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Founder nativity, founding team formation, and firm performance in the U.S. high-tech sector

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Abstract This paper is motivated by the movement of foreign-born entrepreneurs out of ethnic enclaves and into the mainstream, globally-connected economies of the countries of immigration, and from necessity to opportunity entrepreneurship. The theoretical contribution of the paper is to integrate the emerging literature on foreign-born entrepreneurship with work on the composition and impact of founding teams. Empirically, we draw on original quantitative and qualitative data on the U.S. high-tech sector. We find that homophily drives team formation and that nationality diversity in founding teams has a modest impact on firm performance.

Keywords Entrepreneurship · Foreign-born · United States · High-technology · Founding teams

Introduction

High-skill migration and high-growth entrepreneurship are societal processes that have been growing in importance in the advanced industrial economies in the late twentieth and early twenty-first centuries. More than 26 million people with some tertiary education, were estimated to be living outside their home countries in 2000, up from 16 million in 1990 (Docquier et al. 2010). High-skill migration is growing far more quickly than low-skill migration. The "irresistible forces" (to use the phrase of Pritchett 2006) of demographic and wage differentials between high-income and low-income countries will continue to drive such migration for a long time to come. Castles and Miller (2009) characterize the current era as the "age of migration."

As for high-growth entrepreneurship, Audretsch (2003, 21) describes a transformation of the U.S. economy that began in about 1980 from one dominated by big businesses in the immediate post-World War II period to one in which rapid

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growth of newly-created firms plays a vital role. "[I]n recent years…" he continues, "entrepreneurship has come to be perceived as an engine of economic growth and social development around the world." Compelling data have only recently begun to be gathered on a global basis, particularly with regard to high-growth entrepreneurship, which has the most significant economic impact (Bosma and Levie 2010). But it seems likely that new opportunities made possible by technological innovations, changing cultural norms and institutions, and increasing support from public policy will foster high-growth entrepreneurs in the years to come.

An emerging research literature focuses on the intersection between these two trends. Scholars have begun to measure, analyze, and interpret the increasingly visible presence of highly-skilled entrepreneurs who were born in another country and the communities of which they are often a part. This paper extends this emerging literature theoretically and empirically. The theoretical contribution is to integrate concepts related to founding teams into the literature on foreign-born entrepreneurs. Empirically, we draw on original quantitative and qualitative data on the U.S. high-tech sector to examine hypotheses that flow from the theoretical exposition.

The paper begins with a brief review of the literature on foreign-born entrepreneurship. We then identify key concepts related to team formation and firm performance that may provide insights into foreign-born entrepreneurship. The following sections put forward our data, methods, analysis, and results. The empirical highlights are, first, the importance of homophily in team formation and, second, the modest impact of nationality diversity in founding teams on firm performance. We discuss these findings and conclude that they justify further research in this area.

Literature review: foreign-born entrepreneurship

Research on foreign-born entrepreneurship has expanded significantly in recent years. Broadly speaking, the trajectory of this research stream has moved from the study of "necessity" entrepreneurs (Reynolds et al. 2002) who operate within ethnic enclaves to "opportunity" entrepreneurs who are active in the global economy. The historic countries of immigration, especially the U.S., but also Canada, Australia and, more recently, the U.K., have been the empirical loci for most of these studies. As the scale of immigration and the range of destination countries have grown in recent years, foreign-born entrepreneurs and their businesses have begun to be of interest in countries that have not historically received many immigrants but where immigration has risen in recent years, such as Germany, Switzerland, and France (OECD 2010).

The urban ethnic enclave served as the main focus of early work on foreign-born entrepreneurship, especially in the U.S. The foreign-born and their descendants (who were not necessarily distinguished from one another in this work) often resorted to entrepreneurship within enclaves because of barriers (language, discrimination, lack of education, etc.) that limited their economic success in the broader society (Light 1972; Aldrich and Waldinger 1990). Many of their businesses were truly desperate attempts at survival, but others seized reasonably remunerative opportunities that were unique to the enclave and to which the abilities of ethnic entrepreneurs were well-suited (Light and Rosenstein 1995; Dhaliwal 2006; Johnson et al. 2007). For instance, import/export businesses were founded by ethnic entrepreneurs in response to such opportunities (Bandyopadhyay et al. 2008; Kerr 2008).

Researchers found that some enclaves nurtured alternative institutions that mobilized human, financial, and social capital upon which ethnic entrepreneurs could draw (Portes and Sensenbrenner 1993). Necessity entrepreneurship remains very important among immigrants to the high-income countries (Lofstrom 2009). However, ethnic entrepreneurship research has begun to focus more squarely on opportunity entrepreneurs, in which the resources made available by enclave-based institutions and, sometimes, by mainstream institutions in the host society as well, are utilized by their ventures to pursue opportunities that go beyond the enclave.

Research on this subject has been incorporated into a broader emerging literature in anthropology and sociology on “trasnationalism” (Levitt and Jaworsky 2007). Transnationalism described migrants who are simultaneously embedded in both the home and host societies. “Transnational entrepreneurs,” then, as defined by Portes et al. (2002), Connelly (2010), and Drori et al. (2009), among others, form businesses that leverage their knowledge, relationships, and other resources that span the boundaries between their countries of origin and countries of residence.

The opportunities that foreign-born entrepreneurs pursue are increasingly found in globalized high-tech sectors as well as the low-tech sectors that typically characterize ethnic enclaves (Fairlie 2008; Fairlie et al. 2010). Saxenian (1999) demonstrates the importance of Indian- and Chinese-born entrepreneurs in the Silicon Valley high-tech sector. Saxenian (2006) extends her earlier argument, showing that these entrepreneurs often used their connections to their countries of origin to pioneer business models that were not as easily available to their native counterparts, a finding corroborated at the national level by Hart and Acs (2011). Cumming et al. (2009) explore the interaction of venture capitalists with transnational high-tech entrepreneurs and show that they contribute to the mobility of their ventures.

One important reason for the expansion of opportunity entrepreneurship among the foreign-born is that receiving countries have become increasingly selective in their immigration policies. While less-skilled, enclave-based ethnic entrepreneurs may have been more “alert” to opportunity and risk acceptance (Kirzner 1973) or had other difficult-to-measure qualities (Chiswick 1978) that distinguished them from the native-born, many recent foreign-born entrepreneurs were selected for immigration by the receiving countries on the basis of their objective qualifications. Australia and Canada, for instance, have long sought to attract the highly-educated and highly-experienced by implementing “point systems” (Reitz 2004; Castles and Vasta 2004) that reward these attributes. These countries and others (such as the U. K., Singapore, and Hong Kong) have dramatically expanded recruitment of foreign students as well, in part to provide a pre-screened pool of talent for permanent immigration (Wildavsky 2010; Hart and Tian 2010).

Highly-skilled immigrants remain a relatively small portion of the flow into the United States. About 15% of all recipients of a “green card” for legal permanent residence, for instance, fall into the employment-based category, rather than the family reunification, refugee, or diversity categories, which are predominantly low-skilled. But the sheer scale of this flow makes the U.S. the hub of the global high-skill migration system. Between fiscal 1989 and fiscal 2006, for instance, visas for academic and vocational study and for cultural exchange (F, M, and J visas, respectively) grew by about 90% in absolute terms and doubled as a share of all visas (Congressional Research Service 2008). A large share of foreign students, especially those receiving graduate degrees, stayed in the U.S. after graduation (National Science Board 2010). Their transition was made easier in 1990 by a 165% expansion in the employment- based green card category (Congressional Research Service 2006).

At the global level, the increased selectivity of immigrants in parallel across many receiving countries have been portrayed as a "war for talent" and a "brain race" (Michaels et al. 1998; Wildavsky 2010). In the short run, the pool of foreign students and mobile professionals who might become mainstream opportunity entrepreneurs is constrained, as these metaphors of zero-sum competition imply. But over the medium- and long-term, the pool has grown, and there are strong reasons to expect it to continue to do so (Beine et al. 2008). Moreover, as Baumol (1990) argues in his seminal work, entrepreneurial inclinations and attitudes are probably broadly distributed in the human species, dependent on the social environment to be mobilized productively. International migration provides a mechanism for matching up potential entrepreneurs with more productive social environments, thereby exerting pressure on the countries of emigration to reshape their environments to retain entrepreneurial talent as well.

This brief sketch of prior research establishes that foreign-born entrepreneurship is a vital and dynamic subject for scholarship. We adopt the neutral, descriptive term "foreign-born" for our population since we have limited information about their roots in enclaves or their transnational ties. Although this literature is growing rapidly, it is opening new questions equally fast. We begin to address one such question in this paper, exploring what foreign-born entrepreneurs bring to founding teams.

Theory development and hypotheses: foreign-born members of founding teams

A good deal of energy has been expended trying to measure whether the foreign-born are more or less likely to be entrepreneurs than the native-born (e.g. Hsu et al. 2007; Levie 2007; Wadhwa et al. 2007; Hart and Acs 2011). These studies typically do not distinguish between firms with single and multiple founders. Any firm which numbers at least one foreign-born entrepreneur in its founding team is counted as an immigrant-founded firm. Yet, given what researchers have learned about founding teams over the past couple of decades, it seems possible that individually-founded firms and team-founded firms may behave differently and that the composition of the founding team may affect what and how well a firm does.

In other words, the literature on foreign-born entrepreneurship still subscribes to what Kamm et al. (1990, 9) called the "myth of the lone entrepreneur." That agenda-setting work suggested that team-founded firms might well be both more numerous and more successful than individually-founded firms. It called for a deeper understanding, among other things, of team formation and of the potential sources of advantage and disadvantage for team-founded firms. That call has been answered in other parts of the literature, but it has not been well-addressed in the study of foreign-born entrepreneurs.

Team formation

Shane (2003) theorizes entrepreneurship as a process of resource assembly and deployment. One important reason why entrepreneurs might choose to team up, rather than to found firms as individuals, from this perspective, is to assemble more easily the diverse resources that they will need for their companies to succeed (Hellmann 2007). One team member might bring technical skills to the venture, for example, while another brings salesmanship (Eisenhardt and Schoonhoven 1990). The social networks of team members may also complement one another, expanding the team's access to resources relative to the solo entrepreneur (Burt 1992; Vissa and Chacar 2009).

The foreign-born in the U.S. are over-represented in science and engineering fields and in occupations that emphasize quantitative skills relative to communication skills (National Science Board 2010; Peri and Sparber 2009). As a result of these specializations, which are closely linked to language proficiency, they may encounter a "glass ceiling" of discrimination as they pursue managerial tracks within firms (Saxenian 1999). This barrier may encourage them to become entrepreneurs in response. However, because their prior careers limit their access to market-facing jobs, foreign-born entrepreneurs who become solo entrepreneurs may lack key resources, such as contacts and market-oriented knowledge, that would facilitate their ability to start upa new firm. Those who form teams in order to found firms are more likely to gain access to such resources.

H1: Foreign-born entrepreneurs are more likely to found firms as members of teams, rather than as solo entrepreneurs.

While foreign-born entrepreneurs may seek partners who have complementary skill sets to their own, they may have difficulty finding them. Because of their narrower career paths, these entrepreneurs may not know potential partners with deeper knowledge of markets, for instance (Carroll and Hannan 2000). And, except when new firms are "born global" and incorporate international strategies into their business plans, native-born entrepreneurs may not see their immigrant counterparts as attractive partners (Wagner and Leydesdorff 2005).

On the other hand, similarity among partners may foster team formation. For instance, trust and good communication, which Francis and Sandberg (2000) and Forbes et al. (2006) show are essential elements of successful team formation, may be found more easily among partners with a similar national or cultural heritage. The process of running a business requires quick action and tough choices (Amason 1996). Teaming up with someone who is much like oneself may ease concerns about such challenging issues.

There are, then, plausible theoretical reasons to suggest that founding teams may be either diverse or homogeneous with respect to the birthplace of the founders. Empirical research suggests that homogeneity is more common. For instance, in their sophisticated analysis of data from the Panel Study on Entrepreneurial Dynamics (PSED), Ruef et al. (2003, 215) conclude that "team composition is driven by similarity, not differences." Although they did not have data on place of birth, ethnic homogeneity was one of the most powerful predictors of teaming-up. Liao et al. (2011), working with the same data base, corroborate this finding. Chowdhury (2005, 741) finds too little ethnic diversity among the founding teams in his database of IT firms to study this variable, leading him to hypothesize that "ethnic minorities tend to team up with members of their own ethnic group to start new businesses."

Saxenian's (1999) discussion of the "glass ceiling" encountered by the foreign-born in the high-tech sector suggests that immigrant entrepreneurs may share outsider status with females and U.S. minorities in high-tech firms. Ruef et al. (2003)'s identify gender as a driver of team formation as well. My hypothesis therefore anticipates homogeneity across ascriptive traits, such as gender, ethnicity, and nationality.

H2: Foreign-born entrepreneurs who join founding teams are more likely to find teammates whose ascriptive traits are similar to their own than if teams were formed randomly.

Impact of founding team composition on firm performance

The literature on the performance of team-founded firms taps the same theoretical roots as that on team formation. The resources that teams can assemble seem likely to provide advantages and, other things being equal, the more diverse these resources are (including diversity of cognitive styles and values), the better for the firm. On the other hand, teams must establish trust and communicate well; if they do not, their performance will suffer. Diversity may make it difficult to achieve these basic needs of a start-up firm. Beckman and Burton (2008) show that the size and composition of the founding team leaves a long-lasting imprint on the firm, because they shape later top management teams,.

As we noted above, the literature up to the time that Kamm et al. (1990) summarized it suggested that team-founded firms out-perform individually-founded firms. Whatever transaction costs might be imposed by the need for coordination and decision-making among multiple founders (or, alternatively, by the delegation of responsibility by the team to a single leader) seemed to be outweighed by the benefits of pooled resources. The literature since 1990 has generally upheld this conclusion. Chandler et al. (2005, 707) put it this way: "The most compelling research finding to date is that team-founded ventures appear to achieve better performance than individually founded ventures."

H3: Team-founded firms, regardless of team composition, will exhibit higher performance than individually-founded firms.

However, Chandler et al. (2005, 707), the literature also suggests that not all teams are created equal and not all team characteristics are productive for the firm: "initial team size and composition are related to the future development of the new venture in complex ways." One important step that scholars have taken in unraveling these complexities has been to unpack the concept of diversity. A variety of taxonomies of diversity have been offered (e.g. Harrison and Klein 2007; Page 2007; Jackson and Joshi 2010), but none fully captures the complexity of national origins in an era of globalization.

For example, Jackson and Joshi (2010) classify nationality as "relationship-oriented" along with age, gender and other observable demographic characteristics and with non-observable attributes such as values and identity. They contrast these attributes with those that are "task-oriented," such as education, organizational membership, and experience. Jackson and Joshi's approach aligns closely with that of Hambrick et al. (1998), who argue that differences in national origin are associated with differences in values and cognitive schema, and with Liao et al. (2011), who link differences in ethnicity with differences in understanding and communication. Yet, nationality often brings with it cultural understanding and social networks that may be "task-oriented" resources if the task involves "boundary spanning" (Caligiuri et al. 2004; Barkema and Shvyrkov 2007). If diverse teams can overcome the challenges of trust-building and communication, the cognitive benefits and the resource benefits of nationality diversity should reinforce one another (Liao et al. 2011).

These theoretical considerations have not yet found compelling support in the broad and growing empirical literature on the performance impact of diversity of various sorts within top management and other work teams (Nielsen 2009; Jackson and Joshi 2010). Reagans et al. (2004), for instance, show that demographic diversity is not straightforwardly linked to team performance. The much slimmer body of empirical work that assesses the impact of nationality and ethnic diversity on firm performance is inconclusive as well. Caligiuri et al. (2004) find that firms with nationality diversity in top management teams correlates with internationalization in a sample of 76 U.S.-based multinationals, but does not explore performance. Chaganti et al. (2008) find that nationality diversity in the founding team was correlated with a more aggressive growth strategy among 52 Internet start-ups between 1997 and 2000, but not with actual growth. These tests do not invalidate the theory, but they do imply that further empirical research is needed.

H4a: Firms founded by teams of diverse nationality and ethnicity will exhibit higher performance than those founded by homogeneous teams.

H4b: Firms founded by teams of diverse nationalities and that are pursuing international business strategies will exhibit higher performance than firms that have only one or the other of these attributes.

The relationships among the members of the founding team may also shape the performance of the firm. In particular, team members who have prior experience working together are likely to have established a measure of trust and developed high-quality communication, even if they come from diverse backgrounds (Eisenhardt and Schoonhoven 1990; Beckman et al. 2007; Packalen 2007). Such experience may be particularly important when the team members are from different nationalities, due to the potential linguistic and cultural barriers that may impede communication in this case.

H5: Firms founded by teams with members of diverse nationalities who have worked together in the past will exhibit higher performance than firms founded by teams with one or neither of these characteristics.

Data and methods: high-impact, high-tech firm survey and interview follow-up

We examine these issues in the U.S. high-tech sector using original quantitative and qualitative data. The data are drawn from a survey of a national random sample of high-impact, high-tech firms (terms that are defined precisely in the following subsection) and from follow-up interviews conducted with a small subset of survey respondents. The high-tech sector has received particular attention from researchers of entrepreneurial teams in part because high-tech entrepreneurship is carried out in a volatile and uncertain environment, requiring teams to adapt quickly to changing circumstances and solve problems creatively. Diversity should contribute most positively to firm performance under these conditions (Eisenhardt and Schoonhoven 1990; Hambrick et al. 1998). In addition, the high-tech sector is among the most globalized with regard to human resources (Saxenian 1999) and business strategy (Bhagwati and Blinder 2009), so nationality diversity should be relatively common in it. Moreover, many high-tech businesses, such as software and website design, have low barriers to entry and so provide a gateway for under-capitalized but highly-skilled opportunity entrepreneurs. All in all, we consider the high-tech sector to be a “most likely” case (Eckstein 1975) for finding support for our hypotheses as formulated above, which is appropriate for this emerging field of empirical research.

Survey data

This study draws on Acs et al. (2008), who used the Corporate Research Board’s American Corporate Statistical Library (ACSL)[1] to identify high-impact companies (HICs). An HIC is an enterprise the sales of which have at least doubled over the relevant four-year period and which has an employment growth quantifier of two or greater over the same period. [2] Our definition of “high-tech” draws primarily on the work of the Bureau of Labor Statistics (Hadlock et al. 1991), which uses R&D employment as a share of total employment as the key criterion. We also include several other industries that have a high ratio of R&D spending to total revenues, which are identified in Varga (1998). The 49 industries at the three-digit SIC level that meet our definition are listed in Appendix A.[3]

The resulting population of all high-tech, high-impact companies in the U.S. for the period 2002–2006, from which we drew a random sample, numbered about 24,000. About 70% of these companies were in five service sector SICs, while the remaining 30% were manufacturing firms. Computer and data processing services (SIC 737) and engineering and architectural services (SIC 871) were the two largest industries in the population, together accounting for about half of the total. The

[1] The Corporate Research Board’s American Corporate Statistical Library (ACSL) contains more than 140 variables on all business establishments in the country. The ACSL links each establishment over time from its birth through any physical moves it makes, capturing changes in ownership along the way, and recording the establishment’s death if it occurs. The result is a unique longitudinal business file that allows for micro- and macroeconomic analysis of the U.S. economy. Corporate Research Board updates the ACSL every 6 months, drawing on hundreds of public and private sector data sources. Its principal data sources are Dun and Bradstreet’s DMI file, Bureau of Labor Statistics’s Industry Occupation Mix, and Census Bureau’s PUMS file.

[2] The employment growth quantifier (EGQ) is the product of the absolute and percent change in employment over a 4-year period of time, expressed as a decimal. EGQ is used to mitigate the unfavorable impact of measuring employment change solely in either percent or absolute terms, since the former favors small companies and the latter large businesses.

[3] In order to maintain historical continuity, our database uses SIC codes rather than NAICS codes. We dropped SIC 874, management and public relations, which met the BLS definition, but was so large that it would have dominated our results.

survey sample was checked against the available population data to ensure that it was representative. The survey was administered by a professional university-based survey research center in late 2008. The cooperation rate for the survey (as defined by the American Association for Public Opinion Research, definitions 1–4) for eligible respondents who were actually reached was 53%.

The survey data were used to create two databases, one in which the unit of observation is the company and another in which the unit of observation is the founder. There are approximately 1300 companies in the first database and 2000 founders in the second one. 205 companies reported that at least one of their founders was foreign-born, and 261 foreign-born entrepreneurs were identified. The survey data are combined with ACSL data on key characteristics, such as firm size, for the quantitative analyses reported below.

Interview data

Our strategy for the survey was to keep it short in order to boost the response rate. To gain a more detailed understanding of foreign-born entrepreneurship, we conducted follow up interviews, using a semi-structured protocol, with the founders of a small subset of the firms that responded to the survey. These interviews provide qualitative depth and specific details that give the reader more concrete insight into the quantitative analysis.

We used a matching strategy to recruit interview subjects. Our goal was to identify triplets of firms that were similar in key respects but different in the size and composition of their founding teams. Two firms in each triplet were founded by individuals, one foreign-born and one native-born. The third firm in each triplet was founded by a mixed team of foreign- and native-born entrepreneurs.

The most important characteristic that we held constant across these triplets was the firm's line of business. The lines of business included information technology services, construction engineering services, biotechnology, and manufacturing of high-tech products. The total number of firms whose founders were interviewed, therefore, was twelve (three firms in each of four lines of business). We also matched the triplets by firm age (less than 20 years old), proportion of foreign-born in the population of the firm's metro region (high proportion preferred), and firm size (minimum of 20 employees).

This recruitment strategy helps to isolate the impact of nativity on the entrepreneurial experience. The line of business controls for industry-specific effects, such as minimum scale. Firm age controls for cohort effects due to the timing of founding. Proportion of foreign-born in the population of the firm's metro region controls for regional externalities associated with immigration. The minimum firm size focuses our attention on how entrepreneurs have been able to mobilize a relatively large array of resources.

Selection bias

Both the survey and the interview methods impose a selection bias on our data. Only firms that have grown significantly over a 4-year period qualified for the survey. Only firms that responded to the survey and employed at least 20 workers (as well as matched their counterparts on the other criteria) were recruited for interviews. Thus, our findings with respect to team formation are conditional on experiencing sustained success, and our findings with respect to firm performance differentiate superstars, so to speak, from a population of stars.

We therefore urge caution in interpreting and generalizing from our results. This caution applies to comparable studies as well, such as Chaganti et al. (2008), who analyzed 52 Internet ventures that had completed an IPO between 1997 and 1999. Nonetheless, this study and others like it may be useful not only in suggesting hypotheses for further research with other databases, but also indicating how teams can achieve very high performance, which may valuable for managers, investors, and policy-makers.

Methods and controls

We report quantitative results, supplemented by qualitative insights, for our hypotheses in the next section. The team formation analyses rely on descriptive data, tested with the chi-square statistic. The firm performance analyses are OLS regressions that take firm employment, controlling for age, as the dependent variable. The control for age makes the employment variable a proxy for average growth over the life of the firm. The ACSL derives employment data from Dun & Bradstreet (D&B). We also have D&B's revenue estimates for the survey sample, but because most of the sample firms are privately held, we believe that the employment data are more reliable. We control for sector as well, because this variable can independently affect firm performance.

We also control in these regressions for the education level of the entrepreneurs (defined as the highest level of education attained by any member of a founding team), which is particularly important for firm performance in the high-tech sector (Colombo and Grilli 2005). This variable raises an important issue of interpretation. Foreign-born entrepreneurs in our sample are more highly-educated than native-born entrepreneurs. Our interpretation is that this correlation is not causal and that therefore, it is appropriate to think of educational attainment as a control variable. However, if one believes that founders who came to the U.S. for higher education (as most in our sample did) are more gifted academically than native-born founders, then one might view education as an intermediating variable, rather than a control variable. Omitting the education variable affects the results of some analyses, as we report in occasional footnotes.

Table 1 contains descriptive data for our data set and the correlation coefficient for the two continuous variables. In addition to this check for multicollinearity, the regressions underlying Tables 7, 8 and 9, 10 and 11 have been checked for robustness to outliers and to heteroskedasticity, using STATA's "robust regression" and "robust" commands. The reported results hold up through these checks.

Analysis and results

Team formation

We hypothesized that foreign-born founders would be more likely to found firms as members of teams, rather than as solo entrepreneurs, in order to gain access to

Table 1 Descriptive data for regression variables

a. Continuous variables								
	Observations	Minimum	Maximum	Mean	Std. deviation			
ln (Firm employment)	1346	1.1	10.6	2.5	1.1			
ln (Firm age)	1213	1.6	4.6	2.5	.6			
Correlation of these two continuous variables is .15.								
b. Categorical variables								
Team composition	Native-born team: all white (reference category)	Native-born team: white + minority	Native-born team: all minority	Mixed team: White + foreign-born	Mixed team: White + minority + foreign-born	Mixed team: Minority + foreign-born	Foreign-born team: All foreign-born	Total
	370	23	7	55	4	8	36	503
Prior tie between founding team members	Family (reference category)	School	Work	None	Other	More than one	Total	
	176	35	203	73	42	12	551	
Most highly educated founder	High school or less	Some college	Two year college degree	Four year college degree	Masters degree	Doctorate/professional degree	Total	
	88	91	68	484	319	142	1192	
2 digit SIC	MINE	TEXTILE	PAPER	CHEM	PETROL	PRIMETAL	MACHIN	
	18	5	6	59	3	3	178	
2 dig. SIC	ELEC	TRANS	INSTMT	COMM	BUSSERV	ENGSERV	SERV	TOTAL
	72	40	53	16	354	485	54	1346
c. Dummy variables								
	No	Yes						
Team-founded firm?	727	597						
Mixed-nationality team (team-founded firms only)?	424	77						
Intl. business strategy (team-founded firms only)?	403	172						

Missing values (responses such as “don’t know” or “refused”) are omitted resources that they would otherwise have difficulty mobilizing. Table 2 shows that we find no support for H1. We use native-born participation in teams as a baseline for comparison. 68% of the foreign-born founders participated in teams compared to 65% of the native-born founders. A chi-squared test shows no statistical difference between the two groups.

As Table 3 shows, the average size of the founding teams is also nearly the same for the two groups, 2.5 members for teams containing foreign-born members and 2.3 members for teams containing native-born members. When we subdivide these categories further, to account for mixed teams (creating mutually exclusive categories), we find that the size of the mixed teams is a bit bigger, averaging 2.6 founders per team, compared to about 2.3 founders for teams comprised only of native-born or only of foreign-born founders. None of these differences is statistically significant.

H2 predicts that homophily will drive team composition. Our results with regard to this hypothesis are intriguing. We can see from Table 1(b) that foreign-born founders are more likely to join mixed teams than teams containing only foreign-born members. This observation suggests that the hypothesis lacks support. However, we might also interpret this observation as reflecting the greater environmental availability of potential native teammates (natives make up 87.2% of the founders in the sample), rather than the preferences of foreign-born entrepreneurs.

Digging into the data more deeply allows a more nuanced interpretation. H2 implies that outsiders are more likely to team up with outsiders, and we find some evidence for this interpretation. For instance, Table 4 shows that foreign-born male founders are slightly more likely to be found on teams with females than native-born founders, although the difference is not statistically significant in a chi-squared test.

Table 5 shows that foreign-born founders are significantly more likely to team up with U.S. minority entrepreneurs than are white, native-born founders, although the numbers are small. (The number of observations differ for gender and race because more respondents declined to answer the question about race than about gender.) In the majority of teams that included foreign-born and U.S. minority founders, we find some evidence of shared ethnicity. For instance, a team with a Mexican-born founder also contains a native-born founder of Latino ethnicity. Because we used U.S. Census categories for U.S. minorities, such as “Latino” and “Asian-American,” we cannot be certain about ethnic homophily that encompasses both foreign- and native-born entrepreneurs. It is possible, for instance, that the Asian-American partner of a

Table 2 Team participation by founder nativity

Nativity of entrepreneur	Individual founders	Team founders	Total founders	Share of team founders
Foreign-born	85	179	264	68%
Native-born	619	1148	1767	65%
All	704	1327	2031	65%

Pearson chi-square = 0.8146 Pr = 0.367

Table 3 Team size by founder nativity

Nativity of members of founding team (team-founded firms only)	Number of teams	Number of founders	Average founding team size
All members foreign-born	36	82	2.3
All members native-born	448	1024	2.3
Mixed foreign- and native-born	84	221	2.6
At least one member foreign-born	120	303	2.5
At least one member native-born	532	1245	2.3
All	568	1327	2.3

Pearson chi-square (all foreign vs. all) =0.0151 Pr=0.902

Pearson chi-square (mixed vs. all) =0.0836 Pr=0.772

Pearson chi-square (all native vs. all) =0.7455 Pr=0.388

Top three rows are mutually exclusive and sum to final row. Last two rows are not mutually exclusive, because mixed teams are double-counted

Korean-born entrepreneur is of Indian or some other Asian heritage, rather than Korean.

Our final exploration of team formation employs very crude categories of “cultural distance” (Hofstede 1980; Ng et al. 2007) between other countries and the U.S. as a proxy for ethnic homogeneity, the variable highlighted by Ruef et al. (2003). The U.K. and Ireland and the English-colonized “New World” countries of Canada and Australia are culturally “closest” to the U.S. The rest of Europe is the next closest, followed by Latin America. The rest of the world is lumped together in the most distant category. Table 6 shows that although the foreign-born founders are roughly equally likely to found firms individually across regions, those who are from regions that are culturally closer to the U.S. are more likely to team up with white, native-born entrepreneurs than those who are from more culturally distant regions. 43% of the entrepreneurs from the U.K., Ireland, Canada, or Australia teamed up with white, native-born entrepreneurs, compared to only 28% from the rest of Europe, 24% from Latin America, and 16% from the rest of the world.

We interviewed a non-representative group of mixed founding teams. Their stated reasons for teaming-up with one another generally focused on functional complementarity. For instance, in a biotechnology firm, one partner was relied upon

Table 4 Team formation by gender and nativity

	All Founders Male	At Least One Female Founder	N
All Native-born Male Founders	63.5% (native-born males)	36.5% (native-born male+female)	427
At Least One Foreign-born Male Founder	59% (foreign-born male+native-born male)	41% (foreign-born male+female)	99
N	329	197	526

Pearson chi-square =0.8171 Pr=0.366

Table 5 Team formation by race and nativity

	All Founders Are White or Foreign-born	At Least One Minority Founder	N
At least One White Native-born Founder	94% (white)	6% (white+minority)	393
At least One Native-born and One foreign-born Founder	82% (white+foreign-born)	18% (minority+ foreign-born)	67
N	425	35	460

Pearson chi-square =11.0556 Pr=0.001

for his social network and the other, his executive skills. In one case, a foreign-born entrepreneur's international outlook and network was listed by his teammate as a source of functional complementarity, but it was not the most important reason. Two of the teams included partners who are related by a marriage of a U.S. native to a foreign-born spouse. In one case, the spouse was a team member; in the other, the spouse was a cousin of the team member. Marriage may be an important mechanism for bridging social and cultural distance (Liao et al. 2011). Our data do not allow us to study this possibility quantitatively. Finally, we believe that in at least two cases, co-ethnicity of native- and foreign-born teammates facilitated communication and trust within the founding team.

Impact of founding team composition on firm performance

The rest of our hypotheses pertain to the impact of founding team composition on firm performance. We use firm employment, controlling for age, sector, and founders' education, to measure performance. As noted above, this approach provides a proxy for average growth over the firm's lifetime in lieu of year-on-year growth data. We test first the received wisdom from the literature that team-founded firms out-perform individually-founded firms. We find support for H3 in our dataset. As Table 7 shows, team-founded firms have significantly higher employment than individually-founded firms. The p-value is well below .01.

H4a is not supported by our analysis. Table 8 reports a regression, using the same dependent variable and control variables as the previous one, on the team-founded

Table 6 Team formation by cultural distance from U.S. of country of origin of foreign-born team members

Team Composition	Australia, Canada, Ireland, U.K.	Rest of Europe	Latin America	Rest of World	All
Individually founded	34%	31%	32%	37%	34%
White native-born+ foreign-born	43%	28%	24%	16%	25%
All foreign-born	18%	36%	32%	42%	34%
Other	4%	5%	12%	7%	7%
N	44	58	25	102	229

Table 7 Impact of entrepreneurial teams and individuals on firm performance

	Coefficient	Standard error	P-value
Team-founded firm (dummy variable)	.24	.064	.000
Ln (firm age)	.31	.057	.000
Constant	1.49	.17	.000

Linear regression with controls for 2-digit industry sector and founder education (not shown)

Dependent variable: ln (firm employment)

Observations 1072

R^2 0.10

firms in our sample for which we have the necessary data. The independent variable tested is categorical, dividing the firms according to whether their teams are composed of white native-born, minority native-born, or foreign-born, and all combinations thereof. Of all team types, only teams made up of foreign-born and minority entrepreneurs performed significantly better ($p = .03$) than teams founded by all white native-born entrepreneurs (the reference category). However, there are only eight firms in this category, too few to feel confident about generalizing from.

We then regrouped these categories so that teams comprised of members of only one nationality (whether U.S. or non-U.S.) were distinguished from teams comprised of members from more than one nationality. This regression, reported in Table 9, does not yield a statistically significant coefficient for team composition.

H4b requires us to condition the previous analyses on firms pursuing international business strategies. We do so by using a survey question that asks whether the firm has a significant relationship with a foreign partner. The bivariate cross-tabulation using affirmative answers to this question shows that firms with mixed founding

Table 8 Impact of team composition on firm performance – white, minority, foreign-born

	Coefficient	Standard error	P-value
Native-born team: white + minority	−.066	.24	.78
Native-born team: all minority	.36	.60	.55
Mixed team: White + foreign-born	.050	.16	.75
Mixed team: White + minority + foreign-born	−.18	.54	.74
Mixed team: Minority + foreign-born	.92	.42	.03
Foreign-born team: All foreign-born	.091	.21	.66
Ln (firm age)	.33	.09	.000
Constant	1.76	.26	.000

Linear regression with controls for 2-digit industry sector and founder education (not shown)

Dependent variable: ln (firm employment)

Omitted category for team dummy variable: Native-born team – all white

Observations 429

R^2 .077

Table 9 Impact of team composition on firm performance – single or mixed nationality

	Coefficient	Standard error	P-value
Mixed nationality team: native- or foreign-born (dummy variable)	.11	.13	.44
Ln (firm age)	.34	.091	.000
Constant	1.3	.54	.01

Linear regression with controls for 2-digit industry sector and founder education (not shown).

Dependent variable: ln (firm employment)

Observations 427

R^2 .067

teams have more employees than firms founded by single-nationality teams. However, the relationship does not hold up in the multivariate regression (see Table 10), when age of firm, sector, and education of founders are included as controls.

Our final quantitative analysis considers the impact of the prior relationships between founding team members on firm performance. Our survey contained a question that asked whether the team members knew each other through family, work, school, or other ties before getting together to start the firm. As Table 11 shows, firms founded by entrepreneurs who worked together before forming a team performed significantly better ($p = .01$) than firms founded by teams who had family ties (the reference category in the regression).[4] Only 33 firms in the sample met the conditions called for by H5, both mixed founding teams and prior work ties. These firms are much larger on average than firms with only one or neither of these characteristics, but this result is not statistically significant in a multivariate regression (not shown), perhaps in part because of the small number of such firms.

Discussion and conclusions

This paper contributes to an emerging literature on foreign-born entrepreneurship by exploring how foreign-born entrepreneurs may shape founding team formation and firm performance. The study is carried out among relatively successful firms in the U.S. high-tech sector. This setting imposes a selection bias on the analysis, which limits the generalizability of the findings. Nonetheless, we would argue that the findings support further research on this subject in other, less constrained contexts. As foreign-born entrepreneurs increasingly move out of ethnic enclaves and into the mainstream, globally-connected economies of the countries of immigration, and from necessity entrepreneurship to opportunity entrepreneurship, the questions that we ask here will be of growing importance.

[4] If we omit educational level of the founders in this regression, the significance of the work tie variable drops below statistical significance, although none of the education variables is significant, either. If we think of the education variable as a proxy for positive selection among immigrants (in other words, the U.S. chooses them because of their academic prowess), we may hypothesize that higher and graduate education can substitute to a limited degree for prior shared work experience in the development of team trust.

Table 10 Impact of team composition on firm performance for firms pursuing international business strategies

	Coefficient	Standard error	P-value
Mixed nationality team: native- or foreign-born (dummy variable)	.14	.27	.60
Ln (firm age)	.52	.20	.01
Constant	1.4	1.2	.25

Linear regression with controls for 2-digit industry sector and founder education (not shown).

Dependent variable: ln (firm employment)

Observations 130

R^2 .10

With respect to team formation, we find, like Ruef et al. (2003) that homophily is an important factor. Foreign-born founders are not only more likely than chance would suggest to team up with others who are foreign-born, they are also more likely than their white, native counterparts to team up with other "outsiders," namely women and U.S. minorities. The effect of homophily is stronger the greater the "cultural distance" between the entrepreneur's country of origin and the U.S. Although our data are not sufficient to draw strong conclusions, the qualitative interviews indicate that co-ethnicity and marriage ties help to bridge the cross-national cultural gap in team formation.

We do not find support in our sample for the hypothesis that foreign-born entrepreneurs are more likely to participate in teams than native-born entrepreneurs. In fact, the share of individual founding does not vary much across our measure of cultural distance. Rather than finding partners whose national origins are different and thus may be complementary to their own experiences in a variety of ways, foreign-born entrepreneurs more typically go it alone or find partners who are similar to them on this dimension.

Table 11 Impact of prior ties between founding team members on firm performance

	Coefficient	Standard error	P-value
School tie	.30	.21	.16
Work tie	.30	.12	.01
No prior tie	.12	.16	.44
Other tie	−.09	.20	.65
More than one tie	.26	.37	.48
Ln (firm age)	.38	.09	.000
Constant	1.49	.27	.000

Linear regression with controls for 2-digit industry sector and founder education (not shown)

Dependent variable: ln (firm employment)

Omitted category for tie dummy variable: family tie

Observations 453

R^2 .08

Turning to the impact of founding team composition on firm performance, we find modest impacts of nationality diversity. Following Chaganti et al. (2008) and others, we expected that this form of diversity would translated into better performance, particularly in international competition, where knowledge of more places and cultures would seem to be a significant advantage. Our regression coefficients have the right signs to support this argument but do not achieve statistical significance. Larger and more detailed datasets will be needed in order to refine the variables on both sides of these equations.

We conclude that our research has been useful and signals that further study may produce even more interesting results. The literature shows that team formation and team composition may affect firm performance, and we know that foreign-born entrepreneurs are destined to play a larger role in the entrepreneurial economies and thus in founding teams in receiving country economies in the future. The nexus of globalization, entrepreneurship, and migration is dynamic and will be difficult to pin down in cross-sectional research. But that only means that we need to be more creative and expansive in our efforts.

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Appendix A

Table 12 High-Technology SICs (3 Digit)

Crude petroleum and natural gas	131
Cigarettes	211
Miscellaneous textile goods	229
Pulp mills	261
Miscellaneous converted paper products	267
Industrial inorganic chemicals	281
Plastic materials and synthetics	282
Medicinals and botanicals	283
Soap	284
Paints	285
Industrial organic chemicals	286
Agricultural chemicals	287
Miscellaneous chemical products	289
Petroleum refining	291
Miscellaneous petroleum and coal products	299
Reclaimed rubber	303
Nonferrous roling and drawing	335
Ordnance and accessories not elsewhere classified	348

Table 12 (continued)

Engines and turbines	351
Construction and related machinery	353
Metal working machinery	354
Special industry machinery	355
General industrial machinery	356
Computer and office equipment	357
Industrial machines. N.e.c	359
Electronic distribution equipment	361
Electrical industrial apparatus	362
Household appliances	363
Electric lighting and wiring	364
Audio and video equipment	365
Communications equipment	366
Electronic components and accessories	367
Miscellaneous electrical equipment and supplies	369
Motor vehicles and equipment	371
Aircraft and parts	372
Railroads	374
Guided missiles and space	376
Miscellaneous transportation equipment	379
Search and navigation equipment	381
Measuring and controlling devices	382
Optical instruments and lenses	383
Medical instruments and supplies	384
Ophthalmic goods	385
Photographic equipment and supplies	386
Communication services not elsewhere classified	489
Computer and data processing services 737	737
Engineering and architectural services	871
Research and development and testing services	873
Services, n.e.c	899

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