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Gokhan ERTUG
Singapore Management University, gokhanertug@smu.edu.sg

Martin GARGIULO
INSEAD

Charles GALUNIC
INSEAD

Tengjian ZOU
Singapore Management University, tengjianzou.2015@pbs.smu.edu.sg
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Citation

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Gokhan Ertug

Lee Kong Chian School of Business

Singapore Management University

50 Stamford Road, 178899, Singapore

gokhanertug@smu.edu.sg

Phone: +65 6828 0338

Martin Gargiulo

INSEAD (Asia Campus)

1 Ayer Rajah Avenue, 138676, Singapore

martin.gargiulo@insead.edu

Charles Galunic

INSEAD (Europe Campus)

Boulevard de Constance, 77305 Fontainebleau, France

charles.galunic@insead.edu

Tengjian Zou

Lee Kong Chian School of Business

Singapore Management University

50 Stamford Road, 178899, Singapore

tengjianzou.2015@pbs.smu.edu.sg

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Homophily and Individual Performance

ABSTRACT

We study the relationship between choice homophily in instrumental relationships and individual performance in knowledge-intensive organizations. Although homophily should make it easier for people to get access to some colleagues, it may also lead to neglecting relationships with other colleagues, reducing the diversity of information people access through their network. Using data on instrumental ties between bonus-eligible employees in the Equity Sales and Trading division of a global investment bank, we show that the relationship between an employee's choice of similar colleagues and her performance is contingent on the position this employee occupies in the formal and informal hierarchy of the bank. More specifically, homophily is negatively associated with performance for bankers in the higher levels of the formal and informal hierarchy, whereas the association is either positive or nonexistent for lower hierarchical levels.

INTRODUCTION

The tendency to associate with similar others is a well-documented phenomenon in the social sciences. Captured in the proverbial expression "birds of a feather flock together," the phenomenon was labeled "homophily" by Lazarsfeld and Merton (1954). In a comprehensive review of the literature at the turn of the century, McPherson and his collaborators (McPherson et al. 2001) cite research using ethnicity, gender, age, religion, education, and occupation. The evidence supporting the idea that social ties between similar people are more frequent than between dissimilar people continues to accumulate (e.g. Gibbons and Olk 2003, Mollica et al. 2003 on ethnicity; Reagans 2005 on gender; Reagans 2011 on age; Armstrong and Cole 2002, pp. 174-176, Gibson and Zellmer-Bruhn 2001, Joshi et al. 2002 on nationality).

The considerable sophistication in the study and measurement of the attributes and the conditions underlying homophily at the relational level contrasts with the lack of attention paid to the correlates of homophily at the actor level. This is the case with performance. The few existing studies on this topic provide conflicting evidence. In a study of ethnic entrepreneurs in Hamburg, Fertala (2007) found that having co-nationals as suppliers was associated with better economic outcomes among ethnic entrepreneurs, but having them as clients was not. Gompers, Mukharlyamov and Xuan (2012) found that homophily among venture capitalists reduced the probability of investment success, especially for early-stage investments, whereas Hegde and Tumlinson (2014) found that ethnic similarity between VCs and the start-ups they invest was positively associated with the venture's performance. Pearce and Xu (2012) found no evidence of association between homophily and supervisory ratings, except in cases where the supervisor status was contested by a high-status subordinate.

The paucity of consistent empirical evidence is compounded by the contrasting predictions that can be derived from theories that link social ties with outcomes. On the one hand, theories of knowledge exchange suggest that the personal affinity that is likely to exist between similar people should make it easier for them to access the resources and support required to do their jobs (Hansen 1999; Reagans and McEvily 2003), which would result in a positive association between choice homophily and performance. On the other hand, structural holes theory (Burt 1992) poses that

resorting to similar others could compromise the diversity of the resources and information actors access through their network, which should result in a negative association between choice homophily and performance.

The presence of two mechanisms that result in opposite relationships between homophily and performance poses a challenge to formulating and testing hypotheses about this relationship. If the two mechanisms were equally consequential for everybody we should not expect to observe a discernible relationship between homophily and performance: what actors gain in access they would lose in diversity, and vice-versa. Yet, actors may be heterogeneous in the extent to which they experience difficulties in securing access to people who can provide the information and support they need to do their jobs, as well as in the extent to which their performance could benefit from the diversity of such information. If this is the case, the relationship between homophily and performance may be contingent on factors responsible for this kind of heterogeneity among actors.

While there may be idiosyncratic factors that may create variation in the extent to which people are able to secure access to colleagues and to benefit from accessing diverse information through those colleagues, their position in the formal and informal hierarchy of the organization provides a solid and generalizable ground for theorizing. Actors in the upper echelons of the formal hierarchy or those who enjoy high status in the informal hierarchy are more likely to have the legitimacy of established "players" in the organization (Burt 1992, Sparrowe and Liden 2005), which should facilitate access to the information and resources controlled by other actors. At the same time, these actors are more likely to perform tasks for which accessing diverse information is critical (Burt 1997, Gargiulo et al. 2009). The opposite is true for junior or low-status organizational members. They are likely to encounter greater difficulty in gaining the respect and trust of colleagues and less likely to perform complex tasks that require accessing more diverse information. This suggests that the association between homophily and performance may be negative for employees who occupy higher positions in the formal or informal hierarchy of the firm and positive for those occupying lower echelons of those hierarchies.

We test these ideas on a sample of bonus-eligible service professionals in the Equity Sales and Trading division of a major international investment bank. The focus on "knowledge workers" is

pertinent given the role that informal workplace relationships play in their performance and the importance that acquiring diverse information and knowledge has for their ability to learn on the job and perform their tasks (Smith et al. 1995, Groysberg and Lee 2008). Research has shown that the structure of the employees' instrumental networks has a significant association with individual performance (e.g., Burt 1992, 1997, Sparrowe et al. 2001, Cross and Cummings 2004, Gargiulo et al. 2009). We argue that the composition of such networks—understood in terms of comprising similar or dissimilar others—may also matter as an additional factor that helps us understand the relationship between networks and performance.

THEORY

At least since Lazarsfeld and Merton (1954) coined the term "homophily" to describe people's tendency to establish contact with similar others, the phenomenon has been widely documented across different settings and kinds of relationships. In their review of the literature, McPherson and his collaborators succinctly describe the phenomenon by saying that "contact between similar people occurs at a higher rate than among dissimilar people" (McPherson et al. 2001, pp. 416). While an important part of the literature has focused on non-instrumental relationships such as marriage (Kalmijn 1998) and friendship (Shrum et al. 1988), homophily is also apparent in instrumental relationships within formal organizations (Lincoln and Miller 1979, Ibarra 1992, 1997, Brass 1985). Homophily has been observed in the formation of organizational founding teams (Ruef et al. 2003), in the frequency of communication among employees in a R&D firm (Reagans 2005), in friendship ties among executive MBA students (Gibbons and Olk 2003), and in encounters and engagements among business people in a social mixer (Ingram and Morris 2007).

The mechanisms invoked to explain the high frequency of association between similar people include structural constraints and individual preferences (McPherson and Smith-Lovin 1987). Structural constraints highlight the fact that the unequal distribution of people across categories creates different opportunities for associations of majority and minority members (Blau 1977, Blau and Schwartz 1984). Members of a minority group may be induced to form more "heterophilous" ties than their majority counterpart would, irrespective of their preferences. Moreover, the extent to which common features bind people together is likely to vary inversely with the size of the group bearing the

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same characteristics, suggesting that opportunity structures may also affect the salience of a given attribute as a source of homophilous preferences (Simmel [1908]1971: 147; Kossinets and Watts 2009).

The preference for similar others may be further constrained by other factors that render some people more attractive and that are also correlated with observable personal attributes such as gender, nationality, or age. This is especially relevant in instrumental relationships, in which people seek to obtain access to resources, information, or help that could be provided by the other party. While people may seek similar others because they view them as more trustworthy, easier to get along with, and predictable by virtue of their similarity (McPherson et al. 2001, Kossinets and Watts 2009, Rivera et al. 2010; Makela et al. 2007, Marschan-Piekkari et al. 1999, Piekkari et al. 2005), homophilous instrumental ties may also be induced by inequality in the distribution of a valuable resource. If certain members of a specific category of people control a disproportionate amount of a valuable resource, associations between members of this category may not necessarily be driven by a preference to associate with similar others but rather by the concentration of control over that resource.

Although the very notion of "*philia*" (one of the words for "love" in ancient Greek) evokes preference and hence choice, the acknowledgement of the structural constraints under which such choice is exercised led scholars to distinguish between homophily "induced" by the opportunity structure and "choice" homophily that captures individual preferences net of the effects of that structure (McPherson and Smith-Lovin 1987). This distinction has an important methodological implication: attempts to measure choice homophily should consider the effects of the opportunity structure on observed patterns of association between individuals to ensure that the choice homophily measure captures individual preferences and not simply demographic or other types of constraints (Lawrence and Shah 2017). Choice homophily may vary within individuals, as preferences are not necessarily stable personality traits (Brehm 1956, Sharot et al. 2009, Copping et al. 2010). More importantly for our purposes, choice homophily may vary *between* individuals. We will argue that this variation may be associated with differences in individual performance.

The attention devoted to understanding the mechanisms that can help explain associations between similar people at the dyadic level has not been matched by the attention paid to the correlates

of a preference for homophilous associations at the individual level, and particularly regarding performance. Do people who prefer to associate with similar others perform better, worse, or similarly when compared to those who do not display this preference? The question has both theoretical and practical relevance. From a theoretical viewpoint, the importance of homophilous associations in organizational life (e.g. Makela et al. 2007, Marschan-Piekkari et al. 1999, Piekkari et al. 2005) suggests that a better understanding of the relationship between homophily and performance is a worthy endeavor. From a practical viewpoint, such an understanding can help organizations and individuals to design policies and career strategies that consider the potential effects of homophily on organizational effectiveness and career advancement. This may be particularly important in large service organizations, which typically require collaboration and knowledge sharing between people from different backgrounds to serve their customers.

Theorizing about the relationship between homophily and performance is not straightforward, however. Existing models that link instrumental ties to outcomes associated with performance suggest contrasting predictions. On the one hand, theories of knowledge exchange emphasize the difficulty of establishing and maintaining good communication between the acquirer and the provider of knowledge, as well as the fact that transferring knowledge is usually costly for the provider (Szulanski 1996, Hansen 1999, Reagans and McEvily 2003). Refusing to help outright may be rare as it could violate basic norms of collegiality, but providers may still offer perfunctory assistance that is of little value to the acquirer. Since homophily may facilitate the communication between the parties while increasing the motivation of the provider to transfer the knowledge, this perspective suggests that it should have a positive relationship with performance. On the other hand, structural holes theory (Burt 1992) emphasizes the effect of accessing diverse information and knowledge in achieving superior performance. Insofar as a preference for exchanges with similar others may lead an actor to neglect "dissimilar" people, it may reduce the diversity of information and knowledge accessed by this actor, which would result in a negative relationship between homophily and performance.

The previous discussion points to a potential trade-off between the expected affinity and trustworthiness of similar others and the information advantages of a diverse instrumental network. The benefits an actor might obtain due to the superior access to information bestowed by

homophilous ties might be offset by the costs associated with the loss of diversity that would result from neglecting heterophilous contacts. Yet, existing models do not provide conclusive arguments to predict the net result of this trade-off. A fruitful way to advance the research agenda in these situations is to identify contingencies that may moderate the salience of the competing mechanisms on the outcome of interest (Knippenberg and Schippers 2007, pp. 532-33). In our case, this approach implies considering factors that correlate with the difficulty actors might encounter in securing access to relevant information and opportunities through colleagues and with the importance that the diversity of such information might have for succeeding at their jobs.

Members of knowledge-intensive organizations such as professional services firms can vary in their ability to secure access to sources of information and in their need for diverse information to do their jobs along various idiosyncratic factors, but their position in the formal and informal hierarchy of the firm provides a sound basis for theorizing. In these organizations, junior employees typically struggle to "learn the ropes" and to be trusted as legitimate players by senior colleagues. Career progression in the formal hierarchy correlates with more significant business and management responsibilities, and especially more complex decision scenarios, which entail obtaining and processing more and more diverse information. Yet, employees also differ in the status they occupy in the informal hierarchy of the firm. While status partly results from past performance, it is also a reflection of an actor's affiliations (Podolny 1992). More importantly, the correspondence between the formal and informal positions in the hierarchy is seldom perfect (Diefenbach and Sillince 2011), especially (but not solely) due to differences in status among people in the same hierarchical position. Insofar as informal status can facilitate people's access to resources and support independently of their formal position, each of these two hierarchies may play an independent role in moderating the relationship between homophily and performance. We elaborate on this point concretely as it relates to our setting in the data section that follows.

To summarize, the relationship between homophily and performance should be contingent on the position actors occupy in the formal and informal hierarchy of the firm. Specifically, *we expect that that the preference for associating with similar others would be negatively associated with performance for actors who occupy higher levels in the formal or informal hierarchy of the firm,*

whereas the association would be positive for those in the lower levels of those hierarchies. This is the hypothesis we test in this paper.

DATA AND METHODS

Our data come from the Equities Sales and Trading division of a major international investment bank. In 2001, the year of data collection, this division participated in the global primary and secondary markets for equity, equity-linked, and derivative products covering about 100 stock markets in Europe, the Asia-Pacific, Africa, and the Americas. Each of the employees in our sample (whom we refer to as a "banker" for simplicity) works for one of the 41 operational units in the bank. Each unit belongs both to a global function (sales, trading, research, or control functions) and to a geographical region (e.g. The Americas, Asia-Pacific). We describe the division's task and career structure below.

Task and careers in Sales and Trading

The bankers in our data correspond to the four bonus-eligible ranks in the organization: associate directors (AD), directors (DIR), executive directors (ED), and managing directors (MD). The hierarchy and titles used for these ranks are similar across Sales and Trading divisions in other firms, although directors and executive directors are also named "vice-presidents" and "senior vice-presidents" in some banks. Associates occupy the lowest rank. They are promoted to this rank after spending two or three years as "analysts" (who are not part of our sample) or hired with an MBA. The other ranks are occupied by bankers who have gone up the ranks, although in some cases they may have been hired from a competitor. The substance of the task in Sales and Trading does not vary as much with rank as does the volume of trades or the importance of the clients entrusted to a banker. Traders buy and sell stocks and associated equity products for clients or for the bank (also known as "proprietary trading"). Salespeople deal with clients who wish to buy or sell securities and with traders who execute these transactions. Research produces the proprietary research to back up recommendations to clients or to sell reports directly to those clients; they also create sophisticated investment products that can be sold to clients, such as stock derivatives, and analytical models to

price securities. Finally, people in the control function aim to ensure that rules and regulations are properly followed and manage the risk of the operations.

Except for the few bankers who have specific management responsibilities (which is very rare among associates), career progression in Sales and Trading correlates strongly with the size and the complexity of the task assigned, albeit not necessarily with basic the nature of the task (Gutmann 2013). A junior trader or salesperson does largely the same job that a senior one does, except that he or she executes smaller trades (initially on behalf of his or her senior trader) or deals with smaller and less demanding clients, often working under the supervision of a senior colleague. Conversely, a senior trader would be required to interpret more complex trading scenarios, which would require careful consideration of many factors regarding the economy, the industry, and the specific client that could affect the decision on what and when to trade, especially in contexts in which the uncertainty associated with these factors is high. A similar contrast applies to a junior and a senior person in Sales, with the second dealing with larger, more sophisticated, and demanding clients. As the complexity of the trading decisions and client demands increase, so does the importance of accessing diverse information.

Although traders need to be certified and pass a regulatory exam, they learn on the job. The same is true for salespersons. A well-known guide to careers in Sales and Trading stresses that entry-level employees learn from others "what works well in what situations with which individuals" and are only "given responsibilities commensurate with [their] ability to get the job done" (Kim and Rodbard 2007, pp. 21-22). The same guide reminds newcomers that collegial support cannot be taken for granted and that "asking stupid questions" is a capital sin in the rough and unforgiving culture that characterizes these organizations: "it's very easy to make a bad impression, and the trading desk can quickly become an extremely inhospitable environment for interns that don't fit in" (Kim and Rodbard 2007, pp. 90). This also applies to the menial tasks given to newcomers. Getting a coffee order wrong may seriously damage the career of an aspiring trader: "if the kid can't even take a coffee order, what reason do we have to think that he can take a stock order?" (Kim and Rodbard 2007, pp. 105). A participant's account of life in Sales and Trading at the now-defunct Salomon Brothers by the end of the 80s (Lewis 1989) reveals striking similarities with the picture that emerges from more

recent career guides and testimonies, suggesting that this picture is representative of the organizational environment in this business.

Although present, the formal hierarchy in Sales and Trading is less strict than in the traditional investment bank (M&A) side of the business. Those junior employees who can earn the trust of clients and colleagues (senior traders, salespeople, and research staff) can be provided with opportunities to trade more important stocks or to have their own clients. Excelling at these tasks, however, typically requires a good support network to minimize the risk of making mistakes, given the on-the-job nature of the learning and the frantic pace of the work. The importance of this network is apparent in the career advice of a former head of Proprietary Trading at Bank of America Merrill Lynch: "Ask every single other person on the planet for help, before you go back to your manager" (cited in Clarke, 2017). As the task gets bigger and more complex, so does the cost of making errors, which increases the need for accessing more diverse information throughout the bank. A high-status associate is more likely to be taken seriously by bosses and colleagues, opening opportunities that may not be available to lower-status peers in his or her same formal rank—such as covering a senior trader's position while he or she is on vacation or being taken to important client visits by a senior salesperson (Kim and Rodbard 2007, pp. 105). In an industry in which nearly half of the junior bankers quit within the first three years and in which newcomers who cannot earn the trust of senior colleagues can be sometimes relegated to (literally) fetch coffee for months, a high-status employee is more likely to get the attention from colleagues and other senior people. While high status is partly the result of prior superior performance, support networks play an important role in having the opportunity (and the ability) to display such performance.

Traders and salespeople need to collaborate to set a price for the security being traded that would leave the customer happy and still make a profit for the trader, but ultimately this is a zero-sum game: the gain of the client is the loss of the trader. They also have different performance metrics. Traders make a profit by buying low and selling high; salespeople receive commission on the volume of the trade. This forces bankers to strive for a delicate equilibrium in a game in which, in the words of a salesperson, "everyone likes to keep their cards pretty close to the vest" (Kim and Rodbard 2007,

pp. 43). Not surprisingly, trust in the other person's ability and intentions is paramount in a relationship that is rife with potential conflict, especially when not everybody is making money.

Data

Cognizant of the importance of collaboration among their employees and of the barriers to collaboration created by the nature of the task and incentives, investment banks have implemented tools to measure the value bankers add to each other. Central among these tools is a method of cross-evaluations by which each banker evaluates the value that individual colleagues have added to his or her own work in the past year or any other period (see Kane and Lawler 1978, for a discussion). In the bank our data come from, bonus-eligible bankers (associates and above) are asked to identify colleagues with whom they have had "substantial business interactions" during the previous year and to evaluate these colleagues based on their "real contribution to *your business*, not their popularity, not their reputation, and not your perception of their contribution to the business as a whole" (official bank document, emphasis in the original). The system displays a roster with the full names of the colleagues a banker may evaluate, organized by operational units. To prevent "grade inflation" (Kane and Lawler 1978), the system forces bankers to place colleagues in one of four quartiles, allocating approximately equal numbers of colleagues to each quartile. The response rate for the year of our data was 98 percent.

The bankers in our sample faced some limitations in that they could evaluate only a subset of operational units (including the banker's own unit), which were likely to have regular interactions with the focal banker's unit to conduct the business. For example, someone in a regional or country sales unit will rate people in the corresponding regional research and trading units, as well as their global counterparts (e.g. Global Economic Research). The practical implications of these limitations were modest, however: on average, each banker had a list of about 890 colleagues from which to choose from. Bankers were free to evaluate anybody within these constraints, reflecting the fact that their business exchanges are seldom mandated by a formal task structure matching people or jobs, unlike the case in a more traditional organization. If such a clear structure were present, the liberty to choose from such a large pool of colleagues would have been superfluous, as the bank would have known whom each person should evaluate and would display only that list to the evaluator. Although

the specific nature of a transaction may rule out some colleagues and favor others as potential sources of help, bankers have considerable degree of autonomy in choosing whom to associate with, making this setting adequate for studying the correlates of homophilous choices. The bank considers the number of "votes" (i.e., how many people evaluated the focal banker) and the average rating received in these cross-evaluations in the bonus allocation process, which takes place about two months after the evaluation exercise.

Consistent with the wording of the instructions, we interpreted an evaluation from banker i (ego) to banker j (alter) as an indicator of the presence of a directed instrumental tie where ego sought input from alter. In principle, it could be possible that an evaluation would reflect a banker's acknowledgment of unsolicited help offered by a colleague. This, however, is extremely unlikely in the competitive environment of investment banks. Interviews with industry participants, career advice guides (e.g. Kim and Rodbard 2007) and testimonial descriptions of the Sales and Trading work environment (e.g., Lewis 1989), as well as the very existence of evaluation systems aimed at promoting collegial help, attest to the difficulty of securing help in these organizations and suggests that offering unsolicited help is a rare occurrence in these organizations. We used the dyadic evaluations collected by the bank to create a square matrix in which cell i,j is set to 1 if banker i evaluated banker j and to 0 otherwise. In addition, we collected data on personal and organizational background on the bankers, as well as on individual performance.

Measuring choice homophily

Although scholars largely agree on the conceptual definition of homophily, empirical measures show considerable variation (Lawrence and Shah 2017). An adequate measure of individual "choice" homophily requires accounting for the constraints posed by the opportunity structure on such choices. The most common constraints result from the unequal demographic distribution of people across categories. However, measuring choice homophily in instrumental relationships may pose additional constrains grounded in the unequal distribution of valuable resources across those categories. For example, males may build instrumental ties with other males because they are males or because they control a disproportionate amount of a valuable resource, but only the first association would indicate a preference for exchanges with same-gender partners. In addition, choices may be

motivated by the endogenous tendencies of network formation, such as reciprocity and transitivity (Lusher and Robins 2013). Take A and B, both of whom are female; A may choose B because B had chosen A, or because both share a tie with C, and not necessarily because they are both female. Our measure of homophily attempts to take these aspects into account by identifying preferences for similar others that cannot be attributed to the constraints posed by demographic factors, geographical proximity, or resource heterogeneity factors, as well as by the network structure in which instrumental exchanges happen.

Conceptually, we measure the choice homophily of banker i (ego) with respect to attribute h as function of the change in model fit that results from including or excluding an indicator of similarity h_{ij} in a logistic model predicting i's dyadic instrumental ties with j (alters). We use the coefficient of discrimination (Tjur 2009) to measure model fit, an intuitive statistic conceptually related to the familiar R^2 used to assess fit in OLS models (see Allison 2013 for discussion). The intuition behind this coefficient is that a "good" logistic model should generate predicted probabilities π that are close to 1 for "successes" (i.e., for observations in which $y = 1$) and close to 0 for "failures" ($y = 0$). For a given model, the coefficient of discrimination D is the difference between the mean of the predicted probabilities π for successes and the mean of those for failures: $D = \bar{\pi}_{(y=1)} - \bar{\pi}_{(y=0)}$, with $0 \leq D \leq 1$. The more D approaches 1, the better the model fit.

Measuring choice homophily $H_{i(h)}$ for banker i and attribute h involves the following steps. First, we estimate a "full" logistic regression predicting the probability that banker i cited banker j as a function of demographic similarity on h (e.g., gender) and a vector of controls that capture other factors that might have induced i to cite j, including similarity along other measured attributes. Second, we obtain the predicted probabilities π for each dyad in the bankers' risk set. Third, we estimate a "reduced" model removing the demographic similarity indicator h from the full model and obtain the respective probabilities. Fourth, for each banker i, we compute two coefficients of discrimination $D_i = \bar{\pi}_{i,(y=1)} - \bar{\pi}_{i,(y=0)}$, based on the mean of the predicted probabilities from the full and the reduced model respectively, aggregated to the level of an individual banker. Fifth, we compute banker's i choice homophily score H_i as the difference between the coefficients of

discrimination for the full and for the reduced model, $H_i = D_{i(F)} - D_{i(R)}$. It is worth noting that this measure allows for the possibility that the reduced model could predict a banker's choices better than the full model does, which would yield negative H_i scores. These bankers are simply less likely to form homophilous instrumental ties along attribute h. The higher H_i, the more homophily along h explains i's choices of instrumental relationships.

An important substantive choice when computing the logistic models to generate predicted probabilities is determining the reference group for banker—that is, the subsample on which these models would be estimated. Using all the bankers in our sample as reference group would not be suitable in our case, as this may obscure the effect of subcultures or other unobserved factors that vary across organizational or geographical units and which may shape a banker's choices. Therefore, we assumed that the tendency to seek similar others may vary across organizational units and estimated separate models for each of the 41 organizational units in our sample. Each of these 41 subsamples includes all ordered dyads in the risk set of bankers in the focal unit—that is, all possible ordered dyads $\{i,j\}$ in which i is a member of the focal unit and j is a member of the units that could have been rated by i according to the constraints imposed by the bank in the cross-rating exercise (which includes colleagues in i's unit). In practical terms, this approach compares each banker's choice homophily with the average for his or her own business unit. Our approach allows for differences in the effects of each homophily indicator, as well as for those of the control variables across subsamples. On average, each of these subsamples contains 33,770 observations. Each of these observations correspond to an ordered dyad composed by a banker from the focal unit (ego) and all the possible colleagues he or she could rate (alters), including those in the same focal unit. The average size of a business unit is 45 bankers.

Following the procedure described above, we computed three choice homophily scores for each banker based on nationality, gender, and age similarity respectively, and a vector of controls. Gender and age are two standard demographic indicators to define similarity, whereas nationality is likely to be a salient attribute in contexts that bring together people from different countries and cultures, as it is the case with multinational organizations like the one analyzed in this study (Erez and Earley 1993, Armstrong and Cole 2002, Gibson and Zellmer-Bruhn 2001, Joshi et al. 2002). *Same*

nationality and *Same gender* are set to 1 if *i* and *j* are of the same national origin (or same gender) and to 0 otherwise. *Same age* is set to 1 if *j*'s age is one half of a standard deviation younger or older than the focal banker *i*. Since the standard deviation of age is 6.51 years in our sample, *Same age* is set to 1 for two bankers if their ages are three or fewer years apart (so if *j* is up to three years older or three years younger than *i*). We use an age band instead of using absolute differences because this allows us to use the same criterion to define the respective demographic control—that is, the proportion of "similar" eligible colleagues in ego's risk set. These proportions are clearly defined for dichotomous indicators such as nationality or gender, but not for age. In all three cases, the *dependent variable* is the presence or absence of an instrumental tie in the ordered dyad *i,j*. This variable is set to 1 if banker *i* evaluated banker *j* and to 0 otherwise. The control variables account for demographic, organizational, and network factors that could have induced bankers to form instrumental ties, including the formal reporting structure. The controls also include the two other potential sources of choice homophily we investigate. The full models fit the banker's choices reasonably well, with coefficients of determination (Tjur 2009) ranging from 0.42 to 0.72 (0.53 mean, 0.07 standard deviation).

Table 1 provides a succinct description of these control variables. An examination of these variables reveals that our approach to measure choice homophily removes many factors that might have induced bankers to choose "similar" others (including network effects such as reciprocity and transitivity) that might be correlated with similarity. Therefore, the variables retained in the "reduced" models can absorb part of the variance that might be rightfully attributable to similarity. This results in a conservative measure of choice homophily, as the difference between the coefficients of determination that defines our measure should be equal to or lower than (but not higher than) the marginal effect of the specific homophily indicator in explaining the banker's choices in the full model. Like the most sophisticated measures of homophily (Lawrence and Shah 2017), our approach considers both the opportunity structure and individual preferences. Unlike most existing measures, however, our definition of the opportunity structure goes beyond demographic characteristics to simultaneously remove the effect of factors like network structures and similarity across other characteristics that might have induced the observed associations between bankers. This allows us to

isolate the unique contribution of each specific similarity indicator to explain the observed pattern of instrumental ties for each actor.

---------- Insert Table 1 here ---------

Variables in Models that Estimate Performance

Dependent variable

Performance is the dependent variable in the analysis. We measure performance as the natural logarithm of the z-sores of the banker's annual bonus, rescaled to eliminate values that were equal or below zero. Bonuses are the primary way in which investment banks recognize variation in individual performance during the year. In the organization we studied, bonus decisions occur about two months after the cross-evaluation exercise. Typical for the industry, the distribution of bonuses is strongly skewed in our sample: the top earner received a bonus that was 13.23 standard deviations above the mean, whereas the bonus of the lowest earner was only 0.63 standard deviations below the mean, which indicates the suitability of the log transformation of the z-scores.

Independent variables

Choice Homophily measures the extent to which a banker's instrumental relationships reflected preferences for same nationality, same gender, or same age category among eligible colleagues. We computed a separate choice homophily score for each of these three dimensions.

Formal rank. We capture the position of a banker in the formal hierarchy using their formal rank in the organization. In ascending hierarchical order, these ranks are associate director (AD), director (DIR), executive director (ED), and managing director (MD). We use dummy variables to capture formal rank, with MD as the omitted category in the models.

Status. We measure the banker's position in the informal hierarchy using Bonacich's (1987) centrality measure, which is commonly used to capture the status of actors in an informal hierarchy determined by the actor's pattern of associations (Podolny 1993, 2005; Sauder et al. 2012). The more a focal banker is rated by colleagues who are also rated by many other colleagues, the higher is this banker's status. The measure is calculated as follows:

$$c(\alpha, \beta) = \alpha \sum_{k=0}^{\infty} \beta^k \, R^{k+1} \, 1$$

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Where R is the binary relational matrix constructed using the rating data, α is a scaling factor set to make the sum of squared status scores equal to the number of nodes in the network, and β is a weighting factor that determines the extent to which the centrality of an actor's contacts affects the actor's centrality score. Following common practice in the status literature, we set β equal to three-quarters of the reciprocal of the largest eigenvalue of the relational matrix. We divided the status scores by one thousand to facilitate the reporting of the coefficients and standard errors.

Control variables

Demographic control variables. We control for the banker's *Age* (in years), *Gender* (set to 1 for females), and *Nationality*, using an indicator variable for each of the 47 nationalities represented in our estimation sample for bonuses.

Organizational control variables. The average rating bankers receive from colleagues is used by the management in their bonus deliberations. Thus, *Average rating received* controls for the average score the banker has received from the colleagues who have rated him or her. Controlling for this rating is important because it is explicitly considered (along with the number of people rating the banker, which we also control for) when determining bonuses. A banker's performance is likely to be affected by the inputs provided by the colleagues who help this banker. We control for this factor using *Alters' average rating received,* which is the mean of the average rating received by all the colleagues rated by the focal banker. Some bankers were responsible for supervising the work of their colleagues, which might affect their bonuses. *Direct reports* controls for this factor using a count of the number of colleagues directly supervised by the banker. Finally, *Tenure* (in years, logged) controls for the banker's experience in the organization.

Social network control variables. The density of ties among the people a banker relies upon for inputs (i.e., the colleagues a banker rated) and among those who seek inputs from the banker (i.e., those rating the banker) can affect performance (e.g., Burt 2007, pp. 132-139, Gargiulo et al. 2009). If a banker with a high choice homophily score gets help from a set of similar colleagues who also help each other, estimates of the relationship between choice homophily and performance may instead capture the effects of network density. Hence, controlling for network density among the people providing inputs to the focal banker is important to obtain accurate estimates of the relationship

between choice homophily and performance. *Network density acquirer* is the ratio between the number of existing ties among alters rated by the focal banker and the maximum possible number of ties among those alters, whereas *Network density provider* computes the same ratio for bankers seeking inputs from ego. We also control for the size of the banker's acquirer and provider networks. *Network size acquirer* controls for the number of colleagues rated by ego, whereas *Network size provider* controls for the number of colleagues who rated ego. Controlling for this is important also because management considers the number of ratings received by a banker (along with the average value of those ratings) in bonus deliberations. We use a log transformation of the size and density measures to compensate for the skewed distribution of the network size scores. Finally, a banker's performance may be affected by the extent to which he or she engages in reciprocal knowledge exchanges with colleagues, which should create incentives for colleagues to help the banker. Thus, we control for *Reciprocal ties,* defined as the proportion of reciprocated ties in the banker's network.

Table 2 presents the means, standard deviations, and the correlations for these variables.

--------------- Insert Table 2 about here --------------

Model Estimations

We use a multilevel hierarchical linear model (also known as multilevel mixed effects model) with a maximum likelihood estimation to account for the nested structure of the data and to obtain unbiased estimates for the standard errors of the regression coefficients (Raudenbush and Bryk 2002). The 1,745 bankers in our estimation sample are nested within 41 operational units and there are significant differences in the size of bonuses across units ($p < 0.001$), reflecting the nature of their work and the market conditions in which each unit operates. Our multilevel models specify the operational unit of the banker as the identifier that allows for random intercepts, such that bankers are nested in these units and capturing potential differences in bonuses across units. As an alternative to this multilevel estimation, we also ran our models using an OLS estimation with unit fixed-effects. All the significant coefficients we refer to below remain significant in these models.

--------------- Insert Table 3 and Figures 1 and 2 about here --------------

RESULTS

Table 3 presents the results of our analysis of the moderating effect of formal rank and informal status on the relationship between choice homophily and performance. Model 1 is a baseline model. As expected, bonuses in investment banking are strongly influenced by rank (with MD being the omitted category). The coefficient for status is also positive and highly significant ($p < 0.001$), indicating that the position a banker occupies in the informal hierarchy of the firm has an independent effect on performance. Age, tenure, and being female, all have a significant negative impact on bonuses. Because rank is held constant, the negative coefficients for age and tenure reflect the detrimental effect of remaining in the same rank for a long time—indeed, the simple correlation between these variables and performance is positive ($r = 0.26$ and 0.16 respectively). This is not true for females ($r = -0.15$), reflecting the compensation gender gap in the industry. Network size provider (i.e., the number of people rating the banker) and the average rating received are both positive and significant, reflecting the fact that the bank considers these factors in determining bonuses. Interestingly, the proportion of reciprocal ties has a negative effect on performance: the more bankers rely on people who also rely on them for inputs, the more their performance suffers. This is consistent with the idea that factors that may restrict access to diverse information (such as relying on reciprocation) can hurt performance.

Model 2 introduces the choice homophily measures for nationality, gender, and age. None of the coefficients of these measures are statistically significant. This is consistent with our expectation that the relationship between homophily and performance, if any, should be contingent on the position the banker occupies in the formal or informal hierarchy of the firm.[1] Models 3-4 present the contingent relationship between nationality homophily and performance by formal rank and informal status, whereas Models 5-6 and 7-8 do the same for gender and age homophily respectively. Managing director (MD) is the omitted category in all models presenting interactions with formal rank. Therefore, the coefficient for the specific homophily indicator (nationality, gender, or age) in

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[1] We also explored the possibility that homophily could have a curvilinear relationship with performance. To this end, we added quadratic terms for nationality, gender, and age homophily to the models. None of these quadratic terms was statistically significant at conventional levels ($p > 0.19$).

these models shows the net effect of homophily on performance for MDs, whereas the coefficients for the interaction terms show the extent to which the effect of homophily for the specific rank (associate, director, or executive director) might be statistically different from the baseline effect for MDs.

Model 3 presents the interactions between nationality homophily and formal rank. Nationality homophily has a negative effect on performance for MDs ($p < 0.001$), as captured by the main effect of this variable. The positive and significant coefficients ($p < 0.001$) for the interactions between nationality homophily and the three lower ranks suggest that the effect of nationality homophily on performance is less detrimental for these ranks than it is for MDs. Post estimation tests show that the net effect of nationality homophily on performance is not significantly different from zero for directors or executive directors, suggesting that the performance of bankers in these ranks is not related to their preference for co-nationals in their instrumental networks. The net effect of nationality homophily on performance for associates is positive, although it falls short of conventional statistical significance levels ($\beta = 0.012$, 1.59 z-value, $p = 0.11$). These results suggest that nationality homophily reduces bonuses for MDs, whereas it has a marginally positive effect on the bonus of associates, which is consistent with our predictions. Interpreting the size of these net effects is straightforward, given that both the dependent and the independent variable are standardized and that the first is logged. Thus, an increase of one standard deviation in nationality homophily decreases MD bonuses by 6.8 percent of a standard deviation, that is, $100(e^{-0.07} - 1)$. This is noticeable if we consider that 68 percent of the variation in bonuses is explained by rank in our sample, a figure that is consistent with the one reported by Burt (1997) for a similar sample of investment bankers. The corresponding net coefficient for associates suggests that one standard deviation in nationality homophily would increase their bonuses by 1.2 percent of a standard deviation. While small, this percentage is not negligible if we consider the tight distribution of bonuses among associates when compared with the rest of the sample, which ranges from -0.63 to 0.52 standard deviations from the mean for associates (against -0.63 to 13.23 for the whole sample).

The large standard error of the estimate suggests that there is substantial variability in the extent to which associate directors might benefit from nationality homophily. This impression is consistent with the results for informal status presented in Model 4. The interaction between

nationality homophily and status is negative and significant (-4.57 z-value, $p < 0.001$). Figure 1 illustrates the interaction effect between nationality homophily and status on performance. The figure displays estimates of performance for bankers with high (mean plus one standard deviation) and low (mean minus one standard deviation) status. The vertical dashed lines delimit the region comprising 98 percent of our observations. A closer examination shows that the net marginal effect of nationality homophily on performance is negative and significant ($p < 0.05$) for the 400 bankers in the top 22.9 percent of the status distribution and positive for the 54 bankers in the bottom 3.1 percent. Relaxing the significance criterion ($p < 0.10$) shows that nationality homophily has a negative effect on performance for bankers in the top 25.9 percent of the status distribution and a positive effect for those at the bottom 13.4 percent. The rank distribution of the 54 low-status bankers who benefit from nationality homophily using the more stringent criterion for statistical significance shows that they are mostly associates (61 percent) and directors (35 percent), which is consistent with our theory. The opposite is true for the 400 high-status bankers who suffer from homophily: the majority in this group are MDs (35 percent), followed by EDs (28 percent), whereas associates represent only 10 percent. These results suggest that the relatively weak results for the interaction between nationality homophily and formal rank may be driven by the variation in informal status within ranks, which is consistent with the less hierarchical nature of Sales and Trading division as compared with traditional investment banking (M&A).

Model 5 presents the interactions between gender homophily and formal rank, with MD being the omitted category. The coefficient for the main effect of gender homophily shows that it does not have a significant effect on performance for MDs. The effects for the other three ranks are not significantly different from that of MDs either, suggesting that gender homophily does not have a contingent effect on the performance of bankers according to their formal rank. The interaction between gender homophily and status, however, is negative and significant in Model 6 (-2.14 z-value, $p < 0.05$), which is consistent with our prediction. Figure 2 illustrates the interaction effect between gender homophily and status on performance. The figure displays estimates of performance for bankers with high (mean plus one standard deviation) and low (mean minus one standard deviation) status. The vertical dashed lines delimit the region comprising 98 percent of our observations. The net

effect of gender homophily on bonuses is negative and significant ($p < 0.05$) for the 111 bankers in the top 6.3 percent of the status distribution and positive and significant for the 54 bankers in the bottom 3.1 percent. These figures climb to 18.3 and 17.6 percent respectively when the criterion for statistical significance is $p < 0.10$.

The distribution of the 54 low-status bankers for whom there is a significant positive net effect of gender homophily on performance reveals a similar pattern to the one observed for nationality, with 96 percent of these bankers occupying the lower ranks (associates or directors). The high-status bankers whose performance is negatively affected by gender homophily are mostly MDs (81 out of 111 of these bankers, or 73 percent). Among these, 9 are female and 72 are male. Because there are a total of 10 females and 134 males in the MD rank, these results might suggest that the performance of female MDs suffers disproportionally based on their gender homophily, even though their mean homophily score is not significantly different from that of their 72 male colleagues. While we cannot rule out this possibility, the data suggest that an alternative interpretation is more likely. In fact, the female MDs have significantly higher informal status than male MDs in the sample ($p < 0.05$), which is consistent with the idea that only truly exceptional females are likely to reach this male-dominated rank. This suggests that the comparatively large proportion of female MDs whose performance suffer from gender homophily do so because of their high status, rather than because of their gender.

Finally, Model 7 shows the contingent effects of age homophily on performance by rank. The coefficient for the main effect of age homophily reveals that this variable does not have a statistically significant effect on the performance of MDs, the omitted category in the interactions. The effects of age homophily for the other three ranks are not significantly different from the effect for MDs either, suggesting that the performance of bankers does not vary with their level of age homophily, irrespective of their rank. Model 8 shows that that the interaction between age homophily and status is also not significant. (We also investigated these models for the effects of age homophily using alternative age bands to operationalize the *Same age* indictor in our models to construct the [choice] homophily measure: using four, five, or six years' difference, in either direction [younger or older] between ego and alter, instead of the three years. None of the measures that result from using these

alternative bands produce significant results either; the interaction between status and age homophily is not significant in any of these cases, likewise the effects of age homophily for any of the lower ranks are not significantly different from that for MDs in any of these cases, and the effect for MDs itself is not significant.) Unlike the case for nationality homophily and gender homophily, we did not find support for the contingent relationship between age homophily and status in our sample.[2]

The fact that the results are only marginally supportive for gender homophily and negligible for age homophily merits attention. A possible reason for these results is that, unlike nationality, gender and age similarity are weak predictors of tie formation in our data. On average, the baseline odds of observing an instrumental tie increase 61 percent for same-nationality dyads. The corresponding figure for same-gender dyads is 40 percent and it drops to 20 percent for age similarity. If similarity on a specific attribute is not a strong predictor of tie formation, it is unlikely that it would be correlated with actor-level outcomes as predicted by our model, which is indeed the case with our sample.

Taken together, our results provide support for the contingency model of the relationship between homophily and performance. When similarity is a significant predictor of instrumental tie formation, as is the case with national origin (and to a lesser extent, gender) in our sample, homophily is negatively related with the performance of bankers at the top and positively related with the performance of those at the bottom of the formal or informal hierarchies. The relationship is less apparent (or altogether absent) when similarity is a weak predictor of tie formation, as is the case with gender and age. The fact that age similarity is a weak predictor of tie formation may be expected in an environment in which people "learn on the job" from more senior colleagues.

Interpreting the weak effect of gender similarity on instrumental tie formation is less straightforward. In a male-dominated environment imbued with a strong "macho" culture that makes

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[2] We also checked our results by running an OLS estimation with business unit fixed effects. All the significant coefficients from the multilevel estimation reported before remained significant in this OLS estimation: the negative effect of nationality homophily for MDs (-4.03 z-test, $p < 0.001$), the positive effects for the interactions between nationality homophily and the three lower formal ranks ($p < 0.001$ for all three), the interaction between status and nationality homophily (-4.44 z-test, $p < 0.001$), and the interaction between status and gender homophily (-2.09 z-test, $p < 0.05$). Coefficients that were not statistically significant for the hypothesized effects in the multilevel estimations were also non-significant in the fixed effects OLS models.

it particularly inhospitable for women, one might expect women might tend to seek help from other women. Indeed, our data suggest that, on average, females are more gender homophilous than males. The mean gender homophily is significantly higher for women (0.13 versus -0.02 for men, 2.30 t-value, $p < 0.05$). Yet, the standard deviation is much larger among women (1.87) than for men (0.72), suggesting that there is considerable variance in the extent to which women build instrumental relationships with other women in our sample. We also explored whether women benefit or suffer from gender homophily, irrespective of their informal status. Specifically, we conducted two additional analyses. First, we added an interaction between gender and gender homophily to Model 2 in Table 3 and ran the model on the entire sample. Second, we ran Model 2 on a subsample that consists of women only (n = 281). In both cases, the coefficients of interest (i.e., the interaction term and main effect of gender homophily) were not significant. Gender homophily may make it easier for some women to get support in the harsh environment of Sales and Trading, but these benefits seem to be offset by the costs of not having access to male colleagues, who occupy a dominant position in the formal and informal hierarchy of the firm. Gender homophily does hurt all but one of the 10 women at the top of the formal hierarchy, presumably due to their high informal status in the organization.

DISCUSSION

Sociologists and organizational scholars have produced abundant evidence documenting the tendency to establish homophilous relationships, but they have largely neglected studying the relationship between homophily and outcomes. Our results show that the choice homophily of organizational members is related to their performance, but that the nature of this relationship depends on the position the members occupy in the formal and informal hierarchy of the organization, as well as on the salience of the specific attribute that is considered as a predictor of tie formation. Using data on instrumental ties among bonus-eligible employees in the Sales and Trading division of a global investment bank, we find that the relationship between choice homophily and performance is contingent on the formal and informal status of the banker. Bankers who tend to form instrumental ties with colleagues of the same nationality or—to a lesser extent—the same gender receive smaller bonuses if they occupy the top echelons of the formal or informal hierarchy of the firm, whereas they

do better when they are at the bottom of those hierarchies.

The model we propose in this paper suggests that the tendency to work with similar colleagues could help or hurt the performance of bankers depending on their position in the hierarchy of the firm. The nature of our data, however, does not allow us to clearly establish the direction of this relationship. Whereas our model suggests that homophily may affect performance, it is also possible that homophily would be a consequence of performance. For example, poorly performing bankers could find it more difficult to build instrumental ties with colleagues and would need to rely on similar others, who would presumably be more sympathetic. This interpretation is consistent with the observed negative relationship between homophily and performance for bankers in the upper echelons of the hierarchy. However, it cannot explain the positive relationship observed for bankers at the bottom. If homophily is the consequence of poor performance at the top, why would it be the consequence of good performance at the bottom? If low-status performers are indeed forced to rely on homophilous ties due to their poor performance, our results would suggest that this may improve their subsequent performance.

Although the nature of our data does not allow us to clearly establish the direction of the observed relationship between homophily and performance, the overall pattern of the results is more consistent with the idea that homophily affects performance than with the idea that homophily is a consequence of performance. Most likely, both mechanisms are at work. Bankers at the bottom of the hierarchy do marginally better if they rely on similar colleagues, as they can access information and resources that might have been otherwise unavailable to them. As their performance improves, so will their informal status and responsibilities, which would enable (and require) them to build more diverse networks. The opposite dynamics may take place for bankers at the top: poor performance may force them to rely on homophilous ties, which may further erode their performance, locking them into a survival mode from which it may be difficult to escape.

Our study expands on the idea that the effects of informal networks on outcomes are contingent on the position actors occupy in the formal or informal hierarchy of the organization (Burt 1997, Gargiulo et al. 2009, Galunic et al. 2012). Relying on similar others can help actors secure access to information controlled by other organizational members, but it also places constraints on the

range and diversity of such information. The costs of this restriction may be negligible for people whose performance depends more on the effort colleagues put to help them than on the diversity of the information provided by colleagues. These costs, however, become more important for employees whose jobs require them to access diverse information. An important implication of this finding is that, as employees progress in their careers and perform increasingly complex and critical jobs, they might need to adapt their networks, reducing their reliance on similar others to increase the diversity of inputs that is required to cope with the new challenges. Employees who do not do so risk being trapped in a network that, albeit helpful in the past, becomes a liability for their subsequent performance (Gargiulo and Benassi 2000). Like embeddedness, homophily can help the weak, but it may hurt them once they become strong (Gargiulo and Ertug 2014)

In clarifying the relationship between choice homophily and performance, our study contributes to the growing evidence on the effects of informal networks on outcomes. Although earlier network studies emphasized the effect of network composition (e.g., Lin et al. 1981), research since has focused largely on the effect of network structure (see Burt 2005 for a review). Our study brings back some attention to network composition as a factor that may influence outcomes above and beyond network structure. Structure matters, but so does who is at the other end of a tie. While the focus on network structure has been used as a proxy for the resources commanded by the actors in that network, our results indicate that who is in the network may also matter for the accessibility of those very resources for the focal actor (see Rodan and Galunic 2004, for a related point on network composition).

There are interesting parallels between our work and research on the primacy of interpersonal affect over competence in the formation of task-related ties (Casciaro and Lobo 2005, 2008, 2014). Insofar as ties of actors with a higher choice homophily are more likely to have positive affect, our results indicate that the affective value of relationship can indeed be beneficial for people whose position in the formal or informal hierarchy puts them at a disadvantage in securing access to colleagues. At the same time, our findings also suggest that choice homophily is negatively related to the performance of people whose jobs benefit disproportionally from access to diverse information. Although our data do not make it possible for us to measure affect in instrumental ties, it is reasonable

to assume that positive affect is more likely in homophilous relationships. If this assumption is true, our results would suggest that the primacy of affect over other relevant criteria to select instrumental relationships is likely to help people in the lower echelons of the organizational hierarchy, but these benefits may disappear and even reverse as people move into higher positions in that hierarchy

The availability of comprehensive data on instrumental relationships, background, and performance allowed us to measure choice homophily in a rigorous way and to assess its relationship with performance. Yet, the data also impose limitations to our analysis. The first limitation, which we already discussed, pertains to the difficulty in establishing a clear causal relationship between homophily and performance, given that we cannot rule out possible endogenous processes through which homophily might result from prior poor performance. The availability of lagged performance measures might have helped to mitigate this problem, if not to eliminate it completely. Thus, it is impossible for us to determine whether the relationship between homophily and performance results from "treatment" (homophily causes performance) or "selection" (low performers resort to homophilous relationships). The pattern of results, however, suggests that the first is more likely than the second: reverse causality could explain the negative effects of homophily for bankers at the top, but not the positive effect for those at the bottom.

The second limitation pertains to the context that provides our data. Although the employees in our sample can be considered as typical highly-skilled knowledge workers, the fast-paced nature of Sales and Trading in investment banks, the fierce competition among colleagues for large rewards that are contingent on performance, and the significant levels of turnover (especially at the entry-level rank) define an environment that is not necessarily shared by all knowledge workers. Even as the nature of work in more traditional firms is changing, investment banks still present idiosyncrasies that require caution when generalizing our results. This caveat notwithstanding, there are no clear reasons to believe that homophily along salient attributes would not have similar effects on performance in contexts where low-status actors struggle to be accepted as "legitimate" players in the organization and where the complexity and diversity of information people require to do their jobs increases with their career progression along the formal or informal hierarchy of the firm.

A third limitation of our data stems from the grid of cross-evaluations between operational

units imposed by the bank management. If a banker had "substantial business interactions" with someone working in a unit outside the designated set, he or she would not be able to acknowledge this instrumental tie. While this possibility is not very likely given the broad matching between units based on task interdependence, it cannot be completely ruled out. Yet, the potential unobserved heterogeneity in the bankers' networks that could result from these limitations is partly accounted for by our using a multilevel model with random intercepts, which incorporates the nested nature of the data and hence for the effect that the focal banker's unit (and therefore the corresponding risk set) might have on his/her performance and instrumental network.

We have argued that the personal affinity and positive affect associated with homophilous ties should help bankers in the lowest echelons of the formal and informal hierarchy to access task-relevant information, leading to a positive relationship between homophily and performance for those bankers. Yet, several scholars have also shown that the willingness to help is positively associated with the strength of the tie between two parties (Uzzi, 1996, 1997; Hansen, 1999), which is likely to be higher between similar parties. It is thus possible that the positive relationship between homophily and performance observed for low-status bankers captures the unobserved effect of tie strength. While we cannot rule out this possibility due to the lack of a reliable measure of tie strength, three reasons lead us to believe that tie strength is unlikely to play a major role in explaining our results. First, the positive affect and personal affinity associated with homophilous ties does not necessarily result in strong ties, as such ties also require a relatively long period of frequent interactions (Granovetter 1973; Marsden and Campbell 1984). Second, most of the bankers who seem to benefit from homophilous relationships (typically, low status associates) may not be able to wait until their relationships with similar others become strong ties, if they indeed ever become strong ties. This is especially the case in an environment in which people and relationships are constantly reshuffled, slowing down the emergence of strong personal bonds.[3] Finally, strong ties are less likely to occur across formal or informal hierarchical levels (Lazega and Van Dujin 1997), whereas those are precisely the ties that

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[3] Analyzing similar data, Burt (2007) reports that about 70 percent of the instrumental relationships between bankers are new each year, including those that were evaluated as "outstanding" the year before, reflecting the highly dynamic nature of instrumental ties in this industry.

may be more helpful for the low-status bankers who seem to benefit from homophilous relationships. Therefore, it is unlikely that the positive effect of homophily reported in this study would result from the (unobserved) effect of strong ties.

In seeking to elucidate the relationship between choice homophily and performance, our research contributes to our understanding of the possible mechanisms through which this relationship operates. Relying on similar people can be an effective survival strategy for people facing significant difficulties in securing access to the help and information that they need to carry out their jobs in the organization. At the same time, continuing to rely on similar others when it is no longer necessary (for example, when organizational actors can secure that access due to their formal and informal status) can harm performance, because it can detract such actors from leveraging diverse resources and information that are critical to succeeding in their jobs. As is the case with other properties of informal networks, whether homophilous ties help or hinder someone's performance depends on critical contingencies, in this case on the position the actor occupies in the formal and informal structures of the organization.

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Table 1: Variables in the Logistic Regressions Predicting Instrumental Ties

	Variable	Operationalization
Hierarchy, reporting, and rank related controls	Same direct report	Dummy variable, coded 1 if ego and alter share the same direct report
	Direct report	Dummy variable, coded 1 if there is direct reporting relationship between ego and alter
	Ego is MD	Dummy variable, coded 1 if ego is a Managing Director
	Ego is ED	Dummy variable, coded 1 if ego is an Executive Director
	Ego is DIR	Dummy variable, coded 1 if ego is a Director
	Ego higher rank than alter	Dummy variable, coded 1 if ego has higher formal rank than alter
	Ego lower rank than alter	Dummy variable, coded 1 if ego has lower formal rank than alter
Firm-level controls for demographics	Similar age range in firm	Number of people in the bank whose age is within 1 standard deviation of ego's age (i.e. +/-3 years of ego's age)
	Same gender in firm	Number of people in the bank who are the same gender as ego
	Same nationality in firm	Number of people in the bank who are the same nationality as ego
Induced homophily controls in risk set	Similar age range in risk set	Number of people in ego's risk set whose age is within 1 standard deviation of ego's age (i.e. +/-3 years of ego's age)
	Same gender in risk set	Number of people in ego's risk set who are the same gender as ego
	Same nationality in risk set	Number of people in ego's risk set who are the same nationality as ego
Age, tenure, and gender controls for ego and alter	Alter gender	Dummy variable, coded 1 if alter is male
	Ego age	Ego's age
	Alter age	Alter's age
	Ego tenure	Number of years ego has been with the firm
	Alter tenure	Number of years alter has been with the firm
	Tenure difference	Log of the difference between the tenure of ego and alter
Reciprocity and Common Third Parties (Indirect ties) controls	Alter rated ego	Dummy variable, coded 1 if alter rated ego
	Common third parties	Number of bankers who are connected (either by rating them or being rated by them, i.e. ties in either direction suffice) to both ego and alter
Average rating received (quality) controls for ego and alter	Ego average rating received	Mean evaluation received by ego across those who rated the ego
	Alter average rating received	Mean evaluation received by alter across those who rated the alter
Similarity indicators (to measure choice homophily)	Same nationality	Dummy variable, coded 1 if ego and alter have same nationality
	Same gender	Dummy variable, coded 1 if ego and alter have same gender
	Alter age within one standard deviation range	Dummy variable, coded 1 if alter's age is within 1 standard deviation of ego's age (i.e. +/-3 years of ego's age)
Same city, same unit, and same function controls	Same city	Dummy variable, coded 1 if ego and alter work in the same city
	Same operational unit	Dummy variable, coded 1 if ego and alter work in the same unit
	Same function	Dummy variable, coded 1 if ego and alter work in the same function (e.g. Research, etc…)
Indegree and outdegree (network size) controls	Colleagues cited by ego	Number of colleagues rated by ego
	Colleagues citing ego	Number of colleagues rating ego
	Colleague cited by alter	Number of colleagues rated by alter
	Colleagues citing alter	Number of colleagues rating alter
Size of opportunity set control	Ego risk set size	Number of people in ego's risk set

Note: In our homophily measure calculations, the full logistic regression model includes all the variables listed above. The reduced model for nationality includes all the variables except *Same nationality*, the reduced model for gender includes all the variables except *Same gender*, and the reduced model for age includes all the variables except *Alter age within one standard deviation range*. For rank of ego, *Ego is AD* was the baseline category (omitted). For gender, *Ego gender* was omitted (since with *Alter gender* and *Same gender* not all three can be included). For rank comparison, the baseline category (omitted) is *Ego is the same rank as alter.*

	Variable	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Performance	0.41	0.39																			
2	Nationality Homophily	0.00	1.00	-0.04																		
3	Age Homophily	0.00	1.00	0.08	0.02																	
4	Gender Homophily	0.00	1.00	-0.07	0.03	0.05																
5	Status	0.00	0.32	0.64	0.00	0.11	-0.05															
6	Age	35.38	6.51	0.26	0.02	0.00	0.04	0.19														
7	Tenure	1.67	0.83	0.16	-0.01	0.02	0.00	0.22	0.35													
8	Gender	0.16	0.37	-0.15	-0.01	0.02	0.05	-0.04	-0.10	-0.12												
9	Associate Director (AD)	0.35	0.48	-0.50	0.04	-0.01	0.06	-0.30	-0.36	-0.18	0.15											
10	Director (DIR)	0.38	0.49	-0.14	-0.03	-0.04	-0.04	-0.17	0.02	-0.06	-0.03	-0.57										
11	Executive Director (ED)	0.19	0.39	0.30	-0.02	0.01	0.00	0.08	0.24	0.16	-0.09	-0.35	-0.38									
12	Managing Director (MD)	0.08	0.28	0.69	0.02	0.08	-0.04	0.70	0.25	0.20	-0.07	-0.22	-0.24	-0.14								
13	Avg. rating received (ego)	0.00	0.35	0.13	-0.07	0.03	0.04	0.01	-0.08	0.01	-0.03	-0.13	0.05	0.11	-0.02							
14	Avg. rating received (alters)	2.68	0.07	0.05	0.01	0.00	0.08	-0.15	0.03	0.03	0.05	0.08	-0.07	-0.03	0.03	0.09						
15	Direct reports	1.07	3.21	0.48	-0.02	0.05	-0.03	0.41	0.16	0.17	-0.11	-0.24	-0.16	0.16	0.46	0.09	0.01					
16	Network size acquirer	4.09	0.79	0.15	-0.13	0.03	-0.10	0.28	-0.08	0.12	-0.09	-0.23	0.09	0.22	-0.09	0.16	-0.19	0.10				
17	Network size provider	4.03	0.75	0.59	-0.08	0.08	-0.06	0.79	0.14	0.23	-0.06	-0.37	-0.08	0.20	0.50	0.13	-0.14	0.33	0.53			
18	Network density acquirer	3.58	0.36	0.03	0.06	0.00	0.05	-0.06	0.09	-0.08	0.05	0.09	-0.06	-0.21	0.25	-0.15	0.05	0.02	-0.64	-0.21		
19	Network density provider	3.65	0.40	-0.50	-0.03	-0.06	-0.01	-0.63	-0.13	-0.21	0.03	0.25	0.15	-0.17	-0.46	-0.12	-0.06	-0.28	-0.27	-0.63	0.47	
20	Reciprocal ties	0.35	0.14	-0.29	-0.02	-0.02	-0.02	-0.30	-0.16	-0.11	-0.03	0.05	0.16	0.02	-0.39	0.11	-0.09	-0.10	0.20	-0.11	0.17	0.48

- $N = 1745$. Correlations stronger than $|0.05|$ are significant at $p < 0.05$.

Table 3: Multi-level Estimations of the Contingent Relationship between Choice Homophily and Performance

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
			Nationality		*Gender*		*Age*	
Nationality homophily		-0.001	-0.070***	-0.006	-0.002	-0.002	-0.002	-0.002
		(0.004)	(0.017)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Gender homophily		0.004	0.004	0.004	0.029	-0.008	0.004	0.004
		(0.004)	(0.004)	(0.004)	(0.052)	(0.007)	(0.004)	(0.004)
Age homophily		0.005	0.006	0.005	0.005	0.006	0.005	0.007
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Status	0.155***	0.154***	0.162***	0.157***	0.154***	0.145***	0.155***	0.157***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Age	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tenure	-0.041***	-0.041***	-0.042***	-0.042***	-0.041***	-0.041***	-0.041***	-0.041***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Gender	-0.042***	-0.043***	0.042***	-0.042***	0.043***	-0.043***	0.043***	-0.043***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Associate Director (AD)	-0.857***	-0.860***	-0.867***	-0.884***	-0.863***	-0.857***	-0.860***	-0.859***
	(0.039)	(0.039)	(0.039)	(0.039)	(0.040)	(0.039)	(0.039)	(0.039)
Director (DIR)	-0.692***	-0.694***	-0.702***	-0.718***	-0.698***	-0.691***	-0.694***	-0.693***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.039)	(0.038)	(0.038)	(0.038)
Executive Director (ED)	-0.439***	-0.441***	-0.449***	-0.464***	-0.445***	-0.438***	-0.441***	-0.440***
	(0.037)	(0.037)	(0.037)	(0.037)	(0.038)	(0.037)	(0.037)	(0.037)
Avg. rating received (ego)	0.095***	0.094***	0.093***	0.094***	0.094***	0.094***	0.094***	0.094***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Avg. rating received (alters)	0.271***	0.269***	0.265***	0.272***	0.269***	0.269***	0.269***	0.271***
	(0.071)	(0.071)	(0.070)	(0.070)	(0.071)	(0.071)	(0.071)	(0.071)
Direct reports	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Network size acquirer	0.019	0.018	0.019^{+}	0.019^{+}	0.018	0.017	0.018	0.018
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Network size provider	0.050***	0.050***	0.050***	0.049***	0.050***	0.052***	0.049***	0.049***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Network density acquirer	0.041	0.040	0.040	0.037	0.040	0.038	0.039	0.039
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Network density provider	-0.037	-0.037	-0.035	-0.035	-0.038	-0.036	-0.037	-0.037
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Reciprocal ties	-0.158***	-0.155**	-0.155**	-0.152**	-0.155**	-0.157**	-0.154**	-0.155**
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
Homophily * Status				-0.065***		-0.077*		-0.006
				(0.014)		(0.036)		(0.009)
Homophily * AD			0.082***		-0.026		-0.003	
			(0.019)		(0.052)		(0.013)	
Homophily * DIR			0.069***		-0.024		0.009	
			(0.018)		(0.052)		(0.012)	
Homophily * ED			0.069***		-0.024		-0.010	
			(0.021)		(0.053)		(0.018)	
Constant	0.254	0.271	0.285	0.298	0.274	0.270	0.280	0.269
	(0.250)	(0.251)	(0.250)	(0.249)	(0.251)	(0.250)	(0.251)	(0.251)
N	1745	1745	1745	1745	1745	1745	1745	1745

All models include unreported fixed-effects (46 indicators) for the nationality of the banker. These multi-level models account for unit-level differences in the outcome variable (as captured by differences in constants, referred to as "random-intercept", similar to how unit-fixed effects would work for OLS models).

For ease of presentation, in the interactions with *Status* and the formal rank indicator variables (shaded in the table, at the bottom), the variable labeled *Homophily* refers to *Nationality [choice] homophily* in Models 3-4, *Gender [choice] homophily* in Models 5-6, and *Age [choice] homophily* in Models 7-8.

Two-tailed tests *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Standard errors are in parentheses.

Figure 1: Plot of the interaction between Nationality homophily and Status
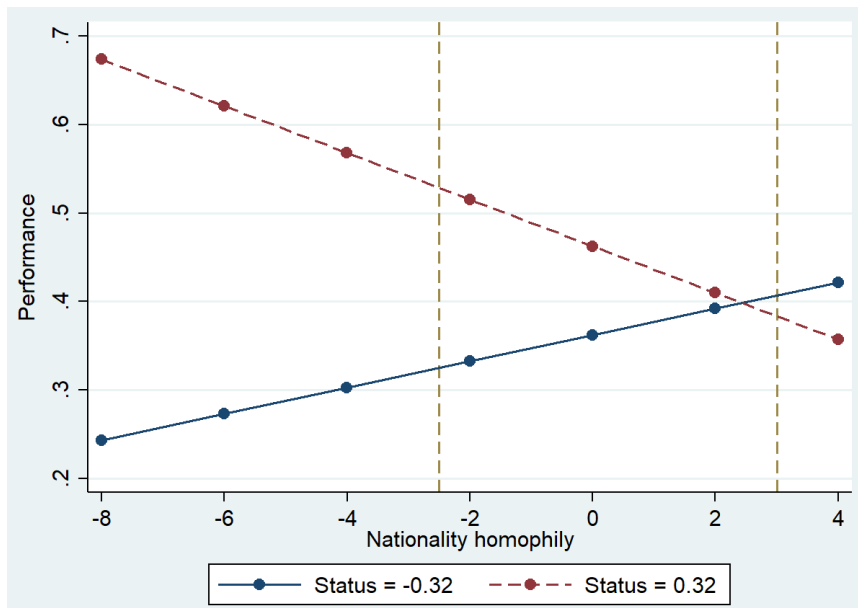
Note: The figure displays estimates of performance for bankers with high (mean plus one standard deviation, dashed [red] line) and low (mean minus one standard deviation, solid [blue] line) status. The vertical dashed lines delimit the region comprising 98 percent of our observations.

Figure 2: Plot of the interaction between Gender homophily and Status
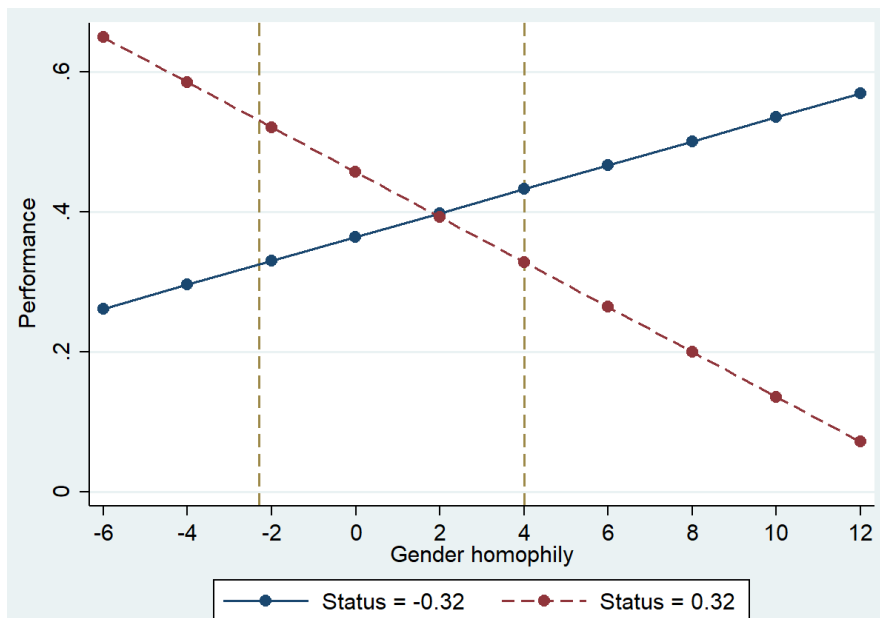
Note: The figure displays estimates of performance for bankers with high (mean plus one standard deviation, dashed [red] line) and low (mean minus one standard deviation, solid [blue] line) status. The vertical dashed lines delimit the region comprising 98 percent of our observations.

Gokhan Ertug is associate professor strategic management at the Lee Kong Chian School of Business, Singapore Management University. He received his Ph.D. from INSEAD. His research interests include social networks, status, reputation, and international business. email: gokhanertug@smu.edu.sg

Martin Gargiulo is a Professor of Entrepreneurship at INSEAD (Asia Campus) in Singapore. He received his Ph.D. in Sociology from Columbia University in New York. His research focuses the effects of social networks on individual and organizational performance, with emphasis on how actors use networks strategically to manage resource dependence relationships. He also examines the interplay between social structures and individual behavior and its effects on the dynamics of interpersonal and interorganizational networks. **Address**: INSEAD, 1 Ayer Rajah Avenue, Singapore 138676; email: martin.gargiulo@insead.edu.

Charles Galunic (charles.galunic@insead.edu) is a professor of organizational behavior and the AVIVA chair in leadership and responsibility at INSEAD. He received his Ph.D. from Stanford University in industrial engineering and engineering management. His research interests are at the crossroads of OMT and strategy, exploring the microfoundations of strategic advantage, with a concern for the performance implications and benefits of structures (e.g., networks) and processes (e.g., innovation/recombinations) within organizations.

Tengjian Zou is a PhD candidate in Strategic Management and Organization at Lee Kong Chian School of Business, Singapore Management University. His research interests include social networks, status, and reputation. email: tengjianzou.2015@pbs.smu.edu.sg