



Ethnic matching in the U.S. venture capital market[☆]



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ABSTRACT

We document the role of entrepreneurial founder and venture capital (VC) partner co-ethnicity in shaping investment relationships. Co-ethnicity increases the likelihood that a VC firm invests in a company. Conditional on investment, co-ethnicity strengthens the degree of involvement by raising the likelihood of VC board of director involvement and increasing the size and scope of investment. These results are consistent with trust and social-network based mechanisms. Shared ethnicity in our sample is associated with worse investment outcomes as measured by investment liquidity, however, which our results suggest might stem from looser screening and/or corporate governance.

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1. Executive summary

In addition to being resource-poor like other entrepreneurs, ethnic entrepreneurs face a further challenge of financial resource assembly by virtue of their ethnic status. While most of the existing literature studies remedies involving the rise of informal institutions (such as rotating credit associations) or changes to formal ones (such as changes to legal or regulatory rules affecting banks), we explore how co-ethnicity between venture capitalists (VCs) and entrepreneurs can accomplish a similar financing function. In the context of the U.S. VC industry, we find that such co-ethnicity is correlated with a higher likelihood of investment, and that co-ethnic investments take place earlier and with much deeper resource commitments on the part of the VC. However, investment matches based on shared ethnicity are correlated with less successful company outcomes.

This research opens the possibility that social proximity and networks can, within existing formal financial institutions, overcome the challenge of funding ethnic entrepreneurs. Kinship and behavioral preference-based motivations, as well as faster and more complete information transmission stemming from a shared social network, are dual mechanisms behind the tightly-coupled co-ethnic economic relations. The results also identify possible trade-offs associated with this phenomenon of ethnic investment matching.

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2. Introduction

Entrepreneurs who are ethnic minority immigrants form a large subgroup of all innovation-based founders in the United States (Saxenian, 1999, 2006; Wadhwa et al., 2007). For companies launched between 1995 and 2005, there was at least one key immigrant founder in 25% of technology and engineering companies across the U.S., and in 52% of all companies based in Silicon Valley. A sizeable fraction of venture capital (VC) firms also employs ethnic minority professionals. Individuals with a shared ethnicity often form networks where they interact and exchange ideas with each other. As reported by Saxenian (2006), there are at least 30 professional and networking associations targeting immigrants in Silicon Valley alone (e.g., The Indus Entrepreneur, TiE), composing over 33,000 members. Therefore, ethnic ties could be an important factor in shaping how the U.S. VC market operates. We empirically examine this expectation, and show that a shared ethnicity (between investment partners and founders) matters for whether, when and how VC firms invest in companies.

Ethnic businesses may face special organizational resource-acquisition challenges stemming from their disadvantaged ethnic business status beyond the already significant obstacles facing the typical new enterprise (for an overview, please see Aldrich and Waldinger, 1990), though there is heterogeneity in the degree to which ethnic groups face such resource challenges (e.g., Bates, 1994, 1997). This is due to immigrant entrepreneurs' often circumscribed access to established financial institutions such as banks and credit.

This funding access shortfall for ethnic entrepreneurs has motivated the vast majority of literature related to both discrimination and the rise of informal institutions to address the funding gap. Studies of markets for small business credit suggest statistical discrimination toward racial minorities (e.g., Cavalluzzo and Cavalluzzo, 1998; Blanchflower et al., 2003). The well-documented phenomenon of ethnically-based rotating credit associations (e.g., Geertz, 1962) is a good example of an informal social-network based institution arising to address ethnic business shortfalls in financial resource mobilization.

Our research departs from examining how informal institutions or even reforms to formal institutions (for example, through legal or regulatory action) can address financial access by ethnic entrepreneurs. Our empirical findings suggest that having co-ethnics on both sides of a formal resource market, the market for venture capital finance, can accomplish a similar function with regard to shaping the likelihood of investment matches and the depth of such relationships when investments are made.

From a broader perspective, our findings add to the literature on the impact of culture in economic exchange (Becker, 1996; Guiso et al., 2006; Iyer and Schoar, 2010). That literature defines culture as shared values, beliefs, and norms of a group or community (a definition that fits well with ethnic groups). In the same vein, our evidence contributes to the growing literature showing that social proximity, in addition to geographical proximity, can matter for financial relationships.¹ This perspective complements the literature showing the importance of ethnicity for trust (Glaeser et al., 2000; Fisman, 2003), innovation (Agrawal et al., 2007; Kerr, 2008) and founding team composition (Ruef et al., 2003).

An open issue under this form of ethnic-network-based resource access is the extent to which this network structure can provide resources to the entrepreneurial venture. A broader understanding of the depth of economic relationships conditional on a match (which in turn is significantly related to interpersonal affiliation as proxied by co-ethnicity) is important, and is the most novel aspect of our analyses. The intensity of such co-ethnic relationships may suggest implications about the process of resource acquisition for less advantaged entrepreneurs, who also may not have the same access to formal resources as others. For example, our results help us understand the depth of investment relationship embeddedness between co-ethnics as compared to non co-ethnics along the dimensions of board representation and the span of involvement, all else equal.

There is also an interesting timing-of-resource-acquisition dimension to our analyses, which contributes to a better understanding of the evolution and persistence of homophily in certain economic relationships and markets. For example, one side of a market may get seeded as a result of accident or purpose with certain types of individuals. Our evidence suggests a process, at least in the VC context, by which there is reinforcement of those characteristics in the market quite early on in the relationship for co-ethnics (board representation and first round of funding participation). While beyond the scope of our paper, the finding that co-ethnic networks for resource flows are activated early in an investment relationship rather than evolving in strength only later has implications for social and public policy. Note that this inference would not be possible under the existing analyses in the literature predicting the likelihood of an investment relationship.

By analyzing a large dataset covering a broad cross-section of the U.S. VC industry, we find that a shared ethnicity between founder and VC increases the probability of an investment match from 4.7 to 5.7 percentage points, a 21% increase. Furthermore, conditional on an investment, co-ethnicity of the counterparties is associated with much deeper investments as measured by the likelihood of board-level involvement (a 16 percentage point increase), earlier and more persistent investment behavior (the probability of a first round investment is raised by 10 percentage points), more capital invested (\$3 million more, on average), and more entrepreneur-friendly financial contracts.² A caveat to these results is that we measure ethnicity coarsely, via surnames of individuals, but this measurement allows us to study a much larger sample. We later discuss the benefits and costs to this approach.

¹ Most existing papers study social proximity based on a shared university affiliation. One set of findings suggests that a shared university affiliation can be beneficial by helping mutual fund managers outperform the market (Cohen et al., 2008) and financial analysts make better forecasts (Cohen et al., 2010). Another set of findings, however, suggests that social ties based on university affiliation can be detrimental: it can worsen corporate governance (Nguyen, 2012) and is associated with lower market valuations (Fracassi and Tate, 2012). A final set of findings show that social ties based on university affiliation can make firms behave in more similar ways, such as with respect to executive compensation (Shue, 2013).

² These statistics are calculated from univariate comparisons. Regression results with controls yield similar magnitudes. Furthermore, the results are robust to a variety of controls, including VC firm and company fixed effects. Our regressions with company fixed effects compares the investment behaviors of the focal VC firm versus other VC firms investing in the focal company; our regressions with VC firm fixed effects compares the focal VC firm's investment behavior in the focal company compared to other companies. Because the coefficient on founder-VC co-ethnicity remains qualitatively similar across specifications with different included fixed effects, we rule out the possibility of time invariant omitted variables driving the results.

Our analysis further suggests that matches based on a shared ethnicity are associated with less successful company outcomes. We find a negative relation between co-ethnicity and the chance of an initial public offering or merger/acquisition.³ This result suggests that partners of VC firms may either overestimate the benefits of ethnicity when they select portfolio companies or fail to impose a sufficient level of monitoring after the investment is made. This interpretation is supported by the result that conditional on a match, VCs allocate more entrepreneur-friendly rights in their financial contracts to co-ethnics. An important caveat for this part of our analysis is that we equate the investment outcome with the company's exit mode due to data limitations. This outcome variable is a coarse measure of investment performance, though it is commonly used in the entrepreneurship literature. Furthermore, unobserved and/or unmeasured inputs to matching processes across a wide range of contexts can be quite severe (Fox et al., 2014), thereby leading to a range of estimated empirical relationships.

To summarize our findings, we show that co-ethnicity is strongly associated with investment matches between VC firms and entrepreneurial companies. A shared ethnicity increases the likelihood of a match occurring, and strengthens the VC firm's involvement conditional on a match. However, this rationale for matching is associated with worse investment outcomes. The remainder of the paper is structured as follows. Section 3 develops our theoretical hypotheses, while Section 4 introduces the data. Section 5 first presents results on matching, and then discusses and distinguishes between competing explanations for our results. Section 6 contains a brief concluding discussion.

3. Prior literature and hypotheses

Based on the perspective that entrepreneurship is a process embedded within a social context (Aldrich and Zimmer, 1986), there might be two mechanisms by which ethnic entrepreneurs may disproportionately match with co-ethnic VCs (and do so in a “deeper” fashion when there is such a match) in the face of resource mobilization challenges: a pure preference-based/trust mechanism and an “enforced” trust one in which network closure and other sanctioning mechanisms within an ethnic group may lower the cost of matching between co-ethnics. One or both of these mechanisms are consistent with ethnic homophily in the market for startup financing and co-ethnic matching between entrepreneur and investor.

The first mechanism is an individual preference for conducting business with co-ethnics. The motivation may be in promoting a given group's stature, or may be due to kinship ties within a given group facing a common situation (perhaps leading to “bounded solidarity” as described by Portes and Sensenbrenner, 1993). For example, patients of an ethnic group may prefer to be medically treated by a co-ethnic health staff (and vice-versa). An early study showed that the geographic distribution of ethnic physicians in Chicago was split more according to ethnic neighborhood lines than would otherwise be expected (Lieberson, 1958). More generally, the phenomenon of homophily in social networks highlights the role of personal similarity breeding connection, and is a basic organizing principle that is prevalent across a wide range of social interaction contexts (e.g., McPherson et al., 2001), including in entrepreneurial team formation (Ruef et al., 2003). While homophilous structures can arise from means outside of strictly preference-based ones, trusted relations, as characterized by individual risk and interdependence (Rousseau et al., 1998), are salient features of co-ethnic interactions.

A second mechanism resulting in co-ethnic matching in the entrepreneurial finance market is enforced trust, which is characterized in the economic sociology literature as a form of social capital (e.g., Coleman, 1988). Co-ethnics are more likely to belong to a tighter, or more “closed” social network in which information about the participants and its actions are more quickly spread within the network by virtue of shared connections among the individuals (also due to forces of homophily). As a result, misconduct by a network participant is spread more quickly and comprehensively than would otherwise be the case. Knowing that these sanctions are in place to penalize in-group misconduct may give more assurance for individuals to join and engage in a given network in the first place, thereby leading to a self-reinforcing cycle resulting in a stronger network structure. Ethnically-based rotating credit associations in which formal contracts are usually not employed in lending relationships is an example of this mechanism at work. As a result, co-ethnics may wish to conduct business together not (just) because of their strict preferences of wanting to promote the interests of their own ethnic group, but due to opportunism safeguards associated with a tight-knit social network.

One or both of these mechanisms help explain the prior finding in the literature regarding the reliance of ethnic businesses on co-ethnics in their social network for a variety of economic transactions such as upstream business relationships (e.g., Kalnins and Chung, 2006) and the provision of trade credit (e.g., Fisman, 2003).

In the market for venture capital funding, anecdotal evidence also suggests that social networks and trusted referrals are important in explaining the matching process (Fried and Hisrich, 1994). Trusted referrals and social networks can include a co-ethnicity dimension too. In contrast to the typical financings utilized by mature companies (i.e., public equity and bond offerings), *people* shape the demand and supply of venture capital financing to a significant degree. On the demand side, individual founders' human and social capitals are key assets in young, entrepreneurial companies. On the supply side, VC firms consist of individual partners who screen, monitor and provide operational support to portfolio companies. Thus, the success of an entrepreneurial company hinges critically on the capabilities of its founders and partners (Hsu, 2007; Sørensen, 2007). Moreover, the relational nature of the VC market

³ Most papers in the VC literature use IPO and M&A outcomes as a proxy for investment success. An arguably better outcome measure would be the internal rate of return (IRR) of the investments, however, these data are not broadly available due to the private nature of entrepreneurial firms and their VC investors (or if so, perhaps subject to success-biased reporting).

means that these two groups have frequent personal interactions with each other. Founders meet with partners during pitching, due diligence, contract negotiations, and board meetings. We therefore expect the following:

Hypothesis 1. Co-ethnicity between entrepreneurial founder and VC raises investment likelihood.

Hypothesis 2. Conditional on an investment, co-ethnicity between entrepreneurial founder and VC deepens the investment relationship.

A natural next step is to investigate how such matching relates to investment outcomes. On the one hand, a VC firm could derive several benefits from making co-ethnic investments. Consider a U.S. company founded by an Indian-born entrepreneur that seeks venture funding. An Indian-born (U.S.-based) VC partner may have soft information that allows him or her to better evaluate the ability of this entrepreneur (Stein, 2002; Petersen and Rajan, 2002; Berger et al., 2005). Moreover, the partner may be a member of the same ethnic-based social network as the entrepreneur. Such a network can provide the partner with additional soft information, trust and reputation to his/her relationship with the entrepreneur (Greif, 1989, 1993; Landa, 1994; Glaeser et al., 2000; Fisman, 2003). The partner and entrepreneur may also have more productive board meetings after the investment is made. This could improve the likelihood the firm will realize a successful exit, given that the board of a venture-backed firm engages in both monitoring and value-added support. If these benefits were important in practice, then we would expect to observe co-ethnic investments to be prevalent and associated with superior performance.

On the other hand, investment relationships between co-ethnics may instead be associated with worse outcomes. The Indian-born partner may also be overconfident in his/her ability to evaluate and monitor Indian-born entrepreneurs, thereby matching with companies of inferior quality. Moreover, the partner may feel social pressure from the ethnic-based network to support entrepreneurs from the ethnic network. Rather than improving the VC's monitoring ability, boards with co-ethnic members may hold meetings that are too undemanding and/or impose too few control mechanisms on the entrepreneur. Moreover, unfounded trust could result in less intensive due diligence of the entrepreneurial company.

A second mechanism predicting worse outcomes from co-ethnic financing is groupthink (Janis, 1982), which is more likely to hold the more similar are members of a group.⁴ While the evidence on groupthink in the social psychology literature is mixed (e.g., Tetlock et al., 1992; Esser, 1998), the possibility that entrepreneurial actions might go under-challenged as a result of personal similarity with the VC may dampen ultimate outcomes. From a resource perspective, redundant ties (as would apply in co-ethnic networks) are less likely to yield diverse, valuable information (Granovetter, 1973), which can also hinder economic outcomes. While Granovetter considers the context of the job market, the idea is that “weak” ties (or looser, more diverse networks) are more likely to contain varied and non-redundant information, with beneficial ultimate effects (thus, the “strength of weak ties”). For example, Huang et al. (2013) find that entry by ethnically Chinese firms (from Singapore, Hong Kong and Taiwan) into China is no more successful with regard to profitability than non-ethnically Chinese firms. Given the competing mechanisms and predicted effects relating co-ethnicity to investment outcomes, the directional effect seems to be more of an empirical matter⁵:

Hypothesis 3a. Co-ethnic entrepreneurial founder – VC investments will be associated with enhanced investment performance.

Hypothesis 3b. Co-ethnic entrepreneurial founder – VC investments will be associated with diminished investment performance.

4. Data

4.1. Sample design

We collect our data, which spans 1984–2009, from VentureEconomics (VE), which is one of the largest and most complete databases on VC investments.⁶ We restrict our attention to U.S. VC investments in order to eliminate the influence of any institutional differences that exists across countries. We use the part of the VE data that includes information on the name of the individuals who are involved in VC investments. The database collects this name information from web pages, news reports, press releases and proprietary surveys. For each company (where information is available), we first identify the name of all company founders. As reported in Panel A of Table 1, our final sample includes 5093 unique individuals who have founded 3125 unique companies. Untabulated analyses show that our sample is a broad cross-section of company locations, industries, and company ages and development stages at the time of financing.

⁴ Tetlock (1979: 1314) defines groupthink: “Groupthink occurs when independent critical analysis of the problem facing the group assumes second place to group members’ motivation to maintain group solidarity and to avoid creating disunity by expressing unpopular doubts or opinions.”

⁵ The bifurcated results from related recent papers on this outcomes analysis may reflect these competing mechanisms. Hegde and Tumlinson (2014) confirm our finding that shared ethnicity predicts matching in the VC industry, but find a positive association with company outcome. This discrepancy can be attributed to critical differences in sample design and empirical methodology. Unlike our paper, Hegde & Tumlinson (i) include both U.S. and foreign VC firms/companies, (ii) code more ethnic groups, including “broad” ones (e.g., Anglo-Saxon/British), (iii) combine founders and individuals who are hired on later, and (iv) restrict their sample to investments where the VC firm took a board seat. On the other hand, Gompers et al. (2012), who study matches between VC firms formed in investment syndicates, find that co-ethnicity increases the likelihood of a match but decreases the chance of a successful company outcome. Similarly, Freeman and Huang (2014) provide evidence that co-ethnic scientists are more likely to coauthor together (relative to chance), but that this homophilic behavior is associated with weaker publications.

⁶ Kaplan et al. (2002) report that the investment coverage of VE is about 85%. The fact that many companies in VE report no VC board seats, however, suggests that this part of the data has lower coverage. As reported by Kaplan and Stromberg (2003), VCs almost always have some representation on the board of directors. As compared to self-reports of other information such as venture valuation, however, board representation is probably not as subject to strategic misreporting.

Table 1

Sample overview.

We obtain from VentureEconomics 10,081 listed actual matches between a VC partner and a company founder. We aggregate these individual-based matches to VC and company levels, and create our sample of 9079 “VC-company matches”. This sample includes both matches where the VC invested and took a board seat and matches where the VC invested but did not take a board seat. We identify the partner's ethnicity from any investment made by the VC firm concurrently with an investment in the focal company. Panel B reports statistics for key variables and Panel C for variables used as additional controls. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Downside Protection Index and Pre-Money Valuation reflect average for all rounds in which VC invested (and data is available). Data on Downside Protection Index come from VCExperts. The sample for company exits is restricted to investment made prior to 2003, to ensure sufficient time for company to realize exit (our data are collected to 2009).

Panel A: sample overview			
VC partner – company founder matches			10,081
Unique company founders			5093
Unique companies			3125
Unique VC partners			2361
Unique VCs			966
VC-company matches			9079
Panel B: summary statistics of key variables (sample is VC-company matches)			
	Obs	Mean	Std. dev.
Same ethnicity	9079	5.2%	22.2%
VC IPO experience	9079	15.1%	10.9%
VC board seat (1 = yes, 0 = no)	9079	59%	49.2%
Company age first time VC invested in company (years)	8827	2.9	3.4
VC invested in first round of company (1 = yes, 0 = no)	9079	44.2%	49.7%
Number of rounds VC invested in company	9079	2.2	2.2
Total dollar amount VC invested in company (in \$m)	9079	9.1	14.0
Pre-money valuation (in \$m)	4815	58.1	97.0
Downside protection index (Bengtsson and Sensoy, 2011)	1923	4.7	1.5
IPO exit (1 = yes, 0 = no)	4934	16.7%	37.3%
M&A exit (1 = yes, 0 = no)	4934	41.0%	57.3%
Panel C: summary statistics of additional controls (sample is VC-company matches)			
	Obs	Mean	Std. dev.
Distance between Company and VC (miles)	8804	812.8	1015.2
Patents 5 years after first VC round (1 = Yes, 0 = No)	9079	47.7%	0.5

We then obtain information about all the VCs that invested in each company in our sample. Our dataset covers 2361 unique individuals working as partners in 966 unique VC firms. Our final sample includes 9079 unique company-VC firm pairs. Each pair is formed by collapsing information on all (listed) company founders and all (listed) active partners at the VC firm. Importantly, we include both VC firms that took a board seat and VC firms that did not. The inclusion of VC firms with and without a board seat allows us to study not only how an ethnic match relates to the VC firm's investment in the company, but also how it relates to the decision to give the VC firm a board seat, conditional on an investment. This significantly broadens the scope of our study, but it also introduces an empirical challenge: we cannot directly measure the ethnicity of partners in VC firms that did not take a board seat. VE and similar databases do not list the names of the partners who were active at a given point in time in a given VC firm. We approximate the list of active partners by identifying all individual partners in the VC firm who took a board seat in any sample company that the VC firm financed during the same time period that it funded the focal company.

To illustrate our methodology, suppose VC Alpha in 2005 invested both in Company Beta and Company Gamma. VC Alpha took a board seat in Company Beta but not in Company Gamma. Suppose Company Gamma has a Chinese founder. From our data on board seats, we can directly observe the ethnicity of the partner(s) at VC Alpha who took a board seat at Company Beta. Suppose one such partner was Chinese. Since the VC firm's two investments were made in the same year, we classify the investment by VC Alpha in Company Gamma as a same-ethnic (Chinese-Chinese) match.

Our methodology relies on the assumption that all of the VC firm's active partners were, at least to some degree, involved in each investment. Our conversations with partners at VC firms confirm that this assumption describes the real-world VC investment process.⁷ If the assumptions were wrong, we may derive biased results on the importance of ethnicity. However, the likely bias is *against* finding significant results because we would estimate the influence of ethnic ties that do not exist in practice. Suppose in the above example that the Chinese partner at VC Alpha had no involvement in the investment in Company Gamma. If ethnicity was important then we would not identify it for the VC Alpha-Company Gamma pair. As we outline in Section 5, even in the presence of such possible bias, we find empirical patterns consistent with the importance of ethnic ties. We also run our tests using only the subsample for which we observe that the VC firm took a board seat in the company. The results are qualitatively very similar.

⁷ A typical VC firm assigns one or a few partners to each investment, who become formally responsible for screening, contract negotiations, monitoring, operational support, etc. All major decisions pertaining to whether, when and how to invest are typically approved at a partner-wide meeting at the VC firm.

4.2. Ethnicity

We use each individual's surname to determine his or her ethnicity. Our information on ethnic surnames comes from two sources. First, we use the database constructed by Kerr (2008), which lists the 100 most common surnames for Chinese, Indian, Japanese, Korean, Russian, Hispanic, and Vietnamese.⁸ Second, we use a list from Wikipedia of the most common Jewish surnames.⁹ We limit our attention to these eight ethnicities/groups because (i) they represent important subgroups that are active in the U.S. VC industry, and (ii) the large overlap in surnames makes it difficult to identify other ethnicities (e.g., many common Norwegian surnames are also common Danish surnames). We also do not analyze “broad” ethnic groups, such as Anglo-Saxon/British, because they consist primarily of individuals with little or no connection to each other due to shared ethnicity. It is formally incorrect to label Jewish people as members of an ethnic group. Rather, Jewish people form a group tied together by religion, culture and heritage. We choose to include Jewish affiliation in our analysis because a large number of VC partners and founders belong to this group. To simplify our use of language in the paper, we refer to Jewish also as an ethnicity.

The fact that we use name data to identify ethnicity introduces two problems to our empirical analysis. First, our estimated regression coefficients are noisy as the explanatory variable indicating co-ethnicity is measured with imprecision from the coded name data. This imprecision implies that some true co-ethnic ties may be misclassified as not having such ties, and some true non-ethnic ties may be coded erroneously as co-ethnic ties. So long as these dyadic coding imprecisions are randomly distributed, however, the resulting estimates should not be biased.

Secondly, we cannot separate between potentially important subgroups within ethnicities. For example, “Hispanic” is not a uniform group but combines people with origins from Cuba, Dominican Republic, Mexico, Spain, etc. However, this issue introduces a bias against finding significant results. Suppose ethnic matching matters if both the VC partner and founder were from Cuba, but not if the VC partner is from Cuba and the founder is from Mexico. By also identifying the latter case as an ethnic match, we are less likely to find significant results on matching. Despite these biases, we find a pervasive pattern of significant results on ethnic matching. Similarly, the Jewish group combines Jews who have lived several generations in the U.S. with Jews who have recently immigrated. Likewise, the Japanese wave of immigration to the U.S. was earlier than many other groups, and so perhaps this group may face fewer obstacles in organizational resource mobilization. Because we rely on name data to ascribe ethnicity, we cannot distinguish temporally recent and distant immigration.¹⁰ Our results are not driven by inclusion or exclusion of Hispanics, Jews, and Japanese groups, however, and so we conclude that while there may be heterogeneity in group composition and social status within and across groups, the relationship between our measured co-ethnicity and match intensity is a robust one.

We create the variable “Same Ethnicity”, which is the focus of our study, by comparing the ethnicity of any of the company's founders to that of any of the VC firm's partners. The variable takes the value 1 if there was an ethnic match based on the eight ethnic groups we coded (i.e., Chinese–Chinese), and 0 if either there was no ethnic match (i.e., Chinese–Indian) or if none of the individuals were from the coded ethnic groups (i.e., Other–Other). For pairs where there are multiple founders and/or multiple partners, it is possible that there is more than one ethnic tie. As reported in Panel B of Table 1, about 5% of all pairs involve an ethnic match.

4.3. Summary statistics

We collect a variety of company, VC and round characteristics for our sample of company–VC firm pairs. Panel B of Table 1 reports summary statistics of the focal variables. We note that 59% of all investments in our sample involve the VC firm taking at least one board seat. We use “VC IPO Experience” as our main proxy for the reputation/skill of the VC firm. This control variable captures the fraction of the VC firm's historical portfolio companies that had a successful IPO exit. The variable is annually updated so that it accurately reflects the VC firm's reputation/skill at the time of its first investment in the company. In unreported robustness tests, we replace it with other proxies for the VC firm's reputation/skill, such as VC firm age and number of historical companies. The results remain stable.

We use two measures of company maturity at the time of the VC firm's first investment in the company: “Company Age First Time VC Invested in Company (years)” and “VC Invested in First Round of Company (1 = Yes, 0 = No).” The average company age was 3 years and 44% of investments included a first round investment. We employ two measures of the VC firm's investment scope: “Number of Rounds VC Invested in Company” and “Total Dollar Amount VC Invested in Company (in \$m).” The average number of rounds was 2.2 and the average investment amount, which is a summation over all rounds in which the VC firm invested was \$9.1 million (with a standard deviation of \$14 million). Two variables measure the degree of company-friendliness of the financial contract: “Pre-Money Valuation (in \$m)” and “Downside Protection Index”. Each variable is calculated as the across-round average for each VC firm–company pair. The first variable is pre-money valuation, which determines how large of an equity stake the VC

⁸ In an earlier version of this paper we coded the ethnicity of founders and partners using both Kerr's database and biographical information (available for a smaller sample). We found that there was a very large overlap between these coding methods, confirming that the use of name data captures most individuals from the focal ethnic groups.

⁹ http://en.wikipedia.org/wiki/Category:Jewish_surnames.

¹⁰ One method that has been used in the literature to distinguish the degree to which immigration to the U.S. is recent is to collect information about the individual's undergraduate institution country location. Like our study, Chaganti et al. (2008) use surnames to identify individual ethnicity, but they also use foreign undergraduate institution country to designate individuals who are more recent immigrants for their sample of 52 individuals. While our study sample size is orders of magnitude larger, we unfortunately are unable to measure when immigration took place. Another possible method of collecting ethnicity data that does not rely on surname data would be to administer a survey and allow individuals to designate their ethnicity (this method would also allow data collection of when immigration took place). One weakness of this approach would be the possible bias associated with individuals choosing to respond to such a set of questions.

Table 2

Ethnicities.

This table reports the ethnicity for the VC partner, company founder, and company founder by whether the partner and founder ethnicities were the same or different. We aggregate individual-based matches to VC and company levels, so one observation is a unique match of a VC and a company. Sample size is 9079. Difference between the subsamples is reported and significance tested with a Wilcoxon test. *** marks significance at 1%, and ** significance at 5%.

	I	II	III	IV	V
	VC firms where (at least) one partner has ethnicity	Companies where (at least) one founder has ethnicity	Companies where (at least) one founder has ethnicity if VC firm has (at least) one partner with ethnicity	Companies where (at least) one founder has ethnicity if VC firm does not have (at least) one partner with ethnicity	Significance for Wilcoxon test of whether III is different from IV
Jewish	19.7%	8.2%	9.6%	7.9%	**
Indian	14.2%	9.2%	15.2%	8.2%	***
Chinese	5.5%	5.0%	9.8%	5.0%	***
Korean	3.5%	1.4%	1.3%	1.4%	
Hispanic	3.9%	1.6%	2.0%	1.5%	
Russian	1.7%	1.6%	1.3%	1.6%	
Japanese	0.9%	0.5%	0.0%	0.5%	
Vietnamese	0.3%	0.9%	0.9%	0.9%	

firm received in exchange for its investment. The average pre-money valuation was \$58 million (and a standard deviation of \$97 million), but it is only reported for about half of our observations. Because this variable is self-reported by companies and VC firms, average values from this subsample are likely higher than the ones for the full sample.

The second variable, Downside Protection Index, determines how much downside protection the VC received beyond what is implied by its equity stake. A high Downside Protection Index reflects a less company-friendly financial contract. Bengtsson and Sensoy (2011) present a detailed discussion of the meaning and importance of each of the six key cash flow contingencies that form the basis of the Downside Protection Index variable. This variable, which is collected from mandatory “Certificate of Incorporation” legal filings, is only reported for about a quarter of our sample. Bengtsson and Sensoy (2011) analyze how this sample is selected and conclude that it is largely representative with regard to company characteristics.

Finally, we use two measures that capture a successful outcome for the company: “IPO Exit (1 = Yes, 0 = No)” and “M&A Exit (1 = Yes, 0 = No).” We limit the sample to investments made prior to 2003 to ensure that all sample companies have sufficient time to realize their exit.¹¹ 17% of investments resulted in an IPO and 41% in a Merger and Acquisition (M&A). These statistics are somewhat higher than reported in other studies, reflecting the fact that both founders and partners are more likely to report their involvement in a successful venture-backed company.¹² This selective reporting is likely to bias our results against finding results on ethnic ties, however, because companies with higher ex-ante probability of success likely have access to a broader group of VC firms, including those without an ethnic match.

5. Empirical results

5.1. Initial evidence

If ethnic ties were important for how matches are formed in the VC industry, we would expect to observe them occurring more frequently than would otherwise be expected. Table 2 presents statistics consistent with this expectation. In the first column, labeled “VC firms where (at least) one partner has ethnicity”, we report the frequency of pairs with (at least) one ethnic partner. As for the most common ethnicities, we note that about 20% of VC firms have a Jewish partner, 14% an Indian partner, and 6% a Chinese partner. In the second column, labeled “Companies where (at least) one founder has ethnicity”, we report the frequency of pairs with (at least) one ethnic founder. About 8% of companies have a Jewish founder, 9% an Indian founder, and 6% a Chinese founder. These statistics show that ethnic founders play an important role in the U.S. entrepreneurship landscape, a finding that has been highlighted by Wadhwa et al. (2007).

We then compute conditional statistics of the founder's ethnicity based on the partner's ethnicity. Column three labeled “Companies where (at least) one founder has ethnicity if VC firm has (at least) one partner with ethnicity” reports the frequency of companies for which a founder shares the same ethnicity as the investing VC firm. This variable is identical to our focal variable “Same Ethnicity” that we use in our regression analysis, except it reports statistics separately for each ethnic group whereas “Same Ethnicity” aggregates this data across all ethnicities.

¹¹ Our data was collected in 2009, so this cutoff translates into a 7 year time period of realizing an exit.

¹² The implied number of IPOs in our sample is about 824. To put this in perspective, 35% of all 7377 IPOs in the US between 1980 and 2008 were VC-backed, equivalent to approximately 2582 IPOs (source: <http://bear.warrington.ufl.edu/Ritter/IPOs2008Factoids.pdf>). The implied number of M&A exit events in our sample is approximately 2023, which implies a ratio of approximately 2.45 M&As per IPO. This ratio is consistent with the overall landscape of exit events experienced by VC-backed firms as reported in Aggarwal and Hsu (2014).

Comparing across the third and the fourth columns of Table 2 reveals that the conditional probabilities of an ethnic founder are higher overall if the partner shares the same ethnicity. Column five reports the results of a Wilcoxon test, which finds that the difference between columns three and four is significant for the three most common ethnicities: Jewish, Indian and Chinese. This descriptive evidence is consistent with the view that ethnic ties matter for VC investments.

5.2. Empirical strategy

We next conduct more systematic empirical tests of the importance of ethnic ties. Our tests proceed in two steps. First, we analyze how the existence of an ethnic tie relates to the likelihood that a company and a VC firm form an investment match. Second, we analyze how the existence of an ethnic tie relates to the nature of the VC firm-company investment relationship, conditional on a match. We analyze whether the VC firm took a board seat, the timing of its first investment, the scope of its overall investment, and the design of the financial contract.

To study each of the above areas, we run a series of regressions where the dependent variable captures the focal dimension of the VC firm's investment and the key independent variable is "Same Ethnicity". In our baseline specifications, we include fixed effects for the year of the VC firm's first investment in the company (to control for VC fund vintage effects and annual differences in funding environments), company location (50 US state dummies) and industry (10 dummies based on the VE 10-segment classification). We also include "VC IPO Experience" to capture differences in VC firm investment behavior that are related to reputation/skill rather than ethnicity. For OLS regressions, we cluster residuals by both company and VC firm (Petersen, 2009). For other regression types, we cluster the residuals by firm.

In addition to our baseline specifications, we run OLS company fixed effect regressions. We switch to OLS because fixed effect probit models do not converge with our data. The OLS company fixed effect specifications allow us to rule out the influence of any company-specific factors that may correlate with ethnic ties. Moreover, they shed light on whether a VC firm with an ethnic match invests differently than other VC firms investing in the same company. This within-company comparison is arguably more interesting than the baseline specification, because a company cannot change the ethnic composition of its team of founders. We also run OLS VC firm fixed effect regressions. These specifications rule out the influence of any VC-specific factors that may correlate with ethnic ties. We can also use this within-VC firm comparison to study whether the VC firm invests differently in companies where an ethnic tie is present than it does in other companies. On the whole, we find qualitatively similar results in the baseline specifications without fixed effects, the specifications with company fixed effects, and specifications with VC firm fixed effects.

One may argue that the many dimensions of the VC firm's investment in a company are highly correlated with whether the VC firm took a board seat, which in turn may be related to an ethnic tie (we empirically validate this latter relationship). We account for the influence of board seats by including the control variable "VC Board Seat (1 = Yes, 0 = No)" in our full sample regressions. We also restrict our sample to a subset of VC firm-company pairs for which the VC firm took a board seat in a separate set of regressions. We find qualitatively similar results for the full sample and the board seat subsample.

Table 3

VC investment decision.

Sample is actual and counterfactual VC-company matches. The dependent variable is 1 if the VC invested in the company (i.e., an "actual match") and is 0 if the VC invested in another company in the same industry (10-segment) and month (i.e., a "counterfactual match") for specifications 1–4. To construct counterfactual matches in specifications 5–8, we also include the criteria that the VC invested in another company in the same state. Specifications 1 and 5 are probit regressions with residuals clustered by company (we obtain similar results if we cluster by VC). Coefficients are normalized to reflect variable means. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specifications 2 and 6 are OLS regressions with residuals clustered by both VC and company (Petersen, 2009). Specifications 3 and 7 are fixed effect OLS with company fixed effects. Specifications 4 and 8 are fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, and ** significance at 5%.

Dependent variable	VC invested in company (1 = yes, 0 = no)								
	Specification	1	2	3	4	5	6	7	8
Same ethnicity		0.011*** [0.002]	0.012*** [0.005]	0.016*** [0.003]	0.012*** [0.002]	0.022*** [0.006]	0.020** [0.009]	0.023*** [0.006]	0.019*** [0.006]
VC IPO experience		0.008** [0.03]	0.008** [0.004]	0.007 [0.007]		0.008 [0.101]	−0.002 [0.011]	0.006 [0.018]	
Sample		Actual and counterfactual VC-company matches				Actual and counterfactual VC-company matches			
Criteria counterfactual match		Same month and industry (10-segment VentureEconomics)				Same month, industry (10-segment VentureEconomics) and state			
Observations		192,423	192,423	192,423	192,423	64,671	64,671	64,671	64,671
R-squared		0.07	0.04	0.01	0.03	0.15	0.15	0.01	0.11
Regression type		Probit	OLS	OLS	OLS	Probit	OLS	OLS	OLS
F.E. VC year investment		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. company industry		Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company state		Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company		No	No	Yes	No	No	No	Yes	No
F.E. VC		No	No	No	Yes	No	No	No	Yes

5.3. Regression results

5.3.1. Matching

Table 3 presents regression results on how ethnic ties matter for the likelihood that the company and the VC firm form a match. To run these tests, we need to compare the prevalence of ethnic ties for the matches that were actually formed to those that could have been formed but were not. Thus, we need to identify counterfactual matches for each of the 9079 actual pairs in our sample. We use data from VE to find such counterfactual matches. Specifications 1 through 4 present results where the counterfactual sample includes all investments made by another VC in the same month/year and (10-segment) industry. Specifications 5 through 8 present results where the counterfactual sample includes all investments made by another VC in the same month/year, (10-segment) industry, and US state. We note that the coefficient on “Same Ethnicity” is positive and significant in all specifications, confirming that ethnic ties matters for which matches are formed in the US VC industry.

A tabulation of the sample of actual and counterfactual matches illustrates the economic significance of our results. The likelihood of a match is 5.7 percentage points if the founder and VC partner has a co-ethnic tie, and is 4.7 percentage points if they do not. This corresponds to a 21% increase in the likelihood of a match for co-ethnics on a univariate basis. Specification 1 is a probit regression with normalized coefficients at the means of the other variables. The coefficient estimate on co-ethnicity remains similar to the estimated effect of the univariate difference.

A possible concern is that our sample of counterfactual matches is too large, which may influence our estimation. Specifications 2 and 6 cluster residuals by both VC firm and company – a correction that ensures that the statistical significance is not inflated. In unreported tests, we also restrict the sample of counterfactual matches to one (randomly selected) per actual match. We find that all results presented in Table 3 remain statistically significant.

5.3.2. Board seats

Table 4 reports results on tests on how ethnic ties matter for whether the VC firm took a board seat, conditional on it making an investment. Again, we find the coefficient on “Same Ethnicity” to be positive and significant in all specifications. Because the result holds even when we include company fixed effects (specification 3), it cannot be explained by some companies being more likely to report the composition of their board. Similarly, because the result holds even when we include VC firm fixed effects (specification 4), the result cannot be explained by some VC firms being more likely to take board seats in all of their investments. Rather, the result shows that VC firms are more likely to be more involved in a portfolio company if they have an ethnic tie with its founders.

An unreported univariate comparison of means shows that the difference for VC involvement is economically significant: a VC firm with an ethnic tie has a 74% likelihood of taking a board seat, versus 58% for other VC firms. The difference is about 16 percentage points, which is similar in specification 1 of Table 4, a probit regression with coefficients normalized at variable means.

5.3.3. Timing of investment

Table 5 reports results on ethnic ties and the VC firm's timing of its investment. In Panel A, the dependent variable is “ln (1 + Company Age First Time VC Invested in Company).” We find that in the presence of an ethnic tie, the VC firm invests in younger companies. In Panel B, we find similar results using the dependent variable “VC Invested in First Round of Company (1 = Yes, 0 = No).” Furthermore, with an ethnic tie, a VC firm has a 54% likelihood of investing in the first round, versus 44% for other VC firms on a univariate basis. The probit estimates of specifications 1 and 5 of Table 5, Panel B are of similar magnitude. The coefficients are normalized to reflect variable means to allow straightforward interpretation.

Table 4

VC board seat.

Sample is actual VC-company matches. The dependent variable is 1 if the VC invested and took a board seat, and is 0 if the VC invested but did not take a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specification 1 is a probit regression with residuals clustered by company (we obtain similar results if we cluster by VC). Coefficients are normalized to reflect variable means. Specification 2 is an OLS regression with residuals clustered by both VC and company (Petersen, 2009). Specification 3 is a fixed effect OLS with company fixed effects. Specification 4 is a fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, * significance at 10%.

Dependent variable	VC board seat (1 = yes, 0 = no)			
	1	2	3	4
Same ethnicity	0.159*** [0.021]	0.154*** [0.022]	0.193*** [0.032]	0.111*** [0.024]
VC IPO experience	−0.134 [0.053]	−0.132 [0.109]	−0.126* [0.069]	
Sample	Actual VC-company matches			
Observations	9079	9079	9079	9079
R-squared	0.04	0.05	0.01	0.05
Regression type	Probit	OLS	OLS	OLS
F.E. VC year investment	Yes	Yes	Yes	Yes
F.E. company industry	Yes	Yes	N.A.	Yes
F.E. company state	Yes	Yes	N.A.	Yes
F.E. company	No	No	Yes	No
F.E. VC	No	No	No	Yes

Table 5
VC timing of investment.

Sample is actual VC-company matches. In Panel A, the dependent variable is the logarithm of the company's age at the time of the VC's investment. Specifications 1–3 include the full sample of actual VC-company matches, and specifications 4–6 includes only actual VC-company matches where the VC took a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specifications 1 and 4 are OLS regressions with residuals clustered by both VC and company (Peterson, 2009). Specifications 2 and 5 are fixed effect OLS with company fixed effects. Specifications 3 and 6 are fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, ** significance at 5%, * significance at 10%.

Panel A: company age

Dependent variable	ln (1 + company age first time VC invested in company)					
Specification	1	2	3	4	5	6
Same ethnicity	−0.139*** [0.041]	−0.044*** [0.013]	−0.097*** [0.033]	−0.157*** [0.045]	−0.047*** [0.017]	−0.131*** [0.041]
VC IPO experience	0.419*** [0.122]	0.057** [0.028]		0.275* [0.156]	−0.077* [0.044]	
VC board seat (1 = yes, 0 = no)	−0.126*** [0.018]	−0.044*** [0.005]	−0.111*** [0.015]			
Sample	Actual VC-company matches			Actual VC-company matches with board seat		
Observations	8827	8827	8827	5197	5197	5197
R-squared	0.15	0.84	0.12	0.15	0.85	0.12
Regression type	OLS	OLS	OLS	OLS	OLS	OLS
F.E. VC year investment	Yes	Yes	Yes	Yes	Yes	Yes
F.E. company industry	Yes	N.A.	Yes	Yes	N.A.	Yes
F.E. company state	Yes	N.A.	Yes	Yes	N.A.	Yes
F.E. company	No	Yes	No	No	Yes	No
F.E. VC	No	No	Yes	No	No	Yes

Sample is actual VC-company matches. In Panel B, the dependent variable is 1 if the VC invested in the company's first VC financing round, and if the VC invested only in later rounds. Specifications 1–4 include the full sample of actual VC-company matches, and specifications 5–8 include only actual VC-company matches where the VC took a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specifications 1 and 5 are probit regressions with residuals clustered by company (we obtain similar results if we cluster by VC). Coefficients are normalized to reflect variable means. Specifications 2 and 6 are OLS regressions with residuals clustered by both VC and company (Peterson, 2009). Specifications 3 and 7 are fixed effect OLS with company fixed effects. Specifications 4 and 8 are fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, and ** significance at 5%.

Panel B: investment in first round

Dependent variable	VC invested in first round of company (1 = yes, 0 = no)							
Specification	1	2	3	4	5	6	7	8
Same ethnicity	0.090*** [0.025]	0.082*** [0.029]	0.076*** [0.023]	0.050** [0.024]	0.093*** [0.028]	0.086** [0.033]	0.050 [0.033]	0.064** [0.029]
VC IPO experience	−0.516 [0.584]	−0.467*** [0.076]	−0.229*** [0.049]		−0.294*** [0.073]	−0.273*** [0.090]	−0.100 [0.085]	
VC board seat (1 = yes, 0 = no)	0.210*** [0.011]	0.200*** [0.012]	0.071*** [0.009]	0.177*** [0.011]				
Sample	Actual VC-company matches				Actual VC-company matches with board seat			
Observations	9079	9079	9079	9079	5357	5357	5357	5357
R-squared	0.08	0.10	0.39	0.07	0.06	0.07	0.43	0.06
Regression type	Probit	OLS	OLS	OLS	Probit	OLS	OLS	OLS
F.E. VC year investment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. company industry	Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company state	Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company	No	No	Yes	No	No	No	Yes	No
F.E. VC	No	No	No	Yes	No	No	No	Yes

5.3.4. Scope of VC investment

Table 6 reports results on ethnic ties and the scope of the VC firm's investment. The dependent variable is "ln (1 + Number of Rounds VC Invested in Company)" in Panel A, and "ln (1 + Total Dollar Amount VC Invested in Company)" in Panel B. We find positive (and significant in most specifications) coefficients on "Same Ethnicity", suggesting that investments with an ethnic tie last over more rounds and involve larger dollar amounts. An unreported comparison of means shows that the average VC firm with an ethnic tie invests \$12 million across 2.5 rounds, as compared to \$9 million across 2.2 rounds for non-co-ethnic investments. The OLS estimate

Table 6
Scope of VC investment.

Sample is actual VC-company matches. In Panel A, the dependent variable is the logarithm of the number of rounds the VC invested in the company. Specifications 1–4 include the full sample of actual VC-company matches, and specifications 5–8 includes only actual VC-company matches where the VC took a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specifications 1 and 5 are negative binomial regressions with residuals clustered by company (we obtain similar results if we cluster by VC). Specifications 2 and 6 are OLS regressions with residuals clustered by both VC and company (Petersen, 2009). Specifications 3 and 7 are fixed effect OLS with company fixed effects. Specifications 4 and 8 are fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, ** significance at 5%, and * significance at 10%.

Panel A: number of rounds

Dependent variable	ln (1 + number of rounds VC invested in company)							
Specification	1	2	3	4	5	6	7	8
Same ethnicity	0.082*** [0.026]	0.080** [0.031]	0.087*** [0.026]	0.109*** [0.030]	0.083*** [0.030]	0.082** [0.035]	0.013 [0.029]	0.098*** [0.034]
VC IPO experience	-1.330*** [0.082]	-1.208*** [0.120]	-0.487*** [0.056]		-0.877*** [0.101]	-0.814*** [0.113]	-0.149** [0.073]	
VC Board Seat (1 = Yes, 0 = No)	0.105*** [0.014]	0.099*** [0.019]	0.169*** [0.011]	0.107*** [0.014]				
Sample	Actual VC-company matches				Actual VC-company matches with board seat			
Observations	9079	9079	9079	9079	5357	5357	5357	5357
R-squared		0.23	0.47	0.19		0.23	0.64	0.22
Regression type	Neg. bin.	OLS	OLS	OLS	Neg. bin.	OLS	OLS	OLS
F.E. VC year investment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. company industry	Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company state	Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company	No	No	Yes	No	No	No	Yes	No
F.E. VC	No	No	No	Yes	No	No	No	Yes

Sample is actual VC-company matches. In Panel B, the dependent variable is the logarithm of the total dollar amount VC invested in company. Specifications 1–3 include the full sample of actual VC-company matches, and specifications 4–6 includes only actual VC-company matches where the VC took a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specifications 1 and 4 are OLS regressions with residuals clustered by both VC and company (Petersen, 2009). Specifications 2 and 5 are fixed effect OLS with company fixed effects. Specifications 3 and 6 are fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, ** significance at 5%, and * significance at 10%.

Panel B: dollar amount

Dependent variable	ln (1 + total dollar amount VC invested in company)					
Specification	1	2	3	4	5	6
Same ethnicity	0.225*** [0.047]	0.091* [0.050]	0.162*** [0.044]	0.191*** [0.053]	0.033 [0.058]	0.112** [0.047]
VC IPO experience	1.117*** [0.206]	0.617** [0.107]		1.539*** [0.232]	1.150*** [0.150]	
VC board seat (1 = yes, 0 = no)	0.311*** [0.032]	0.357*** [0.020]	0.261*** [0.020]			
Sample	Actual VC-company matches			Actual VC-company matches with board seat		
Observations	9024	9024	9024	5319	5319	5319
R-squared	0.11	0.14	0.11	0.14	0.18	0.13
Regression type	OLS	OLS	OLS	OLS	OLS	OLS
F.E. VC year investment	Yes	Yes	Yes	Yes	Yes	Yes
F.E. company industry	Yes	N.A.	Yes	Yes	N.A.	Yes
F.E. company state	Yes	N.A.	Yes	Yes	N.A.	Yes
F.E. company	No	Yes	No	No	Yes	No
F.E. VC	No	No	Yes	No	No	Yes

in specifications 1 and 4 of Panel B of Table 6 suggests that a shared ethnicity increases the total investment amount by about 20%, which is in line with the univariate difference.

5.3.5. Financial contract

Table 7 reports results on how ethnic ties relate to the financial contract used in the investment. In Panel A, the dependent variable is "ln (1 + Pre-Money Valuation)". We find that the VC firm obtained higher pre-money valuations when its partner(s) had an ethnic tie with the company's founder(s), especially for specifications without company or VC fixed effects. Equivalently, for a given dollar investment, the VC received a smaller equity stake in the presence of an ethnic tie. Unreported univariate comparisons of means show a co-ethnic tie is correlated with an average pre-money valuation of \$70 million, versus \$58 million for non-co-ethnics. Table 7 (Panel A, specifications 1 and 4) suggests an increase in pre-money valuation of between 11% and 20% associated with co-ethnicity.

Table 7
Financial contract.

Sample is actual VC-company matches. In Panel A, the dependent variable is the logarithm of the pre-money valuation of the company. The dependent variable is the average across all rounds in which VC invested in company (where data are available). Specifications 1–3 include the full sample of actual VC-company matches, and specifications 4–6 includes only actual VC-company matches where the VC took a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specifications 1 and 4 are OLS regressions with residuals clustered by both VC and company (Peterson, 2009). Specifications 2 and 5 are fixed effect OLS with company fixed effects. Specifications 3 and 6 are fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. Company State is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, ** significance at 5%, and * significance at 10%.

Panel A: pricing

Dependent variable	ln (1 + pre-money valuation)					
	1	2	3	4	5	6
Same ethnicity	0.115* [0.068]	0.011 [0.033]	0.107 [0.073]	0.204*** [0.076]	−0.003 [0.041]	0.203** [0.091]
VC IPO experience	1.874*** [0.186]	0.159** [0.070]		1.782*** [0.271]	0.200* [0.112]	
VC board seat (1 = yes, 0 = no)	−0.329*** [0.034]	−0.032** [0.013]	−0.302*** [0.033]			
Sample	Actual VC-company matches			Actual VC-company matches with board seat		
Observations	4812	4812	4812	2499	2499	2499
R-squared	0.19	0.16	0.14	0.15	0.2	0.13
Regression type	OLS	OLS	OLS	OLS	OLS	OLS
F.E. VC year investment	Yes	Yes	Yes	Yes	Yes	Yes
F.E. company industry	Yes	N.A.	Yes	Yes	N.A.	Yes
F.E. Company State	Yes	N.A.	Yes	Yes	N.A.	Yes
F.E. company	No	Yes	No	No	Yes	No
F.E. VC	No	No	Yes	No	No	Yes

Sample is actual VC-company matches. In Panel B, the dependent variable is the number of downside protection contingent cash flow rights (see Bengtsson and Sensoy, 2011, for details). A higher (lower) value of the index reflects a contract that is more (less) favorable to the VC and less (more) to the entrepreneur. The dependent variable is the average across all rounds in which VC invested in company (where data are available). Specifications 1–4 include the full sample of actual VC-company matches, and specifications 5–8 includes only actual VC-company matches where the VC took a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Specifications 1 and 5 are negative binomial regressions with residuals clustered by company (we obtain similar results if we cluster by VC). Specifications 2 and 6 are OLS regressions with residuals clustered by both VC and company (Peterson, 2009). Specifications 3 and 7 are fixed effect OLS with company fixed effects. Specifications 4 and 8 are fixed effect OLS with VC fixed effects. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment VentureEconomics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, ** significance at 5%, and * significance at 10%.

Panel B: contracting

Dependent variable	Downside protection index (Bengtsson and Sensoy, 2011)							
	1	2	3	4	5	6	7	8
Same ethnicity	−0.102*** [0.039]	−0.466*** [0.171]	0.006 [0.027]	−0.390*** [0.172]	−0.128*** [0.041]	−0.584** [0.173]	−0.025 [0.024]	−0.317 [0.195]
VC IPO experience	−0.387*** [0.088]	−1.825*** [0.440]	0.047 [0.065]		−0.371*** [0.112]	−1.749*** [0.561]	0.169** [0.069]	
VC board seat (1 = yes, 0 = no)	0.016 [0.015]	0.076 [0.071]	0.022** [0.011]	0.125 [0.084]				
Sample	Actual VC-company matches				Actual VC-company matches with board seat			
Observations	1923	1923	1923	1923	1289	1289	1289	1289
R-squared		0.17	0.01	0.10		0.17	0.02	0.10
Regression type	Neg. bin.	OLS	OLS	OLS	Neg. bin.	OLS	OLS	OLS
F.E. VC year investment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. company industry	Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company state	Yes	Yes	N.A.	Yes	Yes	Yes	N.A.	Yes
F.E. company	No	No	Yes	No	No	No	Yes	No
F.E. VC	No	No	No	Yes	No	No	No	Yes

In Panel B, the dependent variable is “Downside Protection Index (Bengtsson and Sensoy, 2011).” We find that contracts are more entrepreneur-friendly for investments with an ethnic tie. These results are not significant when we include company fixed effects (specifications 3 and 7), which is not surprising given the weak statistical power of such tests.¹³ An unreported univariate comparison

¹³ We calculate the dependent variables for each company-VC firm pair by calculating the average pre-money valuation and Downside Protection Index, respectively, over all the rounds in which the VC invested. With company fixed effects, the only source of variation comes from the fact that different VC firms invested in different rounds. However, this variation is low because the pre-money valuations and contract terms are serially correlated across rounds. Amplifying this problem is the fact that data on these variables are often not reported for our sample.

of means shows that the mean Downside Protection Index is about one third of a standard deviation lower (4.27 versus 4.73) when the firms have an ethnic tie.

5.3.6. Summary of results

Our empirical tests suggest a range of dimensions along which ethnic ties matter in the U.S. VC industry. We find that the existence of an ethnic tie increases the likelihood that the company and the VC firm form a match and is associated with VC firms investing earlier, more and using more favorable-to-the-entrepreneur pricing/terms. Because these results hold in specifications with company fixed effects, we infer that the influence of shared ethnicity is unlikely to be explained by a stable omitted company characteristic control, but rather reflects the behavior of the focal VC firm as compared to other VC firms investing in the same company. Similarly, because the results hold in specifications with VC firm fixed effects, we infer that stable omitted VC characteristics are not the explanation. A simple information transmission mechanism, in which co-ethnics learn about deals ahead of others due to shared social networks, can only explain the likelihood of matching but not the pattern of heterogeneity within investments (dimensions such as board participation, stage and scope of investment, and terms of the financial contract). The results reflect the behavior of the focal VC firm in its investments with an ethnic tie as compared to its investments without such ties.

5.3.7. Comparison of results

Before we discuss the possible consequences of ethnic matching, we want to put our results in a broader context by comparing them to findings on two matching correlates that have been documented in the existing literature: geographic distance and shared university affiliation.

Because VC firms need to actively monitor and add value to their portfolio companies, they prefer to invest in geographically proximate firms. Sorenson and Stuart (2001) illustrate how the likelihood of a VC investment decreases with distance (in their Fig. 1). They show that the likelihood of an investment is 0.8% at about 200 miles distance between the VC a focal company, and 1% at about 100 miles distance (the low probabilities reflect a large sample of counterfactual matches). Hence, a doubling of the distance is associated with a 20% increase in the likelihood of an investment on a univariate basis. We find in our data that the economic magnitude for co-ethnicity is approximately the same magnitude as geographic distance in explaining the likelihood of an investment match.

We can also compare our results to those found for social networks based on a shared university affiliation. As we discussed in Section 2, several recent papers find evidence that such ties matter in different investment settings. Sunesson (2009) takes this notion to the venture capital context, and shows that a shared affiliation increases the likelihood of a match by 57%. Hence, his results suggest that ethnic-based matching is about a third as important as university-based matching. However, a major limitation of Sunesson's paper is that he studies only investments made in the year 2002, which due to the bursting of the dot-com "bubble" may have been a special year. In an earlier version of our paper, we studied hand-coded data from biographies for about a fifth of our sample, and found no result on matching based on a shared university affiliation. We did, however, find results that a match was more likely if both the founder and VC partner attended a top-ranked university.¹⁴ The magnitude of the shared top university affiliation effect was much smaller (about a sixth) as compared to the effect of co-ethnicity.¹⁵ These findings suggest that ethnicity could be as important, or even more important, than social connections based on university affiliation.

5.4. Rationales for matching

5.4.1. Discussion

Before we begin analyzing the empirical association between ethnic matching and investment outcomes, it is important to note that matching in the VC context has two distinct goals. First, the partner and founder seek to increase the likelihood that the entrepreneurial company will become successful. Success is the ultimate prize for both parties: The partner is able to exit the investment, receives monetary payoffs (from carried interest), and strengthens his or her standing in the VC community. The founder also receives payoffs, and may enjoy private benefits from the successful outcome itself or from being subsequently "self-employed" in a successful company.

A second goal of matching is that the partner and the founder want to minimize the transaction costs surrounding the formation and maintenance of their relationship. For the partner, these transaction costs include expenses incurred during due diligence, legal fees for contract negotiation, etc. Another transaction cost, and arguably the most important one in practice, is the partner's opportunity cost of time. The VC firm must carefully economize on how much time the partner spends on each investment, because otherwise it risks forgoing other promising investments and providing inadequate monitoring/support to other portfolio companies. For the founder, the opportunity cost of time is also very valuable. If the founder spends too much time dealing with a given VC firm, then he or she may neglect other investors and/or be unable to place sufficient effort to growing his/her company.

Matching based on shared partner and founder ethnicity would create value in a VC investment if it was to achieve either or both of the goals discussed above. Value creation could occur due to easier communication, more efficient sharing of soft information or more trust among members of the same ethnic subgroup. We label such rationales for matching as "beneficial".

¹⁴ We included the following schools in this group: Brown, Caltech, Cambridge, University of Chicago, Columbia, Cornell, Dartmouth, Duke, Harvard, MIT, Oxford, University of Pennsylvania, Princeton, Stanford, and Yale.

¹⁵ We also found that the magnitude of the shared ethnicity effect was greater than the estimated magnitudes of various operational complementarities between founders and VC partners.

Conversely, a match based on shared ethnicity would destroy value if the likelihood of a successful outcome decreased. An obvious question to ask is why a partner and a founder would choose to form a co-ethnic match if it would result in value destruction. One possibility is that they have a behavioral bias that makes them overestimate the skills and capabilities of people who share their ethnicity. Alternatively, they may overestimate the benefits of forming a match with co-ethnics. Another possibility, which we discussed in Section 3, is that a too high degree of similarity between founders and partners may result in group-think during board meetings. Finally, founders and partners may respond to pressure from their ethnic subgroup to do business with members of the same subgroup. We label such rationales as “detrimental”, since matching based on them does not create value.

5.4.2. Empirical strategy and its limitations

We analyze data on investment outcomes to test whether co-ethnic matches in the VC industry are formed based on beneficial or detrimental rationale. We define an investment as successful if the company had an M&A or IPO, and then correlate these investment outcomes with our focal independent variable “Same Ethnicity”. In addition to “Same Ethnicity”, we include controls for investment year, industry and location (i.e., state dummies). We also include as controls the variables we employed in the prior empirical tables. As such, we study whether the VC firm realized a more or less successful company outcome conditional on the intensity of its investment.

Although our analysis of outcomes allows us to shed some light on the rationale behind ethnic matching, it has four limitations. The first limitation is that we can only study investment outcomes for investments in our sample made prior to 2003. Our data are collected in 2009, so this cutoff ensures that each successful company had sufficient time to realize its exit. The resulting sample includes 4812 observations, of which 2499 are matches where the VC firm takes a board seat.

The second limitation is that our tests cannot speak to the association between ethnic matching and transaction costs, such as the VC firm's selection and monitoring efforts. These costs are not observable features of the VC investment. Therefore, it remains possible that ethnic matching could be formed based on the beneficial rationale of lower transaction costs even if such investments were associated with worse investment outcomes.

A third limitation is that the measure of successful investment outcome is noisy in that attaining an initial public offering or an M&A is only one coarse measure of entrepreneurial performance, though this proxy for entrepreneurial performance is commonplace in the literature. The private nature of the companies and investors that we study imply a lack of detailed data on investment outcomes. A better measure of investment success would be internal rate of return (IRR). But information on IRRs is neither reported nor can be calculated from the available information. However, IRRs are likely higher for IPO/M&A outcomes than for other exits (a category that includes failed investments).¹⁶

An additional challenge is that we are unable to perfectly control for other determinants of an IPO, such as the quality of the founder's idea or the nature of the company's other assets. This follows from the fact that we cannot include company fixed effects in the outcome regressions, because our measure of investment outcome is identical for all VC firms investing in the company.

The final, and arguably most problematic limitation is that our tests confound selection and treatment effects. This problem plagues most existing studies of the VC industry (see Sørensen, 2007 for a discussion), and is exacerbated by the inevitable presence of unobserved factors in empirically studying matching processes (Fox et al., 2014).

5.4.3. Results on investment outcomes

With the above limitations in mind, Table 8 presents our results on the association between co-ethnic ties and company outcomes. The estimation technique is multinomial logit where the dependent variable is 1 if the company had no reported outcome (i.e., failure), 2 if an M&A exit, and 3 if an IPO exit. The reported coefficients are compared to a sample where the dependent variable is 1. Specification 1 includes the sample of VC investments with and without a board seat. We find that an IPO outcome is less common when the VC firm has a co-ethnic tie with the company. The result is only weakly significant. Specification 2 limits the sample to investments where the VC took a board seat. We find that an IPO outcome remains less likely with a shared ethnicity and the result is now significant at the conventional level. In unreported tests, we re-run specifications 1 and 2 with an ordered probit regression, with the same dependent variable. This test is similar to the multinomial logit except that outcomes are ordered as IPO (best), M&A (second-best), and failure (worst). We find a negative and significant coefficient on “Same Ethnicity.”¹⁷ We also find a negative coefficient on this focal variable in a logit regression where we define IPO and M&A as a successful outcome, coded as 1, and failure coded as 0. Finally, we rerun these test as OLS regressions with VC fixed effects, and obtain similar results.

Co-ethnic ties are associated with worse investment outcomes in our data, a finding which is consistent with a pair of recent papers in different contexts: Gompers et al. (2012) study company outcomes for co-ethnic matches between VC firms in investment syndicates and Freeman and Huang (2014) study the quality of co-ethnic scientific publications. Both studies also find a negative association between co-ethnicity and performance outcomes in their respective empirical settings. In a series of unreported tests, we rerun the

¹⁶ While a few published papers such as Kaplan and Schoar (2005) and Jackson et al. (2012) have used IRR data, such data are not systematically available. As Kaplan and Schoar (2005, pp. 1193) state: “There is a growing literature studying the economics of the private equity industry. Most of those studies have focused either on aggregate trends in private equity or on the relation between general partners and entrepreneurs. This restriction is mainly due to the difficulty of obtaining information on individual fund performance.” While there are clear benefits to the IRR measure of performance, it does suffer from the issue that the studies employing such data often rely on self-reports from the respondents. As a result, there is sometimes a tradeoff in using the coarser performance measure we use on company exits (which is the more common measure of company performance) and the possible bias related to the concern that only better-performing funds may be disclosing their returns as inputs to calculating more fine-grained investment returns measures.

¹⁷ We run into issues of model non-convergence. The ordered probit regression does not converge if we use our full set of control variables. Models only converge for the sample where the VC takes a board seat.

Table 8

Company exit.

Sample is actual VC-company matches. Multinomial logit regressions. The dependent variable is 1 if the company had no reported outcome (i.e., failure), 2 if an M&A exit, and 3 if an IPO exit. In both specifications, the sample excludes investments after 2003 (our data are collected to 2009). Specification 1 includes the full sample of actual VC-company matches, and specification 2 includes only actual VC-company matches where the VC took a board seat. VC IPO experience is the historical fraction of the firm's portfolio companies that have had an IPO exit. Additional controls are company age at VC's first investment, whether VC invested in first round, number of rounds in which VC invested, dollar amount VC invested in company, pre-money valuation, distance company-VC and whether the company had any patents 5 years after the first VC round. F.E. VC year investment is a dummy for the year the VC first invested in the company. F.E. company industry is a 10-segment Venture Economics dummy. F.E. company state is a dummy for the U.S. state of the company's headquarter. *** marks significance at 1%, ** significance at 5%, and * significance at 10%.

Dependent variable	Company no success (1, base), M&A (2), IPO (3)			
	1		2	
Specification				
Outcome	M&A	IPO	M&A	IPO
Same ethnicity	0.017 [0.181]	−0.508* [0.278]	−0.311 [0.228]	−1.112*** [0.380]
VC IPO experience	0.682 [0.484]	5.285*** [0.632]	1.601** [0.739]	6.131*** [0.994]
VC board seat (1 = yes, 0 = no)	0.143 [0.088]	0.234** [0.119]		
Sample	Actual VC-company matches		Actual VC-company matches with board seat	
Observations	4812		2499	
R-squared	0.21		0.24	
Regression type	Multinomial logit		Multinomial logit	
F.E. VC year investment	Yes		Yes	
F.E. company industry	Yes		Yes	
F.E. company state	Yes		Yes	
Additional controls	Yes		Yes	
Distance and patents	Yes		Yes	

specifications of Table 8 but do so for a wide variety of subsamples according to heterogeneous VC and company characteristics. When we compare the coefficients on “Same Ethnicity” across these different subsamples split at the median of the underlying characteristic, we find no significant differences. These empirical patterns suggest not only that there is a negative average association between co-ethnics and exit likelihood, but also that we are unable to find a positive relationship when we condition the sample based on VC or company characteristics.

An alternative interpretation of our matching outcome result (and suggested by a thoughtful reviewer) beyond our above explanations of irrational overinvesting by co-ethnics and lack of monitoring (direct governance and/or allocating more favorable financial contract terms to the entrepreneur) is that co-ethnic investments only seem to perform poorly because the comparison set performs relatively well. Therefore, from a return-to-limited partner (LP) perspective, perhaps the co-ethnic investments on average do “well enough” relative to some hurdle rate. This would be a more natural interpretation if we had two additional pieces of information: internal rates of return of the investments and the hurdle rates of the LPs. Of course we have neither – nor do we think that it is possible for researchers to systematically collect such data. The likelihood of liquidity (IPO or M&A), which we do examine, is likely to be coarsely correlated with the unobserved IRRs, but is certainly a rough proxy.

6. Concluding discussion

We investigate the empirical relevance of personal similarity in the U.S. VC market, focusing on co-ethnicity between VC partners and company founders. Our results show that person-based matching based on shared ethnicity is a strong predictor of the likelihood of an investment. Our study moves beyond this likelihood analysis, and investigates investment behavior conditional on an investment match: the likelihood that a VC partner takes a board seat in the company, the timing and stage of investment, the scope of investment (number of rounds and amount invested), and terms of the financial contract (valuation and degree to which the contract is “friendly” to the entrepreneur). Our finding of significant co-ethnic effects on these dimensions is consistent with mechanisms highlighted in the entrepreneurship and economic sociology literatures: kinship/behavioral preference-based motivations, as well as “enforced” trust-based mechanisms as a result of tighter social networks among co-ethnics. Since co-ethnicity is significantly related to a wide span of indicators of tightly-coupled economic relations which are not confined to merely one stage of an investment relationship, we conclude that the kinship and enforced trust mechanisms highlighted in the literature are deeply embedded. This inference is not possible with an analysis confined to understanding the likelihood of an investment match.

Like the closest studies to ours on personal similarity and investment behavior, a strong interpretation of the resulting causal performance outcomes is elusive. This is because, among other issues, investment matching is subject to unobserved factors (Fox et al., 2014). Perhaps as a consequence, the existing literature has not reached a consensus on overall direction of effect. Our empirical evidence that co-ethnicity is accompanied by more entrepreneurial-friendly cash flow rights and valuation point to a possible screening and/or corporate governance explanation for our estimated negative relation between co-ethnicity and investment performance

outcomes. We acknowledge that the variety of possible reasons for the correlation makes a strong interpretation of any analysis of consequences of matching difficult, however. We therefore present our outcomes analysis as suggestive.

While our primary aim is in examining the VC-entrepreneur matching context, an area we believe is both important and understudied, it is possible to speculate about how general the co-ethnicity effects are likely to be. We have chosen a context in which there is constrained matching: a given VC partner can only sit on a certain number of boards at a given time, and a given entrepreneurial company can only have a certain number of VC partners on its board. This resembles other matching contexts in which there is a zero-sum choice involved in that matching with one entity means foregoing other opportunities (e.g., the marriage, job, and college markets), and so personal similarity may also be salient in those contexts.

We end with a few thoughts for future avenues of research given the results reported here. First, examining the possible effects more comprehensively would be interesting. For example, how does personal similarity (including co-ethnicity) affect entrepreneur-VC interaction during the pre-investment due diligence process and the post-investment board involvement, and with what consequences? Second, what are the welfare and efficiency implications of matching in the market for entrepreneurial finance? While the results on the depth of investment behavior between co-ethnics sheds light on the processes resulting in observed ethnic homophily in the market for entrepreneurial funding, we do not have a deep understanding of whether, from a societal perspective, this behavior is productive or counterproductive. We hope that future work will delve into these and other questions related to co-ethnic matching.

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