. 14, pp.36–59.
- Martin, B.C., McNally, J.J. and Kay, M.J. (2013) 'Examining the formation of human capital in entrepreneurship: a meta-analysis of entrepreneurship education outcomes', *Journal of Business Venturing*, Vol. 28, No. 2, pp.211–224.
- Matlay, H. (2008) 'The impact of entrepreneurship education on entrepreneurial outcomes', *Journal of Small Business and Enterprise Development*, Vol. 15, No. 2, pp.382–396.
- Meier, R. and Pilgrim, M. (1994) 'Policy-induced constraints on small enterprise development in Asian developing countries', *Small Enterprise Development*, Vol. 5, No. 2, pp.32–38.

- Morris, M.H., Kuratko, D.F. and Cornwall, J.R. (2013a) *Entrepreneurship Programs and the Modern University*, Edward Elgar, Cheltenham, UK.
- Morris, M.H., Webb, J.W., Fu, J. and Singhal, S. (2013b) 'A competency-based perspective on entrepreneurship education: conceptual and empirical insights', *Journal of Small Business Management*, Vol. 51, No. 3, pp.352–369.
- Morris, N.M., Kuratko, D.F. and Pryor, C.G. (2014) 'Building blocks for the development of university-wide entrepreneurship', *Entrepreneurship Research Journal*, Vol. 4, No. 1, pp.45–68.
- Neck, H., Greene, P. and Brush, C. (2014) 'Practice-based entrepreneurship education using actionable theory', in Morris, M.H. (Ed.): *Annals of Entrepreneurship Education and Pedagogy*, Edward Elgar Publishing, Cheltenham, UK, pp.3–20.
- OECD (1998) *Human Capital Investment: An International Comparison*, OECD Publications, Paris.
- Oosterbeek, H., van Praag, M. and Ijsselstein, A. (2010) 'The impact of entrepreneurship education on entrepreneurship skills and motivation', *European Economic Review*, Vol. 54, No. 3, pp.442–454.
- Pirolo, L. and Presutti, M. (2010) 'The impact of social capital on the start-ups' performance growth', *Journal of Small Business Management*, Vol. 48, No. 2, pp.197–227.
- Pittaway, L. and Cope, J. (2007) 'Entrepreneurship education: a systematic review of the evidence', *International Small Business Journal*, Vol. 25, No. 5, pp.479–510.
- Politis, D., Winborg, J. and Dahlstrand, A.L. (2012) 'Exploring the resource logic of student entrepreneurs', *International Small Business Journal*, Vol. 30, No. 6, pp.659–683.
- Rideout, E. and Gray, D. (2013) 'Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education', *Journal of Small Business Management*, Vol. 51, No. 3, pp.329–351.
- Robinson, P.B. and Sexton, E.A. (1994) 'The effect of education and experience on self-employment success', *Journal of Business Venturing*, Vol. 9, No. 2, pp.141–156.
- Sanchez-Famoso, V., Iturralde, T. and Maseda, A. (2015) 'The influence of family and non-family social capital on firm innovation: exploring the role of family ownership', *European Journal of International Management*, Vol. 9, No. 2, pp.240–262.
- Sarasvathy, S.D. (2001) 'Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency', *Academy of Management Review*, Vol. 26, No. 2, pp.243–263.
- Schleinkofer, M. and Schmude, J. (2013) 'Determining factors in founding university spin-offs', *International Journal of Entrepreneurship and Small Business*, Vol. 18, No. 4, pp.400–427.
- Semrau, T. and Werner, A. (2014) 'How exactly do network relationships pay off? The effects of network size and relationship quality on access to start-up resources', *Entrepreneurship: Theory & Practice*, Vol. 38, No. 3, pp.501–525.
- Sequeira, J., Mueller, S.L. and McGee, J.E. (2007) 'The influence of social ties and self-efficacy in forming entrepreneurial intentions and motivating nascent behavior', *Journal of Developmental Entrepreneurship*, Vol. 12, No. 3, pp.275–293.
- Shane, S. (2000) 'Prior knowledge and the discovery of entrepreneurial opportunities', *Organization Science*, Vol. 11, No. 4, pp.448–469.
- Shane, S. and Delmar, F. (2004) 'Planning for the market: business planning before marketing and the continuation of organizing efforts', *Journal of Business Venturing*, Vol. 19, No. 6, pp.767–785.
- Shane, S. and Venkataraman, S. (2000) 'The promise of entrepreneurship as a field of research', *Academy of Management Review*, Vol. 25, No. 1, pp.217–226.
- Sieger, P., Fueglistaller, U. and Zellweger, T. (2014) *Student Entrepreneurship across the Globe: A Look at Intentions and Activities*, Swiss Research Institute of Small Business and Entrepreneurship at the University of St. Gallen (KMU-HSG), St. Gallen.

- Solomon, G.T., Duffy, S. and Tarabishy, A. (2002) 'The state of entrepreneurship education in the United States: a nationwide survey and analysis', *International Journal of Entrepreneurship Education*, Vol. 1, No. 1, pp.1–22.
- Souitaris, V., Zerbini, S. and Al-Laham, A. (2007) 'Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources', *Journal of Business Venturing*, Vol. 22, No. 4, pp.566–591.
- Stam, E., Thurik, R. and van der Zwan, P. (2010) 'Entrepreneurial exit in real and imagined markets', *Industrial & Corporate Change*, Vol. 19, No. 4, pp.1109–1139.
- Steier, L. (2007) 'New venture creation and organization: a familial sub-narrative', *Journal of Business Research*, Vol. 60, No. 10, pp.1099–1107.
- Stevenson, H.H. and Jarillo, J.C. (1990) 'A paradigm of entrepreneurship: entrepreneurial management', *Strategic Management Journal*, Vol. 11, No. 4, pp.17–27.
- Stuart, T. and Sorenson, O. (2003) 'The geography of opportunity: spatial heterogeneity in founding rates and the performance of biotechnology firms', *Research Policy*, Vol. 32, pp.229–253.
- Stuetzer, M., Obschonka, M. and Schmitt-Rodermund, E. (2013) 'Balanced skills among nascent entrepreneurs', *Small Business Economics*, Vol. 41, No. 1, pp.93–114.
- Tan, T-M., Tan, W-L. and Young, J.L. (2000) 'Entrepreneurial infrastructure in Singapore: developing a model and mapping participation', *Journal of Entrepreneurship*, Vol. 9, No. 1, pp.1–33.
- Toledano, N. and Urbano, D. (2008) 'Promoting entrepreneurial mindsets at universities: a case study in the South of Spain', *European Journal of International Management*, Vol. 2, No. 4, pp.382–399.
- van der Zwan, P., Thurik, R. and Grilo, I. (2010) 'The entrepreneurial ladder and its determinants', *Applied Economics*, Vol. 42, Nos. 16–18, pp.2183–2191.
- Volery, T., Müller, S., Oser, F., Naepflin, C. and Rey, N. (2013) 'The impact of entrepreneurship education on human capital at upper-secondary level', *Journal of Small Business Management*, Vol. 51, No. 3, pp.429–446.
- WEF (World Economic Forum) (2014) *Entrepreneurial Ecosystems around the Globe and Early-Stage Company Growth Dynamics*, World Economic Forum, Geneva, Switzerland.
- Welter, F. and Smallbone, D. (2011) 'Institutional perspectives on entrepreneurial behavior in challenging environments', *Journal of Small Business Management*, Vol. 49, No. 1, pp.107–125.
- Werner, A. (2007) *Entrepreneurial Signaling*, Rainer Hampp, Munich and Mering.
- Witt, P. (2004) 'Entrepreneurs' networks and the success of start-ups', *Entrepreneurship and Regional Development*, Vol. 16, No. 5, pp.391–341.
- Zhao, H., Seibert, S.E. and Hills, G.E. (2005) 'The mediating role of self-efficacy in the development of entrepreneurial intentions', *Journal of Applied Psychology*, Vol. 90, No. 6, pp.1265–1272.
- Zimmerman, M.A. and Zeitz, G.J. (2002) 'Beyond survival: achieving new venture growth by building legitimacy', *Academy of Management Review*, Vol. 27, No. 3, pp.414–431.

Notes

- 1 GUESSS participants: Argentina, Austria, Belgium, Brazil, Chile, China, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Japan, Liechtenstein, Luxembourg, Mexico, Netherlands, Pakistan, Portugal, Romania, Russia, Singapore, South Africa, Switzerland, UK.
- 2 Greece was excluded from our final sample because the number of responses was not enough to meet these requirements.