

Winning a Deal in Private Equity: Do Educational Networks Matter?

Florian Fuchs ^a

University of St.Gallen

Roland Füss ^b

University of St.Gallen

Tim Jenkinson ^c

University of Oxford

Stefan Morkoetter ^d

University of St.Gallen

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Abstract

Earlier research finds that a shared educational background can help to establish business connections and facilitate information flows. But how valuable are these social ties for senior managers of private market funds and for their deal sourcing? Our data set comprises the biographical and educational background on more than 4,500 partners from around 2,000 buyout funds and on around 4,500 CEOs working for a company at the time a fund acquired it. We show that funds with a broader exposure to academic institutions generate higher performance. In addition, educational ties are frequent (15% of investigated deals) and increase the odds to win the deal (by 79%). In particular, rare ties are valuable and educational ties seem to mitigate a potential home bias.

Keywords: *Private Equity, Buyout, Deal sourcing, Networks, Educational Tie, MBA*

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^a florian.fuchs@unisg.ch ^b roland.fuess@unisg.ch ^c tim.jenkinson@sbs.ox.ac.uk ^d stefan.morkoetter@unisg.ch

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1 Introduction

Evidence from public markets shows that investment funds use their academic affiliations for investment selection and generate higher performance with these holdings for their investors (Cohen et al. (2008)). Looking more broadly, the benefits of a shared educational background as a means to establish connections and facilitate information flows is widely documented in the financial literature. This includes, for example, evidence on security analysts, Chief Executive Officers (CEOs), and bankers who all seem to benefit from networks related to their previous educational attainments (e.g., Cohen et al. (2010), Butler and Gurun (2012), Engelberg et al. (2012)). However, the case has proven more difficult for private market vehicles due to limited availability of data on their management teams and investment activity. While evidence from venture capital outlines that social and economic ties between different actors are important (e.g., Sorensen and Stuart (2001), Hochberg et al. (2007), Bengtsson and Hsu (2015)), evidence on ties established through a shared educational background is limited (Sunesson (2009)). Our study sheds further light on the value and use of educational networks for fund managers and their ties with the management of companies in which they invest.

We use the buyout industry as an example for private investment vehicles and focus on the use of educational ties for investment identification. The private equity industry has become an important asset class over the last decades managing more than \$2 trillion of institutional investor capital with two-thirds of capital being related to buyout activity (Metrick and Yasuda (2011)). Funds are typically set up as a limited liability partnership with a fixed lifetime of 10-12 years during which the fund managers invest capital for investors (Limited Partners). The management teams are usually small and comprise experienced investment professionals who are highly incentivized by own financial commitments and compensation arrangements. After the fund is raised, the management starts buying other companies. This is followed by a holding period during which managers try to achieve operational improvements and ends with exits whenever favorable market conditions arise. But from where does the fund management source these investments? Existing research on deal sourcing channels note the importance of self-generated deals

(compared to the use of agents) and personal and professional networks as a significant source of deal origination (Teten and Farmer (2010), Gompers et al. (2016b)). But how important are these networks? Does it pay off for an investment firm to hire professionals from schools with large alumni networks or is it better to have a diversified net? Observing that the majority of partners working in the buyout industry obtained MBA degrees, do their alumni networks play a special role?

Our sample comprises around 2,000 buyout funds with past education and professional history information on more than 4,500 partners. A rare feature of this data set is that the allocation of investment professionals is available at the fund rather than at the investment firm (General Partner) level. We also obtain similar information for more than 4,500 CEOs involved in acquisitions by one of these buyout funds. We are not aware of any other such data set covering background information on both the fund management team as well as the target management team (represented by the CEO) within the buyout literature.

Our main findings are as follows. First, we document that funds with a broader exposure to different academic institutions exhibit a positive and significant relationship to fund performance. The evidence seems to be primarily driven by degrees from high-ranked schools yet less so from individual names. This suggests managers are indeed receiving benefits from a more diversified institutional exposure and potentially from the networks this opens up. Second, with regards to deal sourcing, we find that having an educational tie is frequent (15% of investigated investments) and significantly improves the odds of winning a deal compared to other funds being active in the market at the same time (by 79%). We obtain this evidence by simulating a set of competing funds for each actual investment a buyout fund made. Subsequently, we look for a shared educational background between the management team of an acquiring fund and the target company and estimate the probability to win the deal based on the existence of an educational tie. Interestingly, the results reveal that ties matter even more in situations where the number of competitors with ties is low, and thus, the fund has an exclusive edge. Third, our findings show that educational ties can help to mitigate the home bias often found in investment situations and pave the way for longer distance investments. We also find stronger results for ties established at the same graduation time and significant ties based

on MBA degrees. Our findings remain robust when we control for previous experience of the fund partners in professional service firms and in banking as well as for various deal and fund characteristics.

The contribution of our study is threefold. First, we investigate the relationship between school diversity and fund performance. Through attending different universities, fund partners are able to (passively) accumulate large networks which may pay off in their work as investors. While deal sourcing may not be the only value attached to institutional diversity, networks in general seem to be of great importance to fund managers as they usually bring it up when asked (e.g., Gompers et al. (2016b)). Our evidence is a first step towards their relevance on the a level. We developed a measure focusing on the breadth of the exposure based on research in the economic and sociological literature stressing the value of weak ties (Granovetter (1973), Granovetter (1983)) and their special importance for senior management (Wegener (1991)). Our findings also complement earlier evidence related to the relevance of network size (e.g., Hochberg et al. (2007), Brown et al. (2012)). Second, we focus on the deal sourcing aspect and help to determine the role educational ties play in the investment activity of private market vehicles (e.g., Cohen et al. (2008) for public markets). In a cross-sectional study, Sunesson (2009) found a significant influence of educational ties in matching entrepreneurs with venture capitalists. We extend this evidence to buyout investors using an international data set spanning roughly two decades of investments. While educational ties in venture capital may proxy for similarity between the actors, we assume them to serve more as an identification and access purpose for buyout investors. Third, we subset and interact educational ties with degree features (e.g., MBA) and deal characteristics (e.g., geographic distance). Business schools are often said to be strong network generators (Baruch and Peiperl (2000), Hall (2011)) yet they have not received much attention justifying this perception with regards to educational ties. Moreover, we show educational ties may also serve as a way to mitigate investor’s home bias (e.g., Sorensen and Stuart (2001) and Cumming and Dai (2010)).

The remainder is organized as follows. Section 2 reviews the related literature. Section 3 presents the data set and outlines our methodology. Empirical results and robustness tests are presented in Section 4. Section 5 concludes.

2 Literature review

2.1 Deal sourcing in the buyout space

Investors commit money to closed-end funds to gain access to investment opportunities they are not able to address through other channels. As a result, one important value-add of the fund manager is to find and secure these investment opportunities for her investors. This section gives an overview of research on deal sourcing activities.

Besides the imminent need to find investments in the first place, differences in the approach to deal sourcing have been identified as an important performance driver of buyout funds. Fenn et al. (1997) argue that investors are competing directly with their agents (such as investment banks and deal brokers) to find potential target companies as deals from the former tend to be less attractive due to additional fees and bid-up prices by competing investors. Teten and Farmer (2010) report that funds with substantial scale in deal origination as well as a focus outside the most competitive markets tend to be top-quartile performers. Analyzing deal sourcing practices they find personal and professional relationships provide almost half of the internal deal flow, followed by word-of-mouth and cold calls. Gompers et al. (2016b) find proprietary deals an “important determinant of value creation” in a recent survey among buyout investors. Even though almost half of closed deals are considered to be “proprietary in some way”, sources are described rather vague. Around a third are denoted as “proactively self-generated”, whereas around 5-10% come from each the management’s and the investor’s executive network. The remaining share is again related to agents such as investment banks and deal brokers as well as to other private equity firms (presumably resulting in secondaries and co-investments).

Interestingly, all three studies agree that executives the fund managers know from prior (or failed) acquisitions are valuable. This highlights a more general point that deals acquired from outside networks may not only prove valuable in the current situation but potentially give access to additional business in the future. However, despite the frequent notion of the importance of active deal sourcing for the funds and the role of the investor’s networks across studies, specific evidence on where initial relationships and contacts really come from remains sparse.

As the buyout industry grows mature, an increasing number of funds compete for investments. Metrick and Yasuda (2011) name the level of competition among funds as main factor influencing performance, followed by financing conditions. This has different implications for the funds which is likely to also affect their deal sourcing efforts. For example, a countercyclical relationship of capital and deal flow to fund performance is documented (see Phalippou (2007) and Ljungqvist et al. (2009)). In addition, some authors report a recent decline in performance persistence (see Sensoy and Kaplan (2015) for a review on the topic). This indicates stronger competition among investors to find good investments.

While at the outset of the buyout industry transactions were dominated by leveraged buyouts where the investor was usually taking a public company private to restructure it, the market has advanced since then and spread into a variety of different deal types. According to data presented by Kaplan and Strömberg (2009), the buyout industry concentrates more and more on private companies, both in the form of independent firms and divisions of larger corporations. It spreads now across more industries and geographies, especially Western Europe gained a significant share of the overall activity. Compared to public companies, this makes the identification harder for the funds. This has likely driven funds to use more different sources to find investments as well as increasingly tap upon their own networks to find and close deals early on. It also raises the question whether these are the investments driving the performance of the fund based on exclusivity or better information.

The academic investigation of who makes a target has historically often been focused on deal and firm characteristics (see for buyout funds Lehn and Poulsen (1989), Opler and Titman (1993), and Weir et al. (2005)). However, in their study on mergers and acquisitions, Ishii and Xuan (2014) suggest to expand this view by examining more closely the acquirer-target relationship. They find that social ties influence decision making as well as subsequent performance of mergers between corporate firms.

2.2 The role of educational networks

There is a growing literature on networks in finance including their importance for investment decisions (see Allen and Babus (2009) for an overview).¹ In particular, social ties between the members of top management teams across different organizations or interest groups, and the ones based on a shared educational background have proven valuable across a variety of research areas. Such linkages range from companies receiving better terms from banks (Engelberg et al. (2012)), over the CEO and her compensation (Butler and Gurun (2012), Brown et al. (2012), and Engelberg et al. (2013)) as well as her board relations (Nguyen (2012) and Fracassi and Tate (2012)), to security analysts in order to establish relationships with senior management (Cohen et al. (2010)). With a focus on investment firms, Cohen et al. (2008) finds mutual fund managers to invest heavily in firms to which they are connected via corporate board members and to perform significantly better with these holdings. Similarly, for venture capital investors, Sunesson (2009) finds an increased likelihood of matching a venture capitalist with an entrepreneur as well as with another venture capitalist when sharing an academic background.²

As a tie itself cannot prove the existence of direct interactions, Ishii and Xuan (2014) argue that the concept of a “social tie” or “social connection” also captures other dimensions such as homophily.³ They note that educational ties may not only be established by the attendance of the same institution and potential interactions in extra-curricular activities but as well by the commonalities among the group of people attracted to this institution. For example, in venture capital, matching between the entrepreneur and the venture capitalist is said to be “two-sided” (Sørensen (2007)). This means not only the investor has to choose to invest but also the entrepreneur (or founding team) selects from which investor to receive funding. Thus, similarity between the actors is of special importance to establish mutual trust, whereas a shared academic background facilitates this

¹On a more general note, social networks, according to Granovetter (2005), serve three purposes: flow and quality of information, source of reward and punishment, and "trust" that others will do the "right" thing. Kuhnen (2009) adds that they can help to overcome asymmetric information, moral hazard, and costly search. In addition, they can facilitate monitoring but may be subject to favourism.

²Besides social ties, the venture capital literature has documented the value of economic ties (via prior co-investments) as well as the role of spatial distance with regard to syndication networks. Evidence can be found in Hochberg et al. (2007, 2010, 2015), Sorensen and Stuart (2001, 2008), and Chen et al. (2010).

³Borrowing their definition, homophily relates to the “affinity for those who share similar backgrounds”.

process as shown by Sunesson (2009). Further evidence on the importance of shared characteristics comes from Bengtsson and Hsu (2015) and Gompers et al. (2016a). While the former find that co-ethnicity increases the likelihood for venture capital investment, the latter investigate how ethnic, educational, and career background influence syndicates. Compared to venture capital investments, buyout transactions tend to be more dominated by the fund.⁴ However, the network may still serve the partners well to identify targets in the first place and establish initial relations.

To be of relevance for funds in deal origination, social ties need to be established between the management teams of the acquiring party and its investment target. This means that not only the fund managers need to be active networkers but the target management should be open to such approaches. However, there should be little doubt about the connectedness of CEOs as they have often been proven the owner of powerful social networks themselves (e.g., Gottesman and Morey (2006a), Kirchmaier and Stathopoulos (2008)). Brown et al. (2012) report that there is economic value to having a higher number of social ties for the CEO in the form of higher compensation levels. The use of educational ties as a means for outsiders to gain direct access to senior corporate management has been documented before (Cohen et al. (2010)). Further, Cohen and Malloy (2010) state that “alumni networks turn out to be an especially effective kind of social network. [...] because people often self-select into undergraduate and graduate programs [...] which generates both a higher level of interaction and longer-lived relationships.” They conclude that this allows amassing information about other graduates as well as common acquaintances. This brings up an interesting point as research in the economic and sociological literature has often stressed the value of weak ties between people (“acquaintances”) (Granovetter (1973), Granovetter (1983)). The importance of weak ties especially for high ranking positions has been highlighted before (Wegener (1991), Brown et al. (2012)). Through attending different universities fund partners are able to (passively) accumulate large networks which may pay off well in their work as buyout investors.⁵

⁴Often the management team is even replaced after the investment (e.g., Gompers et al. (2016b)).

⁵Klein et al. (2004) examine advice, friendship, and adversarial networks and find that individuals who were highly educated became high in advice and friendship centrality. In addition, evidence from the strategic management literature shows the importance of the first relationship and the ongoing influence of initial networks (Milanov and Shepererd (2013)).

Given the frequent occurrence of MBA degrees in top management teams, the question on their value arises. In educational studies, the wide network of alumni and organizations, an MBA degree typically opens up, is often only described as a “side-benefit” (Baruch and Peiperl (2000)). However, they have also been mentioned with reference to the formation and reproduction of transnational ties (Hall (2011)). Studies in the finance literature discuss MBA degrees when examining characteristics of management teams. In the venture capital literature, they are regularly used as a proxy for business and management education (e.g., Dimov and Shepherd (2005), Patzelt et al. (2009), Zarutskie (2010), Cai et al. (2013)), while in the area of mutual funds and corporate managers they are investigated with regards to superior skills and management performance (e.g., Gottesman and Morey (2006a), Gottesman and Morey (2006b)). With a focus on CEOs, Butler and Gurun (2012) find that their MBA degrees often go hand-in-hand with firm size due to an attraction to larger firms. For the investment industry, these degrees may be of very practical value. However, they have not received much attention in the prior discussions of social ties.

Evidence on the existence and the value of relationships in the buyout space is relatively small. Siming (2014) investigates connections based on past employment between the fund management and financial advisers. He concludes that such relationships provide access to profitable business opportunities. Wu (2011) focuses on syndication networks for leveraged buyout investments and highlights the role of MBA networks for co-investments. Stuart and Yim (2010) show that board networks influence the likelihood of becoming a target in going-private transaction. Besides the networking aspect, prior studies in the buyout literature have found manager characteristics to be of general importance. With regard to operational value creation, Acharya et al. (2013) find that an operational and financial background of the deal partner matters based on the type of the deal (organic/inorganic). Degeorge et al. (2015) note the benefits of complementary skill sets between buyer and seller on the out-performance of secondary buyouts (using data on educational background and career paths). Lopez-de Silanes et al. (2015) investigate team dynamics and the scalability of the organization showing that more homogeneous management backgrounds (consulting, finance, other) lead to smaller diseconomies of scale.

3 Data and methodology

3.1 Sample description

The data is sourced from PitchBook, a U.S. database provider for global M&A, PE and VC transactions.⁶ We split the following discussion of the data set into three components: funds, management teams, and deals.

First, we obtain information on buyout⁷ funds on a global basis spanning vintage⁸ years from 1978 to 2010. For this period 3,837 funds from 1,723 General Partners are listed whereby 56% of funds reside in the U.S., followed by 27% from Europe, and another 9% from Asia. Table 1 breaks down information on the fund sample split by vintage year. The average fund manages USD 540 million in capital (median: 197) and is the 3.9th fund of the investor (median: 2.0). On roughly a third of funds performance information as an internal rate of return (IRR) and/or money multiple (TVPI) is available as a latest reported figure.⁹ The average fund in our sample provides investors with an IRR of 12.5% (median: 11.7%) and a total value of 1.6 times the paid-in capital (TVPI, median: 1.5).

Table 1 about here: Buyout funds by vintage year

Second, Pitchbook lists management teams for more than half of the funds (2,173). A rare feature of this data set is that the allocation of these investment professionals is available at the fund rather than at the investment firm (General Partner) level only. This information is sourced from regulatory filings, fundraising information, investor websites and surveys and complemented with the person's role and position within the

⁶PitchBook represents a rather new source to the academic literature. Brown et al. (2015) recently included it in their comparison of commercial private equity data sets (besides Preqin, Cambridge Associates, and Burgis) and conclude that for North American funds all provide similar signals on performance while outside of North America, coverage varies substantially across the databases. Harris et al. (2015) confirmed that their Burgis performance data are qualitatively and quantitatively similar to those in Pitchbook. According to PitchBook the data is mainly obtained from filings, press releases, and websites, and collected, verified, and integrated with additional information by their data teams. Their research team also surveys companies, advisers, investors, lawyers, accountants, and lenders to cross-validate collected data and to gather additional information. See www.pitchbook.com for more information.

⁷A transaction where a firm acquires all or a significant amount of equity in a business.

⁸Indicates the year that a fund held its final close and/or began making investments.

⁹1,193 funds have an IRR and 1,353 funds have a TVPI multiple available with an overlap of 1,040 funds. Figures are displayed by PitchBook "as-is" from LP reports, who predominantly report their IRRs net of fee. We did not have access to individual cash-flow data, and thus, are not able to calculate Public Market Equivalents (PME).

firm.¹⁰ Another important feature is that also partners are listed who have historically been involved in the fund even though that person has left the investment firm. The average management team lists 3.1 persons (median: 2.0) comprising more than 4,500 individuals who work on average in 1.4 funds (median: 1.0).¹¹ For 92% (2,005) of funds information on biography and educational background of the individuals as well as for almost all partners their assigned investment office is available.

Third, the buyout funds have been involved in roughly 34,000 transactions comprising 25,800 different companies.¹² Most transactions are classified as buyout or growth/expansion which will be the focus of our analysis.¹³ Target firms are mature companies with an average age of 35 years at time of deal (median: 26 years). Around a third of transactions is classified as add-on acquisitions. These typically support a prior acquisition often in a buy-and-build strategy and will be excluded from our analysis as they have their own dynamics and determinants.¹⁴ Over 80% of the transactions carry the name of the CEO at the time of the deal and PitchBook was able to provide biography and educational background for more than 9,000 individuals. After filtering for buyout and growth transactions and excluding add-ons, around 4,500 CEOs remain. Further details and a break-down of the deal sample will be given later in this section.

3.2 Educational background of management teams

The personal information on each individual in the database comprise the name, a textual biography, and a list of educational achievements. The latter splits into the name of the degree institution, the degree type, the degree field, and the degree year. Table 2 presents the most frequently observed institutions for both fund partners and the CEOs involved in one of their transactions. The managers tend to be highly educated as they typically are represented with more than one academic degree. This does not surprise given the

¹⁰E.g., appearance as lead partner in transactions or as a board member for portfolio companies.

¹¹Zarutskie (2010) reports an average top management team size of 2.2 for first-time VC funds.

¹²Some companies are involved in multiple deals over time and within one transaction more than one fund may invest at the same time.

¹³Buyout/growth transactions make up almost 85% of the deals with the largest exclusion being venture capital transactions (another 10%).

¹⁴Morkoetter and Wetzer (2015) show that add-on transactions differ particularly in terms of enterprise value, return on assets, and leverage.

seniority of the individuals. Fund partners are more likely to have post-undergraduate degrees including MBA degrees compared to their corporate counterparts.¹⁵ Moreover, there is a much higher concentration on a selected number of schools among them. The 25 and 100 most frequent degree institutions for fund partners make up 52% and 73% of degrees while only 24% and 48% for CEOs, respectively. MBA degrees are depicted separately. It is noteworthy that the concentration on high-ranking schools is here even larger for the set of fund partners. Especially, Harvard enjoys an apparent presence by heading both lists with the highest number of graduates, a finding which is consistent with earlier studies on senior managers in the investment industry (e.g., Cohen et al. (2008, 2010), Sunesson (2009), Zarutskie (2010)). We want to stress this point as our analysis on educational ties requires the managers to graduate from the same institutions and the more overlap in graduates we have the more likely a match should be.

Table 2 about here: Most frequent institutions of partners and CEOs

Having a closer look at fund partners and institutional diversity at the fund level we observe the following. On average a fund has managers educated at 4.2 different academic institutions (median: 3.0). The average exposure to different MBA institutions is much lower at 1.3 business schools (median: 1.0) despite the high share of MBA graduates among the partners. Around half of the managers obtained an MBA degree (mean and average) and more than a third of managers graduated from an Ivy League school (mean: 36%, median: 25%). Harvard (mean: 19%), the University of Pennsylvania (mean: 9%), and Stanford (mean: 6%) represent the most frequent institutions.

The value of the educational attainment for deal sourcing may depend on the partner's previous professional experience. To account for this, we examine the (relationship-oriented) work history of the managers with regard to professional service firms and banks. Specifically, we parse experience in management/strategy consulting, with a major accounting firm, and with an (investment) bank.¹⁶ We observe around a third of funds

¹⁵A similar findings was reported by Cohen et al. (2008) who focus on mutual funds.

¹⁶We include for consulting McKinsey & Co, BCG, Bain & Co, Oliver Wyman, Roland Berger, Booz/Strategy&, and L.E.K., as accounting firms PwC, Deloitte, KPMG, EY, and Arthur Anderson, and for banking a list of 50 global banks compiled by The Banker as well as major investment banks such as Lehman Brothers, Bear Stearns, Lazard, Rothschild (list not exhaustive).

have partners with prior banking experience, a tenth with consulting experience, and a fourteenth with a major accounting firm (team mean 30%, 10% and 7%, respectively).

3.3 Educational ties and matching procedure

To assess the value of educational networks, we look at their relevance for the deal completion of the buyout funds. This requires us not only to identify educational ties between the management teams of the funds and the target firm but also to determine whether this connection gives them an edge over other potential bidders. As we can only observe the investments that actually happened, we need to simulate a set of counterfactual pairs. In the social tie investment literature a matching procedure is typically employed in this context (e.g., Sunesson (2009), Siming (2014), Bengtsson and Hsu (2015)).

Before describing the matching approach in more detail, we have to restrict our deal sample further. First, as our data set only covers funds up to vintage year 2010 we cannot fully model the competition situation in the years after and, thus, exclude deals from subsequent years.¹⁷ Second, we restrict the data set to cover only the buyout and growth transactions where a fund invests for the first time in the target company.¹⁸ Third, we exclude the few deals where either the deal date or information on the location or industry of the target is missing. Finally, on the fund side, we only include those funds for which the educational background and office location of at least one fund partner is known and those investments which happened within the five year period following the vintage year of the fund. The last criterion is enforced for consistency with the matching approach (see upcoming description). This leaves us with a sample of 3,051 investments comprising a total of 2,606 companies. Table 3 presents a break-down of the deals by geography, industry, and deal year. It shows that around two-thirds of transactions are in U.S.-based companies with almost all remaining being European-focused. The industry split exhibits a high concentration on business and consumer services, followed by the information technology and healthcare sector. Investment years range from the 1980s up to 2010 yet most of our deals took place in the post-2000 period.

¹⁷For example, when a fund invested in a deal in 2012 it is likely that also funds with vintage year 2011 have competed for it. However, we do not have information on these funds raised after 2010.

¹⁸This excludes for example situations where a fund raised its stake in the company.

Table 3 about here: Characteristics of deal sample

Optimally, we would know all funds who evaluated the target and subsequently joined the bidding process (if existing). However, as this is not feasible, the matching approach serves as an alternative to identify funds with a suitable profile which could have invested in the target as well. They will take the role of competitors in the upcoming regression analysis. We create our set of counterfactual matches similar to Bengtsson and Hsu (2015) and require the following three criteria: (i) the fund is at the point of time the deal takes place in its investment period, which we define as the 5-year period following the vintage year¹⁹, (ii) the fund has made at least one other investment in the same geographic region, and (iii) at least one other investment in the same industry sector. The criteria are defined rather broad, however, we will include various controls in the upcoming analysis to account for differences between the funds. This procedure leaves us with a set of around 750,000 counterfactual pairs and, therefore, an average competition ratio of 247 (median: 243). When looking at the competition level over time, we observe an increase in the number of potential investors per deal. This is consistent with the growth of the buyout industry and indicates that deal sourcing has probably become even more competitive for the funds. To mitigate potential concerns about the high matching ratio we show in one of our robustness checks that the main results hold for a one-for-one random draw as well.

If educational ties are indeed an important driver for deal completion, we should observe this case more frequently than expected. Table 4 shows a cross-tabulation of educational ties and actual versus matched investments. From these descriptive statistics we can see that the share of ties is double as high for the actual investments (14.9%) compared to the counterfactual sample (7.4%). Similarly, when we perform the analysis on the share of a match based on common MBA degrees the resulting ratio for ties is more than 1.5 as high for actual investments. However, when we control for a difference based on the pure presence of an MBA degree on both sides without necessarily being from the same institution there is no difference observable.

¹⁹Private equity funds usually have a lifetime of 10-12 years and invest in the first couple of years after initiation. DeGeorge et al. (2015) for example discuss investment periods for buyout deals and define a “bought late” dummy in their analysis with a cut-off when the fund is older than 2.5 years.

Table 4 about here: Investment completion and educational ties

4 Empirical results

4.1 Does school diversity pay off?

Our empirical analysis starts with examining the variety of exposure funds have to different academic institutions. We use ordinary least squares regressions (OLS) with fund performance as dependent variable, where performance is either measured as the IRR or the TVPI multiple. Table 5 shows our results.

In a first step, we simply count the number of universities each fund has represented through its management team.²⁰ All schools are included from which at least one of the fund partners obtained an academic degree yet we count each one only once. We document that funds with a higher institutional diversity show a positive and significant influence on the fund's performance. This approach implicitly incorporates the concept of weak ties by being comprehensive and by not diluting the measure through over-weighting individual schools. Therefore, an additional fund partner who has a different academic background from the existing partners seems to be able to add significant value to the team. When we calculate the same measure for business schools, which are known for their strong alumni networks, we obtain similar results for the MBA degrees.

In a second step, the count is split into subsets based on the school's position in academic rankings. We use the Times Higher Education Ranking of 2010 and the Financial Times MBA Ranking of 2010.²¹ It seems that the prior evidence is primarily driven by degrees from high-ranked schools. This suggests managers are indeed receiving benefits from a broader exposure yet with significant benefits coming from top schools. However, this effect may not only arise from access to additional networks as the weaker evidence on MBA degrees suggest. One may argue that the top schools simply provide superior education or better upfront candidate selection. Yet, when we repeat the analysis using a relative measure of the share top schools have in the team's overall educational profile,

²⁰We use a logarithmic transformation to better account for the long tail of the distribution.

²¹A discussion of alternative rankings is included in the robustness section.

we cannot find a significant relationship to performance.²² The only instance where a coefficient becomes significant is for a higher concentration on degrees from Harvard.

In our analysis, we follow previous performance studies and include the fund's size and sequence number as control variables (e.g., Kaplan and Schoar (2005)).²³ The sequence number is typically used besides size as a proxy variable for the fund's skills (Phalippou and Gottschalg (2009)) which may reduce the value educational affiliations provide. We do not find a significant influence on either of the two variables. In addition, we control for U.S.-based and first time funds using indicator variables. The U.S. dummy variable is motivated by our global data set and a potentially different role of educational networks in the United States. On the other side, first time funds may use different approaches as they still need to prove themselves in the market. Again, we cannot find a significant relationship. Finally, we include the relative share of fund partners with previous experience in the consulting, accounting, and banking industry. Teams with a stronger focus on these sectors could have built alternative networks over time or developed other approaches based on their specific experience. Yet, also these measures do not seem to exert a strong influence on the fund's performance.

While this initial analysis gives a first idea about the value networks may play for the fund management, it cannot fully distinguish its origin. It may well be that other characteristics such as a more effective team work arising from the more diverse educational background contributes to this. In addition, the exposure becomes only relevant if the same school is also able to produce senior managers on the corporate side as well. As we have seen in the descriptive statistics, the range of schools CEOs graduate from is much broader than for the fund partners. Thus, the next section directly addresses educational ties within individual deals and their effect on chances to win the deal for the fund.

Table 5 about here: School diversity and fund performance

²²Similar results are obtained when using only MBA degrees.

²³ As common in the buyout literature, we also use vintage year fixed effects in our model to account for performance differences related to the fund's inception.

4.2 Who wins the deal?

Our second analysis focuses on individual deals the funds have carried out and on the role educational ties may play for their completion. We use logistic regression and define a regression model where the dependent variable is set to one if it is an actual investment and zero otherwise. We proceed as follows. First, we show that educational ties matter for the buyout funds in deal generation. Second, we investigate what kind of ties matter most in the process. Third, we interact the educational ties with deal and fund characteristics to obtain further insights into the dynamics. Tables 6 and 7 show our results.

We find that funds which have a tie based on a shared educational background have 79% higher odds to win the deal compared to other funds being active in the market at the same time (Panel A of Table 6).²⁴ This is in line with the univariate evidence presented before and represents an economic significant increase. Educational ties with an overlap in either degree type or degree time as well as MBA ties (61% increase in the odds) are also highly significant. In particular, the ties achieved at the same graduation time result in a high increase in the chances to compete in a deal (both educational and MBA ties) which confirms earlier evidence presented for mutual funds (Cohen et al. (2008)). Interestingly, our findings show that not only ties from high-ranked institutions matter (though they are highly significant) but especially, the relatively more rare, ties from lower-ranked schools have a high influence on the success probability whenever they exist. For example, educational ties from non-top 100 schools increase the odds by more than 300%. This may be driven by a lower level of competing funds with the same tie.

Table 6 about here: Educational ties and chances to win the deal

To investigate the differences between the ranking groups, we integrate the availability of ties among the competing funds in our measure (Panel B of Table 6). Specifically, we divide the indicator variables by the number of competing funds with an educational tie transforming the variables from a binary to a continuous scale (between zero and one). It follows that the funds winning the deal had higher chances of doing so when their tie is more unique among the competing funds. For deals where the winning fund has a

²⁴Exponentiating the regression coefficient of 0.583 gives an odds ratio of 1.79.

tie from a top-10 school our adjusted measure has an average of only 2.2%, while non-top 100 schools have an average of 20.7% (the overall sample mean being 10.3%). The regression results remain the same with one notable difference: the top-10 group becomes insignificant indicating that the edge a tie provides to the fund diminishes if this is not anymore a differentiating factor to competing funds. This uncovers another benefit of networks. It is not necessarily only the largest and widest network and the one which produces the highest number of CEOs which is of value for the fund partners. Yet, the ones which provide exclusivity seem to drive the results most. Recalling that the CEOs come from many more different universities than the fund partners themselves attended, less represented schools appear to be important for funds.

We employ interaction terms between the educational ties and sample characteristics to identify potential drivers of our results. The deal regressions include the same control variables introduced earlier in the performance regressions with one additional control for geographic distance.²⁵ Results for selected variables are depicted in Table 7.

Starting with fund level controls, we see a strong significance on fund size and the first fund indicator. Interacting these variables with the educational tie we find a weak (negative) significance for size but none for first timers. Similarly, we do not find interactions with the U.S. fund and the sequence indicator (omitted in the table). The negative effect on fund size may indicate that large funds established alternative networks which allows them to substitute for alumni networks. Interestingly, the prior experience variables for the management team also appear again not to drive results. One could have assumed that the networks acquired in these histories provide value for the deal sourcing activity (e.g., Siming (2014) reports that past employment at a financial adviser is beneficial for future mandates). In addition, we include fund performance as an explanatory variable in two specifications. While this information is not available upfront when the deal decision is made it allows us to give an indication whether funds tend to win deals by over-paying (and subsequently have low return measures). However, neither the variable nor the interaction term are significant for IRR and TVPI multiple.

The new control variable for geographical proximity serves as a proxy for local net-

²⁵As fixed effects we use geographic region, industry sector, and investment year. See Table 8 for the full model and alternative specifications of fixed effects.

works and is calculated based on the headquarter of the target company and the nearest investment office where at least one of the fund partners is based.²⁶ Earlier evidence for venture capital has found a home bias and that the likelihood of an investment decreases with a wider geographic distance (e.g., Sorensen and Stuart (2001) and Sorensen and Stuart (2008)). Yet, it has also shown that distant ties exist (Chen et al. (2010)). We confirm that distance matters as the variable is strongly negative in our regressions. However, when interacting it with the educational tie variable the presence of a tie seems to significantly mitigate this effect. The magnitude of the interaction is around a fifth of the negative control for geographic distance.

Table 7 about here: Drivers of educational ties

4.3 Robustness tests

We employ three robustness checks on methodology and data sample in this section.

First, we use different sets of fixed effect and model specifications. We choose to use the same selection as presented by Bengtsson and Hsu (2015) given the similarity of the research question (instead of educational ties the authors focus on ethnic matches). Table 8 presents our results. It splits models based on the full sample (the left four models) as well as using a one-for-one random draw to counter the chance that results are driven by the high match ratio (the right four models). The random draw is also tested by Bengtsson and Hsu (2015) for the same reasons. It also presents the full list of coefficients on our control variables omitted in the earlier sections. The first model in each block is the logistic regression introduced in the deal level regression in the main empirical results (based on the full sample). The next model uses an OLS model but leaves everything else constant. Finally, the remaining two specification alter the model by using fixed effects on the company and the investor level, respectively. For the OLS models we use two-way cluster-robust standard errors on investor and company level. We can also confirm that our results hold using a cluster on companies rather than investors

²⁶Distance is calculated according to the Haversine method assuming a spherical earth and ignoring ellipsoidal effects (radius of the earth 6,378,137 meter).

for the logistic regressions. The coefficients on educational ties (Panel A) as well as MBA ties (Panel B) are highly significant across all specifications.

Table 8 about here: Model specification and educational ties

Second, we present the coefficients of the educational ties and MBA ties for various subsamples in Table 9. We split the sample based on deal characteristics (target geography, target-fund distance) and fund attributes (e.g., vintage, size, performance). Each row reports the coefficients and standard errors from two separate regressions, one for the educational ties and one for the MBA ties. Our results seem not to be driven by the sample selection as the influence of ties remain intact.

Table 9 about here: Data subsets and educational ties

Third, we focus on alternative ranking definitions. We use the Academic Ranking of World Universities (ARWU) released by the Center for World-Class Universities at Shanghai Jiao Tong University instead of the Times Higher Education (THE) World University Rankings and the U.S. News and World Report for Business Schools instead of the Financial Times (FT) full-time global MBA programs. For the fund level regressions we find similar results as before. The broader set of schools shows this time higher coefficients on the second block (Top 11-30) but low ranked schools are again close to zero. The results on business schools are almost identical. For the deal level regressions, results are largely consistent for both the scaled and unscaled variables. Only the top 10 variable is weakly significant at the 10% level with all other ranking classes again highly significant and with higher coefficients.

5 Concluding remarks

We build upon the literature on the relevance and value of social ties. Our analysis indicates that educational ties indeed matter for private market investors by increasing their chances to find investments. Our evidence on buyout funds shows that their value seems to be higher in situations where the tie is more rare as less potential competitors

have one. As degrees of fund partners within the buyout industry are rather concentrated on a small set of schools having a tie can be an important differentiator. Further, results show that funds with a broader exposure to different academic institutions perform better yet this may not only be driven by the networks these schools open up for the fund. However, it seems to show initial empirical evidence on the value fund partners usually attach to such networks themselves when surveyed about their deal sourcing activities.

Finally, a typical drawback of commercial data sets including ours is the lack of a significant collection of investment returns. This is especially true for metrics on the individual deal level which would allow to assess the performance of deals related to the existence of an educational tie. As our data set did not provide us with a significant amount of deal returns and alternative measures, such as IPO rates which are used in venture capital, are not as relevant for buyout investments, we leave this investigation open for future research. However, even such an analysis would still be under the caveats that a lot of value generation only happens after the investment is made through operational improvements, financial leverage, and market timing.

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6 Tables

Table 1: Breakdown of buyout funds by vintage year

The table shows buyout funds up to vintage year 2010 available in the PitchBook database. Only closed, fully invested, and liquidated funds are included and a minimum of three funds per vintage year was imposed. The *fund count* reports the total number of funds as well as the number of funds for which an IRR, a TVPI multiple, and at least one fund partner is available, respectively. The *fund profile* lists the average number of investments and fund partners tagged to the fund as well as the average and median committed capital. The count of investments includes all types of investments (incl. add-on transactions) and is not restricted to the set of buyout and growth transactions used in the empirical part of the study. The number of fund partners does not include investment professionals with titles such as “Analyst” or “Associate”. The *fund performance* depicts the average and median IRR and TVPI multiple for each vintage year. The performance and capital variables are winsorized at the 1% level.

Vintage Year	Fund Count				Fund Profile				Fund Performance			
	Total Funds	w/ IRR	w/ TVPI	w/ Partner	Avg. Partner	Avg. Invest.	Avg. Cap.	Med. Cap.	Avg. IRR	Med. IRR	Avg. TVPI	Med. TVPI
	#	#	#	#	#	#	\$m	\$m	%	%	x	x
1978	4	1	1	0		2.0	63	63	5.5	5.5	1.4	1.4
1979	5	1	1	0		3.7	82	50	19.4	19.4	2.5	2.5
1980	7	1	2	0		2.0	57	60	14.2	14.2	2.7	2.7
1981	8	2	2	4	1.5	7.0	69	11	12.8	12.8	2.7	2.7
1982	3	1	1	0		1.0	123	24	39.2	39.2	3.4	3.4
1983	11	2	3	2	5.0	16.2	90	42	9.7	9.7	1.9	1.8
1984	18	4	3	4	1.0	3.2	115	54	27.4	23.5	3.2	3.6
1985	12	4	3	2	1.0	2.0	81	79	8.3	9.4	2.3	2.7
1986	16	5	3	6	1.5	3.9	226	112	36.1	35.7	3.9	4.4
1987	21	13	7	8	1.2	6.7	630	152	17.0	14.1	2.1	2.1
1988	18	6	4	1	1.0	5.6	121	62	25.2	19.0	1.8	1.9
1989	39	13	15	6	2.2	3.7	296	148	22.3	19.8	2.4	2.4
1990	34	8	4	11	1.6	4.9	236	155	4.8	10.3	1.9	2.2
1991	27	13	13	5	1.0	3.7	151	81	28.7	25.0	2.8	3.0
1992	32	10	6	11	1.4	4.8	348	122	15.7	21.7	1.6	1.5
1993	38	17	14	13	1.6	7.0	342	260	21.7	18.8	2.4	2.1
1994	61	22	22	24	1.6	7.8	293	125	20.4	18.2	2.3	2.1
1995	74	26	28	26	2.0	6.3	261	103	14.7	13.3	1.9	1.7
1996	125	40	34	54	1.6	6.7	322	100	9.8	7.3	1.5	1.3
1997	152	46	53	69	1.7	6.7	463	160	7.7	9.1	1.6	1.5
1998	175	71	68	94	2.3	10.8	454	209	6.3	8.8	1.5	1.5
1999	194	66	69	104	2.4	9.8	400	154	12.7	12.6	1.7	1.7
2000	239	81	79	137	2.8	13.1	556	172	14.0	12.2	1.9	1.8
2001	142	53	55	89	3.4	13.2	567	166	20.7	19.2	2.0	1.9
2002	150	46	47	91	2.7	10.8	441	141	16.3	17.6	1.8	1.8
2003	136	44	50	86	3.4	13.1	554	184	21.2	17.8	1.8	1.7
2004	182	48	54	111	2.6	11.4	459	207	12.2	8.2	1.7	1.6
2005	257	87	110	180	3.9	15.0	717	255	8.2	8.2	1.4	1.4
2006	425	121	159	268	3.6	12.8	778	330	8.2	8.5	1.4	1.4
2007	451	129	164	277	3.7	13.7	658	259	10.4	9.9	1.4	1.4
2008	350	95	129	227	3.6	12.0	682	233	10.5	11.6	1.4	1.4
2009	223	60	73	135	3.3	11.6	615	182	14.5	14.0	1.5	1.4
2010	208	57	77	128	3.6	9.9	375	232	9.8	9.8	1.3	1.2
Total	3837	1193	1353	2173	3.1	11.3	540	197	12.5	11.7	1.6	1.5

Table 2: Most frequent academic institutions of partners and CEOs

The table presents the most frequent academic institutions from which fund partners and target company CEOs received their academic degrees. Individuals can be represented with multiple degrees and MBA degrees are shown separately for each institution. *Fund partners* are the ones working for a buyout fund up to vintage year 2010. *Target CEOs* represent the ones at the time of a deal where one of the buyout funds invested in the company for the first time. This includes only buyout and growth transactions and excludes add-on transactions. The table is sorted in a descending order by the number of fund partner degrees. An institution is listed when one of the two groups is represented with at least 50 degrees.

	Academic Institution	Fund Partner				Target CEO			
		N	%	MBA	%	N	%	MBA	%
1	Harvard University	876	12.04	590	28.12	253	3.69	145	12.05
2	University of Pennsylvania	485	6.67	222	10.58	108	1.58	41	3.41
3	Stanford University	314	4.32	163	7.77	100	1.46	36	2.99
4	Columbia University	180	2.47	115	5.48	60	0.88	21	1.75
5	Northwestern University	171	2.35	124	5.91	96	1.40	54	4.49
6	University of Chicago	156	2.14	130	6.20	71	1.04	54	4.49
7	Yale University	121	1.66	15	0.71	38	0.55	4	0.33
8	Dartmouth College	119	1.64	43	2.05	44	0.64	13	1.08
9	University of Virginia	108	1.48	27	1.29	39	0.57	9	0.75
10	Princeton University	99	1.36	1	0.05	21	0.31	0	0.00
11	Cambridge University	97	1.33	1	0.05	35	0.51	0	0.00
12	University of Oxford	96	1.32	1	0.05	37	0.54	1	0.08
13	INSEAD	92	1.26	83	3.96	52	0.76	26	2.16
14	New York University (NYU)	88	1.21	45	2.14	52	0.76	21	1.75
15	University of Michigan	83	1.14	18	0.86	53	0.77	13	1.08
16	Cornell University	80	1.10	15	0.71	51	0.74	10	0.83
17	ParisTech (Telecom, ENST, HEC)	79	1.09	5	0.24	54	0.79	10	0.83
18	Duke University	75	1.03	16	0.76	32	0.47	10	0.83
19	University of Texas	73	1.00	16	0.76	84	1.23	24	2.00
20	Georgetown University	72	0.99	9	0.43	30	0.44	3	0.25
21	Massachusetts Institute of Technology (MIT)	64	0.88	16	0.76	46	0.67	6	0.50
22	Stockholm School of Economics	60	0.82	2	0.10	16	0.23	1	0.08
23	University of Notre Dame	59	0.81	2	0.10	25	0.36	4	0.33
24	University of California, Berkeley	58	0.80	9	0.43	63	0.92	10	0.83
25	University of California, Los Angeles (UCLA)	55	0.76	29	1.38	39	0.57	12	1.00
26	Brown University	53	0.73	0	0.00	25	0.36	0	0.00
27	University of Illinois	53	0.73	2	0.10	48	0.70	4	0.33
28	University of Wisconsin	34	0.47	5	0.24	56	0.82	11	0.91
	Other	3373	46.38	394	18.78	5222	76.23	660	54.86
	Total	7273	100	2098	100	6850	100	1203	100

Table 3: Characteristics of buyout and growth deal sample

The table shows buyout and growth transactions where a buyout fund invests for the first time in the target company. Add-on transactions and investments after 2010 are excluded. Educational background on at least one partner of the investing fund and the CEO must be available and deals without a deal date or missing information on the company's location and industry as well as funds with missing location or size are omitted. In addition, only deals where the investment took place within the five year period after the fund's vintage year are considered for comparability with the counterfactual investment sample. Headquarter region is segmented based on geographic sub-region for Europe. Industry sector is shown as classified in the database. Investment year indicates the year in which the deal took place.

	N	%
<i>Panel A: Headquarter Region</i>		
Africa	10	0.33
Asia	82	2.69
Eastern Europe	34	1.11
North America	2065	67.68
Northern Europe	187	6.13
South/Central America	26	0.85
Southern Europe	96	3.15
Western Europe	551	18.06
Total	3051	100.00
<i>Panel B: Primary Industry Sector</i>		
Business Products and Services (B2B)	1000	32.78
Consumer Products and Services (B2C)	730	23.93
Energy	119	3.90
Financial Services	259	8.49
Healthcare	352	11.54
Information Technology	461	15.11
Materials and Resources	130	4.26
Total	3051	100.00
<i>Panel C: Investment Year</i>		
1980 - 1994	27	0.88
1995 - 2000	340	11.14
2001 - 2002	201	6.59
2003 - 2004	387	12.68
2005 - 2006	664	21.76
2007 - 2008	777	25.47
2009 - 2010	655	21.47
Total	3051	100.00

Table 4: Investment completion and educational ties

The table tabulates actual vs. counterfactual investments and the existence of an educational tie. Actual investments are the ones described in an earlier table about buyout and growth deals. The counterfactual investments include all buyout funds who have been in investment period at the time of deal and have invested at least once in the same geographic region and industry sector to be included for a specific transaction. An educational tie exists if at least one of the fund partners obtained a degree from the same academic institution as the CEO of the target company at the time of the deal. Refer to Section 3.3 for details on the matching procedure.

Investment	Educational Tie		Total
	No	Yes	
Actual	2598 85.2%	453 14.9%	3051 100%
Counterfactual	694402 92.6%	55240 7.4%	749642 100%
Total	697000 92.6%	55693 7.4%	752693 100%

Table 5: School diversity and fund performance

This table includes buyout funds up to vintage year 2010. The dependent variable is the fund performance expressed as either the IRR or the TVPI multiple. In Panel A, the number of schools is the natural logarithm of a count of all uniquely represented degree institutions from which at least one of the fund partners graduated. In Panel B, only institutions from which at least one MBA degree has been obtained are included. The count is then split into subsets based on the school's position in the Times Higher Education Ranking of 2010 and the Financial Times MBA Ranking of 2010, respectively. The logarithmic transformation has been applied to account for the long tail of the variable's distribution. As controls we include the following variables. Consulting, Big Five, and Banking measure the share of fund partners with prior work experience in the respective industry. Fund size is the natural logarithm of the fund's committed capital and the sequence number is the natural logarithm on the number of funds the investor has already raised including the current one. First fund and U.S. fund are indicator variables which equal to one if the fund is the first fund for the investor and if the fund is based in the U.S., respectively. The performance and size variables are winsorized at the 1% level. Each model includes vintage year fixed effects and standard errors are clustered on the investor level.

	<i>Dependent variable:</i>			
	IRR		TVPI	
	(1)	(2)	(3)	(4)
<i>Panel A: Academic degrees</i>				
Nbr schools	0.022*** (0.008)		0.142*** (0.037)	
Nbr schools (top 10)		0.021** (0.009)		0.140*** (0.043)
Nbr schools (top 11-30)		0.016* (0.010)		0.097** (0.046)
Nbr schools (top 31-100)		0.005 (0.009)		0.060 (0.040)
Nbr schools (non-top 100)		0.001 (0.007)		-0.0004 (0.036)
Consulting (%)	0.034 (0.025)	0.027 (0.025)	0.107 (0.099)	0.060 (0.098)
Big Five (%)	-0.007 (0.030)	-0.002 (0.030)	0.052 (0.133)	0.062 (0.135)
Banking (%)	0.006 (0.013)	0.002 (0.014)	0.002 (0.068)	-0.027 (0.068)
Fund Size	-0.004 (0.005)	-0.005 (0.005)	-0.023 (0.024)	-0.030 (0.024)
Fund Seq.	-0.005 (0.006)	-0.006 (0.006)	-0.049 (0.030)	-0.058* (0.030)
First Fund	0.003 (0.015)	0.003 (0.015)	-0.092 (0.071)	-0.100 (0.072)
U.S. Fund	0.0003 (0.011)	-0.008 (0.013)	-0.034 (0.055)	-0.094 (0.066)
Constant	0.165*** (0.026)	0.182*** (0.027)	1.901*** (0.126)	2.074*** (0.148)
F.E. Vintage Year	Yes	Yes	Yes	Yes
Observations	847	847	966	966
Adjusted R ²	0.111	0.112	0.165	0.171
<i>Panel B: MBA degrees</i>				
Nbr MBA schools	0.018** (0.009)		0.141*** (0.039)	
Nbr MBA schools (top 10)		0.016 (0.010)		0.129** (0.053)
Nbr MBA schools (top 11-25)		-0.009 (0.013)		0.007 (0.060)
Nbr MBA schools (top 26-50)		0.001 (0.016)		0.057 (0.079)
Nbr MBA schools (non-top 50)		0.019** (0.009)		0.086** (0.043)
Controls	Yes	Yes	Yes	Yes
F.E. Vintage Year	Yes	Yes	Yes	Yes
Observations	847	847	966	966
Adjusted R ²	0.109	0.111	0.165	0.166

Note: *p<0.1; **p<0.05; ***p<0.01

Table 6: Educational ties and the chance to win the deal

This table shows different logistic regression models. The dependent variable is an indicator which equals one for actual investments and zero for counterfactual investments. The latter include for each transaction the buyout funds which have been in investment period at the time of deal and which have invested at least once in the same geographic region and industry sector. The table is split into two panels. In Panel A, an educational tie exists if at least one of the fund partners obtained a degree from the same academic institution as the CEO of the target company at the time of the deal. Same type refers to the degree type achieved when graduating from the university. Besides MBA degrees, this also covers PhD, JD, graduate, and undergraduate degrees. Same time refer to an overlap in the time the degree was obtained (3 year window relative to graduation year). The top school definitions follow the same logic as presented earlier in the fund level evidence. An MBA tie exists if both obtained an MBA degree from the same business school. In Panel B, variables are divided on a per transaction basis by the number of competing funds which have an educational tie. For the full baseline model including details on the control variables and alternative fixed effect settings refer to Table 8. Standard errors are clustered on the investor level.

	<i>Dependent variable: Investment Dummy</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A: Binary tie variable</i>							
Educational tie	0.583*** (0.060)						
Educational tie (same type)		0.534*** (0.063)					
Educational tie (same time)			1.003*** (0.144)				
Educational tie (type, time)				0.958*** (0.154)			
Educational tie (top 10)					0.270*** (0.081)		
Educational tie (top 11-30)					0.433*** (0.114)		
Educational tie (top 31-100)					0.826*** (0.116)		
Educational tie (not-top 100)					1.229*** (0.106)		
MBA tie						0.476*** (0.091)	
MBA tie (same time)							1.056*** (0.232)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. Deal Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	752,693	752,693	752,693	752,693	752,693	752,693	752,693
<i>Panel B: Scaled tie variable (number of ties per deal)</i>							
Scaled educational tie	2.340*** (0.194)						
Scaled educational tie (same type)		2.289*** (0.228)					
Scaled educational tie (same time)			3.330*** (0.673)				
Scaled educational tie (type, time)				4.024*** (0.933)			
Scaled educational tie (top 10)					-0.006 (0.942)		
Scaled educational tie (top 11-30)					2.232*** (0.637)		
Scaled educational tie (top 31-100)					2.178*** (0.431)		
Scaled educational tie (not-top 100)					2.438*** (0.216)		
Scaled MBA tie						2.887*** (0.530)	
Scaled MBA tie (same time)							4.356*** (1.291)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	752,693	752,693	752,693	752,693	752,693	752,693	752,693

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 7: Drivers of educational ties

The table shows similar logistic regression models as presented before extended to different interaction settings for the educational tie variable. The dependent variable is an indicator which equals one for actual investments and zero for counterfactual investments. The latter include for each transaction the buyout funds which have been in investment period at the time of deal and which have invested at least once in the same geographic region and industry sector. An educational tie exists if at least one of the fund partners obtained a degree from the same academic institution as the CEO of the target company at the time of the deal. Geographic distance is measured between the headquarter of the target company and the nearest investment office, where a fund partner is based and transformed to its logarithmic base. Fund size is the natural logarithm of the fund's committed capital and first fund is an indicator variable which equals to one if the fund is the first fund of the investor. IRR and TVPI are performance measures for the funds. Performance and size variables are winsorized at the 1% level. For the full baseline model including all fund control variables refer to Table 8. Standard errors are clustered on the investor level.

	<i>Dependent variable: Investment Dummy</i>				
	(1)	(2)	(3)	(4)	(5)
Educational tie	0.297*** (0.101)	1.063*** (0.263)	0.545*** (0.063)	0.604*** (0.101)	0.613*** (0.201)
Educational tie * Geo. distance	0.055*** (0.017)				
Educational tie * Fund size		-0.072* (0.037)			
Educational tie * First fund			0.240 (0.150)		
Educational tie * IRR				-0.437 (0.572)	
Educational tie * TVPI					-0.049 (0.115)
Geo. distance	-0.262*** (0.011)				
Fund size		0.080*** (0.022)			
First fund			-0.234*** (0.068)		
IRR				-0.061 (0.243)	
TVPI					0.026 (0.046)
Remaining controls	Yes	Yes	Yes	Yes	Yes
F.E. Deal Year	Yes	Yes	Yes	Yes	Yes
F.E. Region	Yes	Yes	Yes	Yes	Yes
F.E. Industry	Yes	Yes	Yes	Yes	Yes
Observations	752,693	752,693	752,693	432,693	478,822

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 8: Robustness check: Model specification and educational ties

This table shows different regression settings. The dependent variable is an indicator which equals one for actual investments and zero for counterfactual investments. The latter include for each transaction the buyout funds which have been in investment period at the time of deal and which have invested at least once in the same geographic region and industry sector. Models 1 to 4 show results based on the full sample as presented before, while Models 5 to 8 use a one-for-one random draw on the counterfactual pairs. An educational tie exists if at least one of the fund partners obtained a degree from the same academic institution as the CEO of the target company at the time of the deal. An MBA tie exists if both obtained an MBA degree from the same business school. Geographic distance is measured between the headquarter of the target company and the nearest investment office, where a fund partner is based and transformed to its logarithmic base. Consulting, Big Five, and Banking measure the share of fund partners with prior work experience in the respective industry. Fund size is the natural logarithm of the fund's committed capital and the sequence number is the natural logarithm on the number of funds the respective investor has already raised including the current one. First fund and U.S. fund are indicator variables which equal to one if the fund is the first fund for the investor and if the fund is based in the U.S., respectively. Models 1 and 5 show a logistic regression with the remaining models using Ordinary Least Squares (OLS) regressions with varying sets of fixed effects. Standard errors in the logistic model are clustered on the investor level, the OLS models use two-way cluster-robust standard errors for investors and companies.

	<i>Dependent variable: Investment Dummy</i>							
	Full Sample				Random draw			
	(1) <i>Logit</i>	(2) <i>OLS</i>	(3) <i>OLS</i>	(4) <i>OLS</i>	(5) <i>Logit</i>	(6) <i>OLS</i>	(7) <i>OLS</i>	(8) <i>OLS</i>
<i>Panel A: Academic degrees</i>								
Educational tie	0.583*** (0.060)	0.003*** (0.0004)	0.005*** (0.001)	0.003*** (0.0004)	0.677*** (0.096)	0.142*** (0.017)	0.267*** (0.047)	0.147*** (0.021)
Geo. Distance	-0.252*** (0.011)	-0.002*** (0.0001)	-0.002*** (0.0001)	-0.002*** (0.0001)	-0.331*** (0.021)	-0.068*** (0.003)	-0.123*** (0.006)	-0.064*** (0.004)
Consulting (%)	0.163* (0.089)	0.001** (0.0004)	0.001** (0.0004)	0.001 (0.001)	0.124 (0.129)	0.028 (0.029)	0.054 (0.060)	0.023 (0.055)
Big Five (%)	-0.079 (0.150)	-0.0004 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.315 (0.201)	-0.066 (0.044)	-0.118 (0.085)	-0.141 (0.102)
Banking (%)	-0.007 (0.067)	-0.0001 (0.0003)	-0.0001 (0.0003)	-0.0001 (0.001)	-0.049 (0.095)	-0.011 (0.021)	-0.024 (0.044)	-0.046 (0.046)
Fund Size	0.070*** (0.022)	0.0003*** (0.0001)	0.0003*** (0.0001)	0.001*** (0.0002)	0.130*** (0.027)	0.029*** (0.006)	0.051*** (0.012)	0.067*** (0.013)
Fund Seq.	-0.103** (0.041)	-0.0005** (0.0002)	-0.001*** (0.0002)	0.003*** (0.001)	-0.106** (0.049)	-0.023** (0.011)	-0.042* (0.023)	0.167*** (0.039)
First Fund	-0.205*** (0.065)	-0.001*** (0.0003)	-0.001*** (0.0003)	0.0004 (0.001)	-0.358*** (0.092)	-0.079*** (0.021)	-0.120*** (0.044)	-0.00003 (0.037)
U.S. Fund	-0.089 (0.057)	-0.001*** (0.0002)	-0.001*** (0.0002)	-0.001 (0.001)	-0.053 (0.084)	-0.011 (0.019)	-0.008 (0.038)	-0.088* (0.052)
F.E. Deal Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E. Region	Yes	Yes	n/a	Yes	Yes	Yes	n/a	Yes
F.E. Industry Sector	Yes	Yes	n/a	Yes	Yes	Yes	n/a	Yes
F.E. Company	No	No	Yes	No	No	No	Yes	No
F.E. Investor	No	No	No	Yes	No	No	No	Yes
Observations	752,693	752,693	752,693	752,693	6,102	6,102	6,102	6,102
R ²	0.066	0.005	0.007	0.009	0.151	0.109	0.197	0.255
<i>Panel B: MBA degrees</i>								
MBA tie	0.476*** (0.091)	0.003*** (0.001)	0.004*** (0.001)	0.002*** (0.001)	0.443*** (0.150)	0.094*** (0.027)	0.208** (0.094)	0.111*** (0.032)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	752,693	752,693	752,693	752,693	6,102	6,102	6,102	6,102
R ²	0.064	0.005	0.007	0.009	0.142	0.103	0.188	0.249

Note:

R² for *Logit* model reports Nagelkerke's measure. *p<0.1; **p<0.05; ***p<0.01

Table 9: Robustness check: Data subsets and educational ties

This table shows the coefficients and standard errors for various subsets of the deal data set. Each cell represents a separate regression model under the same formula as specification (1) in Table 8 (logit model). The dependent variable is an indicator which equals one for actual investments and zero for counterfactual investments. The latter include for each transaction the buyout funds which have been in investment period at the time of deal and which have invested at least once in the same geographic region and industry sector. The left column includes all degrees, while the right column only includes MBA degrees. An educational tie exists if at least one of the fund partners obtained a degree from the same academic institution as the CEO of the target company at the time of the deal. An MBA tie exists if both obtained an MBA degree from the same business school. Controls and fixed effects are used as in the original model as appropriate. Standard errors are clustered on the investor level.

	<i>Dependent variable: Investment Dummy</i>	
	Educational tie	MBA tie
Original model	0.583*** (0.060)	0.476*** (0.091)
<i>Deal characteristics</i>		
Deals in Americas	0.432*** (0.072)	0.434*** (0.098)
Deals in Europe	0.872*** (0.111)	0.633** (0.257)
Distance >100 km	0.558*** (0.071)	0.485*** (0.102)
Distance >1000 km	0.589*** (0.071)	0.371*** (0.133)
Distance >5000 km	0.859*** (0.289)	0.875** (0.437)
<i>Fund characteristics</i>		
Post-2000 vintage	0.612*** (0.068)	0.483*** (0.104)
Pre-2001 vintage	0.473*** (0.122)	0.451** (0.193)
U.S. based	0.443*** (0.071)	0.479*** (0.097)
Non-U.S. based	0.782*** (0.109)	0.346 (0.258)
First timer	0.737*** (0.143)	0.788*** (0.227)
Non-first timer	0.562*** (0.064)	0.419*** (0.098)
Large fund [†]	0.588*** (0.065)	0.471*** (0.097)
Small fund [†]	0.607*** (0.149)	0.463* (0.260)
High IRR [†]	0.508*** (0.097)	0.336** (0.148)
Low IRR [†]	0.582*** (0.090)	0.553*** (0.151)
High TVPI [†]	0.536*** (0.091)	0.337** (0.133)
Low TVPI [†]	0.518*** (0.110)	0.637*** (0.166)

[†] Above/below median value based on all buyout funds where the respective metric is available.

*p<0.1; **p<0.05; ***p<0.01