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## ENTRY LEARNING, AGE AT INTERNATIONALIZATION, AND FOREIGN-VENTURE PERFORMANCE OF YOUNG TECHNOLOGY FIRMS\*\*

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### ABSTRACT

The central question that we address is how young technology firms (YTFs) learn about foreign markets when they venture abroad for the very first time. Drawing on learning theory, we develop and test a model for the entry learning and foreign-venture performance of YTF. Our empirical results show that prior foreign market analysis leads firms to postpone the first internationalization, but network learning and imitation lead to earlier international venturing. Further, our results show that the earlier technology firms venture into foreign markets, the higher the foreign-venture performance of the firm.

JEL-Classification: F23, M13, M16.

Keywords: Age at Internationalization; Entry Learning; Foreign-venture Performance; Technology Firms.

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### 1 INTRODUCTION

Research on international entrepreneurship (IE) started in the early 1990s (e.g., Rennie (1993); Oviatt and McDougall (1994)). Over time, IE has grown to a mature and interdisciplinary research field. A large body of empirical evidence in IE research (e.g., Bruneel, Yli-Renko, and Clarysse (2010); Mudambi and Zahra (2007); Presutti, Boari, and Fratocchi, (2007)) focuses on knowledge-intensive firms that pursue an international strategy right from inception. Studies such as those by Sapienza, Autio, George, and Zahra (2006), and Autio, Sapienza, and Almeida (2000) show that such an early exposure to international markets is essential for the growth and survival of these YTF.

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However, an early foray into foreign markets also exposes such firms to particular challenges. When venturing into foreign markets for the very first time, young technology firms (YTFs) are unfamiliar with the foreign market environment and face “*liabilities of foreignness*” (Zaheer (1995)), which could endanger their growth ambitions and even firm survival (Sapienza et al. (2006)). Thus, to handle the liabilities of being foreign, YTFs need to learn about foreign market particularities before venturing abroad for the first time. Entry learning describes the mechanisms a firm uses to acquire the necessary foreign market knowledge before entering the foreign market. However, so far, most of the discussion in the international business and entrepreneurship field has focused on experiential learning once the internationalization process has been initiated (Bilkey and Tesar (1977); Cavusgil (1984); Forsgren and Johanson (1992); Johanson and Vahlne (1977); Johanson and Wiedersheim-Paul (1975)). Opportunities for entry learning have received less scientific attention. This lack of attention is surprising, because in their empirical study, Thornhill and Amit (2003) demonstrate the importance of learning for young firms. Analyzing data from 339 Canadian bankruptcies, Thornhill and Amit (2003) show empirically that failure among younger firms is primarily attributable to deficiencies in knowledge, and that failure in older firms is particularly attributable to an inability to adapt to environmental change. Given the importance of entry learning for YTFs and the lack of research in this area, in this study we address the following two fundamental research questions: How are YTF, which lack a stable resource endowment and international experience, able to learn about the foreign market conditions when venturing abroad for the very first time? How does venturing internationally early on influence the foreign-venture performance of YTF?

In addressing these questions, our aim is twofold. First, we develop a model to explore the foreign market entry learning of YTFs by drawing on learning theory (Levitt and March (1988); Schwens and Kabst (2009)). We examine theoretically and show empirically that the mechanisms applied when acquiring knowledge about the foreign market have different impacts on the age at internationalization. We find that using prior foreign market analysis as a mechanism to learn about the foreign market postpones the age at internationalization, and that network learning and imitation lead to earlier international venturing. Second, we show that earlier venturing abroad leads to higher foreign-venture performance of YTF.

Our paper makes two major contributions to the research field: First, we contribute to a better understanding of the entry learning of YTFs. So far, studies focus on the antecedents of learning effort (Sapienza, De Clercq, and Sandberg (2005)); on the antecedents of technological, market, and social learning (Yeoh (2004)); on the effect of early internationalization on technological learning (Zahra, Ireland, and Hitt (2000)); and on the impact of different types of learning on early internationalization opposed to late internationalization (Schwens and Kabst (2009)). Despite the importance of entry learning for young firms (Thornhill and Amit (2003)), there are very few papers that study the influence of different types of learning on age at internationalization. We also show that age at internationalization has foreign-venture performance implications for YTFs. Although prior research shows that a firm's age at internationalization has an influence on firm growth (Autio, Sapienza, and Almeida (2000)), there are not many studies examining the impact

of age at internationalization on foreign-venture performance. Thus, our work shows that “*the acquisition of local-market knowledge is critical for successful planning and implementation of entry*” (Pedersen and Petersen (2004, 104); Lord and Ranft (2000)).

The paper proceeds as follows. In Section 2 we introduce our theoretical framework, which is based on learning theory (Levitt and March (1988)), and derive our hypotheses. In Section 3 we present our methods and data and test our hypotheses on a data set of internationally operating German firms from four different technologies: nanotechnology, biotechnology, microsystems, and renewable energies ( $n = 248$ ). In Section 4 we discuss our results. In Section 5 we note the limitations of our study. In Section 6 we develop ideas for future research.

## 2 THEORY AND HYPOTHESES DEVELOPMENT

Firms that are entering foreign markets for the first time are usually at a disadvantage compared to companies that are already operating in the focal market (Pedersen and Petersen (2004)). This disadvantage is because the firms face liabilities of foreignness resulting from differences in legal, political, cultural, linguistic, and economic conditions between the firm’s domestic market and its international market (Johanson and Vahlne (1977)). Due to the liabilities of foreignness, YTFs are unable to transfer the knowledge they have gained from their operations in the domestic market to the international market.

Despite the risks of entering foreign markets, YTFs often internationalize early, even right after firm inception, which makes it possible for them to pursue various motives such as striving for business opportunities in niche markets (Bell, McNaughton, Young, and Crick (2003)); seeking growth opportunities in major markets (Ojala and Tyrväinen (2007)); or quickly amortizing initial R&D expenditures (Burgel and Murray (2000)). Thus, for YTFs, learning about the foreign market has particular importance, because YTFs are often characterized by scant resources and limited experience when they first go global, and they cannot easily compensate for errors made in the foreign market (Eriksson et al. (1997)).

Although most of the internationalization literature excludes the opportunities for entry learning and focuses on the firm’s learning after the internationalization process has started (e.g., Bruneel, Yli-Renko, and Clarysse (2010); Johanson and Vahlne (2009)), some studies argue that entry learning is both possible and important. Hence, Forsgren (2002) indicates that the obvious failure of some rapidly internationalizing firms demonstrates that entry learning is an important factor, one which might even determine firm survival. Casson (1994) also notes that it is hard to imagine what the foreign market idiosyncrasies are without conducting entry learning about that market’s environment. Thus, in line with Pedersen and Petersen (2004) and Schwens and Kabst (2009), we not only assume that entry learning is possible, but that it is essential for the success, and in some cases even for the survival, of YTFs. Therefore, firms must emphasize entry learning even if, or particularly when, they venture into foreign markets early in their life cycle.

To study YTFs' entry learning, we apply learning theory developed by Levitt and March (1988). Levitt and March (1988) differentiate between three different types of learning: own learning, which is the extent to which a firm conducts *prior foreign market analysis* through prior analysis of the foreign market situation and conditions; learning from the experience of others, which is the extent to which the firm uses *network learning* to gain prior knowledge about the foreign market before they enter it; and learning from paradigms of interpretation, which is the extent to which the firm learns by imitating other firms' routines that are perceived to be best practices in the focal market. These different types of learning might have different influences on the age of the firms at their first internationalization.

One way to learn, which learning theory points out, is own learning through, for instance, prior foreign market analysis. Through a planned approach to foreign market analysis (Root (1987)), firms are able to systematically become familiar with the host country and to learn about the market in that country (Schwens and Kabst (2011)). Accumulating own knowledge and information about foreign markets over time and combining new with existing knowledge enables firms to develop a solid resource base, thus easing the initial move from an established domestic market into an international one (Julien and Ramangalahy (2003)). However, prior foreign market analysis that includes searching for and noticing new information (Huber (1991)) can be a time-consuming process that does not necessarily forward an early entry into foreign markets. It takes time to collect the necessary information about the foreign market and to verify that the information identified is helpful. Therefore, we posit that prior foreign market analysis is more of a process of stepwise knowledge development, thus postponing the foreign market entry of technology firms. We hypothesize:

**H1:** *Prior foreign market analysis is positively related to age at internationalization.*

Levitt and March (1988) suggest that network learning constitutes another learning mechanism. Network learning facilitates tapping into the knowledge base of network partners that are operating in the foreign market, thus opening up the opportunity for acquiring knowledge that is already geared to the prerequisites of the foreign market. Knowledge of network partners might help technology firms to more quickly overcome the liabilities of foreignness a firm faces prior to its first internationalization. Access to networks provides learning opportunities about foreign markets without gaining own experiential knowledge (Kale, Singh, and Perlmutter (2000)).

YTFs, which are short on resources due to their firm age, very likely have a strong need to learn from network partners (Coviello (2006); Yli-Renko, Autio, and Sapienza (2001)). In addition, YTFs can also have a greater ability to learn from others. Less resistance within the company enables faster and better transfer of outside knowledge throughout the organization (Rosenkopf and Nerkar (2001)), allowing for an earlier and faster initial international venturing. This argumentation is supported by Forsgren (2002, 264), who states that "[m]arket-specific, tacit knowledge can be acquired through interaction with other organizations, which, in the context, also means that the prediction that internationalization is a slow process may not always hold true". There is a stream of research supporting the

argument that interorganizational learning in business relationships allows for acquiring even tacit knowledge from the different actors in the network (Greve and Salaff (2003); Ellis (2000); Anand and Khanna (2000); Andersson, Forsgren, and Pedersen (2001); Eriksson, Hohenthal, and Johanson (1998); Lane and Lubatkin (1998); Uzzi (1996)). Having acquired the necessary foreign market knowledge fast and efficiently from network partners allows for an earlier international venturing. Therefore, we argue:

**H2:** *Network learning is negatively related to age at internationalization.*

Levitt and March (1988) argue that another way YTFs can acquire knowledge about foreign market particularities is learning through imitation. Organizing their routines according to benchmark firms, YTFs can adapt organizational practices that fit the prerequisites of the host country environment (Levitt and March (1988); Aldrich (1999)). Imitation is helpful for technology firms' internationalization, because organizations not only have to be efficient, but must also be legitimated (Meyer and Rowan (1977); Scott (1987)). Legitimacy can be acquired by adopting structural elements that socially constructed environments regard as rational (Zucker (1987); DiMaggio and Powell (1991); Fligstein (1985); Haveman (1993); Kraatz (1998)). Thus, YTFs might imitate those organizations in the target market that they perceive to be successful. Through mimetic isomorphism, YTFs tend to become similar to those organizations, thus reducing the liabilities of being foreign and the risk of foreign market entry (Scott and Meyer (1992)).

Imitation increases both legitimacy and learning efficiency (Schwens and Kabst (2009)). Adapting "best practices" routines could allow firms to learn faster and also to acquire knowledge, rather than learning through, for instance, prior foreign market analysis. Best practices routines are directly catered to the prerequisites of the foreign market, which could reduce the amount of trial-and-error learning. YTFs do not have to develop routines on their own in a time-consuming process, but can instead rely on established routines of perceived best practices. Thus, we hypothesize:

**H3:** *Imitation is negatively related to age at internationalization.*

In addition to elaborating the entry learning behavior, we examine the imprinting effects of age at internationalization on foreign-venture performance. We base our arguments on two interrelated rationales. First, according to Hannan and Freeman (1984) and Hannan, Laszlo, and Carroll (2002), as a firm ages, the more it faces *organizational inertia*, which hampers the internal knowledge transfer process. Second, according to Autio, Sapienza, and Almeida (2000) and Sapienza et al. (2006), younger firms have some *learning advantages of newness* over older firms with more established routines.

The older a firm is at the timing of internationalization, the more likely it is to have established a profound resource stock generated from years of its business activities. When a firm enters foreign markets for the first time, new knowledge about those foreign markets needs to be integrated into the existing knowledge base. This can be a challenging process the older the firm is at its internationalization. Long-standing operational routines that the firm has used on the domestic market might not fit the needs of the international market.

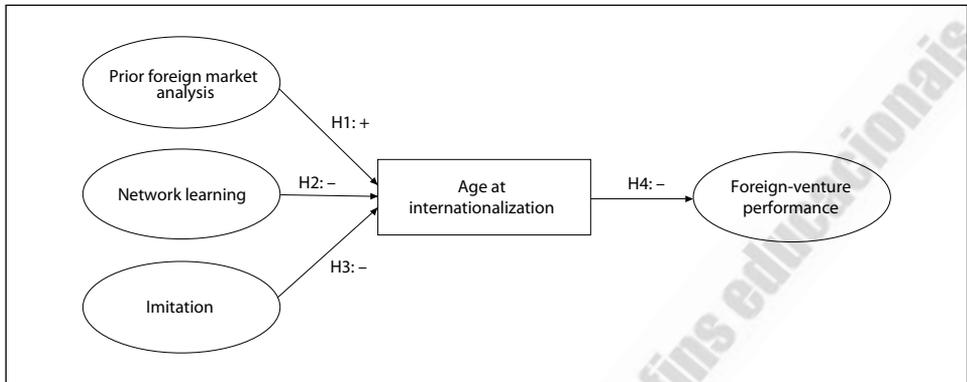
Some parts of the organization might resist or be unable to easily adapt existing routines to the new requirements of the foreign market (Sapienza et al. (2006)). The ability to identify new knowledge, select valuable information, and assimilate it to the organization might be blocked “[...] by impermeable organizational boundaries” (Aldrich (1999, 31)). Older organizations might have become more rigid and narrow, in their perceptions (Vermeulen and Barkema (2001)), and thus might be characterized by organizational inertia (Hannan and Freeman (1984); Hannan, Laszlo, and Carroll (2002)). The firm finds itself in a competency trap (Levitt and March (1988)). “*A competency trap can occur when favourable performance [...] leads an organization to accumulate more experience with it, thus keeping experience with a superior procedure inadequate to make it rewarding use*” (Levitt and March (1988, 322)). A competency trap might hamper the efficient growth and foreign-venture performance of the firm when it first enters the international market (Cohen and Levinthal (1990)).

Younger firms, on the contrary, possess learning advantages of newness (Autio, Sapienza, and Almeida (2000); Sapienza et al. (2006)). An entrepreneurial company does not need to unlearn established routines. When it enters foreign markets for the first time, the firm is exposed to new routines, values, and knowledge. When interfacing with their new environment, younger firms are better able to identify, value, select, and assimilate new knowledge that explicitly addresses the prerequisites of the foreign market. Younger firms are less hampered to observe and implement the necessary information for market entry and are faster able to fit the prerequisites of the new institutional environment (Cohen and Levinthal (1990, 131); Zahra and George (2002)). Younger firms “[...] are usually more flexible and better able to transfer outside knowledge throughout the organization since there is less internal resistance” (Gopalakrishnan and Bierly (2006, 6); Rosenkopf and Nerkar (2001)). Thus, the earlier a YTF internationalizes for the first time, the more learning advantages it possesses increasing the performance of the firm.

Arguing based on organizational inertia compared to learning advantages of newness, it is important to note that older firms compared to young firms are usually more stable in their resource endowment which may cause them to have a higher absorptive capacity (Zahra and George (2002)). These advantages may pay off in the course of further internationalization activities of the firm and in the subsequent growth process of YTFs. However, our focus here is on the entry learning and the timing of first internationalization. We argue that the learning advantages of newness allow younger internationalizers to compensate and even to outweigh some of the disadvantages of scant resources and lack of industry experience, as well as a lack of experience in the workforce. This gives YTFs the ability to internationalize earlier and puts them in a more competitive position leading to a more successful internationalization. Hypothesis 4 summarizes our argument:

**H4:** *Age at first internationalization is negatively related to the foreign-venture performance of YTF*

*Figure 1* illustrates our theoretical argument and clarifies our research model and its underlying hypotheses.

**Figure 1: Research model**

### 3 METHODS

#### 3.1 DATA

To test our hypotheses we use a data set of German technology firms. To include a reasonable number of YTFs with a high degree of internationalization, we searched for technology populations that fit these prerequisites. We have firms from four different technology areas: nanotechnology, biotechnology, microsystems, and renewable energy. Our sample comprises firms that are 20 years old or younger, which is in line with previous research (Burgel et al. (2004); Schwens and Kabst (2011)). Focusing on young firms rather than new firms, which are often defined as firms not more than seven years old (e.g., Zahra, Ireland, and Hitt (2000)), is of particular importance in our paper, because it enables us to examine the effect of different learning mechanisms on the age of the firm at internationalization. Moreover, *“the European context of our empirical study necessitates a higher age limit than is typical in U.S. based entrepreneurship studies. Early-stage [...] funding is not as readily available in Europe as in the U.S. [...] and young firms have limited opportunities to go public”* (Bruneel, Yli-Renko, and Clarysse (2010, 170)).

We began collecting data in 2006 and finished in 2007. To increase validity of our data, we collected data from multiple sources. In cooperation with experts from the Association of German Engineers (VDI) (for the populations of nanotechnology, biotechnology, and microsystems) and industry experts from the German Energy Agency (for the renewable energy population), we identified a sample with a total number of 1,944 relevant firms. Our sampling includes the total populations of the firms from the four technology areas. 15.6% of the 1,944 firms are in nanotechnology ( $N = 305$ ), 27.1% are biotechnology firms ( $N = 526$ ), 15% are in microsystems, ( $N = 292$ ), and 42.2% are renewable energy firms ( $N = 821$ ). To gather secondary information about these firms, we searched the Creditreform Markus database and Hoppenstedt database, and checked each firm's website (Cloninger and Oviatt (2007)) for such information as the year the company was founded

or the number of employees of each of the firms. We also held 12 informational interviews with CEOs from three firms from each technology area as input for our questionnaire construction. Afterwards, we tested our questionnaire on another 12 representative firms (again, three firms from each technology area) prior to the survey.

The questionnaire-based survey took place in 2007. We sent 1,944 questionnaires to CEOs, export managers, and firm owners, since they are likely to have the most profound knowledge about the firm's internationalization practices and strategic decisions. We received 335 questionnaires back, representing a response rate of about 17.2%. Of the 335 questionnaires, 57 came from nanotechnology firms (17%), 91 from biotechnology firms (27.2%), 56 from microsystems firms (16.7%), and 131 from renewable energy firms (39.1%). Of the 335 firms,  $N = 248$  firms have international activities and  $N = 87$  firms focus solely on their domestic market. This translates into a percentage of 74% of firms that have an international presence and 26% that are purely domestic, which is consistent with the secondary data that we collected prior to the questionnaire-based survey. Because our research question elaborates on entry learning perspectives and foreign-venture performance, we exclude domestic firms from our empirical analysis. Therefore,  $n = 248$  enters our analyses. The average firm age of the companies in our sample is 9.13 years and the average age at first internationalization is 3.4 years.

To test for non response bias, we follow Armstrong and Overton (1977), examining differences between early and late respondents in terms of the variables prior foreign market analysis, network learning, and imitation. A  $t$ -test shows no significant differences for all variables. Thus, our results do not indicate problems of non-response bias. Moreover, we use the secondary data we collected prior to the survey and conducted Kolmogorov-Smirnov sample tests as suggested by Siegel and Castellan (1988) to assess possible differences between the responding firms and the firms in our sample. Our responding firms were not significantly different from non respondents in either size (number of employees) or age (number of years since company foundation).

When we asked for the entry learning at first internationalization, we applied a retrospective recall in our survey. The obvious disadvantages of this method merit further comments. In organizational research, retrospective reports have been used extensively to study strategic decision making processes (Bourgeois and Eisenhardt (1988); Mintzberg, Raisinghani, and Theoret (1976)). "*The primary problem is that key informants may not be able to accurately recall the past*". As Golden (1992), Huber and Power (1985), Wolfe and Jackson (1987), and many researchers have suggested, "*inaccurate recall in retrospective reporting can result from inappropriate rationalizations, oversimplifications, faulty post hoc attributions, and simple lapses of memory*" (Miller, Cardinal, and Glick (1997, 189)). Due to the age of some of the companies asking for information about learning and internationalization activities from the firms in our data set could be a problem. However, descriptive statistics (mean is ten years, modus is three years) indicate that the majority of the technology firms in our sample conducted their internationalization activities in the last couple of years. Further, most of the firms in our sample are owner-managed and family businesses. In family businesses, strategic decisions such as the internationalization of the firm are often determined by the owner and/or founder of the firm. This might

significantly reduce the risk of informant fallibility (Golden (1992); Miller, Cardinal, and Glick (1997)), and could lead to higher retrospective accuracy of our data.

### 3.2 MEASUREMENT

We adapt the variables in our model from established scales in the entrepreneurship, international business, and management literature. Whenever possible, we use multiple-item measurements to minimize measurement error and to enhance the content coverage for the constructs in our model. We measure statement-style items on 5-point Likert-scales.

We measure foreign-venture performance by using a three-item scale (Cronbach's  $\alpha = 0.886$ ) from Yli-Renko, Autio, and Tontti (2002). We ask about the extent to which the firm conducted analysis of the foreign market prior to foreign market entry (1 = low extent to 5 = high extent). We select overall success, sales growth, and market share from Brouthers and Nakos' (2004) performance scales. These criteria have also been used in other studies, particularly those on export performance (Madsen (1998); Cavusgil and Zou (1994)). In line with Madsen (1998) we query respondents if the firm's goals for the overall success, sales growth, and market share have been achieved for the firm's first foreign-venture. We opt for subjective performance measurement, since for YTFs objective measures are not only hard to capture, but may be misleading as well. In early years after firm inception, the establishment of a unique technology and know-how instead of making profits may be the primary aim of technology firms. However, this particularity is not captured by the traditional objective performance measures.

We measure network learning with two items adapted from Burgel and Murray (2000); Ellis and Pecotich (2001), asking about the extent (1 = low extent to 5 = high extent) to which the firm learned from network partners prior to first internationalization (Cronbach's  $\alpha = 0.759$ ).

We measure imitation by using a three-item scale adapted from Haunschild (1993). We asked respondents to tell us to what extent (1 = low extent to 5 = high extent) the firm observed the actions of firms that were perceived as using best practices in the foreign market (Cronbach's  $\alpha = 0.795$ ).

We measure age at internationalization by subtracting the year of foundation of the firm from the year in which the firm entered the first foreign market (Autio, Sapienza, and Almeida (2000)).

We use different control variables in our analyses. First, because the foreign-venture performance of the firm may be affected by the number of years the firm operates in the foreign market, we control for this issue. We include the number of years the firm operates in the foreign market in our model. We measure this variable by subtracting the year in which the firm internationalized for the first time from the year of data collection (2007). Second, we use firm size at the time of the first internationalization of the firm. Firm size is often regarded as a proxy for the resources available to the firm, which is a critical

issue when studying the internationalization of young firms. We measure firm size by the number of employees at the time of first internationalization. Third, we control for the extent of R&D activities conducted by the firm at the time of its first internationalization. Since internationalization always carries an increased risk that a firm's proprietary knowledge will fall into the hands of international competitors, this may significantly impact the firm's first internationalization decision. We measure the extent of R&D activities conducted by the firm by the percentage of R&D expenses to total revenues at the time the firm first internationalizes. Fourth, we control for the extent of perceived political, legal, or cultural risks in the host country, which can significantly influence the internationalization decision of a young firm (Schwens, Eiche, and Kabst (2011)). We measure such institutional uncertainty by asking about the extent to which the firm understands the cultural, legal, and political risks in the host country (Likert scale ranging from 1 = low risk to 5 = high risk).

#### 4 RESULTS

We test our hypotheses by using structural equation modeling. To estimate our model, we apply a two-step approach consistent with common structural equation modeling literature (Anderson and Gerbing (1988)). First, we estimate the measurement model by using confirmatory factor analysis. By doing so we can test the reliability and validity of the constructs. Our second step is to test the hypothesized relations between the constructs.

*Table 1* shows the means, standard deviations, and bivariate correlations between the independent, dependent, and control variables. Looking at the bivariate correlations, all correlations stay below 0.7. Thus, we find no serious risk of multicollinearity between the independent, dependent, and control variables. Further, we calculate the variance inflation factor (VIF) values to test for how much the values of the coefficients are increased because of collinearity. Our analyses for the relevant variables show several VIF values with the highest value of 1.5. Since all values are below 2.5 we find no risk of multicollinearity (Allison (1999)).

**Table 1: Means, standard deviations, and bivariate correlations**

Variable	mean	s.d.	1	2	3	4	5	6	7	8
1 Foreign-venture performance	3.28	1.07	1							
2 Prior foreign market analysis	2.53	1.16	0.245**	1						
3 Network learning	3.27	1.23	0.246**	0.257**	1					
4 Imitation	2.77	1.06	0.300**	0.508**	0.346**	1				
5 Age at internationalization	3.40	4.17	-0.093	0.043	-0.177	-0.163*	1			
6 # years in the foreign market	7.89	7.32	0.056	-0.131	-0.064	-0.189**	0.201**	1		
7 Firm size	15.39	24.43	0.148*	0.095	0.007	0.009	0.107	0.149	1	
8 R&D activities	34.74	124.87	-0.053	-0.037	-0.157*	-0.074	-0.044	-0.036	-0.042	1
9 Institutional uncertainty	2.67	1.18	0.117	0.177	-0.019	-0.009	0.190**	-0.017	0.156*	-0.078

mean = mean value; s.d. = standard deviation; Significance levels: \*\*\*  $\leq .001$ ; \*\*  $\leq .01$ ; \*  $\leq .05$ .

The measures of our constructs are self-reported and collected from the same source, so there could be a problem with common method bias. Following Podsakoff and Organ (1986), we use the Harman's one-factor test to assess the influence of common method bias. Our principal component factor analysis, which is based on the nine variables in our model, shows four factors with an eigenvalue above one. These four factors account for 63.4% of the total variance (first factor: 22.9%; second factor: 15.2%; third factor: 14.1%; fourth factor: 11.2%). This result indicates that the data do not suffer from common method variance. A substantial amount of common method variance is present, either when a single factor emerges from the factor analysis, or if one general factor accounts for the majority of the covariance among the variables (Podsakoff and Organ (1986); Podsakoff et al. (2003)).

Table 2 summarizes the latent constructs, their measurement items, the estimated values, and the reliability of the items. All standardized factor loadings are above 0.7. Cronbach's alpha values are all above 0.75, which indicates good internal consistency and thus the reliability in all of the constructs.

**Table 2: Factors, measurement, estimate values, and reliability**

Factor name	Measurement item	Estimate	Cronbach's $\alpha$
Prior foreign market analysis	■ Conducted analysis of the foreign market situation prior to foreign market entry	0.924	0.887
	■ Conducted site analysis of the foreign market prior to foreign market entry	0.870	
	■ Conducted information analysis of the foreign market prior to foreign market entry	0.767	
Network learning	■ Learned from cooperation partners prior to foreign market entry	0.738	0.759
	■ Learned from customers prior to foreign market entry	0.829	
Imitation	■ Tracked competitors' actions in the foreign market prior to foreign market entry	0.771	0.795
	■ Analyzed competitors' brands and products prior to foreign market entry	0.776	
	■ Oriented towards best practices in the foreign market prior to foreign market entry	0.700	
Age at internationalization	Year of first internationalization – year of firm foundation		
foreign-venture performance	■ Goals for the overall success of the foreign market achieved	0.809	0.893
	■ Goals for sales growth of the foreign market achieved	0.930	
	■ Goals for market share of the foreign market achieved	0.840	

#### 4.1 MEASUREMENT MODEL

Before we test the final structural model we estimate the measurement model. The measurement model has a chi-square of 52.172 ( $df = 45$ ;  $p < 0.001$ ) and the results show good model fit. The Tucker Lewis Index (TLI), which researchers view as robust to sampling characteristics, is 0.989, suggesting a good model fit. The comparative fit index (CFI), comparing the target model with the null model, is also above 0.95 (0.994). According to Hu and Bentler (1999), a  $CFI > 0.95$  shows a good model fit. The incremental fit index (IFI) also shows a good model fit, with a value of 0.994 (Bollen (1989)). The root mean square error of approximation (RMSEA), which shows whether the model is a good approximation of the population model, has a value of 0.025. According to Hu and Bentler (1999), RMSEA values  $< 0.06$  suggest a good model fit. Thus, according to all the fit indexes, the measurement model shows a good model fit.

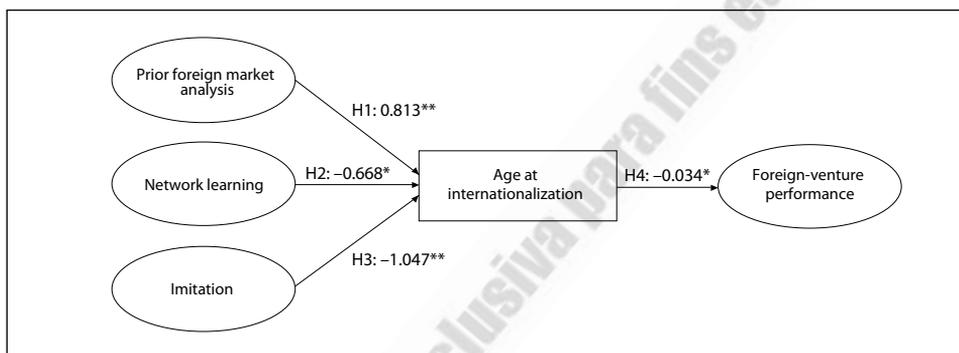
The measurement model can be used to evaluate discriminant validity, which is essential in research when using multiple items and latent constructs. Constructs demonstrate discriminant validity if the variance extracted for each is higher than the squared correlation

between the constructs (Fornell and Larcker (1981)). We examine each pair of constructs in our measurement model and find that all demonstrate discriminant validity.

#### 4.2 FINAL STRUCTURAL EQUATION MODEL

Here, we test the final structural model as hypothesized. *Figure 2* illustrates the results of the unstandardized coefficients.

**Figure 2: Final model**



This is a simplified version of the actual model. It does not show error terms, control variables, or the indicator variables of the latent constructs. An exogenous unobserved error variable was attached to each of the endogenous variables to account for the variance not explained by the observed exogenous variables. The error coefficients were fixed to unity to enable model identification. Number of years the firm operates in the foreign market, firm size at first internationalization, R&D activities, and institutional uncertainty were included as control variables. Path coefficients are standardized maximum likelihood parameter estimates. Latent variables are represented by ovals, the observed variable by a rectangle. The drawn through lines show the direct effects between the different constructs.

**Table 3: Final Structural Equation Model Fit Indices (N = 248)**

Chi-square	Degrees of freedom	CMIN/DF	TLI	IFI	CFI	RMSEA	P
174.072	102	1.707	0.921	0.945	0.943	0.053	0.000

*Table 3* shows the fit indexes of our final (hypothesized) structural equation model. The proposed model has a good model fit, as evidenced by the fit indexes. The Tucker Lewis index (TLI) is 0.921. The comparative fit index (CFI) is close to 0.95 (0.943). The incre-

mental fit index (IFI) shows good model fit with a value of 0.945 (Bollen (1989)). The root mean square error of approximation (RMSEA) has a value of 0.053. The final structural equation model has a chi-square of 170.072 ( $df = 102$ ). Thus, according to all fit indexes the model shows a good model fit, suggesting high consistency.

**Table 4: Path coefficients and tested hypotheses**

Relationship	Hypothesis	Coefficient unstandardized
Prior foreign market analysis → Age at internationalization	H1	0.813**
Network learning → Age at internationalization	H2	-0.668*
Imitation → Age at internationalization	H3	-1.047**
Age at internationalization → foreign-venture performance	H4	-0.034*
# of years firm operates in the market → foreign-venture performance	Control	0.007
Firm size (at first internationalization) → foreign-venture performance	Control	0.005†
R&D activities → foreign-venture performance	Control	0.000
Institutional uncertainty → foreign-venture performance	Control	0.084

Significance levels: \*\*\*  $\leq .001$ ; \*\*  $\leq .01$ ; \*  $\leq .05$ ; †  $\leq .1$ .

Table 4 includes the path coefficients of the final structural equation model. The unstandardized path coefficients indicate significant relations among the different constructs. Prior foreign market analysis is significantly and positively related to age at internationalization, thus supporting Hypothesis 1. Network learning and imitation are significantly and negatively related to age at internationalization, thus supporting Hypotheses 2 and 3. The negative and significant relation between age at internationalization and foreign-venture performance supports Hypothesis 4. Except for firm size, which significantly and positively influences foreign-venture performance, we do not find a significant relation for any control variable.

## 5 DISCUSSION

Our research results support the hypotheses derived from our theoretical framework. Our findings illustrate that prior foreign market analysis is positively related to age at internationalization. Acquiring sufficient knowledge about the particularities of the foreign market through prior foreign market analysis is a time-consuming process, and one which postpones the initial internationalization action.

Some earlier research has shown that a systematic approach to internationalization is important in the internationalization of young, small firms (e.g., Schwens and Kabst (2011); Yip, Biscarri, and Monti (2000)). Our study findings add to this research by showing that although prior foreign market analysis is a valuable mechanism that young firms can use to learn about the foreign market, it does not forward the early and rapid internationalization of the firm. To choose the right source of knowledge acquisition, YTFs have to be aware of their strategic approach to internationalization. The sources of learning can significantly determine whether the firm chooses a traditional or a rapid “born-global” approach to internationalizing (Chetty and Campbell-Hunt (2004)). Future strategy research in the area of IE may want to take these findings into consideration.

Moreover, our results indicate that network learning and imitation are negatively related to the age of the firm at the time it goes global. This finding can be compared to previous studies, which already emphasize the importance of networks (e.g., Coviello (2006); Yli-Renko, Autio, and Sapienza (2001)) and imitation (e.g., Forsgren (2002); Schwens and Kabst (2009)) in the field of IE. We add to these studies, by demonstrating that the two mechanisms significantly influence the speed at which a YTF can acquire the knowledge that makes possible an earlier venturing into the foreign market. This aspect has been largely neglected in earlier research, but it is of major importance for YTFs, which often start international activities right from the time they are founded. Network learning and imitation are negatively related to the age at internationalization. Thus, we show that these two types of learning allow for a fast acquisition of knowledge, leading to an earlier venturing into foreign markets.

Because our results suggest that the age at internationalization influences the foreign-venture performance of the firm, we offer normative implications with our research. This finding is critical, because it shows that in addition to increasing international firm growth, as shown by Autio, Sapienza, and Almeida (2000), the firms’ performance is also influenced by the speed of firm internationalization. Firms that enter foreign markets earlier in their life cycle have learning advantages over older firms that might be suffering from organizational inertia. Younger firms are better able to assimilate into their organizational routines the knowledge they gain in the new environment, and seem to be better able to use this knowledge for commercial ends in the foreign market (Cohen and Levinthal (1990)). Thus, fast, proactive international entry is not only a particular internationalization strategy compared to more incremental internationalization patterns, but also has some clear foreign-venture performance implications.

Since the foreign-venture performance of the firm could be an effect of the number of years the firm operates in the foreign market rather than of the age at internationalization, we control for this issue. The longer a firm is in the market, the more familiar it is likely to be with the market’s rules, norms, values, and idiosyncrasies, leading to a better foreign-venture performance. However, the number of years the firm operates in the foreign market does not have any foreign-venture performance implications in our model. Although this finding is surprising, a reason could be that the firms in our sample are quite successful right from the beginning of their internationalization activities. Most of our firms operate in niche markets with highly knowledge-intensive products. They have

looked for growth opportunities from early on (Bell et al. (2003)). Further, they mostly have to amortize high initial R&D expenditures which forces them to quickly generate sufficient revenues. If the firm is unable to achieve fast early success in the market, then it might quickly leave the market. This case could be a reason for the missing significant relation between the number of years the firm operates in the market and its foreign-venture performance.

We find that firm size has a significant influence on foreign-venture performance. This finding is in line with earlier studies such as that by Johanson and Vahlne (1977). Firms with a stable resource base are better able to deal with the liabilities of being foreigners, thus increasing their foreign-venture performance. Moreover, larger firms have been shown to possess greater absorptive capacity, which makes it possible for them to more efficiently identify, value, select, and assimilate new knowledge with existing knowledge (Cohen and Levinthal (1990); Zahra and George (2002)). This capability increases the firm's learning and the subsequent foreign-venture performance.

We do not find a significant relation between R&D activities at the time of first internationalization and foreign-venture performance. A reason for this lacuna might be that R&D intensity does not influence the performance directly. R&D activities indirectly reflect the firm's strategic approach, which influences the growth and internationalization strategy of the firm and thus impacts foreign-venture performance (Burgel and Murray (2000)). However, our study cannot resolve this issue. Future research might more deeply investigate how R&D, firm strategy, and foreign-venture performance relate to one another.

The institutional uncertainty that YTFs perceive in the host country is not related to the firms' foreign-venture performance. Apparently, the firms in our sample are able to quickly react to the challenges arising from the host country institutional context. Further, the mechanisms they apply – for instance, their learning behavior from network partners – to some extent allows them to deal with the foreign market environment.

## 6 LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Although learning plays a pivotal role in the seminal work by Oviatt and McDougall (1994) and in the internationalization process theories (Johanson and Vahlne (1977; 1990; 2009)), there are very few empirical studies that examine aspects of learning in the field of YTFs venturing abroad. Our paper addresses this deficit by examining the entry learning of YTFs and the foreign-venture performance implications.

Our paper makes several contributions to the research field. First, we address how entry learning of technology firms unfolds. Whereas the state of knowledge on learning and internationalization of technology firms is limited per se, we address a particular gap on the entry learning. So far, most studies excluded or did not pay particular attention to entry learning. We try to make a contribution to overcome this deficit and to increase knowledge on how entry learning unfolds. Further, we show that entry learning feeds

forward into foreign-venture performance. The earlier a firm ventures abroad, the more successful the technology firm is in the foreign market. However, an early venturing is only possible when firms apply network learning and imitation.

However, there are limitations to our study. First, because we conceptualize prior foreign market analysis, network learning, and imitation as discrete mechanisms of learning, other research might question if the different types of learning shall be considered more complementary. It may be that a firm imitates foreign market best practices and learns from customers in the foreign market. Our assumption here is that the different types of learning have different implications for the age at internationalization. Forsgren (2002) supports that there might be just such a learning pattern for rapid internationalization. He contends (2002, 271) “[...] *that the perceived risk [of venturing abroad] can be affected through other means than own experience. These ‘shortcuts’ to lower perceived risk include ‘grafting’ the experience of others into the firm, [...] and imitating firms that for some reason are considered to be market leaders*” (Björkman (1996)). “[...] *The important point here is that the firm will approach the foreign markets more rapidly and maybe in another pattern than is predicted by the Uppsala Model*” (Forsgren (2002, 271)). However, future research may want to pay particular attention to the interactive effects of different learning mechanisms. The work by Bruneel, Yli-Renko, and Clarysse (2010) is a first laudable step in this direction.

Second, our work focuses explicitly on YTFs’ entry learning. Although this may be a valuable contribution to the literature, it is a limitation of our paper as well. Internationalization is a process, one which does not end when the firm first enters the foreign market. We cannot answer how entry learning behavior affects subsequent internationalization decisions, nor can we answer questions pertaining to the internationalization process as a whole. For instance, Davidson (1980) conceptually analyzes how earlier corporate experience influences location decisions when a firm goes global. The study may be a good starting point to examine how earlier internationalization decisions and actions influence subsequent growth patterns of the firm. In particular it might be interesting to find out in how far earlier knowledge is beneficial for subsequent internationalization, or if this knowledge could even be misapplied. Haleblan and Finkelstein (1999) argue that experience from previous internationalization can be generalized and falsely applied, and thus negatively impact the firm’s foreign market venturing. An in-depth analysis of the internationalization process in light of these issues would be a valuable addition to current research. Powerful longitudinal data are necessary to achieve further insights on empirical data.

Third, and related to the previous issue, we cannot fully resolve the relation between learning advantages of newness and the absorptive capacity that increases with larger firm size. We hypothesize that YTFs possess some learning advantages inherent in newness, compared to older firms that, due to their size and age, have become more inert. We are not able to explain how the learning advantages of newness develop over time in growing firms. This would be a critical aspect for future research. Moreover, where do YTFs, which are limited in their resources and experience, find the absorptive capacity that enables them to grow, survive, and become successful (Zahra (2005)). Because our research focuses on entry learning, we can only contribute to resolving the tension between the two

concepts of absorptive capacity and the learning advantages of newness by demonstrating empirically that when a YTF first internationalizes, the learning advantages of newness outweigh the stronger resources of older firms. This is a clear limitation, but also offers promising avenues for future research. Scholars may be encouraged to examine and resolve the relations both conceptually and empirically by applying longitudinal data about the internationalization process over time.

Fourth, although we find that a firm's age at internationalization influences its foreign-venture performance, we do not claim to be exhaustive. Instead, we argue that other factors that are not included in our paper may have particular influence on the foreign-venture performance of YTFs. Many studies investigate the determinants of early internationalization (for reviews see, e.g., Keupp and Gassmann (2009)). Future research might study these factors' influence on the foreign-venture performance. Our study can make only a marginal contribution in this regard. For future research it is important to go deeper into this topic and to base the concepts and variables on strong theoretical foundations. Moreover, studying the role of human resources and the international staffing of YTFs might be important in this regard. There are very few studies that investigate the impact of a firm's human capital on foreign-venture performance. One of the few studies available is that by Isidor, Schwens, and Kabst (2011), who study the influence of international experience, networks, and knowledge intensity on the international staffing of early (opposed to late) internationalizers. Future research may want to build on this work and emphasize the role of the human capital in the internationalization of YTFs.

Fifth, our study is limited to YTFs. Thus, we cannot generalize to other technologies or industries. Due to the high degree of knowledge intensity of the firms in our sample, it may be that the effects are strongest for technology firms, which need to internationalize from early on if they want to realize economies of scale, amortize R&D investments, and serve niche markets worldwide. Future studies might examine whether our reasoning holds true for other industries and technologies as well (Andersson (2004); Fernhaber, McDougall, and Oviatt (2007)). Broadening the empirical context might increase variance explanation of the dependent constructs and might further differentiate the learning mechanisms utilized by different types of firms. To examine the reach of our framework and empirical results, future research could look at low-technology firms, established SMEs, or large MNEs, to name typical populations not covered by our study.

Sixth, although the focus of this paper is more on the types of learning and how this is related to the age at internationalization, future research might examine the content of learning, thus answering the question of what a firm learns at which stage of the internationalization process. We apply retrospective data to identify how the learning at the timing of first internationalization impacts the firm's foreign-venture performance. Although our results are clear and explicit, real longitudinal data would definitely make the results more powerful. This is a clear limitation of our study and an implication for future research.

Seventh, although our study shows that age at internationalization is negatively related to foreign-venture performance, we have a survival bias in our data. We do not know about the learning behavior of the technology firms that have not survived the internationaliza-

tion process. Thus, we still know very little about how age at internationalization impacts the survival of a firm. Sapienza et al. (2006) have made a first conceptual attempt to research this area, and Mudambi and Zahra (2007) have provided first empirical evidence. However, many more studies are needed in this area to achieve a deeper understanding about the relation between early and rapid internationalization and firm survival.

Eighth, our paper has an explicit focus on the question of “when to enter a foreign market” (timing of market entry), and therefore excludes the topics of “how to enter” (mode of entry) and “where to enter” (location) a foreign market. When looking at the location of foreign investment, an in-depth analysis of countries or markets is indispensable (e.g., differentiating between near- or offshore markets). Johanson and Vahlne (1977) introduce the concept of “psychic distance”, arguing for an incremental internationalization process starting off in nearby and culturally familiar countries and eventually (with cumulative knowledge) entering remote countries. Hence, analyzing location requires a detailed discussion and differentiation of markets including cultural and institutional determinants. Equally, when focusing on entry mode, the concept of “establishment chain”, also introduced by Johanson and Vahlne (1977), moves to the center of analysis, displacing a detailed analysis of country characteristics, but still maintaining a strong process perspective. Both concepts, although highly important in IE research, are less relevant to the timing aspects, which is the focus in our paper. Although we control for institutional issues in our empirical analyses, to focus on timing of internationalization, the conceptualizations in our study do not provide a detailed analysis of differences in entry mode or country. However, for future research, there are many opportunities to focus on location and entry mode questions in IE research, because these questions are also important and have been studied only to a limited extent so far.

Our study also has implications for management. Venturing into foreign markets early in a firm’s life cycle is an important issue, particularly for technology firms. However, to avoid post-entry “shock effects”, when entering into foreign markets, YTFs should not underestimate the liabilities of foreignness. Entry learning is not only possible, it is also the basis for successful international ventures by technology firms, and even affects the future development of the firm. Making use of valuable network contacts and imitation to acquire knowledge about the foreign market before entry are worthwhile mechanisms that firms can use to reduce the risks of early foreign market venturing. When taking these precautions into consideration, YTFs can pursue promising avenues of growth and success in international markets.

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