


Social Networks and the Informational Role of Financial Advisory Firms Centrality in Mergers and Acquisitions

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This paper examines the role of the social network *hierarchy* of financial advisory firms in a mergers and acquisitions (M&As) framework. Financial advisors are information intermediaries who play an information extraction and information dissemination role. The more central the advisory firm is within the network of advisory firms, the greater their access to information flows. Our findings indicate that more central advisors are associated with higher acquirer announcement abnormal returns, higher abnormal combined returns and higher operating long-run performance for the new entity. Central advisors also mitigate information asymmetries, resulting in lower premium paid by bidders. In return, more central advisory firms demand higher advisory fees, engage in higher M&A activity and are more likely to advise large acquirers and acquisitions of large and public deals. Our results are robust to endogeneity and self-selection concerns.

Introduction

There is a substantial and growing literature showing that personal and social connections matter in financial issues, such as corporate value and operating performance, policies and practices, corporate governance, investment policies and acquisition performance. Personal connection is an effective mechanism that allows for the exchange and transmission of ideas, knowledge and private information. Sanou, Le Roy and Gnyawali (2016) show that a firm's centrality in the network enhances its competitive aggressiveness and its market performance. Houston, Lee and Suntheim (2018) show that inter-bank connected firms are more likely to partner in the syndicated loan market. Portfolio managers are more likely to invest in firms that are socially connected (Cohen, Frazzini and Malloy, 2008). Other studies investigate the role of connections among company directors and

executives (Fracassi and Tate, 2012; Hwang and Kim, 2009; Larcker, So and Wang, 2013), bidder and target directors (Cai and Sevilir, 2012; Ishii and Xuan, 2014), bankers and borrowers (Engelberg, Gao and Parsons, 2012; Ferreira and Matos, 2012), sell-side analysts (Cohen, Frazzini and Malloy, 2010) and venture capitalists (Hochberg, Ljungqvist and Lu, 2007), and the impact on CEO executive compensation (Engelberg, Gao and Parsons, 2013; Hwang and Kim, 2009).

Personal ties help to enhance information flow as well as acquisition and transmission of knowledge, private information and ideas (Bruner, 2004; Schmidt, 2015; Schonlau and Singh, 2009). Social connections generate valuable soft information and, in turn, make it easier for market participants to communicate information that would otherwise have been hard to share. More generally, the increased flow of soft information through social connections can enhance participants'

understanding of the wider market and industry dynamics and better respond to market challenges and conditions.

The social network literature (Brass, 1984; Ibarra and Andrews, 1993; Tsai and Ghoshal, 1998) suggests that not every relationship and connection in a network is equal. While personal connections contribute to a more efficient and faster way of spreading and sharing information, knowledge and the flow of ideas, an actor's location in a network can determine the benefits and disadvantages they face. The positions of actors in the network differ significantly, and there is a hierarchy. Bhardwaj, Qureshi and Lee (2008) argue that the central position of an actor enables her to have a structural advantage in her network. El-Khatib, Fogel and Jandik (2015) examine the role of CEO network centrality in merger and acquisition (M&A) decisions and reveal the importance of dominant CEOs in their network. Bajo *et al.* (2016) study the informational advantage of higher-centrality underwriters in initial public offerings (IPOs), highlighting their information dissemination and information extraction roles.

Mergers and acquisitions are important and complex corporate finance activities, which have been highly debated in terms of value creation (Cartwright and Schoenberg, 2006). In this paper, we investigate the role of financial advisors within the M&A framework from a different and new angle. We focus on financial advisors' positions in their network, and the informational advantages that stem from occupying a central location in the network. The more central the advisor is in the network, the greater their access to information. (Bajo *et al.*, 2016). One of the main assets of financial advisors is their connections and the information flow these connections generate. Chemmanur and Fulghieri (1994) and Bajo *et al.* (2016) show that financial advisors are information intermediaries, with an information extraction and information dissemination role.

In the M&As market, financial advisors use their network to extract information about industry dynamics. A central position in the network enables them to have access to a greater number of market participants and better knowledge and understanding of industry dynamics, such as local competition and market opportunities; hence, they are better equipped to identify and select target firms that could more efficiently leverage the resources and capabilities of the acquirer. In addition,

through their wider network, they can better match bidding with target firms, leading to higher synergistic gains for the newly combined firm. The identification of appropriate targets, accurate valuation and structuring of synergistic deals, and the provision of advice on strategic actions, are key M&A-related activities (McLaughlin, 1992) that involve access to, and production of, information.

Chemmanur and Fulghieri (1994) develop a model that explains the information quality of underwriters in an initial public offerings context. They highlight the function of financial intermediaries as information producers who help mitigate the negative impact of information asymmetry in financial markets (see also Booth and Smith, 1986; Titman and Trueman, 1986). Financial advisors have the incentive to build a reputation as accurate information generators, or credible certifiers (Bajo *et al.*, 2016; Kale, Kini and Ryan, 2003). Chemmanur and Fulghieri (1994) further highlight that their model is applicable in cases such as M&As, where advisors act as information producers, helping to reduce the adverse impact of information asymmetry in financial markets. One of the direct implications of their model in an M&A context suggests that the greater the informational advantage of a financial advisor, the more effective it is in reducing the impact of information asymmetry in the equity market.

We argue that being central in a network should be associated with improved access to flows of information, thereby raising the chances that the information produced will reduce information asymmetry. Central financial advisors can alleviate information asymmetries between the bidder and the target. Through their wider network, central advisors can extract and produce information related to the target's assets, contributing to more accurate target valuations. Then, they can provide robust advice to the management of the acquirer, and acquirers could avoid overpayment. The potential value improvements should be larger in cases where the bidder is subject to heightened information asymmetry.

We collect a sample of US domestic M&As from 2000 to 2012 and construct four measures of centrality for the respective advisors. Three dimensions of centrality in a social network are proposed by Freeman (1977, 1979), that is degree (number of direct connections), closeness (fewer steps between actors/nodes) and betweenness centrality (gatekeeper between other nodes). The fourth

dimension, introduced by Bonacich (1972), is eigenvector centrality, which determines how influential an actor's position is. To construct the four centrality measures, we need to establish connections among financial advisors. We employ two different approaches. First, we use the Boardex database to determine financial advisors' peer network, which is defined as the organization's peer network on the basis of the social connections of its top management (CEO, chair, directors of the board, CFO and executive directors) via prior employment, education or social activities. Florackis and Sainani (2018) emphasize the importance of the CFO's role, among other key directors, in shaping key corporate policies. Second, for robustness, we follow Bajo *et al.*'s (2016) approach and identify a connection between two advisors if they have advised the same bidder in the last 5 years.

Our results show that central financial advisors manage to create more value for bidders' shareholders. We find a positive and significant relationship between advisor centrality and acquirer announcement abnormal returns for the large group of non-top-tier advisors. To deal with the endogeneity and self-selection bias that arises between the bidders and advisors' selection process, driven by observable and unobservable firm and deal characteristics, we employ a Heckman two-stage procedure process and a propensity score matching methodology. Higher-centrality advisors are more likely to be involved with larger bidders, to advise larger deals and to be involved in acquisitions of public target firms. The matching between bidders and advisors may not be a random process, and the ordinary least squares (OLS) estimator may be biased. We compare high- versus low-centrality advisors based on observable characteristics. The results remain robust and continue to hold even after these controls. We further show that central advisors are positively correlated with higher combined announcement returns for the new entity, as well as superior long-run performance.

By utilizing their leading position in their networks, central advisors seem to benefit their clients. Following Chemmanur and Fulghieri's (1994) model of information asymmetry, we argue that advisors can alleviate asymmetries and we examine the impact of centrality on deal premiums. Our findings suggest that central advisors help alleviate information asymmetries between bidders and targets and advise for more optimal valuations.

In addition, we examine whether financial advisors benefit from being involved in M&A transactions. Kolasinski and Kothari (2008) claim that M&A advisory fees are a major source of revenue for investment banks. Golubov, Petmezas and Travlos (2012) report that over 85% of M&A deals by transaction value around the world were advised by investment banks in 1997 alone, and these advisors generated \$39.7 billion in income from their advisory services. Our results show that there is a positive and significant relationship between bidders' advisor centrality and the fees they charge. These findings imply that central advisors not only create value for their clients, but also charge higher advisory fees for their services. Furthermore, our findings show that central financial advisors are involved in more M&A activity than disconnected or less central advisors, and are more likely to advise large acquirers, acquisitions of public targets firms and acquisitions involving relatively larger targets.

Overall, the results are robust when we employ an additional proxy to capture the connections between advisors based on their prior working relationships, as in Bajo *et al.* (2016). The results are robust for alternative windows of bidders' cumulative abnormal returns (CARs). For robustness, we orthogonalize the centrality measures by three variables, namely reputation, past performance and prior relationship, and re-run the analysis with the orthogonal version of the centrality measures (Nyborg and Ostberg, 2014). We find similar results for the centrality coefficients.

This paper makes several contributions to the existing literature. It is the first paper to examine the impact of financial advisor centrality in an M&A framework. Our findings suggest that the position of a financial advisor in their network has a significant effect on various issues related to M&As, such as deal outcome and advisory fees. Our paper closely relates to El-Khatib, Fogel and Jandik (2015), who examine the impact of CEO centrality on M&As. El-Khatib, Fogel and Jandik (2015) show that central CEOs are more likely to undertake value-destroying acquisitions because they are self-motivated and use their power to increase entrenchment. Our paper also shows that centrality matters in a financial advisor setting. This study also relates to Bajo *et al.* (2016), who discuss the role of underwriter centrality in an IPO framework.

Second, we extend the literature that examines financial advisors' characteristics and their

impact on takeover deals. The existing literature suggests numerous non-economic factors for the bidder's choice of financial advisor, like the advisor's performance (Sibilkov and McConnell, 2014), scope (Song, Wei and Zhou, 2013) and reputation (Derrien and Dessaint, 2018; Kale, Kini and Ryan, 2003; Rau, 2000); the prior relation of bidders with their advisory banks (Francis, Hasan and Sun, 2014); and the advisor's industry-specific expertise (Chang *et al.*, 2016; Wang, Xie and Zhang, 2014). This study claims that financial advisor centrality is a key determinant that significantly affects the choice of financial advisors during the acquisition process.

Third, our study further highlights the informational role of financial advisors in the corporate world and in financial markets. It builds and extends the theoretical implications of Chemmanur and Fulghieri's (1994) model, which assumes that underwriters have equal access to information channels, and their deviations in reputation helps to certify the quality of information. This paper utilizes measures that capture the informational position of financial advisors and their implications for M&A outcomes. Our study also relates to Golubov, Petmezas and Travlos (2012), who show that top-tier advisors are able to deliver higher bidder returns. Our paper shows that one of the underlying mechanisms that is crudely captured by splitting advisors into top- and non-top-tier is the informational advantage stemming from a more central position in the network.

The remainder of the paper is structured as follows. The next section discusses the economic mechanism along with relevant literature and builds the hypotheses. The third section describes the sample construction and centrality measures. The fourth section explores the informational role of advisors; while the fifth section presents extra test and robustness checks and the sixth section concludes.

Related literature, economic mechanism and hypothesis development

This section discusses related literature and the mechanism of how the central position of a financial advisor in their network can affect the outcomes of M&As. The theoretical framework on which we develop the mechanism through which central financial advisors affect M&A outcomes

draws from two strands of literature. One strand argues that financial advisors serve as financial intermediaries and perform a number of tasks. One of the major functions of financial advisors is the extraction, production and dissemination of information (Chemmanur and Fulghieri, 1994; Golubov, Petmezas and Travlos, 2012). This strand of the literature focuses on top-tier financial advisors and claims that top-tier banks provide a certification mechanism to the market about the potential synergies emanating from M&As. Golubov, Petmezas and Travlos (2012) claim that top-tier advisors generate synergies for bidder shareholders due to reputation effects and higher-quality skills.

This paper proposes a different and new angle for financial advisors involved in M&As. Motivated by another strand of the literature on social connections, we propose that financial advisors' connections and their central position in their network can affect M&A outcomes. Studies on social connections show that personal ties help to enhance information flow as well as acquisition and transmission of knowledge, private information and ideas (Bruner, 2004; Schmidt, 2015; Schonlau and Singh, 2009). For example, Bekkers, Verspagen and Smits (2002) find that central firms in an industrial network are positively associated with market share and intellectual property rights because they readily acquire knowledge about the latest important technologies and market environment. Larcker, So and Wang (2013) show that firms with centralized boards experience better performance in terms of operating profit and risk-adjusted stock return. They identify the economic benefits of directors' centrality as one reason for firms' positive performance; well-connected directors have prior knowledge of industry trends, market conditions and regulatory changes. Despite the growing literature on social connections, there is limited evidence on the role of financial advisors' networking hierarchy in M&A outcomes and characteristics.

The information and knowledge that central financial advisors acquire through their networks can affect M&A outcomes via two channels. First, more central financial advisors are better positioned to extract information from their network about market and industry-wide dynamics, and to propose appropriate target firms that can create synergic gains for the bidders' shareholders. Central financial advisors are expected to have a wealth of knowledge and better understanding of

market and industry dynamics due to their greater connectivity, which provides valuable information about market conditions, industry trends, firm insider information and critical legal and regulation changes (Ahuja, 2000; Berg, Duncan and Friedman, 1982). This comparative information advantage would make it easier for financial advisors to identify wealth-creating takeover options for bidders and reduce transaction costs. Yawson and Zhang (2017) suggest that central network positions convey an information advantage and can help financial advisors achieve better M&A outcomes and alleviate information asymmetries.

The theoretical building blocks are derived from Benveniste and Spindt (1989). They argue that investment banks have the ability to extract private information from institutional investors and exploit this information to more accurately value IPOs. Bruner (2004) shows that board networks provide information about potential target firms, which leads to more efficient identification of actual targets and thus reduces potentially large search costs, while social linkage reduces the cost of gathering information, which translates to value-creating merger deals.

The second channel relates to the attention attraction and dissemination of information propositions (Bajo *et al.*, 2016). The network centrality of a financial advisor can also affect their ability to attract attention and disseminate information to various market participants about the quality of the deal, both in terms of synergy gains and firm valuation. The theoretical predictions lie in the model of Merton (1987) and the 'investor recognition' or 'attention' model. Merton (1987) argues that information is useful to the financial market not only when it is revealed but, most importantly, when attention is paid to it. Information attention and acquisition come with a cost. Financial advisors, through their central position in the network, can have significant implications for information dissemination and investor attention with regard to the quality of the deal. Through the investment banks in their network, a central financial advisor will be more connected to a greater number of institutions, allowing them to more efficiently convey information about the quality of the deal, potential synergistic gains and risks of overpayment.

Conclusively, a central position in a network enables advisors to have access to a greater number of market participants, and greater depth of knowledge of market and industry dynamics. Hence,

they are better equipped to identify and select target firms that could more efficiently leverage the resources and capabilities of the acquirer. Their wider network can also help to extract and produce information related to the target's assets, contributing to more accurate target valuations. In this way, they can provide robust advice to the management of the acquirer, and acquirers could avoid overpayment. Central financial advisors could also bid for M&A deals on favourable terms for their clients due to their better negotiation and bargaining position. The above leads us to the following hypothesis:

H1a: There is a positive relation between bidders' announcement abnormal returns and bidders' financial advisors' centrality measures.

Similarly, if central advisors are better able to more effectively match bidding with target firms, that would benefit both parties involved. More central financial advisors, who are better positioned to extract information from their network about market and industry-wide dynamics, are better able to match target firms with bidders in order to generate higher synergy gains. Higher synergy gains would be beneficial for the shareholders of both firms, leading to superior long-run performance as well. Gelles (2014) suggests that network actors use their personal contacts to identify potential targets, conduct due diligence, negotiate and close contracts on favourable terms. The above leads us to the following hypothesis:

H1b: There is a positive relation between the performance of the newly combined entity and financial advisors' centrality measures.

The information dissemination channel as discussed above has further implications regarding the reduction of information asymmetries. Schoorman, Bazerman and Atkin (1981) suggest that centrality helps to leverage social relationships by reducing information asymmetry when designing contracts. Characteristics such as information advantage, power and control should also contribute to value creation for acquiring firms' shareholders. A central position in the network helps in information extraction (Bajo *et al.*, 2016), which is considered vital for the successful completion of merger transactions. Chemmanur and Fulghieri's (1994) model highlights the implications of advisors' informational role in mitigating information

asymmetries in cases such as M&As. We argue that being central in a network should be associated with improved access to flows of information, thereby raising the chances that the information produced will reduce information asymmetry and result in value creation and avoid overpayment.

Empirical studies show that targets subject to higher information asymmetry receive higher premiums (Cheng, Li and Tong, 2016; Zhu and Jog, 2009). In general, equity with information asymmetry usually sells at lower prices (Hertzel and Smith, 1993). Cheng, Li and Tong (2016) hypothesize and empirically confirm that bid premium can appear to increase with the target's information asymmetry. However, Dionne, La Haye and Bergerès (2015), who also test the impact of information asymmetry on acquisition premiums, show that informed bidders pay lower premiums. They suggest that participants who do not hold private information are afraid of suffering from the winner's curse and either withdraw from the auction early or do not participate. Betton, Eckbo and Thorburn (2009) confirm that the size of a threshold has a negative effect both on the final offer premium and the initial offer price.

Central financial advisors can also help reduce information asymmetries between bidder and targets. High information asymmetry between the two parties can prove challenging for bidding firms in understating and correctly pricing target firms. Through their wider network, central advisors can extract and produce information related to the target's assets, contributing to more accurate target valuations. Following Dionne, La Haye and Bergerès (2015) and Betton, Eckbo and Thorburn (2009), we argue that bidders with more central advisors who are more informed would pay lower premiums. Central advisors can provide robust advice to the management of the acquirer, and acquirers could avoid overpayment. Given the impact of information asymmetry on acquisition premiums, the phenomenon would be even more pronounced for targets subject to high information asymmetry. Central advisors can prove particularly useful when information asymmetry between the bidder and the target firm is high. Hence, we obtain the following hypothesis:

H2: Financial advisor centrality is negatively related to bidders' premiums and is expected to be more pronounced for targets subject to higher information asymmetry.

M&A sample and network centrality data

M&A sample

A sample of US mergers and acquisitions is downloaded from the Securities Data Company (SDC) Mergers and Acquisitions database over the period 2000–2012. We include all domestic merger deals announced by public acquirers. The sample is further screened. We exclude (i) all deals characterized as leveraged buyout, exchange offer, repurchase, spin-off, recapitalization, privatization and self-tender; (ii) mergers in the utilities and financials industries; (iii) transactions with no deal value disclosed by SDC; (iv) all M&A deals with a value of either less than one million USD or less than 1% of the acquirer market value; (v) deals in which the percentage of share acquired by the bidder is less than 50% of the target's share; and (vi) deals for which neither the target's nor the bidder's advisor information is available in SDC.

After these exclusions, our final sample consists of 2,250 acquisition deals. The financial information of the final M&A sample is downloaded from DataStream. Table 1 presents further information related to the distribution of the sample over time (Panel A) and across industries (Panel B).

Financial advisors' connections

We use the SDC to download data on financial advisors involved in US domestic takeovers either as the bidder's or the target's advisor over the period January 2000 to December 2012. As the SDC sometimes provides multiple codes for the same bank or mentions the same advisor's name in different styles, we manually check advisors' codes and names to avoid repetition. In the case of multiple advisors being involved in a deal, we keep the financial advisor with the highest centrality. The final sample has 627 unique advisor names. Boardex provides connections information data from 2000 onwards. This is why the M&A sample starts in 2000.

We use the Boardex database to determine financial advisors' peer network, which is defined as the organization's peer network on the basis of individuals' social connections. We manually collect data with regard to the social connections of advisors' directors. Directors refer to the CEO, the chair or president, directors of the board, the

Table 1. Descriptive statistics for the sample

| Panel A: By year | | | Panel B: By acquirer industry | | |
|------------------|--------|--------|-------------------------------|--------|--------|
| Year | Number | % | Industries | Number | % |
| 2000 | 241 | 10.71% | Basic Materials | 71 | 3.16% |
| 2001 | 211 | 9.38% | Consumer Goods | 186 | 8.27% |
| 2002 | 181 | 8.04% | Consumer Services | 276 | 12.27% |
| 2003 | 170 | 7.56% | Healthcare | 367 | 16.31% |
| 2004 | 188 | 8.36% | Industrials | 441 | 19.60% |
| 2005 | 210 | 9.33% | Oil & Gas | 206 | 9.16% |
| 2006 | 193 | 8.58% | Technology | 620 | 27.56% |
| 2007 | 197 | 8.76% | Telecommunications | 83 | 3.69% |
| 2008 | 123 | 5.47% | | | |
| 2009 | 110 | 4.89% | | | |
| 2010 | 148 | 6.58% | | | |
| 2011 | 115 | 5.11% | | | |
| 2012 | 162 | 7.20% | | | |
| Total | 2,250 | 100% | Total | 2,250 | 100% |

| Statistics on variables | N | Mean | Std dev. |
|---|-------|--------|----------|
| Panel C: Bidding firm characteristics | | | |
| Bidder size | 2,250 | 7.030 | 1.927 |
| Market to book | 2,250 | 4.285 | 27.784 |
| Free cash flow | 2,250 | 0.104 | 0.349 |
| Return on assets | 2,250 | 0.147 | 0.195 |
| Leverage | 2,250 | 27.799 | 24.654 |
| CARs (-1, +1) | 2,250 | 0.011 | 0.120 |
| Panel D: Deal characteristics | | | |
| Relative deal size | 2,250 | 0.478 | 1.812 |
| Public | 2,250 | 0.331 | 0.470 |
| Private | 2,250 | 0.370 | 0.483 |
| Cash deals | 2,250 | 0.341 | 0.474 |
| Stock deals | 2,250 | 0.155 | 0.362 |
| Diversifying deals | 2,250 | 0.374 | 0.484 |
| Panel E: Bidder advisor characteristics | | | |
| Prior relation | 2,250 | 0.115 | 0.319 |
| Past performance | 2,250 | 0.007 | 0.049 |
| Advisor reputation | 2,250 | 8.14 | 13.637 |

This table presents the descriptive statistics for 2,250 domestic M&A deals announced by US acquiring firms from 2000 to 2012. The value of each deal is at least \$1 million, and more than 50% share is acquired in the transaction. Definitions of all variables are given in the Appendix. Panel A presents sample statistics by year, Panel B by acquirer's industry and Panels C–E provide statistics on a number of variables employed in empirical analysis.

CFO and executive directors. Related studies discuss important CEO features, such as extraversion (Malhotra *et al.*, 2018) and experience in the target's industry (Fitch and Nguyen, 2020) in M&A acquisitiveness. Individuals remain connected with their old organization when they join another firm or retire. For example, two companies may share a board member or individual working for both companies, who also works as an independent director of a non-professional organization (club,

charity, etc.). Hence, the organizational network keeps multiplying and becoming stronger with the increase of its individual connections. Boardex provides information for 511 of the 627 financial advisors in our sample.

Point to point matching is performed among financial advisors to determine the financial advisor peer network. Financial advisors exhibit first-degree connections when they are connected with their peers through an individual's overlapping; for

example, when one individual is an independent director of two advisory firms. Financial advisors are connected with their peers through second-degree connections when individuals are linked through a third party, for example individuals belonging to two separate financial advisory firms who went to the same educational institution, worked together in a professional institution, were members or officers in a charity organization or spend their leisure time together in a club. To make our proxy more meaningful, we consider only the first-degree connections of individuals. We collect data on individuals who hold roles which could have a significant impact on a firm's merger decision, such as the CEO, chair, directors of the board, CFO and executive directors. Financial advisors' peer connections are also measured on a 5-year trailing basis by considering the time bias issue. We construct an $N \times N$ matrix of financial advisors for each sample year. Each cell in the matrix takes a value of one if top executives (CEO, chair, directors of the board, CFO and executive directors) of two financial advisory firms have been connected through a first-degree connection at some point over the 5-year period. Financial advisor centrality is estimated on a yearly basis and, finally, we obtain yearly centrality measures for 209 advisors.

Financial advisor centrality measures

Centrality is a multi-dimensional concept. We use four dimensions to measure financial advisors' centrality in their peer networks. Three dimensions of centrality in a social network are proposed by Freeman (1977, 1979): degree (number of direct connections), closeness (fewer steps between actors/nodes) and betweenness (acting as gatekeepers between other nodes). The fourth dimension is eigenvector centrality, introduced by Bonaccich (1972), which determines the influential position of an actor.

Degree centrality indicates the number of direct connections that a financial advisor has in his peer network. *Closeness centrality* counts the number of steps between two financial advisors. Similar to degree centrality, it measures the strength of connections but considers both direct and indirect connections. *Betweenness centrality* determines the extent to which a financial advisor is a link between two other advisors. The underlying concept is how well situated a financial advisor is, in terms of the network paths he has. The

influential position of financial advisors is also determined through *eigenvector centrality*. Ties with higher-status actors (well-connected actors) in a network help to elevate one's own status, whereas ties to lower-status actors can compromise it (Podolny, 1993). Eigenvector centrality determines the well-connectedness of an agent through the well-connectedness of his direct links. A detailed description of the measures can be found in the Appendix (see online supporting information).

The correlation among the four measures of centrality is relatively high, ranging from 0.78 (correlation between closeness and degree) to 0.95 (correlation between degree and betweenness). The four centrality measures tend to capture different aspects of the centrality of actors in the network.

Financial advisor reputation measure

The financial advisor league table for the year 2012 is downloaded from Thomson Financial SDC. We rank the top 10 financial advisors according to the value of deals advised as top-tier, and the remaining advisors as non-top-tier. For the value of deals advised, as a cut-off point, we use \$100,000 million. For the percentage of market share, the cut-off point is 10%. In other words, financial advisors for which the value of deals advised is above \$100,000 million, or their market share is above 10%, are classified as top-tier. The ranking of the top 10 financial advisors is also determined based on the fact that these banks are almost always in the top 10 in advisor league. The list of top-tier advisors in Table 2 contains some of the largest and most globally orientated and systematically important banks that perform a range of key tasks for the financial system, apart from acting as advisors in M&A deals.¹ Hence, they are quantitatively and qualitatively different from other institutions. Based on this, and the fact that the previous M&A-related literature has mainly focused on the role of top-tier advisors (e.g. Chemmanur and Fulghieri, 1994; Golubov, Petmezas and Travlos,

¹For example, they act as market-makers in sovereign bond markets in the USA and abroad, and participate in the implementation of monetary policy as trading counterparties of the central bank; 8 of the 10 top-tier institutions mentioned above are currently in the list of the Primary Dealers of the New York Fed (<https://www.newyorkfed.org/markets/primarydealers>).

Table 2. Top 25 US financial advisor ranking and centrality

| Rank | Financial advisor | | Rank value | | Market share | | Financial advisors' centrality | | | |
|--------------|-------------------------------|--|------------|--|--------------|--|--------------------------------|-----------|-------------|-------------|
| | Top-tier | | US\$m | | (%) | | Degree | Closeness | Betweenness | Eigenvector |
| 1 | Goldman Sachs & Co. | | 299,786.8 | | 34 | | 0.277 | 0.586 | 0.122 | 0.279 |
| 2 | JP Morgan | | 241,503.6 | | 27.4 | | 0.185 | 0.530 | 0.053 | 0.198 |
| 3 | Barclays | | 229,892.8 | | 26.1 | | 0.218 | 0.547 | 0.064 | 0.206 |
| 4 | Credit Suisse | | 216,742.4 | | 24.6 | | 0.045 | 0.425 | 0.012 | 0.065 |
| 5 | Morgan Stanley | | 175,236.9 | | 19.9 | | 0.259 | 0.584 | 0.102 | 0.268 |
| 6 | Evercore Partners | | 140,872 | | 16 | | 0.064 | 0.453 | 0.008 | 0.096 |
| 7 | Citi | | 134,063 | | 15.2 | | 0.195 | 0.542 | 0.068 | 0.212 |
| 8 | Bank of America Merrill Lynch | | 131,484.2 | | 14.9 | | 0.202 | 0.546 | 0.089 | 0.210 |
| 9 | Lazard | | 124,840.4 | | 14.2 | | 0.108 | 0.495 | 0.014 | 0.155 |
| 10 | Deutsche Bank | | 101,316.3 | | 11.5 | | 0.171 | 0.528 | 0.045 | 0.193 |
| | Average | | 179,573.84 | | 20.380 | | 0.172 | 0.524 | 0.058 | 0.188 |
| Non-top-tier | | | | | | | | | | |
| | | | US\$m | | (%) | | Degree | Closeness | Betweenness | Eigenvector |
| 11 | Centerview Partners | | 74,152.5 | | 8.4 | | 0.008 | 0.238 | 0.000 | 0.000 |
| 12 | RBC Capital Markets | | 41,237.6 | | 4.7 | | 0.045 | 0.394 | 0.040 | 0.035 |
| 13 | Foros | | 35,280.9 | | 4 | | 0.015 | 0.398 | 0.000 | 0.023 |
| 14 | UBS | | 34,212.9 | | 3.9 | | 0.079 | 0.467 | 0.016 | 0.119 |
| 15 | Jefferies & Co. Inc. | | 33,421.7 | | 3.8 | | 0.067 | 0.456 | 0.015 | 0.091 |
| 16 | Moelis & Co. | | 28,568.8 | | 3.2 | | 0.023 | 0.384 | 0.000 | 0.029 |
| 17 | Greenhill & Co., LLC | | 24,314.6 | | 2.8 | | 0.108 | 0.474 | 0.050 | 0.110 |
| 18 | Qatalyst Partners | | 22,536.4 | | 2.6 | | 0.033 | 0.431 | 0.000 | 0.047 |
| 19 | Wells Fargo & Co. | | 21,989.9 | | 2.5 | | 0.071 | 0.452 | 0.002 | 0.100 |
| 20 | Rothschild | | 20,632.4 | | 2.3 | | 0.034 | 0.391 | 0.001 | 0.042 |
| 21 | Perella Weinberg Partners LP | | 20,320.5 | | 2.3 | | 0.034 | 0.421 | 0.001 | 0.046 |
| 22 | Tudor Pickering & Co. LLC | | 19,544.8 | | 2.2 | | 0.027 | 0.397 | 0.001 | 0.028 |
| 23 | Houlihan Lokey | | 14,609.8 | | 1.7 | | 0.078 | 0.442 | 0.024 | 0.082 |
| 24 | Glenchor & Co. Inc | | 13,349 | | 1.5 | | 0.015 | 0.391 | 0.000 | 0.026 |
| 25 | Macquaire Group | | 12,421.6 | | 1.4 | | 0.010 | 0.357 | 0.000 | 0.014 |
| | Average | | 27,772.89 | | 3.153 | | 0.043 | 0.406 | 0.010 | 0.053 |

This table presents the ranking and centrality of the financial advisors for a sample of M&A transactions targeting US firms in 2012. The financial advisors are ranked according to the value of deals and market share, and data is drawn from the Thomson Financial SDC Mergers and Acquisitions database. The top 10 advisors via value and market share are defined as top-tier, and all others are classified as non-top-tier. Definition and calculation of financial advisors' centrality is explained in the text.

Table 3. Top-tier dummy for acquirer financial advisor and acquirer short-run performance

| CARs (-1, +1) | All (1) | Public (2) | Private (3) | Subsidiary (4) |
|-----------------------|------------|---------------|----------------|-------------------|
| Top-tier dummy | 0.021*** | 0.034** | 0.016 | 0.015 |
| Public | -0.032*** | | | |
| Stock | -0.017* | -0.024*** | 0.021 | 0.027 |
| Bidder size | -0.006*** | -0.004 | -0.002 | -0.013*** |
| MTBV | -0.0003 | 0.0002 | -0.002 | -0.0004** |
| RS | 0.001 | -0.005 | 0.023*** | 0.0007 |
| Diversification | -0.007 | -0.009 | -0.016** | 0.003 |
| Free cash flow | 0.002 | 0.007*** | 0.116*** | 0.015 |
| ROA | -0.028 | -0.069 | -0.167** | 0.013 |
| Leverage | 0.0003** | 0.002** | 0.0002 | 0.0002 |
| Tender offer | -0.003 | -0.029 | | |
| Hostile takeover | 0.028 | 0.025 | | |
| Prior relation | -0.006 | 0.004 | -0.009 | 0.003 |
| Past performance | 0.048 | 0.041 | 0.016 | 0.194 |
| Advisor reputation | -0.003* | -0.004* | -0.002 | -0.002 |
| Constant | 0.049*** | 0.007 | 0.030 | 0.108 |
| Industry fixed effect | Yes | Yes | Yes | Yes |
| Year fixed effect | Yes | Yes | Yes | Yes |
| N | 2050 | 715 | 711 | 624 |
| Pseudo R-squared | 0.079 | 0.097 | 0.102 | 0.089 |

*, ** and *** depict the level of significance at 10%, 5% and 1%, respectively.

This table presents the regression results for the top-tier financial advisors on bidders' announcement abnormal returns for a sample of US acquisitions announced over the period 2000–2012. The top-tier dummy takes the value of one if the acquisition deal involves an advisor who belongs to the top-tier financial advisor group, and zero otherwise. Bidders' short-run returns are calculated as the CARs over the window (-1, +1) around the acquisition announcement. Abnormal returns are calculated using a modified market-adjusted model. The dependent variable in all regressions is acquirer CARs. We control for deal, firm and financial advisor characteristics. Definitions of the variables are given in the Appendix.

2012), we are motivated to divide the sample into top-tier and non-top-tier advisors and consider the implications of centrality for both groups. Table 2 presents the average value of deals advised by top-tier advisors; their average market share is around 6.5 times higher than the average deal value advised and the market share of non-top-tier advisors. Top-tier advisors are the most central in the sample. The average degree centrality of top-tier advisors is four times more than the average degree centrality of non-top-tier advisors. The other centrality measures in our sample also show similar trends.

To test the robustness of our sample against prior literature, we also test the association between top-tier advisor and bidders' abnormal returns. Table 3 presents the regression results for the whole sample as well as for different types of M&A deals based on targets' public status. Bidders' returns are calculated as the CARs over the 3-day window (-1, +1) around the acquisition announcement. The main independent variable in all regressions is a top-tier dummy variable, which

takes the value of one if the deal is advised by a top-tier financial advisor, and zero otherwise. The results show that top-tier advisors create value in public acquisitions while failing to create shareholder wealth in private and subsidiary M&A deals. The result is consistent with the findings of Golubov, Petmezas and Travlos (2012), which strengthens the validity of our sample with earlier studies.

Empirical analysis: The informational role of central financial advisors

Financial advisor centrality and acquisition quality

In this section, we investigate whether leading advisors can help acquirers to identify value-creating deals and the wealth effects on bidders' and targets' shareholders. First, we examine the impact of central financial advisors on bidders' announcement abnormal returns. Following Fuller, Netter and Stegemoller (2002), we use event study methodology to calculate CARs, which are the

summation of abnormal returns for the 3 days surrounding the announcement date (-1, +1). Table 4 presents the regression analysis results, where the dependent variable is acquirers' CARs for the 3 days surrounding the announcement date, and the main variables of interest are the four centrality measures – degree, closeness, betweenness and eigenvector. In addition to industry and year fixed effects, we also control for a number of variables that have been shown in the literature to affect bidder performance.² Robust standard errors are clustered by acquiring firm due to the presence of multiple acquirers in the sample. A more detailed description of the control variables is available in the Appendix.

Panel A of Table 4 shows the results for non-top-tier advisors. The centrality coefficients are all positive and statistically significant. The regression analysis shows a positive relationship between advisor centrality and the market reaction around the acquisition announcement date. The first regression suggests that more central advisors manage to identify value-enhancing deals for bidding firms and create value for their clients. Panel B of Table 4 depicts the results for top-tier financial advisors. The centrality coefficients are all statistically insignificant. The results seem to suggest that there are diminishing returns from centrality as financial advisors grow extremely large and central. The focus of this paper from this point onwards is non-top-tier financial advisors.

The analysis is based on the assumption that the choice between high-centrality and low-centrality advisors is exogenously determined. The involvement of a high- or low-centrality advisor is a matter of choice made by the bidder and the advisor, which could lead to self-selection bias, resulting in unreliable OLS estimates. To control for self-selection bias, we apply a Heckman (1979) two-step procedure where the first-stage equation models the choice between a high-centrality and a low-centrality advisor, and the second-stage equation corrects for the selection bias. Following Kai and Prabhala (2007) and Golubov, Petmezas and Travlos (2012), we introduce the variable 'prior relationship' as an identification restriction in the first-stage equation. The relationship variable takes the value of one if the firms retain the same

advisors from their previous M&A transactions over the sample period, and zero otherwise.

The results of the Heckman two-step procedure are presented in Table 5. In the first step, the coefficient of the prior relationship variable is statistically significant at the 1% level, which shows that the extent to which a bidder used the services of a high-centrality advisor bank in the past is positively related to the decision to employ a highly central advisor again. The inverse Mills ratio from the first equation is used as a regressor in the second-stage model. The coefficient of the inverse Mills ratio is positive and statistically significant, which reflects self-selection. Certain observed and unobserved characteristics that increase the probability of choosing a central advisor further increase bidder CAR.

To further address the pure effect of advisor centrality on bidder CARs, a propensity score matching process is applied. Our results also indicate that leading financial advisors are more likely to be associated with large acquirers. One could argue that our results may be driven by this selection bias issue. Firm and deal characteristics like bidder size, target public status, market-to-book value, relative deal size, method of payment, free cash flow and leverage may drive the acquirer short-run performance results.

Although we control for bidder and deal characteristics in the regression analysis in Table 4, for robustness reasons and to further address this selection bias issue, we employ a propensity score nearest-neighbour matching without replacement methodology (nn-1). Following Rosenbaum and Rubin (1985), we apply a caliper of 0.25 standard deviations to reduce at least 90% of bias. Acquirers advised by more centrally located advisors are matched with acquirers advised by low-centrality advisors on the basis of firm and deal characteristics. In this way, the two subsamples consist of acquisitions of bidders with similar firm and deal characteristics; therefore, these variables are unlikely to drive the abnormal returns results. Panel A of Table 6 presents the regression analysis after propensity score matching on firm and deal characteristics is applied. The coefficients for the four centrality measures remain positive and statistically significant.

We further employ the propensity score matching approach and we now match on advisors' characteristics, such as reputation, past performance, prior relation, type of advisor and industry

²For a subsample of the initial sample, we also control for CEO degree centrality and the results remain robust.

Table 4. Acquirer financial advisor centrality and acquirer short-run performance for non-top-tier and top-tier advisors

| CARs (-1, +1) | Panel A: Non-top-tier | | | | Panel B: Top-tier | | | |
|-----------------------|-----------------------|---------------|-----------------|-----------------|-------------------|---------------|-----------------|-----------------|
| | Degree (1) | Closeness (2) | Betweenness (3) | Eigenvector (4) | Degree (5) | Closeness (6) | Betweenness (7) | Eigenvector (8) |
| Degree | 0.292*** | 0.027*** | 0.165** | | -0.229 | -0.253 | | |
| Closeness | | | | | | | | |
| Betweenness | | | | | | | | |
| Eigenvector | | | | 0.086*** | | | | -0.072 |
| Public | -0.044*** | -0.043*** | -0.047*** | -0.044*** | -0.0251*** | -0.024*** | -0.025*** | -0.025*** |
| Stock | -0.011 | -0.011 | -0.011 | -0.012 | -0.020 | -0.020 | -0.019 | -0.019 |
| Bidder size | -0.007*** | -0.007*** | -0.006*** | -0.007*** | -0.001 | -0.001 | -0.001 | -0.001 |
| MTBV | -0.0005* | -0.0003*** | -0.0003*** | -0.0005** | 0.000 | 0.000 | 0.000 | 0.000 |
| RS | 0.0007 | 0.0003 | 0.0008 | 0.0006 | 0.023*** | 0.022*** | 0.022*** | 0.020*** |
| Diversification | 0.003 | 0.004 | 0.003 | 0.003 | -0.006 | -0.006 | -0.006 | -0.005 |
| Free cash flow | -0.101 | -0.101 | -0.100 | -0.102 | -0.058 | -0.055 | -0.058 | -0.058 |
| ROA | 0.033 | 0.034 | 0.034 | 0.034 | -0.019 | -0.024 | -0.019 | -0.018 |
| Leverage | 0.0002* | 0.0002** | 0.0002* | 0.0002* | 0.00002 | 0.00002 | 0.00002 | 0.00002 |
| Tender offer | 0.005 | 0.011 | 0.004 | 0.006 | 0.008 | 0.010 | 0.007 | 0.007 |
| Prior relation | 0.004 | 0.003 | 0.004 | 0.004 | -0.022** | -0.023** | -0.022** | -0.022** |
| Past performance | 0.052 | 0.065 | 0.058 | 0.053 | -0.078 | -0.058 | -0.077 | -0.080 |
| Advisor reputation | -0.0005*** | -0.0004*** | -0.0005** | -0.0004** | -0.0004** | -0.0004** | -0.0004** | -0.0004** |
| Constant | 0.068*** | 0.074*** | 0.069*** | 0.071*** | 0.037 | 0.037 | 0.035 | 0.037 |
| Industry fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 1,399 | 1,399 | 1,399 | 1,399 | 545 | 545 | 545 | 545 |
| R-squared | 0.078 | 0.078 | 0.076 | 0.078 | 0.150 | 0.153 | 0.151 | 0.149 |

*, ** and *** depict the level of significance at 10%, 5% and 1%, respectively.

This table presents the regression results for the centrality measures of non-top-tier and top-tier bidder financial advisors on bidders' announcement abnormal returns. Bidders' short-run returns are calculated as the CARs over the window (-1, +1) around the acquisition announcement. Abnormal returns are calculated using a modified market-adjusted model. The dependent variable in all regressions is acquirer CARs. The main independent variables are the four centrality measures. We control for deal, firm and financial advisor characteristics. Definitions of the variables are given in the Appendix.

Table 5. Heckman two-stage procedure: acquirer CARs

| | Degree | | Closeness | | Betweenness | | Eigenvector | |
|---------------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|-------------|
| | Selection (1) | Outcome (2) | Selection (3) | Outcome (4) | Selection (5) | Outcome (6) | Selection (7) | Outcome (8) |
| CARs(-1, +1) | | | | | | | | |
| Intercept | 20.152*** | 0.285** | 6.926*** | 0.139* | 15.267*** | 0.106** | 6.594*** | 0.079** |
| Prior relation | 0.294** | | 0.278** | | 0.399*** | | 0.248** | |
| Public | 0.034 | -0.034*** | 0.039 | 0.034*** | 0.046 | 0.034*** | 0.038 | -0.034*** |
| Stock | -0.283** | -0.015 | -0.267** | -0.015 | -0.272** | -0.011 | -0.302** | -0.015 |
| Bidder size | 0.114*** | -0.004*** | 0.106*** | -0.004*** | 0.137*** | -0.005*** | 0.091*** | -0.004*** |
| MTBV | -0.006** | -0.0006 | -0.007* | -0.0002 | -0.008** | -0.0006 | -0.007** | -0.0002 |
| RS | -0.011 | 0.0007 | -0.012 | 0.0007 | -0.013 | 0.0006 | -0.01 | 0.0006 |
| Diversification | -0.164 | 0.013** | -0.166 | 0.014** | -0.145 | 0.012** | -0.157 | 0.013** |
| Free cash flow | -0.434 | -0.074* | -0.544 | -0.076* | -0.562 | -0.065* | -0.334 | -0.074* |
| ROA | 1.383** | 0.044 | 1.335* | 0.047 | 1.344* | 0.026 | 1.160* | 0.045 |
| Leverage | 0.013*** | 0.0002* | 0.013*** | 0.0002* | 0.013*** | 0.0001* | 0.012*** | 0.0002* |
| Past performance | 1.784* | 0.029 | 1.757* | 0.048 | 2.025* | 0.012 | 1.557* | 0.032 |
| Advisor reputation | 0.001** | 0.003** | 0.001*** | 0.003** | 0.001** | 0.004** | 0.001** | 0.003*** |
| Inverse Mills ratio | | 0.016*** | | 0.034*** | | 0.041** | | 0.023** |
| N | 1,327 | 1,327 | 1,327 | 1,327 | 1,327 | 1,327 | 1,327 | 1,327 |
| R-squared | 0.326 | 0.326 | 0.322 | 0.322 | 0.324 | 0.324 | 0.325 | 0.325 |

*, ** and *** depict the level of significance at 10%, 5% and 1%, respectively.

This table presents results of the Heckman two-stage procedure for bidder CARs analysis for US non-top-tier advisors involved in M&A over the period 2000–2012. The first column for each subsample is the first-stage selection equation, estimated by probit regression, where the dependent variable is one if the bidding firm retained a high-centrality advisor, and zero otherwise. The second column for each subsample is the second-stage equation, where the dependent variable is bidder CAR and the inverse Mills ratio adjusts for the nonzero mean of error terms. The relationship variable takes the value of one if the firms retain the same advisors from their previous M&A transactions over the sample period, and zero otherwise.

Table 6. Acquirer financial advisor centrality and acquirer short-run performance after propensity score matching

| CARs (-1, +1) | Panel A: Propensity score matching Covariate: Bidder and deal characteristics | | | | Panel B: Propensity score matching Covariate: Financial advisor characteristics | | | |
|-----------------------|---|---------------|-----------------|-----------------|---|---------------|-----------------|-----------------|
| | Degree (1) | Closeness (2) | Betweenness (3) | Eigenvector (4) | Degree (5) | Closeness (6) | Betweenness (7) | Eigenvector (8) |
| Degree | 0.198** | | | | 0.190** | | | |
| Closeness | | 0.089** | | | | 0.074** | | |
| Betweenness | | | 0.118*** | | | | 0.097** | |
| Eigenvector | | | | 0.059*** | | | | 0.045** |
| Public | -0.047*** | -0.047*** | -0.047*** | -0.047*** | -0.038*** | -0.038*** | -0.038*** | -0.038*** |
| Stock | -0.004** | -0.004** | -0.004** | -0.004** | -0.005 | -0.005 | -0.005 | -0.005 |
| Bidder size | -0.002 | -0.002 | -0.002 | -0.002 | -0.004 | -0.004 | -0.004 | -0.004 |
| MTBV | -0.0001 | -0.0001 | -0.0001 | -0.0001 | -0.0002 | -0.0002 | -0.0002 | -0.0002 |
| RS | 0.014** | 0.014** | 0.014** | 0.014** | 0.0006 | -0.0006 | 0.0006 | 0.0005 |
| Diversification | -0.009 | -0.009 | -0.009 | -0.009 | -0.013** | -0.014*** | -0.013** | -0.013** |
| Free cash flow | -0.156* | -0.156* | -0.156* | -0.156* | -0.035 | -0.035 | -0.035 | -0.035 |
| ROA | 0.064 | 0.064 | 0.064 | 0.064 | 0.033 | 0.032 | 0.031 | 0.033 |
| Leverage | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.00003 | -0.00003 | 0.00003 | 0.00003 |
| Tender offer | -0.008 | -0.008 | -0.008 | -0.008 | -0.039 | -0.038 | -0.041 | -0.038 |
| Prior relation | | | | | 0.0001 | -0.0005 | 0.0001 | 0.0004 |
| Past performance | 0.003 | 0.003 | 0.003 | 0.003 | 0.031 | 0.039 | 0.031 | 0.035 |
| Advisor reputation | 0.039 | 0.039 | 0.039 | 0.039 | -0.00004** | -0.00003 | -0.00004** | -0.00004** |
| Constant | 0.0004** | 0.0004** | 0.0004** | 0.0004** | 0.029 | 0.01 | 0.034 | 0.014 |
| Industry fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 918 | 918 | 918 | 918 | 895 | 895 | 895 | 895 |
| R-squared | 0.155 | 0.155 | 0.155 | 0.155 | 0.093 | 0.093 | 0.093 | 0.093 |

*, ** and *** depict the level of significance at 10%, 5% and 1%, respectively.

This table presents the regression results of the centrality measures of non-top-tier bidder financial advisors on bidders' announcement abnormal returns. Bidders' short-run returns are calculated as the CARs over the window (-1, +1) around the acquisition announcement. Abnormal returns are calculated using a modified market-adjusted model. Acquisition deals advised by high-centrality advisors are matched with deals advised by low-centrality advisors by using a propensity score matching (PSM) technique without replacement. In Panel A, the two subsamples are matched on bidder and deal characteristics like size, MTBV, RS, etc.; in Panel B, they are matched on financial advisor characteristics – that is reputation, past relation, past performance, type of advisor and industry expertise. The dependent variable in all regressions is acquirer CARs. The main independent variables are the four centrality measures. We control for deal, firm and financial advisor characteristics. Definitions of the variables are given in the Appendix.

Table 7. Acquirer financial advisor centrality and acquirer abnormal return on assets

| Abnormal ROA | Degree (1) | Closeness (2) | Betweenness (3) | Eigenvector (4) |
|-----------------------|---------------|------------------|--------------------|--------------------|
| Degree | 1.222** | | | |
| Closeness | | 1.922** | | |
| Betweenness | | | 1.405** | |
| Eigenvector | | | | 0.014*** |
| Public | 0.185 | 0.214 | 0.189 | 0.179 |
| Stock | -0.166 | -0.182 | -0.164 | -0.163 |
| Bidder size | 0.196** | 0.223** | 0.196** | 0.193** |
| MTBV | 0.002 | 0.002 | 0.002 | 0.002 |
| RS | 0.015 | 0.019 | 0.016 | 0.015 |
| Diversification | 0.627 | 0.624 | 0.625 | 0.628 |
| Free cash flow | 1.775*** | 1.726*** | 1.775*** | 1.784*** |
| Leverage | -0.001** | -0.001** | -0.001** | -0.001** |
| Tender offer | 1.485 | 1.456 | 1.487 | 1.491 |
| Prior relation | 0.009 | 0.073 | 0.009 | 0.097 |
| Past performance | 1.252 | 1.501 | 1.307 | 1.119 |
| Advisor reputation | 0.001** | 0.078** | 0.001** | 0.001** |
| Constant | 1.818** | 1.347** | 1.831** | 1.847** |
| Industry fixed effect | Yes | Yes | Yes | Yes |
| Year fixed effect | Yes | Yes | Yes | Yes |
| N | 1319 | 1319 | 1319 | 1319 |
| R-squared | 0.106 | 0.106 | 0.106 | 0.106 |

*, ** and *** depict the level of significance at 10%, 5% and 1%, respectively.

This table presents the regression results for the centrality measures of non-top-tier bidder financial advisors on bidders' long-term accounting performance. The dependent variable in all regressions is abnormal ROA. Abnormal ROA is calculated as the ROA of the firm after 3 years of M&A transaction less the value-weighted average ROA of the acquirer and target firms 12 months before the deal announcement. The main independent variables are the four centrality measures. We control for deal, firm and financial advisor characteristics. Definitions of the control variables are given in the Appendix.

expertise.³ Panel B of Table 6 presents the regression analysis results. The centrality coefficients for all four measures are positive and statistically significant. In unreported results, we further match on different combinations of firm- and deal-specific characteristics and the results remain robust. Our results are also robust to other event windows, such as (-2, +2). These findings indicate that central financial advisors succeed in identifying synergy-enhancing acquisitions for their clients and create wealth for bidders' shareholders.

If central advisors are better able to more effectively match bidding with target firms, that would benefit both parties involved. More central financial advisors who are better positioned to extract information from their network about market- and industry-wide dynamics are better able to match target firms with bidders in order to generate higher synergy gains. To empirically examine H1b, we adopt two metrics. To further access and establish the quality of the deal and the combined benefits to bidders and targets, we use a long-term performance measure, such as abnor-

mal return on assets (ROA). Abnormal ROA is estimated, as is the average ROA of the acquirer in the 3-year period after deal completion, minus the value-weighted average ROA of the acquirer and target in the year prior to the deal announcement (Li, Qui and Shen, 2017). Table 7 presents the regression analysis results, where the dependent variable is abnormal ROA and the main variables of interest are the four centrality measures. As control variables, we employ the same variables as in Table 4. The results show a positive and statistically significant relationship between abnormal ROA and the centrality measures, indicating that the better match between bidders and targets leads to superior long-run performance.

³Following Song *et al.* (2013), the 'type of advisor' variable takes the value of one if the advisor involved in the M&A deal is full service, and zero if it is boutique advisor. In line with Wang *et al.* (2014), 'industry expertise' is defined as the number of mergers advised by a bank for a firm's four-digit SIC industry divided by the total number of mergers in the industry over the sample period (2000–2012).

Table 8. Combined cumulative abnormal returns and acquirers' financial advisors' centrality

| Combined CARs | Degree (1) | Closeness (2) | Betweenness (3) | Eigenvector (4) |
|---------------------------------------|---------------|------------------|--------------------|--------------------|
| Degree | 0.461*** | | | |
| Closeness | | 0.261** | | |
| Betweenness | | | 0.310*** | |
| Eigenvector | | | | 0.177** |
| Public | -0.032*** | -0.032*** | -0.032*** | -0.032*** |
| Stock | -0.004 | -0.004 | -0.004 | -0.004 |
| Bidder size | -0.009** | -0.009** | -0.008** | -0.009** |
| MTBV | -0.0003 | -0.0003 | -0.0003 | -0.0003 |
| RS | -0.001*** | -0.001*** | -0.001*** | -0.001*** |
| Diversification | 0.005 | 0.004 | 0.004 | 0.005 |
| Return on assets | -0.026 | -0.0267 | -0.025 | -0.027 |
| Leverage | 0.0003 | 0.0003 | 0.0003* | 0.0003 |
| Hostile takeover | 0.009 | 0.006 | 0.01 | 0.013 |
| Tender offer | -0.002 | -0.006 | -0.003 | -0.003 |
| Bidder past relation | 0.022 | 0.022 | 0.022 | 0.022 |
| Bidder's advisor past performance | -0.152 | -0.115 | -0.139 | -0.175 |
| Bidder's advisor reputation | -0.004** | -0.003** | -0.004** | -0.003* |
| Target size | 0.018*** | 0.017*** | 0.018*** | 0.018*** |
| Target advisor's past performance | 0.335 | 0.323 | 0.335 | 0.338 |
| Target financial advisor's reputation | 0.014* | 0.013* | 0.014* | 0.014* |
| Constant | -0.034 | -0.111 | -0.111 | -0.027 |
| Industry fixed effect | Yes | Yes | Yes | Yes |
| Year fixed effect | Yes | Yes | Yes | Yes |
| N | 535 | 535 | 535 | 535 |
| R-squared | 0.325 | 0.312 | 0.324 | 0.323 |

*, ** and *** depict the level of significance at 10%, 5% and 1%, respectively.

This table presents the regression results for the centrality measures of non-top-tier bidder financial advisors and synergistic gains for the new combined entity. The dependent variable in all regressions is combined CARs of newly combined firms. Combined CARs are estimated as the market value-weighted average of the CARs of the bidder and the target around the announcement date. The main independent variables are the four centrality measures. We control for deal, firm and financial advisor characteristics. Definitions of the control variables are given in the Appendix.

Furthermore, to assess synergy gains between bidders and targets, we employ combined cumulative abnormal returns. Following Golubov, Petmezas and Travlos (2012), combined CARs are estimated as the market value-weighted average of the CARs of the bidder and the target around the announcement date. Combined CARs are used as a measure of synergy gains in the corporate finance literature.

Combined CARs are regressed on bidders' advisors' centrality. Table 8 depicts the results. The findings show a positive and statistically significant relationship, indicating that more central financial advisors are indeed able to create synergistic gains for the new combined entity, benefitting the shareholders of both the acquirer and the target firm.

Conclusively, more central financial advisors are able to better match bidding with target firms and create synergistic gains, which translate to higher

abnormal returns for the bidders' shareholders and overall, long-run performance of the combined entity.

The informational role of financial advisors on acquirers' and targets' information asymmetry

Chemmanur and Fulghieri's (1994) model suggests that intermediaries act as information producers, helping to reduce the adverse impact of information asymmetry in the financial market. The information dissemination role of central advisors is important in conveying information about the deal (Bajo et al., 2016). In a structurally embedded relationship, the central status of an actor can control the flow of information (Tsai, 2001). Central financial advisors can use their social network to transmit information about proposed merger deals. The dissemination of information would reduce

information asymmetries. This could provide acquirers with another reason to work with more central advisors when information asymmetry for target firms is high.

We examine the impact of central financial advisors and how they can alleviate information asymmetry between bidding and target firms. Through their wider network, central advisors can extract and produce information related to the target's assets, contributing to more accurate target valuations. Prior literature (Cheng, Li and Tong, 2016; Zhu and Jog, 2009) shows that there is a positive relationship between premiums paid to target firms and information asymmetry. However, informed bidders pay a lower premium and this is more pronounced in a high information asymmetry setting (Dionne, La Haye and Bergerès, 2015).

We conduct OLS regression to investigate the association between financial advisor centrality and acquisitions' premium by using eight measures of information asymmetry for bidders and targets. Namely, these are: diversifying deals, target firm segmentation, target industry risk, target firms' age, target size, relative deal size, asset turnover and target return volatility. Servaes and Zenner (1996) argue that information asymmetry increases when the acquirer and target firms operate in different industries. We create a diversification dummy variable that takes the value of one if the acquirer and target firm operate in different industries, and zero otherwise. Similarly, target firms with a large number of business segments are difficult to evaluate due to their diverse structure and large size, creating information asymmetry between acquiring and target firms. We calculate the number of business segments for each target firm. A dummy variable takes the value of one if the number of segments for the target firm is higher than the mean number of segments, and zero otherwise. High return volatility reflects high risk, which may induce information asymmetry for investors (Corwin, 2003). To capture this information asymmetry effect between acquirers and targets, we create a dummy variable that takes the value of one if the industry return volatility of a target firm is above the median, and zero otherwise. Older and larger firms tend to disclose higher amounts of information (Black *et al.*, 2017; Frankel and Li, 2004), so the discrepancies between insiders' and outsiders' information are low. Age is calculated as the difference between the date of incorporation

of the firm and the date of merger announcement (Karpoff, Lee and Masulis, 2013). We measure size as the natural log of the book value of total assets in the year prior to merger announcement (Officer, Ozbas and Sensoy, 2010). Similarly, relatively large M&A deals and firms with high asset turnover tend to be relatively easy to value, as investors generally have good information about big deals and profitable target firms (Dionne, La Haye and Bergerès, 2015). Relative deal size, taken from the SDC, is the value of the deal as reported by the SDC over the market value of the acquirer. Asset turnover is the ratio between net sales and average total assets. Volatility is calculated as the standard deviation of daily stock returns (or abnormal returns) over the last 200 days, which is -206 to -6 before the merger announcement. High stock return volatility depicts a noisy information environment (Coles, Daniel and Naveen, 2006), which leads to information asymmetry between firm and investors (Karpoff, Lee and Masulis, 2013).

Table 9 presents the regression analysis results for the degree centrality measure and the premiums bidders pay when they face high- versus low-asymmetry firms. Regressions (1)–(8) show the results for the eight information symmetry proxies, respectively. The main variable of interest is the interaction variable between centrality and information asymmetry. The coefficients in all cases are negative and statistically significant, indicating that when information asymmetry for target firms is high, bidders who employ more central advisors pay a lower premium. The results are robust for all four centrality measures. Central advisors help reduce information asymmetries between bidders and targets, leading to more accurate valuations and avoidance of overpayment. This finding is consistent with Dionne, La Haye and Bergerès (2015) and Betton, Eckbo and Thorburn (2009), who show that informed bidders pay lower premiums.

Extra tests and robustness checks

In this section, we discuss whether central financial advisors are paid more for their superior services and whether they can enhance their revenues by getting involved in takeover activity. We also present various robustness tests.

Financial advisors are well paid due to their superior expertise and skilful negotiation (Walter,

Table 9. Acquirer financial advisor centrality, acquirer–target information asymmetry and deal premiums

| | Diversification (1) | Target segments (2) | High risk industry (3) | Young (4) | Small (5) | Small RS (6) | Small asset turnover (7) | High volatility (8) |
|-----------------------|------------------------|------------------------|---------------------------|---------------------|--------------|-----------------|--------------------------------|------------------------|
| Premium | | | | | | | | |
| Degree | -1.111** | -1.074** | -1.103** | -0.669* | -2.295* | -2.215** | -0.500** | -1.887** |
| IA dummy variable | 0.054** | 0.011** | 0.002** | 0.088** | 0.051** | 0.042** | 0.012** | 0.035** |
| Degree*IA dummy | -1.485** | -0.046** | -0.592** | -0.594** | -0.371** | -1.185** | -0.873** | -1.892** |
| Public | 0.195** | 0.195** | 0.204** | 0.068 | 0.108 | 0.065 | 0.101 | 0.106 |
| Stock | -0.006 | -0.004 | -0.007 | -0.062 | -0.051 | -0.054 | -0.058 | -0.053 |
| Size | -0.003 | -0.006 | -0.005 | -0.014 ^c | -0.014** | -0.014** | -0.014** | -0.012** |
| MTBV | 0.001*** | 0.002*** | 0.002*** | 0.001* | 0.005* | 0.004* | 0.004* | 0.004* |
| RS | -0.021 | -0.021 | -0.021 | -0.007 | -0.009 | -0.008 | -0.012 | -0.011 |
| Diversification | | | | | | | | |
| ROA | 0.251*** | -0.024 | 0.241*** | -0.015** | -0.005** | -0.008** | -0.009** | -0.013** |
| Leverage | -0.0002 | 0.241*** | -0.0004 | -0.001 | 0.076 | 0.078 | 0.081 | 0.075 |
| Tender offer | -0.075 | -0.056 | -0.051 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 |
| Hostile takeover | 0.108** | 0.091** | 0.082** | 0.176 | 0.179 | 0.187 | 0.171 | 0.233 |
| Past relation | -0.038 | -0.051 | -0.047 | 0.015 | 0.024 | 0.029 | 0.037 | 0.025 |
| Past performance | 0.042 | 0.028 | 0.019 | 0.009 | 0.007 | 0.015 | 0.003 | 2 |
| Advisor reputation | 0.0026** | 0.006** | 0.006** | 0.019* | 0.019* | 0.019* | 0.016* | 0.015* |
| Constant | 0.289** | 0.303** | 0.306** | -0.184 | -0.182 | -0.119 | -0.119 | -0.119 |
| Industry fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 402 | 402 | 402 | 402 | 402 | 402 | 402 | 402 |
| R-squared | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 |

*, ** and *** depict the level of significance at 10%, 5% and 1%, respectively.

This table shows the regression results of financial advisor centrality measures on acquisition premium depicting high and low information asymmetry between acquirers and targets. The main independent variables in all models are the four centrality measures. For brevity, we report results only for one measure of centrality (i.e. degree). Information asymmetry is determined with diversification, target firm segmentation, target industry risk, target firm size, target age, relative deal size, target's asset turnover ratio and target's return volatility. An IA dummy variable is created which takes the value of one for diversifying deals, high target firm segmentation, target firms operating in high-risk industries, young target firms, small target size, small relative deal size, low target asset turnover ratio and high volatility in targets' stock returns over the last 200 trading days before the merger announcement, and zero otherwise. The results for all defined proxies are shown in Models (1)–(8), respectively. In all regressions, we control for deal, firm and financial advisor characteristics. Definitions of the control variables are given in the Appendix.

Yawson and Yeung, 2008). First- and second-tier advisors charge substantially higher advisory fees. Golubov, Petmezas and Travlos (2012) find that top-tier banks charge a premium advisory fee, which motivates them to build up and maintain their reputational capital. In turn, advisors provide high-quality services to their clients. Managers occupying central network positions are expected to be higher in a social hierarchy and should be considered more influential and powerful (Mizruchi and Potts, 1998). Based on this fact, central financial advisors could demand high advisory fees from their clients due to their social status and power, as centralized CEOs, directors or board members are paid well and are less likely to be fired due to their prestige, status and social influence (Wong, Gygax and Wang, 2015). Our findings show a positive relationship between advisory firms' fees and the four centrality measures. More central financial advisors not only identify value-enhancing target firms but also charge higher advisory fees for their superior services.

Central financial advisors have a comparative information advantage, better access to and control of resources, and the power to influence others' decisions. Hence, their involvement in merger activity would be relatively high. Empirical evidence reveals that central financial advisors are involved in higher takeover activity.

It is well established in the M&A literature that bidder size has a significant impact on almost all dimensions of merger decision, such as acquisition activity and bidders' announcement returns. El-Khatib, Fogel and Jandik (2015) argue that more central CEOs are more likely to manage large acquirers, who could afford to pay higher fees. Hence, we expect more central financial advisors to be more involved with larger acquirers. Servaes and Zenner (1996) argue that deals for which the target is publicly listed are more complex, and a higher advisory fee is more likely to be charged. Our findings suggest that central advisors are more likely to advise large acquirers, acquisitions of public target firms and acquisitions involving relatively larger targets. More detailed discussion and supportive empirical analysis can be found in the Appendix.

For robustness reasons, we identify advisor connections by employing an additional and alternative approach. We follow Bajo *et al.* (2016) to establish connections among advisors. Financial advisors are considered affiliates of their peer network if they have advised the same bidder in

the past. Overall results are robust and similar to the first proxy.

A natural question is whether the centrality measures capture financial advisor factors such as reputation, past performance and prior relationship, which have already been studied in the literature. We orthogonalize the centrality measures by these three variables and re-run the analysis with the orthogonal version of the centrality measures (Nyborg and Ostberg, 2014). Even with this approach, our results remain consistent with what has been presented in the analysis so far.

Conclusions

This paper builds on the growing literature of network centrality in corporate finance. While El-Khatib, Fogel and Jandik (2015) examine the role of CEO centrality in an M&A framework, and Bajo *et al.* (2016) investigate the impact of underwriters' centrality in IPOs, this paper extends this area of the literature by providing evidence of the impact of financial advisors' centrality on M&As. We highlight the impact of financial advisors' centrality in merger outcomes, advisors' fees and bidder and deal characteristics. One of the main assets of financial advisors is their connections and the information flow generated from their connections. Financial advisors are information intermediaries, with an information extraction and information dissemination role. The more central the advisor is in the network, the greater their ability to access information.

Four centrality dimensions, that is degree, closeness, betweenness and eigenvector centrality, are employed to capture financial advisors' centrality in their peer network for US advisors involved in merger deals over the period 2000–2012. We find that central financial advisors both create value for their clients and the combined firm and charge higher advisory fees for their superior services. Central advisors also reduce information asymmetry between bidders and targets, leading to lower premiums paid by bidding firms. Leading advisors seem to exploit their connections and their position in their network to access and advise 'fee-generating' deals. Our findings also indicate that central financial advisors are more likely to be involved in takeover deals initiated by a large acquirer. We further show that central financial advisors are more likely to be involved in deals of

public target firms and deals of relatively larger target firms. These findings further reinforce the argument that central advisors are more likely to choose deals that are more likely to boost their revenue.

This paper extends the literature that examines financial advisors' characteristics, such as advisors' performance (Sibilkov and McConnell, 2014), scope (Song, Wei and Zhou, 2013) and reputation (Rau, 2000), and the prior relation of bidders with their advisory banks (Francis, Hasan and Sun, 2014), on takeover deals. This paper introduces financial advisor centrality as an additional key determinant, which significantly affects the choice of financial advisors during the acquisition process.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table A1. Acquirer financial advisor centrality and advisory fees

Table A2. Financial advisor centrality and frequency of M&A deals

Table A3. Acquirer financial advisor centrality and bidder size, target public status and relative size of the deal

Table A4. Financial advisor centrality measures estimated through past working connections