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THE COST OF FRIENDSHIP

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ABSTRACT

This paper explores two broad questions on collaboration between individuals. First, we investigate what personal characteristics affect people's desire to work together. Second, given the influence of these personal characteristics, we analyze whether this attraction enhances or detracts from performance. Addressing these problems in the venture capital syndication setting, we show that venture capitalists exhibit strong detrimental homophily in their co-investment decisions. We find that individual venture capitalists choose to collaborate with other venture capitalists for both ability-based characteristics (e.g., whether both individuals in a dyad obtained a degree from a top university) and affinity-based characteristics (e.g., whether individuals in a pair share the same ethnic background, attended the same school, or worked for the same employer previously). Moreover, frequent collaborators in syndication are those venture capitalists who display a high level of mutual affinity. We find that while collaborating for ability-based characteristics enhances investment performance, collaborating for affinity-based characteristics dramatically reduces the probability of investment success. A variety of tests show that the cost of affinity is not driven by selection into inferior deals; the effect is most likely attributable to poor decision-making by high-affinity syndicates post investment. Taken together, our results suggest that non-ability-based "birds-of-a-feather-flock-together" effects in collaboration can be costly.

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1. Introduction

People collaborate with each other in different settings. Construction of the Panama Canal and group hunting of mammoths are independent examples of mutually beneficial cooperation. Collaboration enables groups to achieve what cannot be accomplished as a result of a solely individual effort. Joint work can also increase the efficiency of individual production as in the celebrated example of the multi-stage production of pins. The division of labor, which such collaborations entail, drives economic progress and great productivity (Smith, 1776). In spite of the tremendous importance of collaborations, we lack a complete understanding of how people select their future working partners and whether there are any economic implications of different selection strategies.

In this paper, we explore two related questions on collaboration using the venture capital industry as the laboratory. First, we ask what personal characteristics influence individuals' desires to work together in venture capital syndication. Second, given the influence of these personal characteristics, we ask whether this attraction enhances or detracts from investment performance. We find that people are more likely to collaborate with those who share similar characteristics with them. Such similarities can be divided into two broad classes—those characteristics related to ability (e.g., whether both individuals in a dyad obtained a degree from a top university) and those characteristics related not to ability but, instead, to affinity (e.g., whether individuals in a pair share the same ethnic background, attended the same school, or worked for the same employer previously). We find that individual venture capitalists collaborate with other venture capitalists for both ability- and affinity-based characteristics. We then show how ability-based and affinity-based similarities between members of a group affect its performance. In particular, collaborating for ability-based characteristics enhances investment performance while collaborating for affinity-based characteristics dramatically reduces investment returns.

The tendency of individuals to associate, interact, and bond with others who possess similar characteristics and backgrounds has long been viewed as the organizing basis of networks (e.g., McPherson et al., 2001). The principle of homophily shapes group formation and social connection in a wide variety of settings, such as school, work, marriage, and friendship, in which

similarity between dyad or group members is observed across a broad range of characteristics including ethnicity, age, gender, class, education, social status, organizational role, etc. For example, positive assortative mating along observable inheritable traits (e.g., intelligence, race, and height) discussed by Becker (1973) in the context of a marriage market can be viewed as the micro foundation of homophily in which choosing a partner with similar characteristics increases the certainty about the quality of one's offspring. Currarini et al. (2009) provide theoretical foundations for the pattern of homophily in social networks using a search-based model of friendship formation and conclude that biases towards same-types in both individual preferences and the matching processes affect pairing outcomes.

Despite growing evidence that people do indeed tend to partner with similar individuals, the success implications of this bias remain unclear. One conjecture is that the more characteristics a pair of individuals has in common, the better performance the dyad is likely to demonstrate. This better performance may result from easier communication, the ability to better convey tacit information, or the ability to make joint decisions in a timely and productive manner (e.g., Ingram and Roberts, 2000; McPherson et al., 2001; Cohen et al., 2008; Gompers and Xuan, 2010). Moreover, homophilic selection based on ability-related characteristics can lead to the formation of high-ability pairs that demonstrate superior performance.

On the other hand, however, homophily may induce social conformity and groupthink that may lead to inefficient decision making (e.g., Asch, 1951; Janis, 1982; Ishii and Xuan, 2010). Individuals in homophilic relationships often have an enhanced desire for unanimity and ignore, or insufficiently consider, the disadvantages of the favored decision as well as the advice from experts outside the group. Furthermore, individuals may lower the expected return hurdle and due diligence standards on a project (consciously or unconsciously) for the opportunity to work with similar others because they derive personal utility from the collaboration. Consequently, under an alternative hypothesis, collaborations based on characteristics unrelated to ability might suffer from a "cost of friendship" and induce a negative relationship between affinity-based similarities and performance.

We test these hypotheses in the venture capital syndication setting, analyzing individual venture capitalists' selection of co-investment partners in syndicated deals as well as the

associated performance implications. Venture capital syndication is an important and common mechanism for venture capital investors to diversify their portfolios, accumulate and share resources and expertise, and reduce asymmetric information concerning portfolio companies (e.g., Lerner, 1994; Hochberg et al., 2011). Although extant studies on syndication largely focus on the characteristics of the partnership at the venture capital firm level (e.g., firm reputation and investment scope), investment in venture capital is typically individual-led. The individual venture capitalist pursuing and initiating an investment in a portfolio company (the *founding* investor) normally identifies other individuals at different venture capital firms with whom he or she may wish to collaborate on this particular deal. In other words, consistent with the idea of venture capitalists competing with each other for investment opportunities (Gompers and Lerner, 2000), it is natural to think of a *follow-on* investor as being chosen by the founding investor from a pool of potential co-investors. Both the founding and follow-on investors usually serve on the board of directors of the portfolio company, representing the interests of their respective venture capital firms and seeking to maximize the return on their investment. Depending on the performance of the portfolio companies and the market conditions, venture capitalists may use a variety of exit strategies, ranging from initial public offerings (IPO) to the sale of shares back to the entrepreneurs or strategic investors. Although there are examples of successful exits by venture capitalists by means of mergers and acquisitions, the consensus in the industry and academia is that an exit via IPO is the best indicator of investment success, in which venture capitalists achieve not only the highest returns but also wide recognition for their abilities.[1] The individual-led nature of the venture capital investing and syndication process, the availability of rich biographic information on individual venture capitalists, the existence of frequent collaborations between these individuals aiming for the same goal and making decisions the outcome of which have significant economic consequences for the decision-makers, and a clear-cut measure of success together make venture capital syndication an ideal platform to study the factors that influence individuals' choices to work together and the accompanying value implications.

[1] Prior research indicates that the return to venture investing is primarily driven by the small fraction of investments that goes public (Venture Economics, 1988). Similarly, Gompers (1996) demonstrates that venture capital firms are able to more easily raise new funds after exiting a portfolio company via an IPO.

Using a novel dataset of 3,510 individual venture capitalists investing into 11,895 portfolio companies from 1975 to 2003, we first examine the selection of co-investment partners on syndicated deals. In particular, we are interested in determining a set of pairwise personal characteristics based on which people are attracted to work with each other. For each venture capitalist, we hand-collect detailed biographic information including gender, ethnicity, educational background, and employment history. To assess how these various personal characteristics affect the likelihood of collaborations between individual venture capitalists, for each pair of actual venture capitalist partners in syndication, we construct a plausible set of counterfactual pairs each consisting of the actual founding partner and a potential follow-on partner that was available for syndication but who was not selected by the founding venture capitalist that originated the deal. We find that individual venture capitalists are more likely to collaborate with others who possess similar characteristics and backgrounds. For example, two venture capitalists that both hold degrees from top universities (potentially indicating high ability) are 8.5% more likely to co-invest together than individuals not similar in terms of being graduates of top academic institutions. An even stronger effect is documented with respect to non-ability-related, affinity-based characteristics. A pair of venture capitalists who graduated from the same university are 20.5% more likely to partner on a deal, and even more strikingly, the probability of collaboration between two individual venture capitalists increases by 22.8% if they are part of the same ethnic minority group. Partnership is also more likely to happen if the two venture capitalists worked at the same company earlier in their careers. These results on syndication decision represent strong evidence of homophilic selection in collaboration.

We then examine how ability-based and affinity-based similarities between members of a venture capitalist dyad affect its performance by assessing the outcomes of the portfolio companies in which the pair has co-invested. We find that the investment performance of a venture capital dyad improves with the number of top school degree holders in the pair. The first top degree holder in a pair increases the chance of its portfolio company going public by 9%; the second top degree holder further increases the chance of success significantly by 11%. Therefore, the decision of a top university graduate to syndicate with a venture capitalist who also holds a degree from a top school does enhance investment returns. To the contrary,

similarities between venture capitalists based on affinity-related characteristics worsen the performance of a syndication dyad. Specifically, the probability of a successful exit outcome decreases by 18% if two venture capitalists who previously worked at the same company partner up in the syndication. The likelihood of success drops by 22% if co-investors attended the same undergraduate school. The negative effect of affinity is even stronger when it relates to ethnicity. Collaboration with someone from the same ethnic minority group comes at the expense of a 25% reduction in performance.

We further explore the impact of similarities between collaborators on performance using ability and affinity scores. We construct the simple-average ability score of a pair of venture capitalists as the average of pairwise ability characteristics (measures indicating whether both members of the pair hold top school degrees). The weighted-average ability score of a pair of venture capitalists is the dot product of a vector of pairwise ability characteristics and a vector of estimated coefficients on these characteristics in the syndication decision regression. The simple-average and weighted-average affinity scores are similarly constructed over the set of pairwise affinity characteristics (measures indicating whether members of the pair are of the same gender, in the same minority ethnic group, attended the same school, or previously worked for the same employer). The weighted-average ability and affinity scores are essentially weighted measures of how alike the two venture capitalists in the dyad are in terms of ability and affinity characteristics, respectively, with the weights representing how important each similarity characteristic is in determining the collaboration decision. When we examine the relationship between these aggregate similarity scores and investment performance, we again find that the more alike the partnering venture capitalists are in affinity-related characteristics, the less likely their investment outcome is ultimately successful. We also find that the affinity score of a pair of venture capitalists is significantly and positively related to the total number of syndicated deals on which the pair collaborates. Therefore, affinity-based similarity not only determines people's attractions to work together for the first time, but also increases their frequency of repeated collaborations.

Finally, we account for the potentially endogenous determination of the syndicate's level of affinity depending on the underlying investment quality of a deal and confirm the robustness of results using a variety of tests. Although high-affinity venture capitalists do indeed pursue joint opportunities of lower investment appeal at the time financing, the analysis shows that the contribution of this effect to the empirical biases documented in the paper is at most weak. The most likely source of the cost of affinity is a treatment effect, in particular, poor decision-making by venture capitalists post investment.

To illustrate the effects of ability- and affinity-based similarities on the syndication decision and investment performance, consider as an example from our data the co-investment pattern of Mr. A through the lens of his background. Mr. A lived in Israel before moving to the U.S. for school, and graduated from Massachusetts Institute of Technology (MIT). He was actively involved in the Jewish communities in the U.S. During his career as a venture capitalist at venture capital firm Z, Mr. A co-invested on fourteen deals from 1984 to 2001. An MIT graduate, Mr. A co-invested on eleven deals with at least one other venture capitalist having a degree from a top school. Out of these eleven deals, two deals also have syndication teams characterized by the Jewish ethnicity commonality. In the remaining three of the fourteen co-investments, Mr. A's syndication partners are characterized by similar ethnical background only: they are all Jewish. Mr. A is a very successful venture capitalist: four of the fourteen deals resulted in a portfolio company going public and are classified as successful in our analysis; all of these four deals are syndications based on ability but not affinity.

The fourteen deals are represented in a two-by-two matrix in Table 1, in which each dimension stands for the type of syndication: ability-based or affinity-based.[2] Consistent with the homophily bias of founders selecting a working partner possessing similar characteristics, Mr. A had no joint investments with venture capitalists that he is unlikely to associate himself with either based on ability or affinity. Moreover, all successful deals feature a venture capital team with only ability-related characteristics in common. There is not a single successful deal among affinity-based co-investments. The unconditional success ratio of Mr. A is 28.6% (4/14);

[2] A co-investment may be both ability- and affinity-based if a venture capitalist has both ability and affinity similarities with the co-investment partners.

conditional on the co-investment being ability-based and not affinity-based, his success ratio increases to 44.4% (4/9), whereas conditioned on affinity-based syndications, the success ratio drops to 0% (0/5). This illustrates the negative effect of affinity-based similarities within a syndication dyad on its performance.

The findings of this paper relate to several literatures. First, we contribute to the growing evidence that preferences for homophily strongly affect the composition of working groups. In the venture capital context, for example, Bengtsson and Hsu (2010) show that startup founders are more likely to be matched with partners at VC firms similar in terms of ethnicity and education.

The second literature studies the success implications of social ties. According to Hochberg, Ljungqvist, and Lu (2007), better-networked VC firms demonstrate significantly better performance. However, the evidence on the connection between the success and composition of venture capital working groups remains mixed. Data limitations leave researchers with no choice but to measure the extent to which a syndicate is homogenous at a firm level. The breadth of our data makes it possible to identify partners directly involved in each particular deal arming us with a relevant and precise measure of syndicate-specific homogeneity. This increases our ability to make inference about the relationship between team composition and its success.

Third, we make a methodological contribution with respect to distinguishing between two drivers of venture capital returns: selecting better deals vs. adding value to a portfolio company post-investment. Tian (2012) demonstrates superior performance of entrepreneurial firms backed by a venture capital syndicate and uses the Heckman (1979) selection model and an instrumental variable approach to control for the fact that syndication may not be exogenous. Sorensen (2007) overcomes endogeneity problems in estimating the outcome equation by developing a two-sided matching model which controls for the sorting between portfolio companies and venture capitalists — more promising entrepreneurial firms get funding from investors with higher relative rankings.[3] We implement the instrumental variable approach, the Heckman two-step procedure and design a novel method which involves assessing the quality of

[3] This method is analogous to the Heckman (1979) two-stage procedure.

the portfolio company at the time of investment using portfolio company characteristics and examining the relationship between this ex ante quality measure and the affinity level in a syndicate.

Fourth, our paper relates to the literature on the venture capitalists ability to add value. We demonstrate that investment outcomes are explained by observable characteristics of co-investment partners controlling for the selection bias. Since the composition of a VC syndicate matters for the success of a portfolio company, we indirectly document the ability of venture capitalists to add value. Brander, Amit, and Antweiler (2002) argue that if the key reason for syndication were the enhanced ability to select better portfolio companies, we would have seen the formation of most syndicates on projects with ambiguous investment prospects. This is not what we observe in practice, since syndicated ventures return more than standalone investment projects. Tian (2012) demonstrates that VC syndication creates both product market value (e.g., better operating performance and more patents) and financial market value (e.g., more successful exits, lower IPO underpricing, and higher valuation) for entrepreneurial firms.[4]

The remainder of the paper is organized as follows. Section 2 presents the data and the construction of variables used in the analysis. Empirical results are presented in Section 3. Section 4 investigates whether the cost of affinity on investment performance is attributed to selection or treatment effects. Section 5 concludes.

2. Data

2.1. Sources of Data

The data used in this paper is derived from several different sources. We start with VentureSource, a database that contains detailed information on venture capital investments. For each portfolio company, VentureSource reports the identities of the venture capital firms and individual venture capitalists that invested in the company as well as the date of each investment.

[4] See Tian (2012) for a discussion of recent papers on the venture capital value creation and the VC syndication

For each individual venture capitalist in the data, we hand-collect through web searches, SEC filings, and news articles a broad range of biographic information including past career track, education history, and gender. For prior job histories, we record companies at which an individual had worked in the past. The education array includes data on the academic institutions at which individuals obtained their academic degrees as well as the types of degrees: undergraduate, postgraduate non-business (Ph.D., M.S., J.D., and M.D.), or postgraduate business (MBA). To determine whether an individual holds a degree from a top academic institution, we classify as top universities the Ivy League schools (Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, Princeton University, University of Pennsylvania, and Yale University) as well as other top U.S. schools (Amherst College, California Institute of Technology, Duke University, MIT, Northwestern University, Stanford University, University of California, Berkeley, University of Chicago, and Williams College).[5]

Venture capitalists' genders are determined based on their first names. In the cases of unisex names, we determine gender by reading news articles and web pages mentioning or containing pictures of the individual venture capitalists.[6] As for ethnical background, we use the name-matching algorithm developed by Kerr and Lincoln (2010) to determine the most likely ethnicities of venture capitalists based on their last names. Individual venture capitalists are classified into five non-overlapping ethnic groups: East Asians, Indian, Jewish, Middle Eastern, and all others. Although the limitation of the name-matching algorithm does not allow us to identify all possible ethnicities such as African American, the groups that the algorithm has been shown to successfully identify capture the most active ethnic minority groups in the venture capital industry, and all have a strong sense of cultural identity.[7]

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[5] The results presented in the paper are robust to classifying only the Ivy League universities as top schools as well as to adding top European universities (Cambridge University, INSEAD, London Business School, London School of Economics, and Oxford University) to the list of top schools. See Appendix Table 1 for more information.

[6] Despite our best effort, we cannot determine the gender of 27 venture capitalists in our sample.

[7] We use the information on the country/geographic region of a venture capitalist's undergraduate academic institution to determine ethnicity when the name-matching algorithm fails to do so.

We determine the investment outcome using VentureSource and Thomson Financial's SDC database, supplemented by Thomson Financial's VentureXpert database. Although there are examples of successful investments which did not result in IPOs, public floatation of a portfolio company is the cleanest signal of the venture's success.[8] We therefore consider an investment to be successful if and only if it results in the IPO of the portfolio company. Finally, we use the *Pratt's Guide to Private Equity and Venture Capital Sources* to manually code the locations of venture capital firm offices at the Combined Statistical Area (CSA) level and the Metropolitan Statistical Area (MSA) level where a CSA is not available.

2.2. Variables

The data are used to construct two sets of variables: individual and pairwise. Individual variables include personal characteristics of a venture capitalist that are fixed over time such as education, ethnicity, and gender dummy variables. The education dummy variables *Top College*, *Top Business School*, *Top Graduate School*, and *Top School* equal one if a venture capitalist holds, respectively, an undergraduate, business, graduate, or any degree from a top university and zero otherwise. *Ethnic Minority* takes the value of one if a venture capitalist is East Asian, Indian, Jewish or Middle Eastern. Dummy variables *East Asian*, *Indian*, *Jewish* and *Middle Eastern* pin down a venture capitalist's ethnicity; the dummy variable *Female* identifies an individual's gender.

Also included in the personal characteristics of a venture capitalist is a metric that changes with each additional deal completed and measures his or her success up to the current deal. The variable *Performance* measures the venture capitalist's success ratio up to the current deal, defined as the total number of successful investments made before the current investment divided by the sum of the total number of investments.[9] An investment is counted as successful even if the portfolio company did not go public before the date at which the *Performance* variable is evaluated. Venture capitalists may correctly predict the outcome of a successful deal

[8] For example, in our data, the ambiguity of an acquisition as an indicator of success is evidenced by the 40% of investments that exited via acquisition.

[9] For the first deal of a venture capitalist—when there is no investment track record by construction—the *Performance* variable is set equal to 0. Our results are robust to dropping such observations from specifications that rely on *Performance* as an explanatory variable.

long before the portfolio company sells its shares in a public offering.[10] In addition, the IPO preparation itself normally takes at least six months, and the decision to conduct an IPO is made even earlier. All results in the paper are robust to using an *ex ante* performance metric, i.e., if we include in our calculation of *Performance* only deals which had gone public prior to the date of the current deal.

We then construct pairs of individual venture capital investors that co-invested on syndicated deals. For each deal, we use the investment dates to determine founding venture capitalists, who are defined as the earliest investors in the deal, and follow-on investors, who participate in subsequent rounds.[11] Consistent with the idea that founding investors initiate and lead the deal and make decisions to bring follow-on investors on board, we focus on pairs of venture capitalists in which at least one member of the dyad is a founding investor. We focus on the first co-investment between two individual venture capitalists since the decision to collaborate for the first time is not colored by confounding factors such as experience of past collaborations and allows us to better isolate the impact of personal characteristics similarities in driving partnership decisions.[12]

For each pair of individual venture capital investors in the sample, two groups of pairwise variables are constructed based on the individual variables. The first group uses the qualifiers *At Least One* and *Both*. Values of such dummy variables depend on the number of venture capitalists in a dyad that possess a given characteristic. For example, *Top School: Both* takes the value of one if both venture capitalists in a pair hold degrees from top universities and zero otherwise; *Female: At Least One* equals one if there is either one or two female venture capitalists in a dyad and zero otherwise.

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[10] The financial success of Facebook, for example, had enabled its early-stage investors (e.g., Accel and the Founders Fund) to label it as a successful investment long before the company officially announced its IPO plans in February 2012.

[11] We also consider venture capitalists who invested within a 100-day period after the first investment date recorded founding investors to account for the possibility that the short interval between reported dates may be due to different reporting practices at different venture capital firms even though they invested in the same round. Our results are robust to considering only the venture capitalist with the earliest investment date or to using a different window (e.g., 30 days) to determine the founding investor.

[12] Our results are robust to including all pairs (first-time and repeated syndications) in the sample. First-time syndication pairs constitute about 93% of all pairs; the rest 7% are repeated collaboration pairs. We analyze these repeated collaborations in Section 3.4.

A separate group of pairwise variables are constructed using the qualifier *Same*. *Same School* equals one if the pair of venture capitalists attended the same academic institution and zero otherwise. *Same College*, *Same Business School* and *Same Grad School* are defined in a similar way but impose a requirement on obtaining degrees of the same type. *Same Ethnic Minority* equals one if both venture capitalists in a dyad are part of the same ethnic minority group and zero otherwise. *Same Previous Employer* is a dummy variable equal to one if two venture capitalists worked at the same company earlier in their careers and zero otherwise. We also define a dummy variable *Same Location* that equals one if the venture capitalists' firms are located in the same CSA and zero otherwise.

Our sample consists of 3,510 venture capitalists that invested into 11,895 different portfolio companies from 1975 to 2003. The distribution of their personal characteristics is summarized in Table 2. 3,382 of these venture capitalists have co-invested at least once with another venture capitalist in the sample. The pairwise data set contains 17,473 collaborations between a pair of venture capitalists partnering for the first time.

2.3. Counterfactual Syndication Pairs

In order to understand which factors lead to the establishment of collaborations between people, we construct a plausible set of potential partners that were *available* for syndication at the time when a founding venture capitalist partnered with a different co-investor. This set of counterfactual partners allows us to construct *counterfactual* pairs, essentially, a control group, which, when contrasted with the set of *actual* pairs, enables us to assess the significance of various personal characteristics in determining the likelihood of collaborations between people. Central to the construction of the set of counterfactual partners and pairs, therefore, are the assumptions on what makes a partner "available for syndication at the time of co-investment but not selected by the founding investor", i.e., counterfactual.

For each actual pair of venture capitalists syndicating on a deal, we generate all possible counterfactual, or pseudo, pairs by letting the founding venture capitalist "choose" a counterfactual partner that satisfies the following three criteria. First, the counterfactual partner and the founding investor must be from different venture capital firms. Second, the counterfactual partner must have invested in the same industry within 30 days of the actual co-

investment between the founding venture capitalist and the actual follow-on partner.[13] Third, the counterfactual partner must not have ever co-invested with the founding venture capitalist. The overall universe of counterfactual syndication pairs thus generated has roughly 2,000,000 pairs. We then draw a stratified random sample of 50,000 pairs controlling for the marginal distribution of pairs by year and industry as our sample of counterfactual pairs. Our results are robust to alternative methodologies for constructing the counterfactual syndication pairs, including, for example, further requiring the counterfactual partner to come from the same firm as the actual follow-on partner, or requiring four randomly chosen matched pseudo pairs for each actual pair in the sample of counterfactual pairs. The condition for the counterfactual partner to come from the same firm as the actual partner is a strong one and acknowledges that the venture capital firm selected as a syndicate partner may have a special expertise relevant for the deal. The results being qualitatively and quantitatively similar under different methodologies indicate that personal characteristics of a pair of individual venture capitalists are of the first-order importance for predicting the likelihood of syndication as well as the investment outcome.

3. Empirical Results

In this section we report empirical results of three major blocks of our analysis. First, we are interested in determining the set of personal characteristics that affect the performance of an individual venture capitalist. Second, we examine interactions between personal characteristics of two individuals and establish their impact on the likelihood of a pair working together. Third, we study the performance implications of different kinds of similarities between venture capitalists co-investing together. We use probit regressions to fit models with binary dependent variables—whether an investment outcome is considered successful (in the first and third blocks) and whether a pair of venture capitalists actually collaborate in syndication (in the second block). We cluster robust standard errors by portfolio company because different individual venture capitalists and syndicates that invest into the same portfolio company share

[13] If there were no other deals in the same industry within a 30-day window, we expand the window to 180 days.

the same realization of a random investment outcome as a dependent variable. Portfolio company's industry and year of investment fixed effects are included in every specification to capture differences in syndication patterns and in the investment success across different sectors and over time.[14] In addition, we analyze repeated collaborations between venture capitalists and explore differences in pairwise characteristics between individuals that partner with each other once and those who collaborate more frequently. Each of these analyses is discussed in turn.

3.1. Individual Success

The results of the analysis of individual success characteristics are presented in Table 3. The unit of analysis is person-investment, where *person* is an individual venture capitalist. We find that individual performance is persistent which is reflected in the positive and significant effect of past investment success on the current deal's success. Holding a degree from a top academic institution also matters. For example, controlling for past performance, graduating from a top college or getting an MBA from a top business school increases the likelihood of investment success by 1.2 and 2.0 percentage points, respectively. Given the overall sample fraction of successful investments at 17.7%, these marginal effects are economically significant and are equivalent to an increase of the probability of a favorable outcome by 6.8% and 11.3%, respectively. Holding any degree from a top academic institution is a stronger and more precise signal of individual ability than holding a particular kind of degree from a top university: the point estimate of the *Top School* dummy variable is the largest among other ability parameters and corresponds to a 14.1% boost of the probability of success. Ethnicity and gender characteristics do not consistently have any significant effect on individual performance. This justifies the distinction between ability variables, which positively affect individual success, and affinity variables, which are not ability-related and have no relationship with individual performance.

3.2. Syndication Partnering Decision

We then explore the determinants of collaboration between people. Regression results are summarized in Table 4. The unit of analysis is a pair of venture capitalists, actual or

[14] See Appendix Table 2 for a summary of the total number of deals and the number of successful deals over time and across industries.

counterfactual. If the syndication pair is counterfactual, the dependent variable takes the value of zero; if venture capitalists in a dyad are actual collaborators on a syndicated deal, the dependent variable takes the value of one.

In specifications 1 to 6, we explore the explanatory power of three groups of pairwise variables, school rank, same school, and same ethnicity, in isolation; fully specified models are reported in columns 7 and 8. We find strong support for the homophily-driven choice of working partners. Most ability- and affinity-based pairwise characteristics have positive and significant point estimates. For example, two venture capitalists both holding degrees from top universities are more likely to work together by 2.2 percentage points (Column 2), or by 8.5% relative to the unconditional sample probability of collaboration.[15] Finer classification of the schools (Columns 1 and 7) suggests that syndication based on similar top ability characteristics seems to be largely driven by top business school graduates.

An even stronger effect is observed with respect to affinity-based characteristics. Getting a degree from the same school increases the likelihood of two venture capitalists working together by 20.5% (Column 4). Adding a restriction on the shared educational background to be of the same type further raises the chances of collaboration between a pair of individuals with such commonalities. For example, venture capitalists who attended the same undergraduate school are 42.5% more likely to co-invest (Column 3). Furthermore, the likelihood of two individuals partnering is 22.8% higher if both belong to the same ethnic minority group (Column 6). The contributions of different ethnic groups are uneven. For example, East Asian venture capitalists display the greatest tendency to collaborate with investors of the same ethnicity. To be specific, a partnership between two randomly drawn venture capitalists that are both East Asian is 74.5% more likely to happen. If both individuals in a pair are either Indian or Jewish, the probability of them co-investing together increases by

[15] The unconditional sample probability of cooperation is approximately 25.9%. This can be calculated from the number of actual syndication pairs and the number of counterfactual syndication pairs used in the regression. The number of actual syndication pairs and the number of counterfactual syndication pairs as inputs to the regressions are, respectively, 17,473 and 50,000. The number of observations in the regressions reported in Table 4 is less than 67,473, because gender information on 27 individual venture capitalists is missing. As a result, 153 actual and 432 counterfactual pairs have the variable *Both Female* unidentified.

52.1% and 18.9%, respectively (Column 5).[16] All these effects remain strong and significant in the fully specified models in Columns 7 and 8.

Venture capitalists also exhibit a strong preference to partner with individuals with whom they share prior job histories. Having at least one common past employer increases the probability of two people investing together by 64% (Column 7). In addition, location also matters. Venture capitalists are much more likely to collaborate with each other if the companies at which they work have offices in the same CSA.[17]

Finally, gender is another characteristic based on which homophily may potentially come into play. We do not find a significant effect on the *Female: Both* parameter, likely because there is not a sufficient number of co-investments on which women work together to estimate the coefficient more precisely.[18]

Overall, our results on syndication partnering decisions show that individual venture capitalists are more likely to collaborate with others who possess similar characteristics and backgrounds, whether these characteristics are related to ability or not. The effects of these similarities on collaboration likelihood are highly significant, both statistically and economically.

3.3. Investment Success: Pairwise Characteristics

Having found strong evidence for homophily in the syndication patterns of venture capitalists, we next explore whether there are success implications of these biases. Table 5 presents the estimation results. The unit of analysis is an actual pair of venture capitalists that partnered on a syndicated deal. We regress the investment outcome (a dummy variable indicating success) on a set of pairwise individual characteristics. Some pairwise characteristics are represented by two dummy variables with qualifiers *At Least One* and *Both*. The purpose of having two types of variables is to understand whether a characteristic has an additive

[16] Specifications do not include a dummy variable that captures the effect of two Middle Eastern investors working on a deal together. There are 15 Middle Eastern venture capitalists in the data. The number of deals on which they invest together is insufficient to estimate the effect of sharing the Middle Eastern ethnicity on the syndication decision. Hence, we omit the variable *Middle Eastern: Both* in all specifications.

[17] Chen et al. (2010) study implications of distance between entrepreneurs and venture capitalists.

[18] The vast majority of venture capitalists in the dataset are male. 219 female venture capitalists invested in 1,314 different portfolio companies, resulting in only 81 actual pairs of both female investors.

impact on success or whether it only matters if both individuals in a pair share it. We establish two main results.

First, ability characteristics have a positive additive effect on the co-investment success. Having an extra person with a degree from a top school in a pair of venture capitalists consistently increases its chances of success on the investment. The unconditional success rate of venture capital syndicates is 21.0%. As reflected in columns 4 to 6, the first top degree holder increases the probability of success by approximately 9%, while the second top degree holder gives an additional 11% boost. Similar to our results on individual success factors, holding any degree from the top school—without considering college, business and graduate school degrees separately—seems to more precisely indicate a person's ability. Our results indicate that collaborating for ability-based characteristics improves investment performance.

On the contrary, collaborating for affinity-based characteristics severely worsens the performance of a syndication dyad. In particular, syndication between venture capitalists who are part of the same ethnic minority group or who worked at the same company in the past have lower chances of success. For example, former co-workers have an 18% lower probability of investment success when they co-invest with each other. Attending the same undergraduate school is even more detrimental. Syndicate partners with degrees from the same college exhibit a 22% lower success rate.[19] The cost of affinity is even greater for venture capitalists with similar ethnic backgrounds. Being part of the same ethnic minority group reduces the probability of success by 25%. The effect is not evenly distributed across underlying ethnicities. East Asian investors collaborating with each other exhibit the largest cost of affinity, 63%. When two Jewish venture capitalists partner on a deal, the probability of investment success drops by 20%. It is important to note that none of the affinity variables with a qualifier *At Least One* is significant. It is not the presence of an ethnic minority investor that drives underperformance. Indeed, Table 3 shows that individual's ethnicity is not related to success.

[19] The insignificance of the estimated coefficient on *Same School* suggests that the cost of affinity is amplified when two individuals have the highest likelihood of actually knowing each other and/or associating with each other based on the educational experience of the same type (e.g., undergraduate). The point estimate on *Same College* also displays the highest magnitude in the syndication partnering decision model presented in Table 4.

Investment success is negatively affected when *two* investors being part of the same ethnic minority group partner on a deal.

We have thus established a dichotomy between ability- and affinity-related characteristics. On one hand, people display greater inclination to work with similar others. Similarities may be in terms of ability (e.g., whether individuals hold degrees from top academic institutions) or affinity (e.g., whether individuals share the same ethnic background). On the other hand, these two sets of pairwise characteristics affect performance in opposite ways. Teams with more able participants are more likely to result in a successful investment outcome. On the contrary, investments are more likely to fail when groups are formed based upon similarities between members along characteristics having nothing to do with ability.

We bring the analysis one step further by introducing ability and affinity scores. We construct the simple-average ability score of a pair of venture capitalists as the average of pairwise ability characteristics (measures indicating whether both members of the pair hold top school degrees). We construct the weighted-average ability score as the dot product of a vector of pairwise ability characteristics and a vector of estimated coefficients on these characteristics in the syndication decision regression, the marginal effects of which are reported in Table 4. The simple-average and weighted-average affinity scores are similarly constructed over the set of pairwise affinity characteristics (measures indicating whether members of the pair are of the same gender, in the same minority ethnic group, attended the same school, or previously worked for the same employer). The weighted-average ability and affinity scores of a pair of venture capitalists are essentially weighted measures of how alike the two venture capitalists in the dyad are in terms of ability and affinity characteristics, respectively, with the weights representing how important each characteristic similarity is in determining the syndication partnering decision.

The ability and affinity scores thus constructed can be used as aggregate independent variables to explain the investment success of the syndication dyad. Results of the analysis at the syndication pair level are presented in Table 6. Using these aggregate scores to measure similarities between members of a pair, we again find that the more alike the partnering venture

capitalists are in affinity-related characteristics, the less likely their investment outcome is successful.

3.4. Repeated Collaborations

Our analysis so far examines only first-time co-investments made by pairs of venture capitalists. In this section we supplement the analysis by considering the total number of co-investments a pair of venture capitalists makes together. In particular, we explore whether aggregate measures of ability- and affinity-based similarities between individuals—proxied by the ability and affinity scores—can be used to predict the total number of collaborations in which a pair of individuals engage.

We run Poisson regressions of the total number of co-investments by a syndicate on the ability and affinity scores. Estimation results are presented in Table 7, with Columns 1 and 2 using simple-average scores and Columns 3 and 4 using weighted-average scores. Results in Columns 1 and 3 are based on the analysis over both actual and counterfactual pairs, whereas results in Columns 2 and 4 are derived solely from actual pairs. Counterfactual pairs, by definition, have zero collaboration together. Since the distinction—in terms of pairwise personal characteristics—between counterfactual and actual pairs is sharper than the difference between actual pairs with unequal number of collaborations, Columns 1 and 3 bear estimates of greater magnitudes. The number of co-investments—among actual and counterfactual pairs—is positively and significantly related to affinity scores. Any positive relationship between the number of co-investments a pair of venture capitalists made together and their ability score, however, seems to be entirely driven by the contrast between counterfactual pairs with zero collaborated deals and those pairs collaborating at least once. Among actual pairs only, we find positive relationship only between the affinity score and the number of co-investments. This pattern is captured in Figure 1, which presents the average values of ability and affinity scores for dyads of venture capitalists grouped by the number of co-investments they make together.[20] Collaborating individuals have both greater ability and affinity scores than non-collaborating individuals. Frequency of collaborations—among actual syndicates—does not seem to be related

[20] Figure 1 and tables that follow are based on the simple-average ability and affinity scores. Using the weighted-average ability and affinity scores generates similar patterns.

to the ability score. It is, however, increasing in the affinity score. Therefore, affinity-based similarity not only determines people's attractions to work together for the first time, but also increases their frequency of repeated collaborations.

4. Selection versus Treatment

Inferior performance of investments undertaken by venture capitalists with a high level of affinity between them may be attributed either to selection or treatment effects. On the one hand, collaboration with similar others may have value in itself. In this case, a venture capitalist may derive personal utility from the collaboration and consciously reduce the hurdle rate if making the investment involves future cooperation with a syndicate partner sharing common features. As a result, syndications based on affinity will have lower probabilities of success because of less stringent requirements on portfolio companies at the time of investment. Alternatively, it is possible that affinity makes it easier for one venture capitalist to convince another that the investment is worthwhile. Consequently, if the attractiveness of an investment opportunity is questionable and hence it is hard for a founding venture capitalist to reach out to a wide set of potential syndication partners, it is more likely that a future co-investor will display a high level of affinity with the original investor. Finally, entrepreneurs may prefer to work with a diverse group of venture capitalists in order to reduce the likelihood of investors colluding and making decisions not in the interests of entrepreneurs. Entrepreneurs of inferior portfolio companies have considerably less bargaining power in terms of which venture capitalists to bring aboard. Accordingly, the underperformance of deals on which high affinity venture capitalists are among co-investors may also be explained by the inability of entrepreneurs of low quality portfolio companies to push for a more diverse group of investors.

On the other hand, the negative effect of affinity may be due to treatment effects after the investment was made. The dark side of homophily can lead to poor decision-making by inducing social conformity and groupthink. In contrast, differences in knowledge, skills, and perspectives among team members may enhance creativity and innovation and elicit a multiplicity of views, adding dimensions to problem-solving and decision-making processes as well as eventually improving performance (William and O'Reilly, 1998; Jehn, et al., 1999).

Venture capital investors provide significant value-add to their portfolio companies beyond the supply of capital. Post-investment, they make important decisions and offer invaluable advice on a variety of issues: hiring and firing the CEO, the senior management team, and the board of directors; identifying customers or partnering opportunities; and devising a viable overall strategy, all of which are critical to moving the venture forward along the path to success. Thus, any inefficient decision-making post investment induced by homophily among high-affinity venture capitalists will negatively impact the success of the portfolio company they oversee. In other words, the lower likelihood of success of co-investments between venture capitalists that share similar characteristics is triggered by their making inefficient decisions or even mistakes that they would otherwise avoid with more diverse boards.

Although similar in terms of empirical effects, the selection and treatment effects explanations have different welfare implications. According to the selection story, the success of a portfolio company is independent of the composition of the venture capital team once the investment is made. As long as investors act rationally, i.e., all investments have nonnegative ex ante expected returns, there is no efficiency loss post investment. Potential losses are incurred if some deals undertaken would not have been financed absent the affinity between co-investors or if high-affinity deals crowd out better deals that should have been financed instead. In the treatment story, however, the investment outcome is affected by whether syndication partners exhibit high homophily or not. To this end, there is scope for greater efficiency if venture capitalists become more cautious in choosing to collaborate with investors possessing similar traits.

It is clearly possible that both mechanisms take place in practice, and it is not entirely obvious which effect contributes more to the empirical biases that we document. In the tests that follow, we try to disentangle selection versus treatment effects. First, we show that our results are robust to controlling for quality-related characteristics of portfolio companies known to venture capitalists at the time of financing. The treatment story should be identifiable using the right set of ex ante quality observables, allowing us to estimate the causal effect of affinity in the reduced form regressions. Second, we instrument for the level of pairwise affinity between a syndicate of venture capitalists involved in a deal with the level of affinity among their

respective colleagues not involved in the deal under consideration and refer to this measure as the cross-firm affinity. The structural form results support the treatment effect story. The direct analysis of the treatment effect would require us to study how decisions made by or the amount of effort exerted by venture capitalists differ depending on the composition of the investment team. This information is hard to document, let alone quantify, because of the tacit nature of venture capitalists' production function. The robustness of results to adding portfolio company controls and to instrumenting for the affinity measure makes us confident that the composition of the syndicate is an important causal driver of the ultimate investment success. At the same time, the selection story cannot be ruled out; instead we also find evidence—both indirect and direct—for its existence. The reduction in the magnitudes of point estimates on the affinity score following the inclusion of portfolio company controls indicates that approximately 17% of the negative effect of affinity stems from the fact that high affinity syndicates choose to work on deals inferior at consummation, whereas the remaining 83% is due to the detrimental nature of affinity post-investment. We confirm that venture capitalists that display high levels of mutual affinity do indeed invest into portfolio companies of lower potential investment success by constructing the measure of ex ante deal quality and showing that it is negatively related to the affinity score. The economic effect of this bias, however, is small.

We also use the Heckman (1979) two-stage procedure to address sample selectivity issues. Model identification comes from the variation in the co-investment frequency between VC firms. For every syndication between individual venture capitalists—actual and counterfactual—we calculate the number of past syndications between their two respective venture capital firms. These co-investments may include partnerships between one of the venture capitalists in the pair under consideration and colleagues of the other VC in a given dyad or joint deals undertaken by their colleagues without either of the investors in a pair being involved. Since we are examining exclusively the first syndications between individual venture capitalists, their past collaboration history is non-existent by construction. The co-investment frequency (e.g., over the previous 6 months, 1 year, and 2 years) between two firms is a strong predictor of whether individual investors from these firms choose to partner on a deal. It is not, however, related to

the investment outcome.[21] The inclusion and exclusion restrictions hold, and hence, the variable is a valid instrument to be used in the Heckman selection equation from which the inverse Mills ratio is computed. Including the inverse Mills ratio computed from the selection equation as an additional explanatory variable into the pairwise investment success model does not affect the qualitative nature of results reported in Table 5. This suggests that the biases we document are not driven by the sample selectivity.

We present two sets of results in Table 8. First, we establish the economic significance of ex ante characteristics of portfolio companies in predicting their ultimate performance (Panel A). Second, we document that the cost of affinity is robust to accounting for portfolio company controls in explaining the investment success of a syndicate (Panel B).

Panel A of Table 8 reports marginal effects on the investment success probability of each of the portfolio company characteristics measured at the time of financing. The dependent variable is a dummy variable equal to 1 if the entrepreneurial firm eventually conducts an IPO. The estimations are based on probit regressions with industry, year, and venture capital firm fixed effects. In Column 1 of Panel A, we focus on whether the portfolio company was founded by serial entrepreneurs by tracking the careers of founders and identifying those who had already established a venture capital-backed business. An entrepreneur with a track record of success is more likely to succeed that a first time entrepreneur (Gompers et al., 2010). In Columns 2 and 3, we examine the stage (e.g., Startup/Seed, Early Stage, Expansion, Later Stage, and Buyout/Acquisition) at the time of fundraising and the financing round, respectively, keeping in mind that earlier stages and rounds involve more risks and hence are less likely to result in a successful outcome. Last, we account for the amount of attention that the media paid to the portfolio company at the time of investment in Column 4. Deals that receive more media presence prior to the first venture capital investment are ultimately more successful. We use *Dow Jones Factiva* to identify portfolio companies which had news stories about them released at the time of financing or just prior to it. Specifically, we search for publications with the portfolio company name and the phrase "venture capital" in the time frame from six months

[21] Frequent syndications between two firms over a long period of time in the past (e.g., 3 years or more) make it more likely that individual venture capitalists from these firms will be more successful. This is consistent with the idea that long-term partnerships are likely to be backed by superior performance.

before the investment until one month after.[22] We then separate the investments into three groups, those with no media coverage, those with moderate media coverage, and those with high media coverage, and include two dummy variables, Moderate Media Coverage and High Media Coverage, as independent variables in Column 4.[23] All these variables display statistical and economic significance in predicting the future investment outcome, separately as well as jointly (as indicated in Column 5 when all the factors are included at once). Having a serial entrepreneur as a founder, for example, increases the likelihood of the portfolio company going public by 3.8 percentage points from the unconditional IPO probability of 17.7%. Similarly, compared with portfolio companies with no media coverage at the time of investment, portfolio companies with moderate and high media coverage are significantly more likely to eventually be successful. Overall, results in Panel A demonstrate that these characteristics are good indicators of the ex ante quality of portfolio companies.

Panel B of Table 8 shows that the detrimental effect of affinity is not driven by the selection of high-affinity syndicates into inferior deals based on observable characteristics of portfolio companies discussed in Panel A. The point estimate on the affinity score remains negative, highly statistically and economically significant across all specifications. The corresponding marginal effect's absolute value goes down by 17% from 0.237 to 0.197 following the inclusion of portfolio company controls. This suggests that the relative contribution of the treatment effect and the selection effect to the cost of affinity is roughly 83/17. On one hand, this observation may be interpreted as indirect evidence for the selection story—the bias has been eliminated following the inclusion of additional controls correlated with the treatment. On the other hand, and most importantly, the reduction in magnitude of the affinity's marginal effect by only 0.040 from 0.237 following the inclusion of objective fundamental controls—highly significant in explaining the future investment outcome—indicates that the major portion of the negative side of affinity stems from the post-investment actions of the syndicate as opposed to

[22] Our results are robust to using alternative windows such as six months before to six months after the investment.

[23] Investments with zero news articles covering them are grouped in the No Media Coverage category. For investments covered by at least one news article, we separate them into Moderate Media Coverage and High Media Coverage using the median number of articles covering the investment in that year.

the deal selection patterns. Naturally, real investment decisions are made based on a much richer information set, which includes unobservable attributes of portfolio companies as well. We use the instrumental variable approach to address endogeneity at this level.

The instrumental variable used to account for the endogeneity between the level of affinity in a syndicate and the underlying quality of a deal is the cross-firm affinity score. It can be thought of as the degree to which employees of two firms—excluding people involved in a deal under consideration—are similar to each other. The measure is constructed in three steps. First, for every employee of one firm—not staffed on that deal—we compute affinity scores vis-à-vis every employee of another firm—not staffed on that deal. Second, we take an average of the scores by person, which gives us the extent to which a venture capitalist of one firm is similar to a group of people working at another firm. Third and last, we average out these individual similarity measures by firm and arrive at the cross-firm affinity score.[24] Gompers et al. (2012) show that new hires into venture capital firms tend to be very similar to VC partners active at the time of their recruitment. This suggests that every employee should exhibit a high level of affinity with other people working at a firm even if they are not involved in the same deals. Since the cross-firm affinity score does not take into account people who participate in the selection or execution of a deal under consideration, the measure cannot be directly related to the ultimate performance of the portfolio company as well as to the ex ante quality of the investment opportunity. These two facts hold in data and justify the use of this variable as an instrument for the pairwise affinity measure. The ability score is subject to the same endogeneity concerns as the affinity score—high ability syndicates may choose to invest into deals of superior quality at the time of financing. We instrument for it with the cross-firm ability score constructed in a similar way based on the above-mentioned procedure.

Table 9 presents the estimates obtained using the two-stage least squares method. Reported in Panel A, structural form equations show that controlling for the endogenous determination of a syndicate's affinity level does not change the conclusion that greater similarity between co-investment partners is associated with lower success rates. The TSLS

[24] Using the maximum operator instead of the average in computing the cross-firm affinity score leads to results similar both qualitatively and quantitatively.

point estimates on the affinity score are negative and highly statistically significant across all specifications. The increase in absolute values and standard errors of estimates on the affinity coefficient compared to probit (Panel B of Table 8) and OLS (unreported) may be driven by the noisiness of the instrument and heterogeneous effects. Interestingly, the opposite holds for the ability score. Since the TSLS point estimate on the ability score is not statistically significant, it might be the case that the positive reduced form relationship between the deal's success and the ability score is explained by the selection of high ability co-investment partners into portfolio companies of ex ante superior quality. Our confidence in the implemented IV approach is supported by the first stage estimates reported in Panel B of Table 9. Each instrument displays significant statistical power in predicting the endogenous variable of interest; the F-statistics on the excluded instruments are very large. The weakness of the selection story is confirmed by the fact that none of the observable portfolio company characteristics prove to be significant determinants of the syndicate's level of affinity.

Table 10 provides additional evidence in favor of the treatment story. Using the estimates from Panel A of Table 8, we construct the predicted probability of success for each investment as the summary measure for the ex ante investment quality. We interact the affinity score with high (low) investment quality dummies—equal to one if the investment quality is above (below) the median investment quality of all deals in that year—and show that the cost of affinity is most pronounced on deals which did have a high level of investment appeal at the time of financing. This strongly suggests that the post-investment developments are more important to the detrimental nature of affinity than the selection story which argues that high-affinity syndicates choose to pursue low-quality investment opportunities.

Having documented direct evidence of the strong treatment effect, we cannot rule out the selection story. The following tests show that venture capitalists with common traits do indeed syndicate on deals with lower investment appeal. This effect, however, is by no means a significant driver of the biases we document; the post-investment behavior of venture capitalists with similar characteristics is the ultimate source of the cost of affinity.

Results of the Heckman two-stage procedure are reported in Table 11. The selection equation (1) uses the number of syndications between two venture capital firms within 6 months

prior to a given syndication between a pair of individual investors as an instrument. Recent collaborations between two firms make it much more likely that venture capitalists from these firms will decide to partner on a deal. The fraction of counterfactual pairs of VCs that work at firms with joint syndications in the preceding 6 months is under 5%, whereas around 16% of actual pairs come from firms that do have recent co-investment history. The number of syndications by two VC firms in the past 6 months is uninformative with respect to investment success of joint deals. Adding the instrument as an explanatory variable into the syndication success regressions does not produce a significant coefficient and does not change the magnitudes or significance of other estimates (unreported specification). Finally, we add the Inverse Mills Ratio generated from the selection equation as an independent variable into the success regressions (4) and obtain a negative point estimate on it. This suggests that there is negative correlation between the residuals in the selection and outcome equations; pairs of VCs that are more likely to work together have lower success potential. This supports the selection story. However, since none of the values of coefficients change, the slight sample selectivity cannot be responsible for the biases we document.

We also use an additional strategy to identify the selection effect. According to the selection story, venture capitalists with high affinity co-invest in portfolio companies that are of low quality already at the time of financing. A confirmation of this hypothesis in the data would be a negative relationship between the syndicate's affinity level and the ex ante quality of investment. We do find evidence of mild selection by examining the relationship between the ex ante quality of investment and the syndicate's affinity level. Regression results reported in Table 12 demonstrate that the affinity score is indeed negatively related to the probability of the portfolio company to go public assessed at the time of financing. In spite of being statistically significant, point estimates do not bear remarkable economic importance. For example, increasing the affinity score of a given syndicate by adding a weak social tie between venture capitalists (i.e., allowing them to have gone to the same college, graduate school or business school or have worked at the same company in the past or to belong to the same ethnic minority group) reduces the ex ante quality of investment by less than 1 percentage point from the average value of 18–20% depending on the specification. In contrast, as follows from Panel

B of Table 8, controlling for the investment attractiveness of the portfolio company at the time of financing, a one-step increase in the affinity score lowers the chances of a portfolio company to eventually go public by 2.5 percentage points from the unconditional average of 21.0%. This suggests that the selection effect, albeit present, is not an economically significant driver of the cost of affinity compared to the treatment effect. This finding is consistent with the results of the Heckman two-stage procedure. In addition, we examine the deals that successfully conducted IPOs within six months (or one year) of investment as another proxy for ex ante quality and find no significant relationship between ex ante quality and affinity (unreported). Furthermore, we examine syndicates in which both venture capitalists join at the same time versus syndicates consisting of one founding investor and one follow-on investor and find no evidence that the latter exhibit higher levels of affinity.

We document the presence of both treatment and selection effects in the data. A variety of tests discussed in this section—introducing a range of portfolio company controls, accounting for the endogeneity using the instrumental variable approach, applying the Heckman two-stage procedure to adjust the results for sample selectivity, and demonstrating that the affinity is most detrimental on deals of highest quality at the time of financing—make us confident that the contribution of the selection effect to the empirical biases documented in the paper is at most weak. The treatment effect post-investment is the key channel through which the mutual affinity of venture capitalists involved in a deal affects ultimate investment success.

5. Conclusion

Collaborative behavior between people is of great importance in different spheres of life. We engage in brainstorming discussions with our colleagues at work to find an optimal solution to a business problem. Companies we work at form partnerships with other firms to develop creative products and enhance joint productivity. Our children form study groups with their classmates to learn the material better. Our countries collaborate with other nations upon security and environmental issues. Living in a globalized world, we face great opportunities not only in terms of what to work on, but also with whom to cooperate. The growth in the number of projects that are being done in a team rather than individually makes it increasingly

important to understand the following questions. First, what personal characteristics are taken into account when people select their working partners? Second, how does the influence of these personal characteristics on the team composition affect performance? We use the venture capital syndication setting to answer these questions.

Conducting the analysis at the individual venture capitalist level with a dataset most comprehensive of its kind to date, we establish a distinction between personal characteristics which affect individual performance and those which do not. Ability-related characteristics include ranks of academic institutions which an individual graduated from. Holders of degrees—undergraduate, graduate, and MBA—from top universities are more likely to make successful investments. Personal characteristics not related to success and ability—after controlling for past performance—include ethnicity and gender.

Consistent with the homophily literature, we conclude that investors who share similar characteristics with each other are more likely to co-invest together. This finding applies to both ability- and affinity-related pairwise characteristics. For example, top university degree holders—highly able investors—are 8.5% more likely to work together at least once. Venture capitalists exhibit an even stronger attraction to each other based on affinity-related characteristics. Graduates of the same university—not necessarily with the same type of degree—are 20.5% more likely to co-invest with each other. Furthermore, being part of the same ethnic minority group increases the probability of cooperation between two venture capitalists by 22.8%.

The real effects of these biases are not unidirectional. On one hand, syndication based on top ability characteristics improves performance of a group. On the other hand, investment teams that exhibit a high extent of similarity between members over characteristics not related to ability are less likely to succeed. The adverse effect of affinity based on prior employment, educational background or ethnicity is economically and statistically significant, in some cases lowering the probability of investment success by 25%. A variety of tests show that the cost of affinity is not driven by selection into inferior deals; the effect is most likely attributable to poor decision-making by high-affinity syndicates post investment. We also find that venture capitalists who collaborate most frequently with each other are precisely those who have a lot of

affinity-related characteristics in common. In such groups, people partner because they associate with each other, they share a bond, and perhaps they are even *friends*.

Our conclusion is that, to paraphrase Ralph Waldo Emerson, you cannot afford to be stupid with old friends when you are venture capitalists co-investing together.[25]

[25] The original quote from Ralph Waldo Emerson (1803–1882) is: "It is one of the blessings of old friends that you can afford to be stupid with them."

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Table 1
Illustrative Example

This table presents co-investments of an Israeli venture capitalist in our sample, Mr. A, into four categories depending on the types of similarities that he has with his co-investors. Ability-based syndications are the ones on which Mr. A, an MIT graduate, co-invested with at least one other venture capitalist holding a degree from a top school. Partnerships are affinity-based if investors share Israeli background.

Affinity-based co-investment	Ability-based co-investment: No	Ability-based co-investment: Yes
Yes	Number of deals: 3 Number of IPOs: 0 Success Rate: 0.0%	Number of deals: 2 Number of IPOs: 0 Success Rate: 0.0%
No	Number of deals: 0 Number of IPOs: 0 Success Rate: N/A	Number of deals: 9 Number of IPOs: 4 Success Rate: 44.4%

Table 2
Summary of Personal Characteristics

This table summarizes the distribution of venture capitalists' personal characteristics. A venture capitalist is counted in Top College, Top Business School, Top Grad School or Top School if she holds, respectively, an undergraduate, business, graduate or any degree from a top university. There are individuals which hold more than several different degrees from top schools. That is why, Top College, Top Business School and Top School numbers do not add up to Top School. Ethnicity is uniquely determined. Gender information is missing for 27 venture capitalists in the dataset.

Personal Characteristic	Number of VCs	Fraction of VCs
Top College	1,089	31.0%
Top Business School	1,308	37.3%
Top Grad School	466	13.3%
Top School	1,867	53.2%
Indian	83	2.4%
East Asian	113	3.2%
Middle Eastern	15	0.4%
Jewish	640	18.2%
Ethnic Minority	851	24.2%
Male	3,264	93.0%
Female	219	6.2%
Total Number of VCs	3,510	100.0%

Table 3
Individual Investment Success

This table reports marginal effects of probit regressions for the probability of success of an investment made by a venture capitalist. The dependent variable is a dummy variable that takes the value of one if the investment is successful and zero otherwise. Independent variables are success and personal (education, ethnicity, and gender) characteristics of a venture capitalist. *Performance* is the venture capitalist's success ratio up to the current deal. *Top College*, *Top Business School*, *Top Grad School* and *Top School* are dummy variables which take the value of one if a venture capitalist holds, respectively, an undergraduate, business, graduate or any degree from a top university and zero otherwise. *Ethnic Minority* is a dummy variable that equals one if a venture capitalist is East Asian, Indian, Jewish, or Middle Eastern. Portfolio company's industry and year of investment fixed effects are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Performance	0.083***	0.084***	0.089***	0.089***	0.083***	0.083***	0.084***	0.084***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
Top College	0.012**				0.012**	0.012**		
	[0.005]				[0.005]	[0.005]		
Top Grad School	0.010				0.010*	0.010*		
	[0.006]				[0.006]	[0.006]		
Top Business School	0.020***				0.020***	0.020***		
	[0.005]				[0.005]	[0.005]		
Top School		0.025***					0.025***	0.025***
		[0.005]					[0.005]	[0.005]
East Asian			-0.001		-0.008		-0.006	
			[0.013]		[0.013]		[0.013]	
Indian			-0.008		-0.009		-0.011	
			[0.015]		[0.015]		[0.015]	
Jewish			-0.005		-0.004		-0.004	
			[0.006]		[0.006]		[0.006]	
Middle Eastern			-0.009		-0.007		-0.009	
			[0.041]		[0.041]		[0.040]	
Ethnic Minority				-0.005		-0.005		-0.005
				[0.005]		[0.005]		[0.005]
Female	-0.012	-0.012	-0.014	-0.014	-0.012	-0.012	-0.012	-0.012
	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]
Observations	26,327	26,327	26,327	26,327	26,327	26,327	26,327	26,327

Table 4
Syndication Partnering Decision

This table reports marginal effects of probit regressions for the probability of a venture capitalist to partner with another venture capitalist based on a set of observable characteristics. The dependent variable is a dummy variable equal to one if the syndication between two investors takes place (actual pairs) and zero otherwise (counterfactual). Independent variables are pairwise personal characteristics (education, ethnicity, career and gender) of a dyad of venture capitalists. *Both Top College*, *Both Top Business School*, *Both Top Grad School* and *Both Top School* are dummy variables which take the value of one if both venture capitalists in a pair hold, respectively, undergraduate, business, graduate or any degrees from a top university and zero otherwise. *Same School* equals one if venture capitalists attended the same academic institution and zero otherwise. *Same College*, *Same Business School* and *Same Grad School* are defined similarly with a restriction on the type of degree obtained. *Same Ethnic Minority* equals one if venture capitalists are both part of the same ethnic minority and zero otherwise. *Same Previous Employer* is a dummy variable equal to one if two venture capitalists worked at the same company before entering the venture capital industry and zero otherwise. *Same Location* is a dummy equal to one if venture capitalists' firms have offices in the same Combined Statistical Area. Portfolio company's industry and year of co-investment fixed effects are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Top College: Both	0.013**						0.004	
	[0.005]						[0.006]	
Top Business School: Both	0.020***						0.013**	
	[0.005]						[0.005]	
Top Grad School: Both	0.005						-0.008	
	[0.011]						[0.012]	
Top School: Both		0.022***						0.012***
		[0.004]						[0.004]
Same College			0.110***				0.103***	
			[0.016]				[0.016]	
Same Business School			0.040***				0.028***	
			[0.008]				[0.009]	
Same Grad School			0.066***				0.072***	
			[0.025]				[0.028]	
Same School				0.053***				0.045***
				[0.006]				[0.007]
East Asian: Both					0.193***		0.188***	
					[0.047]		[0.048]	
Indian: Both					0.135*		0.131*	
					[0.069]		[0.070]	
Jewish: Both					0.049***		0.049***	
					[0.011]		[0.011]	
Same Ethnic Minority						0.059***		0.061***
						[0.010]		[0.010]
Female: Both	0.040	0.040	0.039	0.039	0.041	0.041	0.040	0.040
	[0.030]	[0.030]	[0.030]	[0.029]	[0.030]	[0.030]	[0.030]	[0.030]
Same Previous Employer	0.169***	0.169***	0.167***	0.165***	0.171***	0.171***	0.166***	0.164***
	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]
Same Location	0.125***	0.125***	0.125***	0.124***	0.127***	0.127***	0.124***	0.123***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Observations	66,888	66,888	66,888	66,888	66,888	66,888	66,888	66,888

Table 5
Investment Success: Pairwise Characteristics

This table reports marginal effects of probit regressions for the probability of investment success by a pair of venture capitalists. The dependent variable equals one if the investment is successful and zero otherwise. Independent variables are pairwise personal characteristics (education, ethnicity, career, and gender) of a dyad of venture capitalists. Variables with the classifier *at least one (both)* take the value of one if at least one (both) individual(s) in a pair has (have) a specific attribute and zero otherwise. *Same Previous Employer* is a dummy variable which equals one if venture capitalists in a dyad worked at the same company. *Same Location* takes a value of one if the two venture capitalists' firms are located in the same CSA. Portfolio company's industry and year of co-investment fixed effects are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Top School: At Least One	0.017	0.016	0.016	0.020*	0.019*	0.019*
	[0.011]	[0.011]	[0.011]	[0.010]	[0.010]	[0.010]
Top School: Both	0.021**	0.021**	0.023**	0.022**	0.022**	0.024***
	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]
Same College	-0.048***	0.047***		0.047***	0.047***	
	[0.017]	[0.017]		[0.017]	[0.017]	
Same Business School	0.001	0.001		0.002	0.001	
	[0.014]	[0.014]		[0.014]	[0.014]	
Same Grad School	0.000	0.001		0.001	0.001	
	[0.033]	[0.033]		[0.033]	[0.033]	
Same School			-0.014			-0.014
			[0.010]			[0.010]
East Asian: At Least One	-0.010			-0.010		
	[0.019]			[0.019]		
East Asian: Both	-0.133***			-0.133***		
	[0.025]			[0.025]		
Indian: At Least One	-0.004			-0.001		
	[0.025]			[0.025]		
Indian: Both	-0.045			-0.045		
	[0.073]			[0.073]		
Jewish: At Least One	0.001			0.000		
	[0.010]			[0.010]		
Jewish: Both	-0.043**			-0.043**		
	[0.018]			[0.017]		
Same Ethnic Minority		-0.052***	-0.053***		-0.052***	-0.053***
		[0.017]	[0.017]		[0.017]	[0.017]
Female: At Least One	-0.020	-0.020	-0.020			
	[0.015]	[0.015]	[0.015]			
Female: Both	-0.039	-0.039	-0.038			
	[0.049]	[0.049]	[0.049]			
Same Previous Employer	-0.038**	-0.039**	-0.038**	-0.038*	-0.038**	-0.038*
	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]
Same Location	0.021**	0.020**	0.020**	0.020**	0.020**	0.020**
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
Observations	17,320	17,320	17,320	17,473	17,473	17,473

Table 6
Ability and Affinity Scores: Investment Success

This table reports marginal effects of probit regressions for the probability of investment success by a pair of venture capitalists. The ability score is the simple average of pairwise ability characteristics (*Top College (Business School, Grad School, School): Both*) in Columns 1 and 2 and the weighted average of pairwise ability characteristics in Columns 3 and 4 where the weights are coefficients from the syndication partnering decision model reported in Table 4. The affinity score is defined similarly over the set of pairwise affinity characteristics (*Same College (Business School, Grad School, School)*, *East Asian (Indian, Jewish): Both*, *Same Ethnic Minority*, *Female: Both*, and *Same Previous Employer*), with simple averages in Columns 1 and 2 and weighted averages in Columns 3 and 4. Columns 1 and 3 are based on specification 7 in Table 4, and Columns 2 and 4 are based on specification 8 in Table 4. Portfolio company's industry and year of co-investment fixed effects as well as a dummy variable indicating whether the two venture capitalists' firms are located in the same CSA are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Simple average		Weighted average	
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**
Ability Score	0.050**	0.032***	0.010	0.029***
	[0.020]	[0.010]	[0.006]	[0.010]
Affinity Score	-0.243***	-0.118***	-0.316***	-0.127***
	[0.074]	[0.036]	[0.082]	[0.038]
Observations	17,320	17,320	17,320	17,320

Table 7
Ability and Affinity Scores: Repeated Collaborations

This table reports the results of Poisson regressions for the number of co-investments a pair of venture capitalists made together. Columns 1 and 3 present the results of the analysis over both actual (positive number of co-investments) and counterfactual (no co-investments) pairs; Columns 2 and 4 focuses exclusively on actual pairs. The ability score is the simple average of pairwise ability characteristics (*Top College (Business School, Grad School, School): Both*) in Columns 1 and 2 and the weighted average of pairwise ability characteristics in Columns 3 and 4 where the weights are coefficients from the syndication partnering decision model reported in Table 4. The affinity score is defined similarly over the set of pairwise affinity characteristics (*Same College (Business School, Grad School, School)*, *East Asian (Indian, Jewish): Both*, *Same Ethnic Minority*, *Female: Both*, and *Same Previous Employer*), with simple averages in Columns 1 and 2 and weighted averages in Columns 3 and 4. Ability and affinity scores are computed based on specification 7 from Table 4 (results based on specification 8 from Table 4 are both qualitatively and quantitatively similar). Portfolio company's industry and year of co-investment fixed effects as well as a dummy variable indicating whether the two venture capitalists' firms are located in the same CSA are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Simple average		Weighted average	
	With Pseudo Pairs	Actual Pairs Only	With Pseudo Pairs	Actual Pairs Only
Independent Variables	(1)	(2)	(3)	(4)
Ability Score	0.03900	-0.00400	0.031***	0.00000
	[0.036]	[0.012]	[0.011]	[0.004]
Affinity Score	1.848***	0.143***	2.444***	0.195***
	[0.145]	[0.052]	[0.149]	[0.061]
Observations	66,888	17,320	66,888	17,320

Figure 1
Ability and Affinity Scores: Repeated Collaborations

This figure presents the average values of ability and affinity scores for pairs of venture capitalists grouped by the number of co-investments they make together. Counterfactual pairs of venture capitalists partnered on no investments by construction; actual pairs of venture capitalists participated on at least one joint deal. The ability score is the simple average of pairwise ability characteristics (*Top College (Business School, Grad School, School): Both*). The affinity score is defined similarly over the set of pairwise affinity characteristics (*Same College (Business School, Grad School, School)*, *East Asian (Indian, Jewish): Both*, *Same Ethnic Minority*, *Female: Both*, and *Same Previous Employer*). Ability and affinity scores are computed based on specification 7 from Table 4 (results based on specification 8 from Table 4 are both qualitatively and quantitatively similar).

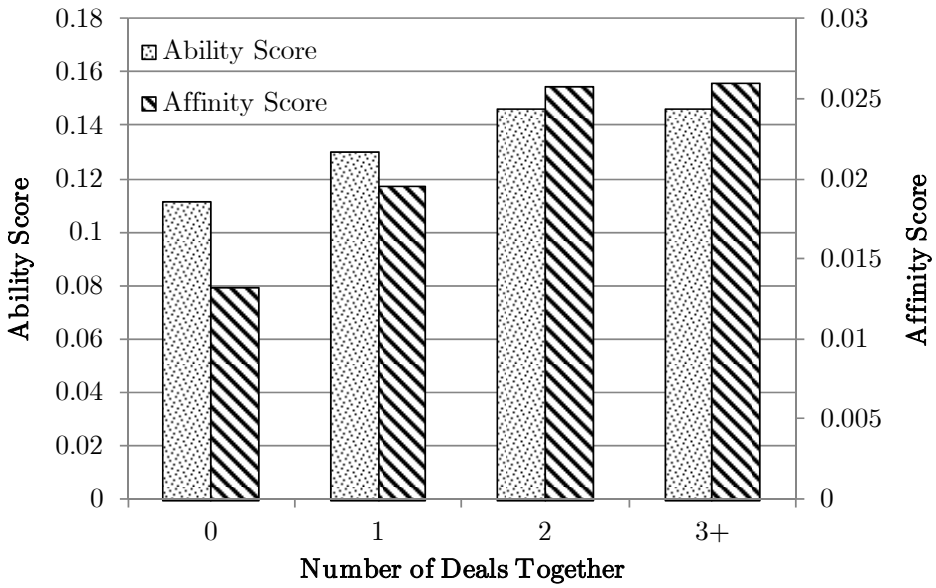

Table 8
Portfolio Company Characteristics

Results presented in this table show that the detrimental effect of affinity on investment success is robust to accounting for the characteristics of a portfolio company—measured at the time of investment—that strongly predict future investment outcome. Each panel reports robust standard errors clustered at the portfolio company level in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Panel A. This panel reports OLS estimates for the probability of success of an investment made by an individual venture capitalist. The dependent variable equals one if the portfolio company eventually goes public and zero otherwise. Independent variables are characteristics of a portfolio company at the time of investment. *Serial entrepreneur* is a dummy equal to one if the founder of a portfolio company had previously founded another venture-backed company. *Portfolio Company Stage* is a variable with integer values from 1 to 5 corresponding to start-up/seed, early stage, later stage, expansion, and buyout/acquisition, respectively. *Financing Round* indicates the round at which the investment was made into the portfolio company. *Moderate (High) Media Coverage* is a dummy variable that equals one if the number of news articles covering the investment is greater than zero and is below (above) the median number of news articles for investments covered by at least one news article in that year. Industry, year of investment, and venture capital firm fixed effects are included in all specifications.

Independent Variables	(1)	(2)	(3)	(4)	(5)
Serial Entrepreneur	0.038***				0.035**
	[0.013]				[0.013]
Portfolio Company Stage		0.029***			0.020***
		[0.004]			[0.006]
Financing Round			0.031***		0.020***
			[0.003]		[0.004]
Moderate Media Coverage				0.047***	0.036***
				[0.008]	[0.011]
High Media Coverage				0.062***	0.045***
				[0.010]	[0.013]
Observations	18,408	25,880	24,961	25,441	17,390
R-squared	0.208	0.195	0.207	0.193	0.224

Panel B. This panel reports marginal effects of probit regressions for the probability of investment success by a pair of venture capitalists. Affinity Score is the simple average of pairwise affinity characteristics: *Same College/Business School/Grad School, East Asian/Indian/Jewish: Both*, *Female: Both*, and *Same Previous Employer*. Portfolio company's industry and year of co-investment fixed effects are included in all specifications.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Affinity Score	-0.237***	-0.225***	-0.227***	-0.216***	-0.213***	-0.197***
	[0.072]	[0.074]	[0.072]	[0.074]	[0.073]	[0.076]
Top School: Both	0.030***	0.031***	0.025***	0.024**	0.027***	0.022**
	[0.009]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
Same Location	0.020**	0.020**	0.023**	0.024**	0.024**	0.028***
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
Portfolio company controls	None	Serial entre-preneur	Stage	Round	Media	All
Observations	17,320	16,368	17,175	16,674	16,595	15,470

Table 9
Cost of Affinity: Instrumental Variable Approach

This table reports results of two-stage least squares for the probability of investment success by a pair of venture capitalists. Ability Score is defined as in Panel B of Table 8. *Ability Score* equals one if both VCs in a pair hold degrees from top schools and zero otherwise. *Affinity (Ability) Score* is instrumented for with the *Cross-Firm Affinity (Ability) Score*, which measures the extent to which employees of two firms—excluding people involved in a deal under consideration—are similar to each other in terms of affinity (ability) characteristics. Portfolio company's industry and year of co-investment fixed effects are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Panel A. This panel reports structural form equation estimates for the probability of investment success by a pair of venture capitalists.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Affinity Score	-1.008**	-0.845*	-0.898*	-1.024**	-1.182**	-0.976**
	[0.481]	[0.468]	[0.475]	[0.467]	[0.514]	[0.485]
Ability Score	0.077	0.052	0.061	0.031	0.072	0.019
	[0.054]	[0.056]	[0.055]	[0.055]	[0.055]	[0.058]
Same Location	0.027**	0.026**	0.029**	0.037***	0.031**	0.038***
	[0.013]	[0.013]	[0.013]	[0.013]	[0.014]	[0.013]
Portfolio company controls	None	Serial entre-preneur	Stage	Round	Media	All
Observations	10,441	10,035	10,400	10,214	9,996	9,512
R-squared	0.13	0.144	0.145	0.149	0.134	0.162

Panel B. This panel reports first stage estimates for each endogenous variable in a specification with all portfolio company controls (column 6 in Panel A). First stage estimates for columns 1–5 in Panel A are similar and are not displayed for brevity.

Independent Variables	Affinity	Ability
Cross-Firm Affinity Score	0.538***	-0.385
	[0.053]	[0.309]
Cross-Firm Ability Score	-0.007***	0.393***
	[0.003]	[0.024]
Same Location	0.004***	0.076***
	[0.001]	[0.013]
Serial Entrepreneur	-0.001	0.014
	[0.001]	[0.016]
Portfolio Company Stage	0.000	0.005
	[0.001]	[0.008]
Financing Round	0.000	0.000
	[0.000]	[0.005]
Moderate Media Coverage	-0.002*	-0.021
	[0.001]	[0.016]
High Media Coverage	-0.002	-0.012
	[0.002]	[0.018]
Observations	9,512	9,562
F-statistic on excluded instruments	155.72	194.20
R-squared	0.043	0.066

Table 10
Cost of Affinity on Deals of Superior Investment Quality

This table reports estimates of OLS regressions for the probability of investment success by a pair of venture capitalists. Affinity Score is the simple average of pairwise affinity characteristics: *Same College/Business School/Grad School, East Asian/Indian/Jewish: Both*, *Female: Both*, and *Same Previous Employer*. *Investment Quality* is the investment appeal of a portfolio company at the time of financing. It is defined as the probability of an IPO predicted by the corresponding model in Panel A of Table 8 (specifications are matched column-to-column). *High (Low) Investment Quality* is a dummy variable that equals one if the *Investment Quality* of a deal is above (below) the median investment quality of all deals in that year. Portfolio company's industry and year of co-investment fixed effects are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Affinity Score x	-0.255**	-0.229**	-0.257**	-0.224**	-0.327***
High Investment Quality	[0.101]	[0.100]	[0.103]	[0.104]	[0.104]
Affinity Score x	-0.128	-0.132	-0.088	-0.133	-0.028
Low Investment Quality	[0.078]	[0.083]	[0.080]	[0.082]	[0.087]
Top School: Both	0.021**	0.015*	0.013	0.018*	0.016
	[0.009]	[0.009]	[0.009]	[0.009]	[0.010]
High Investment Quality	0.145***	0.139***	0.150***	0.135***	0.174***
	[0.010]	[0.010]	[0.011]	[0.010]	[0.011]
Same Location	0.011	0.011	0.013	0.011	0.015
	[0.010]	[0.009]	[0.009]	[0.010]	[0.010]
Observations	16,368	17,175	16,674	16,595	15,470
R-squared	0.186	0.179	0.189	0.175	0.202

Table 11
Heckman Two-Stage Procedure

This table presents the results of the Heckman two-stage model. The dependent variable in the selection equation (1) equals one if a pair of individual venture capitalists syndicate on a deal and zero otherwise. The dependent variable in the syndication success regressions (2–7) is a dummy equal to one if a portfolio company goes public. *Number of Syndications between VC Firms* is an instrument in the selection equation; it is equal to the number of co-investments between two venture capital firms within 6 months prior to a given syndication between a pair of individual VCs. The Inverse Mills Ratio is generated from the selection equation. Portfolio company's industry and year of co-investment fixed effects are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Independent Variables	(1) Real Pair	(2) IPO	(3) IPO	(4) IPO	(5) IPO	(6) IPO	(7) IPO
Inverse Mills Ratio		-0.017	-0.012	-0.031**	-0.039***	-0.024*	-0.044***
		[0.013]	[0.014]	[0.013]	[0.014]	[0.014]	[0.014]
Affinity Score	1.514***	-0.233***	-0.218***	-0.233***	-0.238***	-0.217***	-0.226***
	[0.120]	[0.059]	[0.060]	[0.059]	[0.059]	[0.060]	[0.061]
Top School: Both	0.027**	0.028***	0.029***	0.023***	0.022***	0.026***	0.020***
	[0.011]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
Same Location	0.320***	0.015**	0.017**	0.013*	0.014**	0.017**	0.016**
	[0.011]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
Number of Syndications between VC Firms	0.698*** [0.016]						
Portfolio Company Controls	None	None	Serial entre-preneur	Stage	Round	Media	All
Observations	66,888	17,320	16,368	17,175	16,674	16,595	15,470

Table 12
Selection into Deals of Inferior Investment Quality

This panel reports estimates of OLS regressions for the ex ante quality of investment. The dependent variable *(Investment Quality)* is the investment appeal of a portfolio company at the time of financing. It is defined as the probability of an IPO predicted by the corresponding model in Panel A of Table 8 (specifications are matched column-to-column). *Affinity Score* is the simple average of pairwise affinity characteristics: *Same College/Business School/Grad School, East Asian/Indian/Jewish: Both*, *Female: Both*, and *Same Previous Employer*. Portfolio company's industry and year of co-investment fixed effects are included in all specifications. Robust standard errors clustered at the portfolio company level are reported in brackets. Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Independent Variables	(1)	(2)	(3)	(4)	(5)
Affinity Score	-0.048***	-0.067***	-0.075***	-0.072***	-0.068***
	[0.015]	[0.014]	[0.015]	[0.014]	[0.018]
Top School: Both	0.014***	0.017***	0.016***	0.016***	0.016***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Same Location	0.017***	0.013***	0.013***	0.012***	0.015***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Observations	16,368	17,175	16,674	16,595	15,470
R-squared	0.725	0.717	0.694	0.704	0.676

Appendix Table 1
Investment Performance of Top School Venture Capitalists

This table contrasts the investment performance of venture capitalists' with a degree from a top academic institution and those who did not attend a top university. We consider three different classifications of top schools. Column 1 presents summary statistics for only the Ivy League schools—Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, Princeton University, University of Pennsylvania, and Yale University—classified as top schools. Column 2 adds other Top U.S. schools—Amherst College, California Institute of Technology, Duke University, Massachusetts Institute of Technology, Northwestern University, Stanford University, University of California (Berkeley), University of Chicago, and Williams College—in the classification. Top European schools—Cambridge University, INSEAD, London Business School, London School of Economics, and Oxford University—are added to the list in Column 3.

Top School Classification	Ivy	Ivy + Top US	Ivy + Top US + Top Europe
Number of Venture Capitalists			
Top School VCs	1,253	1,867	1,940
Non-Top School VCs	2,257	1,643	1,570
Number of Investments (avg / med)			
of a Top School VC	8.4 / 6	8.5 / 6	8.4 / 6
of a Non-Top School VC	7.1 / 5	6.4 / 5	6.4 / 5
Success Ratio (avg / med)			
of a Top School VC	16.9% / 12.5%	16.0% / 11.1%	15.7% / 11.1%
of a Non-Top School VC	12.8% / 0.0%	12.3% / 0.0%	12.5% / 0.0%

Appendix Table 2
Venture Capital Investments over Time

This table illustrates the venture capital investment activity—in terms of the total number of deals and the number of successful deals—over time and across different industries.

All Industries

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	11,895	966	3,025	7,904
# of IPOs	1,865	342	941	582
% of IPOs	15.7%	35.4%	31.1%	7.4%

Energy

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	31	4	12	15
# of IPOs	12	3	7	2
% of IPOs	38.7%	75.0%	58.3%	13.3%

Computers

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	5,164	410	1,145	3,609
# of IPOs	710	129	332	249
% of IPOs	13.7%	31.5%	29.0%	6.9%

Biotech and Healthcare

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	2,237	187	814	1,236
# of IPOs	528	82	312	134
% of IPOs	23.6%	43.9%	38.3%	10.8%

Communications

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	1,722	181	443	1,098
# of IPOs	288	72	134	82
% of IPOs	16.7%	39.8%	30.2%	7.5%

Financial Services

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	247	7	45	195
# of IPOs	31	1	15	15
% of IPOs	12.6%	14.3%	33.3%	7.7%

Business and Industrial

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	200	60	89	51
# of IPOs	31	11	18	2
% of IPOs	15.5%	18.3%	20.2%	3.9%

Business Services

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	1,300	16	92	1,192
# of IPOs	76	4	19	53
% of IPOs	5.8%	25.0%	20.7%	4.4%

Consumers

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	568	39	207	322
# of IPOs	101	17	58	26
% of IPOs	17.8%	43.6%	28.0%	8.1%

Other

	1975-2003	1975-1985	1986-1995	1996-2003
# of deals	426	62	178	186
# of IPOs	88	23	46	19
% of IPOs	20.7%	37.1%	25.8%	10.2%