

6-7-2014

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Recommended Citation

Pathak, Saurav; Muralidharan, Etayankara; and Laplume, Andre (2014) "HOME COUNTRY FACTORS AND THE DECISION TO INTERNATIONALIZE TECHNOLOGY-BASED NEW VENTURES: A MULTI-LEVEL STUDY OF EARLY-STAGE ENTREPRENEURS," *Frontiers of Entrepreneurship Research*: Vol. 34: Iss. 19, Article 1.

Available at: <http://digitalknowledge.babson.edu/fer/vol34/iss19/1>

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HOME COUNTRY FACTORS AND THE DECISION TO INTERNATIONALIZE TECHNOLOGY-BASED NEW VENTURES: A MULTI-LEVEL STUDY OF EARLY-STAGE ENTREPRENEURS

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ABSTRACT

Using Global Entrepreneurship Monitor (GEM) survey of over 25,000 nascent and new entrepreneurs from 2005-2008 and 45 countries, we predict their internationalization decisions based on three domestic institutions. Results indicate that stronger regulatory environment, smaller home market, and weaker innovation environment favor internationalization. Interaction results indicate that strong regulatory environment helps overcome the negative effect of a large home market towards internationalization and that it also facilitates internationalization by aiding to acquire resources necessary for innovation that may be lacking domestically. Finally, a larger home market size reduces the need to internationalize to compensate for lacking innovation resources.

INTRODUCTION

According to Cantwell, Dunning, and Lundan (2009: 571), “the institutional aspects of the environment for IB activity have become steadily more important for MNEs over time, particularly since the advent of the knowledge-based economy and contemporary globalization”. Improved communication and low-cost transportation combined with greater liberalization of markets have contributed to increased demand in global markets prompting entrepreneurs to adopt an international perspective (Ohmae, 1990). These conditions appear to be contributing to the emergence of an increasing number of international new ventures, a new class of start-ups that span international borders at birth (Oviatt & McDougall, 1994). Many ‘born global’ start-ups are found in high technology industries where there may be greater opportunities for global trade and investment (McDougall, Shane, & Oviatt, 1994). A key strategic issue facing entrepreneurs is the timing of their internationalization initiatives, that is, whether they should start the process immediately upon formation or later after gaining sufficient experience. Traditionally firms opt to go international because of commercial and managerial experience (Ganotaki & Love, 2012), and after accumulating sufficient resources, for instance, after an initial public offering (Filatotchev & Piesse, 2009). However, it is also recognized that entrepreneurs may go global for a variety of reasons including opportunities that pull them toward foreign markets and threats that push them away from their home countries (Autio, Sapienza, & Almeida, 2000).

Entrepreneurial ventures requiring the use of the latest available technologies may internationalize proactively to gain advanced technologies or they may be compelled to do so in order to recover the high costs they incur in the use and development of new technology domestically (Preece, Miles, & Bates, 1999). We select a definition of technology entrepreneurship that is suited to the individual-level study we have pursued. We focus on nascent entrepreneurs that have not yet launched their ventures and new entrepreneurs – termed collectively as *early-*

stage entrepreneurs. Our dependent variable is the likelihood of internationalization by early-stage technology entrepreneurs. We define technology entrepreneurship as the *use of the latest available technologies* by early-stage entrepreneurs in their new ventures, which is an important component in the *development of new technologies*. We use this definition - *use of the latest available technologies* by entrepreneurs - interchangeably with *technology entrepreneurship* throughout the paper and examine the influences of home country factors on the likelihood of their internationalization.

The phenomenon of international entrepreneurship, which includes “new and innovative activities that have the goal of value creation and growth in business organizations across national borders” (McDougall & Oviatt, 1997: 293), is attracting increasing research attention since Oviatt and Doughall’s (1994) seminal article. In order to generate a more theoretical perspective of international entrepreneurship, researchers describe how internationalization occurs and predict the outcomes of such endeavors. While scholars have also examined some of the antecedents of international entrepreneurship (Keupp & Gassmann, 2009), the full reasoning behind the existence of international new ventures is still not well understood (Zahra, 2005). Thus, answering the ‘why’ of international new ventures may strengthen our understanding of this phenomenon.

The external environment in which entrepreneurs operate plays an influential role in understanding international entrepreneurial behavior (Szyliowicz & Galvin, 2010). The role of home country conditions may be an important source of variation in international entrepreneurial activities. In their review of the literature on international entrepreneurship, Keupp and Gassmann (2009: 616) point out that “firms may experience a lack of resources in the home country; it may be the availability of resources and opportunities in the international environment that draw entrepreneurs and firms into involvement across national borders”

To extend this stream of scholarship we engage in cross-disciplinary research examining how country-level factors affect internationalization of early-stage technology entrepreneurship. Drawing from the international business literature, we propose that home country conditions affect the motivations of early-stage technology entrepreneurs to internationalize. Much of the international entrepreneurship research has addressed the influencers of internationalization at the individual and firm levels (Szyliowicz & Galvin, 2010). Country-level research examines the effects of factors such as cultural distance and host country issues as drivers of the outcomes of international entrepreneurship (Keupp & Gassmann, 2009).

We use a multi-level modeling methodology to test hypotheses concerning country-level antecedents to internationalization of technology entrepreneurship by individuals and thereby help facilitate an understanding of the reasons and circumstances leading to early internationalization. The results indicate that the quality of the *regulatory environment* and a relatively smaller size of *home country market* both increase the propensity of early-stage technology entrepreneurs to internationalize. Interestingly, less developed *innovation environments* also increase this likelihood, suggesting that rather than merely seeking markets, early-stage technology entrepreneurs may look to foreign economies as a source of valuable resources deemed necessary for innovation if their home countries have weaker national systems of innovation. Furthermore, we show that a strong regulatory environment is a requirement for technology entrepreneurs internationalizing early when their home markets are small and their home-country environments are not conducive to innovation, potentially in order to protect their investments. We also find that entrepreneurs tend to give preference to home market opportunities for their products over input resources when deciding to internationalize early.

THEORY & HYPOTHESIS DEVELOPMENT

In order to motivate our choice of home country factors, we look to Williamson's (2000) theory of the institutions, which has four levels forming a hierarchy from macro to micro-level institutions: (1) informal institutions (norms, customs, mores, traditions, taboos, codes of conduct, sanctions); (2) formal institutions (constitutions, laws, and property rights); (3) institutions of execution (access to financing, supply chains, market conditions); and (4) the production functions of firms and entrepreneurs (resource allocation). All four levels are expected to influence transaction costs, altering the desirability of alternatives in the 'make/buy' decisions of organizations and entrepreneurs. Transactions are considered the basic units of analysis and these are created by the institutions at each level of the hierarchy (Williamson, 2000), thus affecting the choice of entering different types of entrepreneurship (Baumol, 1990).

In their related study, Estrin, Korosteleva, and Mickiewicz (2012) examine intellectual property rights, corruption and social ties, arguing that these institutional variables approximate Williamson's hierarchy of institutions. Following their lead, the individual decision to internationalize is a level-4 institution that is affected by the size of the home country market at level-3, the regulatory environment of the home country as the formal institutions at level-2, and the innovative environment as a combination of level-2 and level-3 factors.

Innovative Environment and Internationalization

The technological activities of global firms are usually based in their home countries and they are expected to derive firm specific technological competitive advantages from their home country environments (Cantwell, 1995). Thus, the innovation environment of the home country specifically supports technological development. An innovative environment is characterized by availability of sophisticated national institutions involved in research and development, availability of high quality universities involved in research, availability of highly quality skilled manpower, networking opportunities with similar high technology entrepreneurs, and availability of high quality knowledge based workers. The innovative environment is key to development and use of technology and knowledge and is the core resource relevant to international entrepreneurship, particularly for technology entrepreneurs (Autio et al., 2000). Rapid internationalization has been found to occur mainly in high technology industries where knowledge is the key resource that contributes to their international growth (Jones & Coviello, 2005). "Innovation, R&D, knowledge development, and capabilities leveraging" have been found to be playing key roles in the international success of high technology entrepreneurs entering the global arena early in their growth trajectories (Knight & Cavusgil, 2004: 135). Therefore, for technology entrepreneurs to internationalize, they need access to an innovative environment.

In sum we argue that for technology entrepreneurs to survive, it is necessary for them to be at the edge of development in their particular domain or capability niche. They will, therefore, need to have access to resources provided by an innovative environment in order to develop the knowledge and capabilities required of a high technology firm. Firms, driven by their entrepreneurial motivations of their founders, will seek such resources to provide that leading edge in their technological endeavors. They will go international if these resources are not available in their home countries. Hence we suggest:

Hypothesis 1: All else being equal, the weaker the home country innovation environment, the more likely a technology entrepreneur will choose to go international at an early stage.

Regulatory Environment and Internationalization

The regulatory dimension consists of laws, regulations, and policies of the government that promote certain behaviors and restrict others (Busenitz et al., 2000). When we address the levels of regulatory development, we refer to differences in the regulatory environments among nations that either facilitate or constrain their economic activity. These differences in the regulatory environments around the world can determine the extent or the lack of regulatory support for international technology entrepreneurship (Kiss & Danis, 2008). Those countries which have well developed regulatory environments have sophisticated banking systems, financial institutions, strong and stable public equity markets, and strong venture capital industries (Bruton et al., 2005). They also provide support for new businesses, reduce the risks for individuals starting a new company, and facilitate entrepreneurs' efforts to acquire resources and finances which are required for the international growth of technology entrepreneurship (Busenitz et al., 2000). Such countries also have well-established legal systems and effective governance and enforcement mechanisms, facilitating growth and providing protection to entrepreneurial firms and their investors. For example, the U.S. government provides advice and assistance for firm starting new businesses and offers financial assistance for new technology development in small enterprises; similarly, several European governments provide smaller firms with financial assistance for export development (Reynolds, 1997). Well-developed domestic regulatory institutions, therefore, provide a strong foundation for the international expansion of entrepreneurship, such that when such domestic regulatory institutions are absent or underdeveloped, international initiatives by entrepreneurs may not be feasible (Kiss & Danis, 2008). In sum, we argue that while technology entrepreneurs would desire internationalization at the inception of their ventures, lack of regulatory support from their home countries may constrain their internationalization initiatives. Hence we suggest:

Hypothesis 2: All else being equal, the stronger the home country regulatory environment, the more likely a technology entrepreneur will choose to go international at an early stage.

Domestic Market and Internationalization

Knowledge intensive entrepreneurial firms incur high investment costs for their knowledge development by way of new product development, technology development and process development. Specific investments will include hiring highly qualified researchers, building research and development facilities, and conducting field trials or clinical trials. Further these firms will have to be continuously investing such resources in order to keep pace with the changes in global trends in technology and markets. Examples of such areas include wireless data communications, marine sonar technologies, genetic engineering, drug discoveries etc. Therefore, financial investments to sustain such technology intensive operations will be very high (Preece et al., 1999). Such firms will not be viable in the long run if they are not able to achieve quick growth right from their inception in order to support their early investments (Ohmae, 1990). For the reasons mentioned above, high technology entrepreneurs using the latest available technologies in their ventures may need to internationalize early in their growth trajectory since they may need to reach out to larger markets in order to recover their development costs to create the product,

service, or process (Zahra et al., 2000). A single market such as the home market of the technology entrepreneur may be insufficient to support the R&D, marketing, financing, and distribution costs of the latest available technologies being used in the venture (Hordes, Clancy, & Baddaley, 1995).

In sum, we argue that smaller the domestic market, the higher is the tendency of an entrepreneur to go international. If the home market for technology entrepreneurs is large enough compared to international markets, they will likely remain within the home market at inception. The economic environment in which these entrepreneurs operate is, therefore, one of the key influences of their internationalization decisions as it has a direct bearing on their profit-maximization motives. This tendency is more so in the case of technology entrepreneurs in view of the high startup costs that such firms incur for use of the latest available technologies. Hence we suggest:

Hypothesis 3: Everything else being equal, the smaller the size of the home country market, the more likely a technology entrepreneur will choose to go international at an early stage.

Regulatory Environment and Market Size

As argued earlier, strong regulatory support in the home country will be required for technology entrepreneurs to internationalize earlier in their growth trajectories. Similarly, technology entrepreneurs operating in a home country with a small market size are expected to internationalize early or right at inception in order to recover their high investments. When both these influences are present we can expect a combined effect on early internationalization of technology entrepreneurs. In other words, we argue that a weaker regulatory environment in the home country and a small home country market are expected to influence the likelihood of technology entrepreneurs to go international right at the inception. Technology entrepreneurs may, out of necessity, choose to go international because of the smaller size of their domestic markets (Ganitsky, 1989). Going international to access markets would entail investments in distribution arrangements, foreign sales offices, patent filings, warehousing, and servicing arrangements for the high technology products that are being marketed. Investments in such initiatives would be very high for early entrepreneurs internationalizing early. Protection of these investments is, therefore, necessary for technology entrepreneurs internationalizing early (Busenitz et al., 2000). Non-availability of protection in their home would be an additional inducement for technology entrepreneurs to search for the same in international markets along with their main objective of markets for their high technology products. In sum, while it may be necessary for technology entrepreneurs with a small home country market to go international early in order to recover the expenses incurred to develop high technology products and services; they would also need regulatory support from institutions or regulatory agencies in order for them to enter international markets early in their growth trajectories. Hence we suggest that:

Hypothesis 4: Home country regulatory environment moderates the relationship between home country market size and the likelihood of a technology entrepreneur going international at inception; such that as the regulatory environment becomes stronger, the negative effect of the market size weakens.

Regulatory Environment and Innovative Environment

A strong regulatory environment and a weak home country innovative environment both increase the likelihood that technology entrepreneurs go international early. Technology entrepreneurs will need access to resources such as highly qualified manpower, research facilities, sophisticated laboratories and equipment in order to be at the edge of technological development in their domains (Autio et al., 2000). Lack of these resources in their own country will induce them to look outside their countries in order to fulfill their creative instincts. This resource seeking motive induces technology entrepreneurs to go international early in their growth trajectories. High investment costs may need to be mitigated by strong home country regulatory institutions. Regulatory assistance in terms of foreign exchange availability, strong monetary policies by the government, strong banking channels, availability of venture capital and other government level initiatives to facilitate and protect investments of these entrepreneurs should be forthcoming (Rondinelli & Kasaarda, 1992). In sum, the resource seeking behavior of high technology entrepreneurs can exist only when there is sufficient regulatory support in their home countries. This support will ensure that the investments that these entrepreneurs make are sufficiently protected. Hence we suggest.

Hypothesis 5: Home country regulatory environment moderates the relationship between home country innovative environment and the likelihood of a technology entrepreneur going international at inception; such that as the regulatory environment becomes stronger, the negative effect of the innovation environment strengthens.

Market Size and Innovative Environment

We argue that technology entrepreneurs operating in a country lacking a sufficiently developed innovation environment may not be induced to go international early when there exist a sufficiently large domestic market. Large markets may have more abundant and diverse opportunities which entrepreneurs can tap to satisfy their creative instincts (Madsen & Servias, 1997). However, when the domestic market size is smaller, technology entrepreneurs may not find sufficient outlets for their entrepreneurial motivations. Between market seeking motives (i.e., demand) and resource seeking motives (i.e., inputs provided by an innovation environment), we argue that technology entrepreneurs would prefer the former where there exists a sufficiently large domestic market to satisfy their profit maximization objectives. In such cases, we can expect entrepreneurs to channel their energies to areas appropriate to the domestic market needs or develop appropriate technology for manufacturing products to be supplied in their home markets (Hollick, 1982). Hence we suggest.

Hypothesis 6: Home country market size moderates the relationship between home country innovative environment and the likelihood of a technology entrepreneur going international at inception; such that as market size increases, the negative effect of innovation environment weakens.

METHODOLOGY

Data

We analyzed panel survey data on 25,384 individual-level responses from 45 countries for year 2005-2008. The data was obtained from the publicly available Global Entrepreneurship Monitor (GEM) survey (Reynolds et al., 2005). Next, we complemented this database with data on *regulatory environment* obtained from World Governance Indicators (WGI), and both size of *home country market* and *innovation environments* collected from the World Economic Forum's Global Competitiveness Index report.

Dependent Variables

Our dependent variable is individual-level likelihood of internationalization of early-stage technology entrepreneurship and was obtained from the GEM dataset. GEM identifies three types of entrepreneurs based upon the length of time that they would spend in the entrepreneurial process combined with the nature of activity performed by them. These are: (1) *nascent entrepreneurs* (individuals who are active in the process of starting a new firm during the preceding 12 months and with expectations of full or part ownership, but have not yet launched one); (2) *new entrepreneurs* (owner-managers of new firms who have survived for 42 months and have paid wages to any employees for more than 3 months); and (3) *established entrepreneurs* (owner-managers of firms 42 months old or older).

We created our dependent variable by adopting a three step procedure. First, since the focus of this study is on the internationalization of "early-stage" technology entrepreneurship, we sampled only nascent and new entrepreneurs. This is consistent with GEM's operationalization of early-stage entrepreneurs. Next, for all those who are identified as either nascent or new entrepreneurs, GEM further identifies them as "technology entrepreneurs". Technology entrepreneurs are those that responded "yes" to a question that asks whether latest technology was *available* to them and that if they were *using the latest technology* in their ventures. Others who indicated that latest technology were not available for them to use in their ventures and that they were continuing to use older technologies were not considered technology entrepreneurs. Thus, nascent or new entrepreneurs who were also identified as technology entrepreneurs were subsequently assigned a value of 1 while nascent or new entrepreneurs who were not technology entrepreneurs were assigned a value of 0. Finally, we imposed our last condition and identified early-stage technology entrepreneurs who went international. GEM identifies the status of internationalization of only nascent or new entrepreneurs and not of established entrepreneurs. It asks all identified nascent or new entrepreneurs – "What proportion of your customers will normally live outside your country? Is it more than 90%, more than 75%, more than 50%, more than 25%, more than 10%, or 10% or less or none?" The response to this question was obtained from all those who were retained in our sample after the second step (early-stage technology entrepreneurs). We assigned a value of 0 to all those who answered "none" indicating no internationalization while all others were assigned a value of 1 indicating internationalization. The study aims to look into the influence of domestic conditions on the likelihood of internationalization of early-stage technology entrepreneurship and not on the extent of internationalization fostered by those conditions. As a result, all early-stage technology entrepreneurs who responded a greater-than-zero percentage were assigned a value of 1.

Combined, these three steps yielded our final sample that retained early-stage technology entrepreneurs who internationalized (= 1) and those who did not (= 0). Our dependent variable is thus dichotomous. Following the above mentioned steps, our usable dataset ultimately included 25,384 observations with 1,715 (6.76%) as early-stage technology entrepreneurs who internationalized. It is worthy to note that the level of analysis of our dependent variable pertains to 'individuals' and not to 'new entrepreneurial entities' such as new ventures or firms.

Predictor Variables

We used three country-level factors: *regulatory environment*, *size of home country market* and *innovation environment*. Annual data for each of these predictors were used from 2005-2008 for each of the 45 countries included in our study.

A country's quality of *regulatory environment* was measured using the Worldwide Governance Indicators (WGI) made publicly available by the World Bank Group. The regulatory quality indicator is reflective of government policies and regulations that influence private sector development including individuals' propensity to start businesses within and across domestic borders. For the 45 countries included in our study from 2005-2008, we observed a mean score for regulatory quality of 0.87 (across all countries and over all four years), a minimum of -1.13 (for Ecuador in 2008) and a maximum of 1.92 (for Ireland in 2008).

Size of home country market and *innovation environment* was both obtained from World Economic Forum's Global Competitive Index (GCI). The size of the domestic market is constructed by taking the natural log of the sum of the gross domestic product valued at purchased power parity (PPP) plus the total value (PPP estimates) of imports of goods and services, minus the total value (PPP estimates) of exports of goods and services. For the 45 countries included in our study from 2005-2008, we observed a mean score on the size of home country market size of 4.84 (across all countries and over all four years), a minimum of 2.97 (for Uruguay in 2007) and a maximum of 6.91 (for U.S. in 2008).

GCI reports country's innovation environment which is a composite measure computed as a weighted average of seven sub-measures: capacity for innovation, quality of scientific research institutions, company spending on R&D, university-industry collaboration in R&D, government procurement of advanced technology products, availability of scientists and engineers, and utility patents and intellectual property protection. For the 45 countries included in our study from 2005-2008, we observed a mean score on the home country innovation environment of 4.45 (across all countries and over all four years), a minimum of 2.36 (for Ecuador in 2008) and a maximum of 5.92 (for U.S. in 2005).

Interaction Terms

We created three interaction terms in order to test our hypotheses on the moderating effects of our country-level predictors on the internationalization of early-stage technology entrepreneurship. Z-scores of each of our three predictors were multiplied individually with the remaining two z-scores yielding three interaction terms in all. The three interaction terms are those between (1) regulatory quality and market size, (2) regulatory quality and innovation environment and (3) market size and innovation environment. These three terms operate at the country-level.

Individual-Level Controls

We controlled for a number of individual-level variables as well as demographic characteristics, all of which were obtained from the GEM dataset. Perceived *self-efficacy* indicates whether the individual thought that (s) he possessed the knowledge, skills, and experience required to start a new business. This was operationalized as a dummy variable (1 = yes, 0 = no). *Ties with entrepreneurs* captures vicarious exposure and was measured by asking whether or not the individual knew someone personally who had started a business in the past 2 years: 1 = yes, 0 = no. Familiarity ties with entrepreneurs have been suggested as an important source of vicarious experience that affects the entrepreneurial intentions of individuals. Further, an individual's age has an important influence on entrepreneurship. Both *education level* and *household income* have been linked with entry into entrepreneurship as well. Therefore, we also controlled for women's *level of education* (five levels – 0 = none; 1 = some primary; 2 = primary; 3 = secondary and 4 = graduate), and socioeconomic status represented by *household income tier* (3 equally large strata in each country: 1 = lower income tier; 2 = middle income tier; and 3 = upper income tier).

Estimation Methods

Random-effect logistic regressions (xtlogit command in Stata 13.0) were employed to estimate the probability of internationalization of technology-based early stage new ventures. regression models are reported in Models 2 and 3 of Table 1. These models report estimates for the fixed part (estimates of coefficients) and random part (variance estimates), as well as model fit statistics. The estimates are reported as odds ratios (exponential of the beta coefficients obtained from logistic regressions), with ratios greater than one representing positive association (percent increase) and those less than one representing negative association (percent decrease).

RESULTS

Intra-class Correlation (ICC)

Significant between-group variance in the dependent variable requires multilevel analysis. To check this, we estimated multilevel logistic regressions (Model 1 of Table 1) that yielded an intra-class correlation coefficient (ICC or rho) of 19.7% in our dependent variable across the 87 groups included in our study and that a significant 10% of this variance was attributed to the temporal variability in our dependent variable alone. The ICC (or rho) values represent the proportion of variance in the dependent variables that reside between groups owing to country-level characteristics and the point in time.

Effects on Internationalization of Early-stage Technology Entrepreneurship

Model 2 includes the individual-level and country-level controls. The model reports the proportion of variance (in internationalization of early-stage technology entrepreneurship) accounted for by only these controls. We observed that the variance component of random intercept decreased from 0.81 in the null model (Model 1 of Table 1) to 0.61 in Model 2, suggesting that our individual-level and country-level controls explained up to 25 percent $\left(\frac{0.81 - 0.61}{0.81} \times 100\right)$ of the group-level variance in the individual-level likelihood of internationalization of early-stage technology entrepreneurship.

Model 3 of Table 1 shows the influence of *innovation environment* (hypothesis H1), *regulatory quality* (hypothesis H2) and the size of *home country market size* (hypothesis H3) on individuals' likelihood of internationalization of early-stage technology entrepreneurship. The odds ratios indicate that an increase of one standard deviation in a country's innovation environment reduced this likelihood by 29 percent ($1 - 0.71$; $p < 0.001$) supporting H1. These findings suggested that the prevalence of innovative environment within a country is more likely to keep the efforts of early-stage technology entrepreneurs domestic as opposed to their going international. Since our dependent variable is the internationalization of early-stage technology entrepreneurship – defined as the *use of latest technologies* by entrepreneurs in their ventures – an innovative environment coupled with the availability of resulting innovations for use by early-stage technology entrepreneurs is what ensures keeping their efforts domestic as opposed to internationalizing them.

We also observed, that an increase of one standard deviation in a country's regulatory quality increased the likelihood by 72 percent (odds ratio = 1.72; $p < 0.001$) supporting H2. This suggests that countries with a better quality of governance enable early-stage technology entrepreneurs to cross domestic borders and take their businesses to foreign lands.

Finally, it was also observed that an increase of one standard deviation in the home country domestic market size decreased the likelihood of internationalization of early-stage technology entrepreneurship by 26 percent ($1 - 0.74$; $p < 0.001$), thus supporting H3. This suggests that if the domestic market size is large enough – thus offering augmented business opportunities for early-stage technology entrepreneurs – they are more likely to operate and conduct business domestically as opposed to going international. In other words, large market size substitutes for internationalization.

We observed that the variance component of random intercept decreased from 0.61 in Model 2 of Table 1 to 0.36 in Model 3, suggesting that the addition of the three country-level predictors explained up to 41 percent ($((0.61 - 0.36)/0.61) * 100$) of the remaining group-level variance in the individual-level likelihood of internationalization of early-stage technology entrepreneurship after the individual-level and country-level controls have been accounted for. This finding consolidates the fact that a country's innovation environment, regulatory quality and its domestic market size are salient and significant predictors of individual-level likelihood of internationalization of early-stage technology entrepreneurship.

Moderating Effects of Country-level Domestic Conditions on The Internationalization of Early-stage Technology Entrepreneurship

Models 4, 5 and 6 report the regression models that examine our three hypotheses pertaining to the moderating and are explained graphically. Figure 1 suggests that individuals' likelihood of internationalization of early-stage technology entrepreneurship ($p < 0.004$) is always lower in countries where the quality of regulatory environment is less conducive than in countries where they are more conducive for all levels of the domestic market size. It is also observed that in countries with less conducive regulatory environments the likelihood of entrepreneurs going international is more than in countries with more conducive regulatory environments as the size of the domestic market decreases. This observation provides support in favor of hypothesis H4. Figure 2 suggests that individuals' likelihood of internationalization of early-stage technology entrepreneurship ($p < 0.022$) is higher in countries where the quality of regulatory environment is less conducive than in

countries where they are more conducive only when the innovative environment is also weak. This observation provides support for hypothesis H5. Figure 3 suggests that individuals' likelihood of internationalization of early-stage technology entrepreneurship ($p < 0.001$) is higher in countries where the domestic market size is low than in countries where the domestic market size is high only when the innovative environment is also weak. This observation provides support in favor of hypothesis H6.

DISCUSSION

We examined the home country factors that influence an entrepreneur's decision to internationalize. Drawing from the literature on institutional theory, we characterize three levels of the institutional hierarchy, which seem to be involved in the decision of nascent and new entrepreneurs to internationalize their ventures. Entrepreneurs that internationalize may be viewed as adding potential to an economy through returns to domestic investors and increased volume of home country value added divisions. The individual decision to internationalize is thus an important study variable for those interested in crafting policy to support it. We used the size of the home country market as a proxy for Williamson's level-3 institutions; the regulatory environment of the home country mirrors the formal institutions at level-2; and finally, we looked at the innovative environment, which we take to resemble the level-2 and level-3 institutions.

We find that each level influences the dependent variable. We see a negative influence for the national systems of innovation suggesting that if these are missing in span or quality, then entrepreneurs may need to internationalize to find innovation resources. These results were also supported by our robustness checks that further decomposed our dependent variable. The level-2 and level-3 institutions both contributed positively to the propensity to internationalize, suggesting that mature formal regulatory environments and small local markets both spur entrepreneurs to internationalize early. However, when innovation capacity increases, entrepreneurs become more likely to keep their businesses at home. This may reflect the nature of innovation, where market demand may be less important than an innovation push regime. Since this reflects a competitive capacity in the entrepreneur rather than any defect in the economy, it seems that policy makers should not be concerned with the loss of internationalizing entrepreneurs but rather with the internally (domestically) focused shift in high value added investment. Consistent with Kuemmerle's (2002: 99) six case studies of internationalizing new ventures, "in the early stages of international ventures, cross-border activities that augment the venture's knowledge base are more prevalent than cross-border activities that exploit the venture's knowledge base." This is a major departure from the more common view that internationalization occurs in order to develop new markets and it highlights how early stage entrepreneurs are different from incumbent firms, and thus should not be viewed as small versions of large organizations. In understanding the way domestic conditions influence early internationalization of technology entrepreneurs, we have also attempted to answer the 'why' of international new ventures and thereby extend the theoretical understanding of the phenomenon of international entrepreneurship.

Finally, the results for the interaction effects suggest that each country-level factor does not merely operate in isolation, but that regulatory quality moderates the effects of home-country size and innovation environment; and home-country size moderates the effect of innovation environment. This is consistent with Williamson's (2000) neo-institutional theory, which posits that each level affects the others either directly or indirectly.

Limitations and Future Research

One important limitation of the paper is that the dependent variable is one where we are interested in measuring propensities to engage in and not in performance at internationalization. Extending this study to examine the actual performance of internationalization of these early technology entrepreneurs, the extent to which such entrepreneurs would internationalize at the inception, and growth in the international markets can further contribute to scholarship on born global. Other contextual factors, such as foreign direct investment and barriers to technological adoption may be involved in the decision to internationalize. The state of financial institutions, country-level cultural orientations and other cultural factors like the social desirability of international entrepreneurship could also be examined in future research.

The effect of the destination (or host) country's environmental context has not been considered in this study. While scholars have examined the effects of host country environmental conditions on firm and export performance (Keupp & Gassmann, 2009), to what extent would host country environmental factors interact with the domestic country's environmental conditions to predict early internationalization of high technology entrepreneurs can be an area for future research.

CONCLUSION

We have demonstrated that home country conditions can influence entrepreneurs' decisions to internationalize at an early stage. Our three predictors, market size, regulatory environment, and innovation environment, and their interactions, account for a significant proportion of the variation in rates of internationalization of technology entrepreneurship across the countries in our sample. This is important because it demonstrates that country level factors embedded in the institutional context of a country can explain entrepreneurial phenomena at the individual level. Most previous research has looked to individual level attributes, cultural distance and to host country conditions to predict internationalization of entrepreneurship, or examined the internationalization at the level of firms and industries (Keupp & Gassmann, 2009). We hope that this study spurs additional research examining multi-level modeling approaches taking on the phenomenon of international entrepreneurship, which to date remains understudied.

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Table 1 Effect of domestic conditions on the internationalization of early stage technology entrepreneurship (odds ratio)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Fixed part estimates						
Individual-level						
Age		0.99***(0.00)	0.98***(0.00)	-0.01***(0.00)	-0.01***(0.00)	-0.01***(0.00)
Gender		0.86*(0.05)	0.86*(0.05)	-0.15*(0.06)	-0.15*(0.06)	-0.15*(0.06)
Education level		1.14***(0.03)	1.09***(0.03)	0.08***(0.02)	0.08***(0.02)	0.08***(0.02)
Household income		1.04(0.04)	1.01(0.04)	0.01(0.04)	0.01(0.04)	0.01(0.04)
Self-efficacy		1.02(0.09)	1.01(0.09)	-0.00(0.08)	0.00(0.08)	0.00(0.08)
Ties with other entrepreneurs		1.09(0.07)	1.08(0.07)	0.08(0.06)	0.08(0.06)	0.08(0.06)
Country-level						
GDP growth, % change		1.28***(0.09)	1.20*(0.09)	0.19*(0.08)	0.20*(0.08)	0.17*(0.08)
Innovation environment (H1)			0.71***(0.07)	-0.26*(0.10)	-0.26*(0.10)	-0.01(0.12)
Regulatory quality (H2)			1.72***(0.15)	0.56***(0.09)	0.39***(0.11)	0.31***(0.10)
Size of domestic market (H3)			0.74***(0.05)	-0.36***(0.07)	-0.32***(0.06)	-0.56***(0.09)
Regulatory quality X Market size (H4)				0.21***(0.07)		
Regulatory quality X Innovation environment (H5)					-0.26*(0.11)	
Market size X Innovation environment (H6)						0.31***(0.06)
Random part estimates						
Variance of intercept	0.81	0.61	0.36			
Variance of overall residue	3.30	3.27	3.35			
% of variance explained (Rho)	19.7	15.7	9.7			
Model fit statistics						
Number of observations	25 384	25 384	25 384	25 384	25 384	25 384
Number of groups (year and countries)	87	87	87	87	87	87
Degrees of freedom (Number of variables in the model)	0	7	10	11	11	11
Chi-square	-	63.31	181.11	176.67	187.15	186.86
Probability > Chi-square	-	***	***	***	***	***
Log likelihood	-4 736	-4 704	-4 637	-4 633	-4 635	-4 625
Likelihood ratio test of Rho	***	***	***	***	***	***

Standard errors in parentheses

Note: Columns 2 and 3 represent odds ratio (OR) instead of regression estimates. OR values greater than 1 signal positive association. OR values smaller than 1 signal negative association. Whereas columns 4, 5 and 6 represent beta coefficients of the estimates. $p < 0.001^{***}$; $p < 0.01^{**}$; $p < 0.05^{*}$; $p < 0.1^{+}$; 2-tailed significances for hypotheses

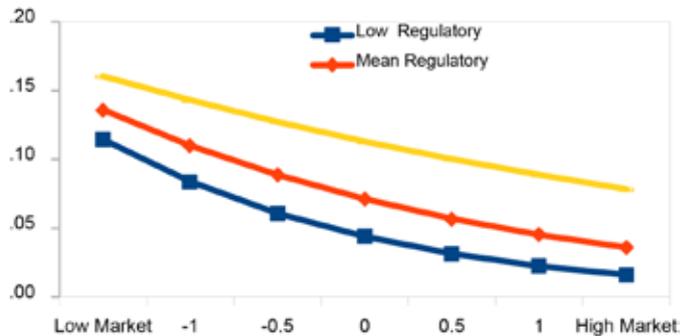


Figure 1 Interaction effect of regulatory quality on the influence of market size on the internationalization of early-stage technology entrepreneurship (Y-axis = probability; X-axis = Low to high market size).

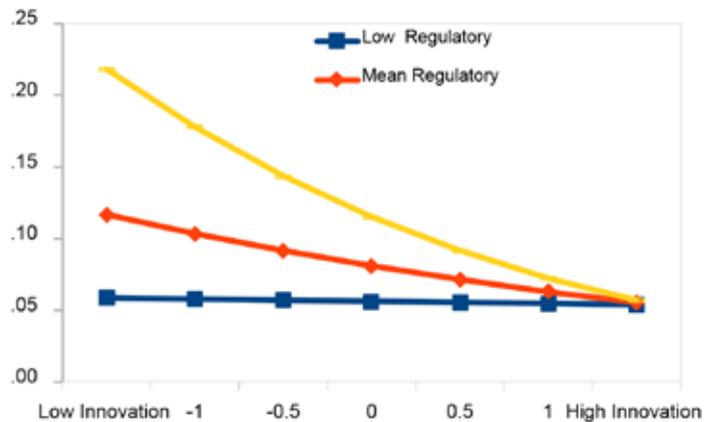


Figure 2 Interaction effect of regulatory quality on the influence of innovation environment on the probability internationalization of early-stage technology entrepreneurship (Y-axis = probability; X-axis = Low to high innovation)

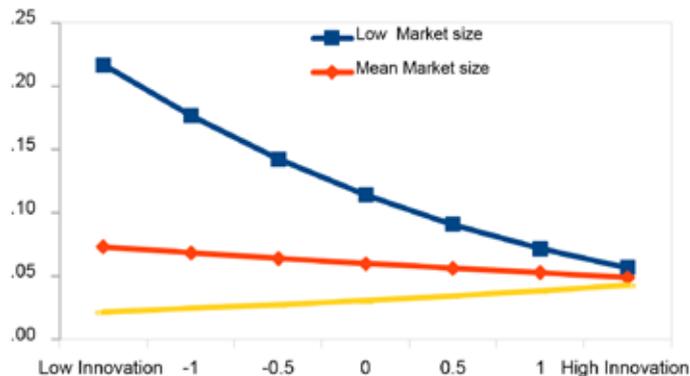


Figure 3 Interaction effect of market size on the influence of innovation environment on the probability internationalization of early-stage technology entrepreneurship (Y-axis = probability; X-axis = Low to high innovation).