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Network advantage: Uncontested structural holes and organizational performance in market crises

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Abstract

Research Summary: We examine how crisis conditions affect the link between structural holes and organizational performance. Since brokerage offers early access to diverse perspectives and autonomy in exchange relations, the benefits of brokerage should rise when crises erupt. However, evidence on the subject has been inconclusive, raising the question of whether crisis actually imposes a boundary condition on structural hole theory. Using longitudinal data on investment banks, and exploiting the 2000 dot.com crisis as well as the 2008 financial crisis, we explore whether crises moderate the favorable effect of brokerage on performance. Our results reveal that only exclusive, and not shared, structural holes are advantageous for performance, as they facilitate ambidextrous responses to crisis. Implications for brokerage theory and new research on crisis are discussed.

Managerial Summary: Crises, in the form of pandemics, wars, or market crashes, affect the relationship between a firm's position in collaboration networks and its future performance. Our analyses bring into focus a finding of interest to managers of firms operating as brokers in these networks: when a crisis erupts, a firm that serves as the *sole* bridge between its otherwise disconnected collaborators performs especially well. Uncontested by other intermediaries, such firms achieve a better mix of search and stability, and thus higher performance, amidst crisis. These advantages disappear when other intermediaries are present. This implies that firms frequently exposed to crisis may benefit from constructing entry barriers around their bridging positions in collaboration networks.

KEYWORDS

ambidexterity, brokerage, market crises, networks, structural holes

1 | INTRODUCTION

Crises are “sudden, unexpected, and massively disruptive” events (Wenzel, Stanske, & Lieberman, 2020, p. V8). Crises, such as financial meltdowns, terrorist attacks, disease outbreaks, wars, or other episodes in which “society and normal operations are interrupted” (Hällgren et al., 2018, p. 136) raze established opportunities, while also creating new ones. A clear though untested implication of a large body of network theory is that brokers are especially well-suited for the extreme conditions of change, scarcity, and uncertainty that abrupt, “fast-burning” crises (Boin et al., 2021; 't Hart & Boin, 2001) bring about. In such conditions, as industry dynamics destroy old priorities (Madhavan et al., 1998), brokers appear positioned both to navigate the resulting uncertainty (Podolny, 2001) and to cultivate the best opportunities (Burt, 2000). Since brokerage positions offer early access to diverse perspectives as well as autonomy in exchange relations (Burt, 2021), it is easy to imagine occupants of such positions moving more flexibly than their peers to safe havens when crises erupt. Unlike firms trapped in tightly intertwined networks, brokers appear poised to see their network-based advantages amplified, not weakened, in exigent circumstances.

In this article, we address the following question: how does crisis affect the link between brokerage[1] and firm performance? Pursuing answers to our research question is important for two main reasons. First, our overarching motivation is that we want to clarify boundary conditions on structural hole theory. Second, our inquiry presents an opportunity to explore the *kind* of brokerage—shared or exclusive (Burt, 2015)—that may be most beneficial in crisis conditions.

Establishing boundary conditions—which address the “who, where, and when” features of a theory—is vital for the advancement of any theory. Boundary (or scope) conditions “place limitations on the propositions” that a theory generates (Whetten, 1989, p. 492) and so highlight the different degrees to which that theory fits empirical reality (Busse et al., 2017). Identifying such limitations and degrees-of-fit is particularly important for structural hole theory, since it

[1]One might distinguish between *structural holes*, a feature of network position, and *brokerage*, an action taken by virtue of occupying a position marked by structural holes. While recognizing the different emphases implied by these definitions, in this study we use these two terms interchangeably. We do so because, in examining responses to crises, separating between the action driven by position in the structure from the structure itself does not affect our theoretical narrative or empirical tests.

has long been clear that whether or not brokers can mobilize the resources latent in their networks hinges on the nature of the broader environment in which those networks reside. Middle-range research in this vein has demonstrated that environments marked by competitive crowding (Burt, 1997) and discrimination (Burt, 1998), as well as by cooperative norms (Ahuja, 2000) and collectivist culture (Xiao & Tsui, 2007), all oppose brokers' capacity to cultivate opportunities otherwise afforded by the gaps they span. However, earlier explorations of the "territory" (Dubin, 1978, p. 134) in which the predictions of structural hole theory receive empirical support have ignored *crisis*. Given the mounting prevalence of crises in recent years (Taleb, 2007; Wenzel, Krämer, et al., 2020), empirical tests of whether crisis imposes a boundary condition on structural hole theory are particularly important.

This gap in the literature is striking, given the parallels between the specific disruptions that crises cause (Wenzel, Stanske, & Lieberman, 2020) and the mechanisms by which structural holes confer competitive advantage. Here we sketch these disruptions and associated mechanisms, to offer brief theoretical scaffolding for the exploratory, question-driven approach (Graebner et al., 2022) we adopt.

Specifically, two main disruptions caused by crises which are most relevant to brokerage are *scarcity* and *uncertainty*. In a crisis, existing business opportunities and related resources suddenly dry up, at the same time that long-standing "skills and capabilities important for competitive advantage" become less relevant (Koka & Prescott, 2008, p. 643), making it unclear where and how to proceed (Pearson & Clair, 1998). In the face of scarcity in resources and capabilities, a brokerage position offers an array of differentiated options with various unconnected partners for pursuing new opportunities. Brokers are thus better situated than their constrained rivals when "slack resources, whether internally or externally … become scarce rather quickly in times of crisis" (Wenzel, Stanske, & Lieberman, 2020, p. v15). Brokers' wider choice-sets (Gulati et al., 2000) contribute to a safety net useful for making considered, rather than rash, decisions about how best to proceed in scarcity (cf. Kozyrkov, 2020).

In the face of uncertainty over the future course of action, brokers are again advantaged. Structural holes are valuable for resolving "egocentric" uncertainty—"the uncertainty that the producer has regarding market opportunities and the set of resource allocation decisions that will best enable the producer to realize those opportunities" (Podolny, 2001, p. 37). In stable, non-crisis situations, firms in industries and market segments marked by egocentric uncertainty benefit from brokerage. Brokerage benefits should grow even more pronounced during crises, when egocentric uncertainty is extreme. Brokers' resilience in the face of uncertainty and capacity to recombine productively seemingly divergent interpretations of market realities (Burt, 2021, pp. 386–387) are conducive to updating their strategic premises (Wenzel, 2015) and finding and moving to new fitness peaks made necessary by crisis.

Brokers' innovative responses to scarcity and uncertainty are further complemented by their autonomy in exchange relations. Unconstrained by social obligations pervasive in closed networks (Gargiulo & Benassi, 2000), brokers are more flexible when considering different opportunities. They have more latitude in negotiating and managing their relationships than non-brokers. To realize the benefits inherent in these relationships, brokers can bring other actors together or keep them apart. This in turn offers brokers freedom to redesign their collaborative ties when needed, aiding "generative resilience" marked by "bouncing forward" in response to the disruptions of crisis (Burt & Soda, 2021; Grandori, 2020, p. 495).

Despite the simple, intuitive appeal of the preceding theoretical argument, prior work on the benefits of brokerage in turbulent—although less severe—environments imply that the moderating effect of crisis on the brokerage–performance relationship is not as straightforward as existing theory might predict. In particular, using cross-industry comparisons, Rowley et al. (2000) found empirical support for the benefits of dense connections among a firm's partners in stable environments but not for the benefits of sparse connections in turbulent environments. In addition, using cross-temporal comparisons, Koka and Prescott (2008) showed that firms in networks marked by non-redundancy and diversity do better than their less entrepreneurially positioned rivals during a moderate legislative change, but not amidst a more disruptive technological change. Such mixed results, which indicate that greater environmental turbulence need *not* tighten the brokerage-performance link, underscore the importance of addressing our research question.

Using longitudinal network data on investment banks (Shipilov & Li, 2012), we examine the effect of brokerage on performance amidst the severe turbulence brought on by a crisis. To do so, we develop a difference-in-differences design in which matched sets of firms move along parallel paths across time—until the treatment group suffers a sudden crisis, while the control group does not. We exploit the dot.com crisis of 2000 and in our appendices we also explore the housing crisis of 2008—each of which was severely disruptive for treated banks. In the discontinuous change that marked both these events, banks underwent a phase transition in scarcity and uncertainty as once-lucrative opportunities evaporated. Using three-way interactions between brokerage, year, and treatment, we compare crisis-ridden firms with otherwise comparable "twins" un-implicated in the crisis across time. Our approach allows us both to focus on within- versus between-firm effects of brokerage and to disentangle the effects of crisis from those of other kinds of temporal heterogeneity.

Our empirical design also helps us to examine the *type* of brokerage that may prove most beneficial in crisis conditions. We thus explore another boundary condition beyond the state of the environment. We believe that, in addition to the "where" and "when" of crisis at the macro level (Busse et al., 2017; Whetten, 1989), the "who"—the kind of broker—also warrants attention at the micro level. Various studies of networks have recently drawn a distinction between two kinds of brokerage and associated types of structural holes: structural holes spanned mutually with other third parties (i.e., "shared brokerage") versus structural holes uniquely bridged by just one firm (i.e., "exclusive brokerage"). We depict shared brokerage through the gap spanned by *K* (and by other firms) on the left of Figure 1. We illustrate exclusive brokerage by the gap bridged only by *J* on the right. Numerous researchers have described the other firms, *W*, *X*, and *Z* structurally equivalent to *K* as "partners" (Burt, 2015), "shadow egos" (Everett & Borgatti, 2020; Graham et al., 2022), and "alternative brokers" (Becker & Bodin, 2022). In contrast to *K*, *J* is a "sole mediator" (Hamilton et al., 2020) and represents exclusive brokerage.

The network literature has offered conflicting predictions on whether exclusive brokerage is more advantageous than shared brokerage in crisis conditions. On the one hand, there is prior work suggesting that exclusive brokerage is a liability. If crisis-related disruptions call for collaborative navigation to safe havens, then the exclusive broker is disadvantaged: the sole mediator lacks "partners" that are otherwise valuable for facilitating coordination across structural holes (cf. Burt, 2015, p. 151). Sole mediators also face the risks of lower trust among their contacts and correspondingly higher transaction costs (Hamilton et al., 2020, p. 8), which can in turn limit their access to new capabilities otherwise accessible in a diverse network (Koka & Prescott, 2002). And if inter-organizational cooperation drops overall in crisis (Federo & Bustamante, 2022), it is access to alternative brokers, not exclusivity, that should differentiate the focal broker, signaling its attractiveness as a collaborative exchange partner.

On the other hand, a different body of research suggests just the opposite, that exclusive brokerage is an asset when crisis hits. Suppose that crisis calls for—even licenses—a shift in

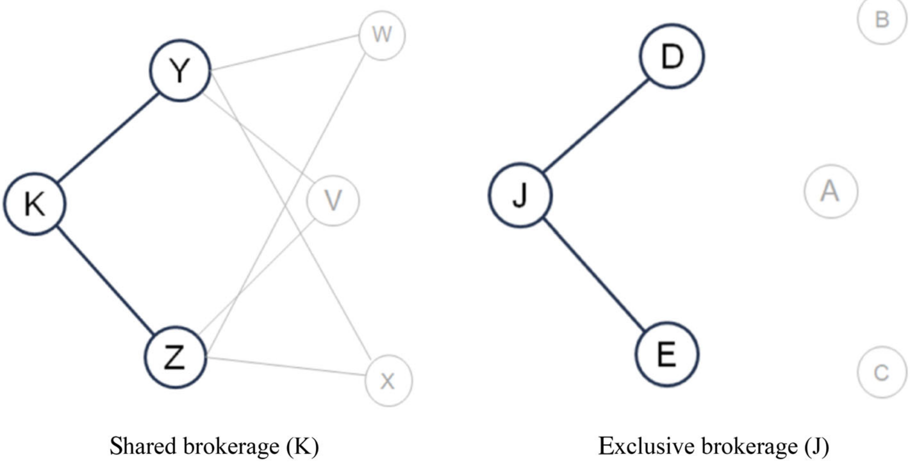

FIGURE 1 Two kinds of brokerage positions.

brokering behavior (Quintane & Carnabuci, 2016) from cooperative to opportunistic—that is, from coordinating to gatekeeping (Gould & Fernandez, 1989), from joining to separating (Obstfeld, 2005), or from collaborating to arbitraging (Soda et al., 2018). Insofar as these are the dominant behavioral shifts that could lead to performance improvements when crises burst forth, lurking third-parties may become like "the little foxes … that spoil the vines" (Song of Solomon 2, v. 15). It is then that the exclusive broker—not unlike a wolf unencumbered by diffuse competition with foxes—will outperform others.

Given these competing predictions, we do not derive and test a formal hypothesis on the kind of brokerage most conducive to firm performance in crisis conditions. In the analyses that follow, we instead address our research question by estimating a set of empirical models that begin by examining how crisis moderates the effect of brokerage as it is usually operationalized as network constraint (Burt, 1992). Although widely used to capture structural holes, constraint cannot distinguish between shared and exclusive brokerage. Consequently, we then use ego-network betweenness, calculated based on the "immediate network" around the ego (Burt, 2010, p. 239; Burt, 2015; cf. Freeman, 1977) to see if exclusive as distinct from shared brokerage is an asset or liability during two market crises.

More generally, we proceed at the boundary between abductive and inductive research orientations. Our approach is abductive in that we seek through a series of analyses to develop a plausible explanation that is "locally relevant" (Behfar & Okhuysen, 2018, pp. 325–326) to the main brokerage-related processes in the crisis conditions we study. Our investigations reveal that exclusive, not shared, brokerage is an asset for performance in these crises. Our analyses show further that firms marked by exclusive brokerage adopted an ambidextrous approach in their strategic responses to crisis conditions: they formed new business relationships, while simultaneously maintaining their activities in known sectors.

Our approach is also inductive in that we conclude with propositions for future research that we hope will contribute to a "general explanation or theory" (Behfar & Okhuysen, 2018, p. 325) of how brokerage affects performance amidst crisis. Our propositions center on the claim that, in contexts beset with sudden scarcity and acute uncertainty, exclusivity (or absent competition) surrounding structural holes is vital for realizing brokerage advantages. The absence of crowding in exclusive structural holes facilitates network brokers' adaptability, enabling them to strike an ambidextrous balance between strategic stability and renewal. In highlighting these insights, our research contributes to both the brokerage and crisis literatures, while also opening up avenues for further exploration. We hope that future research will explore the benefits of exclusive brokerage in countering strategic myopia in crises, and will also examine alternative environments that share similar characteristics with crises, where exclusive brokerage may also confer advantage.

2 | METHODS AND RESULTS

2.1 | Overview of empirical settings

We examine our research question by using longitudinal data on the underwriting activities of investment banks on the U.S. market. When underwriting new issues, investment banks often form syndicates to buy securities from issuers and then sell them to investors. A syndicate is led by one or a group of investment banks—the lead(s)—who work directly with the issuer. The lead(s) is also responsible for inviting other banks—the co-lead(s)—to join the syndicate. Co-leads contribute their own capital to the deal, but take a more passive role in the syndicate.

In this banking sector, collaboration opportunities and information about (potential) clients, partners, and investors are two vital resources determining the survival and growth of banks (Shipilov & Li, 2012). Access to these resources depends heavily on the ties and positions of banks in the syndication networks, making this empirical domain an appropriate context for our study.

To examine causal evidence that crises influence the favorable effect of brokerage on future firm performance, we design a quasi-experimental study that leverages the exogenous shock of the dot-com crisis in 2000. In the appendix, we conduct an additional study in which we exploit the financial crisis in 2008 and use the demise of four axial banks—Bear Stearns, Lehman Brothers, Merrill Lynch, and Wachovia—as a natural experiment. Our objective in studying two contexts is to determine whether our findings are consistent across a range of crises.

2.2 | The dot-com bubble as a natural experiment

As a stock market bubble, the dot-com market crash significantly altered the equity underwriting business landscape in 2000. Before the crash, in particular between 1996 and 1999, the Internet sector was the most rapidly growing and fruitful market segment of the equity underwriting market, with returns spiking up to over 1000 percent (Ofek & Richardson, 2003). After the bubble burst in 2000, however, these returns entirely vanished. Many (potential) Internet-related clients went bankrupt and investors lost their appetite for Internet-based companies. Investment banks working with Internet-related clients had to cancel many of their previously planned public offerings, and were also not able easily to find new underwriting deals in the Internet sector.

The severe but sector-specific consequences of the dot-com crisis unexpectedly assigned investment bank to two groups: a treatment group consisting of banks exposed to Internet-based stock offerings in 1999–2000 and thus affected by the crisis, and a group comprised of banks that did not engage in any Internet-related business deals during that period and so did not suffer the crisis effects. Our interest is in how the performance-favorable effects of brokerage changed for a bank exposed to the crisis when that crisis hit the market. One potential approach to examining this question would be to perform a before-and-after-crisis comparison of the effects of brokerage for investment banks in the treatment group. However, such an approach cannot distinguish the effect of crisis from other time-varying factors, such as shifting macroeconomic conditions, which may also shape the effects of brokerage. Another approach is to consider the differences in the effects of brokerage on performance between treated banks and control banks *only* after the crisis hit the market. This approach, though, is subject to concerns related to endogeneity: unobserved heterogeneity, such as differences in attitudes toward risk, may both drive the selection of investment banks into the treatment group and influence the benefits of brokerage. To address these issues, in this study we quantify the impact of the dot-com crisis on the performance-favorable effects of brokerage through a difference-in-differences (DID) model. We assume that the control and treatment groups follow parallel pre-treatment trends—an assumption that we reinforce through Coarsened Exact Matching, as we explain later. We then take the differences in the before-and-after-crisis changes in the effects of brokerage between two groups as the impact of the crisis.

One may argue that the dot-com crisis is not a purely exogenous treatment and thus that it cannot serve as a natural experiment for our DID study. Specifically, one could suggest that the market crash was created by those investment banks in the treatment group, which led the public offerings of Internet-based companies pre-crisis. It is certainly the case that all banks were well aware of the increase in the valuation of dot-com companies during the dot-com mania and participated in Internet business deals. However, as Alan Greenspan famously pointed out, we all know the course of a bubble in retrospect, but we never know when exactly the bubble will burst (Burniske & Tatar, 2017). Likewise, investment banks could choose to be involved in dot-com deals or to avoid them, but it was impossible for them to accurately predict when the bubble would end and how long the recession following the bubble would persist. Accordingly, it was less likely that investment banks could plan ex-ante to withdraw from the Internet segment, redesign their business strategy or restructure their syndicate ties based on the expectations of the arrival of the crisis in the early 2000. Therefore, we are persuaded that the timing of the dot-com crisis was unexpected and exogenous to individual investment banks. In addition, our use of a matched sample, in which the treated and the control banks were similar in a number of covariates at the time of crisis, supports the likelihood that we do not include in our DID estimation any outlier that had special market powers to induce and exploit the dot-com crisis for private benefits.

2.3 | Data and measures

2.3.1 | Data

Because the crisis mainly hit the equity market, in this study we collect data on all U.S. equity public offerings from 1985 to 2006 from the SDC Platinum database. Consistent with prior work, we aggregate all variables using rolling 2-year time windows. We do so in light of the possibility that some offerings may take 18 months to complete (Shipilov & Li, 2012). Our unit of analysis is therefore a bank-period in which period t represents a 2-year time window t and $t-1$.

2.3.2 | Network definition

We construct inter-bank networks based on banks' co-memberships in syndicates. We only consider two types of co-membership: between two leads or between a lead and a co-lead, as co-leads rarely interact with each other (Baum et al., 2005). Since the interaction is always stronger in a lead–lead relationship than in a lead-co-lead one, we assign a weight of 2 to a co-membership between two leads and a weight of 1 otherwise. Our networks also follow the 2-year moving time-window rule, and thus from 1985 to 2006, we have a total of 21 networks. The tie between two banks in the inter-bank network of time t is the weighted sum of their co-memberships in the syndicates during 2 years t and $t - 1$.

2.3.3 | Dependent variable

We operationalize bank performance at time t by the revenue of a bank during that period. This is the total dollar value (adjusted for inflation) that the bank receives from all of its deals during a particular time period. To calculate the dollar value that banks receive from each deal, we follow the approach of Jensen (2008). In particular, for each offering, we assign the proceeds to the syndicate members according to the following rule: the leads in the syndicate receive two shares of the dollar value of that deal and the co-leads receive a single share. For example, if a deal is worth a 100 million dollars and its underwriting syndicate consists of three banks—one lead and two co-leads—the lead will be assigned $2/4 \times 100 = 50$ million dollars and the other two co-leads will receive $1/4 \times 100 = 25$ million each. This approach is in keeping with the common observation that lead banks tend to underwrite more of the deal and earn more revenue relative to the co-lead banks. We label this variable as *Revenue* and take its natural log plus unity to correct for its highly skewed distribution.

2.3.4 | Independent variables

Given our interest in the kind of brokerage that is most valuable in crisis conditions, we not only measure access to structural holes but also distinguish between two types of structural holes: those that are exclusively accessed by the focal bank and those that are shared by the focal bank with other banks. We do so by using two measures of structural holes. The first is Burt's measure of constraint (Burt, 1992), which measures "the extent to which … time and energy are concentrated in a single group of interconnected colleagues—which means no access to structural holes" (Burt, 2010, p. 294). High values of constraint indicate that the bank has low structural holes in its ego network and that it is not occupying a brokerage position. Low values of constraint indicate that the firm is a broker.

While a typical measure of brokerage in the literature, constraint does not take into account the degree to which structural holes are subject to competitive crowding. Betweenness centrality (Freeman, 1977, 1979), on the other hand, "is a count of the structural holes to which a person has monopoly access" (Burt, 2010, p. 297) and thus it captures well the absence of competition in access to structural holes. Since we expect that a lack of competition-free brokerage opportunities may not matter in normal market situations, but may attenuate the effect of brokerage in a crisis, when many are "striving" for the holes (Buskens & van de Rijt, 2008), we use betweenness centrality as our second measure of brokerage and compare the effects of general brokerage captured by constraint with the effects of competition-free brokerage captured by betweenness.

We operationalize Burt's constraint and betweenness calculations over banks' ego networks. To compute the constraint measure of a bank i at time t, we first calculate the dependence level of i on each of its contacts j at t: $c_{ij} = \left(p_{ij} + \sum_q p_{iq} p_{qj}\right)^2$ where p_{ij} is the proportion to which i's network invested in the contact j directly and $\sum_q p_{iq} p_{qj}$ is the proportion of i's network invested in the contact j indirectly via contact q. Then we sum the dependence levels over all contacts of i to obtain the constraint measure $C_i = \sum_j c_{ij}$ of i at time t. To facilitate comparisons, we convert constraint to a measure of structural holes, creating the variable *brokerage* by taking $1 - C_i$.[2]

We operationalize betweenness using two different indices. Starting with binary networks, we calculate *unweighted betweenness* by computing the proportion b_{jki} of the shortest paths between two contacts j and k in i's ego network that pass through i and then by summing over all pairs of contacts: $B_i = \sum_j \sum_k b_{jki} = \sum_j \sum_k \frac{\text{number of } j-k \text{ shortest paths through } i}{\text{number of } j-k \text{ shortest paths}}$. This index is proposed by Freeman (1977, 1979) and is commonly used in the social networks literature.

Since Freeman measures are based on binary networks, one may be concerned that any differences between its effects and those of brokerage are driven by its reliance on unweighted networks and not by the nature of the access to structural holes. Therefore, we also calculate *weighted betweenness*—an index adapted to weighted networks by Burt (2015). In this index, the proportion b_{jki} in *unweighted betweenness* is replaced by "the extent to which communication between j and k through ego is strong and exclusive" (Burt, 2015, p. 153): $b_{jki} = (1 - z_{jk})(z_{ji} z_{ik}) / \left(z_{jk} + \sum_q z_{qj} z_{qk}\right)$ where z_{jk} is a normalized strength of connection between j and k. This index is closer to the *brokerage* measure and thus serves as a better basis for comparison.

We note also that both betweenness measures are continuous, rather than discrete, variables. This reflects the continuity of the exclusive brokerage concept. Earlier research has proposed that the greater the number of brokers spanning a single structural hole, the more intense the competition among them for the benefits of that structural hole (Burt, 2000). In this conception, the difficulty faced by the focal broker in extracting the benefits of the hole is continuously increasing with the number of shadow brokers also in contention. Continuous measures of exclusive brokerage allow us to capture these graduations in competitive intensity.

2.3.5 | Treatment variable

Our treatment variable, *Treatment*, is a dummy variable set to 1 if a bank was exposed to the dot-com bubble in the period 1999–2000, that is, did at least one public offering in the Internet sector in the period 1999–2000, and 0 otherwise. In the Online Appendix A3, we perform sensitivity analysis using different thresholds to define our treated group. Our findings generally hold in all cases.

[2]For "social isolates and dense networks of less than four contacts" (Burt, 2015, p. 152), C_i can be larger than 1, resulting in negative values for *brokerage*. Following the suggestion of Burt (2015), we assign the value of 1 to C_i and correspondingly 0 to *brokerage* in these cases. Our results show similar patterns when we use the unrefined calculation of C_i or the converted one.

2.3.6 | Control variables

We also construct several conditioning variables, which we include both in matching procedures and in our DID analysis, in order to strengthen the parallel-trend assumption.

Status, together with structural holes, is a central feature of network positions that affect performance. An organization's status—derived from patterns of deference relationships—acts as a prism through which other actors perceive its quality (Podolny, 2001). A firm with high status will find it easier to acquire capital (Stuart et al., 1999), to command higher prices (Askin & Bothner, 2016; Benjamin & Podolny, 1999), exercise bargaining power (Castellucci & Ertug, 2010), and hence to achieve high performance.

Since the formation of syndicate ties can be thought of as an act of deference—the fact that one bank has invited the other to collaborate means that the former defers to the latter for its competencies and resources (Podolny, 2005)—the status of a bank in syndicate networks will influence performance significantly and warrants inclusion as a control variable in our model. Following Podolny (2005), we measure *status* using Bonacich centrality (Bonacich, 1987), in which we set the beta term to 75% of the reciprocal of the largest eigenvalue of the inter-bank network in the focal year.

Volumes: Banks with higher volumes of deals had much of their capital tied up in underwriting around the time of the crisis, which would significantly hamper their ability to adapt. We thus constructed two additional variables: *Number of lead deals*—the number of times a bank participated in syndication as a lead in the focal period—and *Number of co-lead deals*—the number of times it participated as a co-lead member—to adjust for the sheer extent of the bank's underwriting business. Given the skewness in the distributions of these variables, we also take the natural log.

Isolates: Although forming syndicates is a common practice in this industry, banks can still underwrite public offerings on their own. If a bank always does business by itself, it will not have any connections in inter-bank networks and thus its *brokerage* measure is undefined. Following Burt (2015), we set the constraint scores in these cases to 1 and accordingly *brokerage* to 0, and add a dummy *Isolates* to our analysis as a further control. *Isolates* receive the value of 1 if a bank did not have any partners in a given 2-year window and 0 otherwise.

Inactive: As we operationalize over 2-year windows, banks may be absent from underwriting business in any one of these single years. We control for absence by two dummies: *Inactive in year t* and *Inactive in year $t-1$*. *Inactive in year $t-1$* is set to 1 if the focal bank did no underwriting in the first year of the 2-year window. For the period 1999–2000, for example, this would mean the absence of deals in 1999. Otherwise, this variable equals zero. *Inactive in year t* is equal to one if the focal bank did not do any underwriting in the second year of the 2-year window, that is, for the period 1999–2000, the focal bank did not do any deals in 2000.

We also include in our estimations fixed effects for firms and for time. Firm fixed effects account for heterogeneity in time-invariant unobserved characteristics of banks, which may enable them to acquire and place public offerings, while time fixed effects are necessary to absorb overall annual changes in the industry.

2.4 | DID estimation and matching procedure

In our DID analysis, we extend standard approaches in two main ways. First, since our interest is not in the direct impact of the crisis on future performance, but rather in how the crisis moderates the main effects of structural holes, we focus on interaction terms. Second, to examine the transience of crisis-by-structural holes interaction effects, we do not average the effects across years and focus on just two time periods: pre- and post-treatment. Instead, we observe the dynamics of the crisis's influence on the main effect of structural holes over multiple post-treatment periods. To do so, we modify the standard DID model (Imbens & Wooldridge, 2009) by including a set of three-way interactions between measures of structural holes, time dummies, and a treatment index. Our estimation models take the form:

$$Revenue_{i,\{t+1,t+2\}} = \tau_{\{t-1,t\}} I_{\{t-1,t\}} + \mu_i B_i + \alpha SH_{i,\{t-1,t\}} + \beta SH_{i,\{t-1,t\}} * Treatment_i + \gamma_{\{t-1,t\}} I_{\{t-1,t\}} * SH_{i,\{t-1,t\}} + \delta_{\{t-1,t\}} I_{\{t-1,t\}} * Treatment_i + \theta_{\{t-1,t\}} I_{\{t-1,t\}} * SH_{i,\{t-1,t\}} * Treatment_i + X_{i,\{t-1,t\}} \gamma + \varepsilon_{i,\{t+1,t+2\}}$$

where $Revenue_{i,\{t+1,t+2\}}$ is the future performance of bank i during time period $\{t+1, t+2\}$, $I_{\{t-1,t\}}$ is a time dummy for each time period $\{t-1, t\}$, B_i is a bank dummy, $SH_{i,\{t-1,t\}}$ is the structural hole measure of bank i in $\{t-1, t\}$, $Treatment_i$ is the treatment variable[3] and $X_{i,\{t-1,t\}}$ is a set of control variables. Our coefficient of interest is $\theta_{\{t-1,t\}}$.

We estimate three models for three measures of structural holes—*brokerage*, *unweighted betweenness*, and *weighted betweenness*. Since the dot-com crisis was bookended by the NASDAQ peak and trough in 2000 and 2002, respectively, in each model, we let time t range from 1998 to 2002, resulting in five 2-year periods with the first period (1997–1998) as the pre-treatment window and the baseline for our time dummies. The estimates $\theta_{\{t-1,t\}}$ then capture differences between the treatment group and the control group regarding changes in the effects of structural holes on future performance at $\{t-1, t\}$, compared with the baseline period. Consequently, coefficients $\theta_{\{t-1,t\}}$ for the post-treatment time—periods after 2000—reflect the moderating influence of the crisis on the main effects of structural holes.

To reinforce the assumption of parallel pre-treatment trends between treated and control banks, we perform Coarsened Exact Matching (CEM) procedures on our data. CEM works by approximating a fully-blocked randomized experimental design, such that the treatment and control sample are simultaneously balanced on all variables (Iacus et al., 2009). For each observation in the control and treatment groups, CEM attempts to calculate a matching weight that would determine the differences between the current observation and other observations. If the differences are too large, the focal observation is dropped from the analysis. We then use the matched samples and the weights for the retained observations in regression models to account for their similarity.

We match on the covariates: *status*, *number of lead deals*, *number of co-lead deals*, *brokerage*, and *isolates*. Tables 1a,b,c show the balance in the means of covariates in the period 1999–2000 before and after matching for three models with *brokerage*, *unweighted betweenness*, and *weighted betweenness* respectively. We see that, in the period 1999–2000, banks in the treatment group differed systematically from those in the control group. After matching, however, the treatment and control groups were virtually equal on all characteristics. Three matched samples, although smaller than the initial sample, help us reduce dissimilarity

[3]As *Treatment* does not vary within firm, its effect is fully absorbed by bank fixed effects. Therefore, we do not include *Treatment* separately in our estimation. This is unproblematic for our analysis and interpretation, since our interest is not the main effect of *Treatment* on future performance but time-varying interactions between *Treatment* and brokerage measures.

between the treated and control-group banks and thus reinforce the parallel trend assumption.[4]

3 | RESULTS

Table 2 presents descriptive statistics and correlations in three matched samples. Table 2a uses *brokerage* to operationalize structural holes, while Table 2b,c use *unweighted* and *weighted betweenness*. Most of the correlations are low (<0.7), except the correlation between *unweighted betweenness* and *status* in the *unweighted betweenness* sample (Table 2b) and *number of co-lead deals* and *status* in the *weighted betweenness* sample (Table 2c). We believe it is theoretically important to include them in the main analyses, but to test the sensitivity of our results to multicolinearity, we also run our regressions without *status* and *number of co-lead deals* as a robustness check. Our results do not change in these additional models, suggesting that multicolinearity is unproblematic.

We start our analysis with three within-bank models in which we use different structural hole measures to predict future revenue for a full panel over 10 years before the crisis, from 1987 to 1997. These models reveal how brokerage opportunities affect performance in non-crisis conditions. Table 3 presents the results of these models. The coefficient on *brokerage* (Model 1) is precisely estimated and positive, while *unweighted betweenness* (Model 2) and *weighted betweenness* (Model 3) are not.[5] These results are aligned with previous findings in the literature (Kwon et al., 2020), in which access to structural holes leads to higher economic returns, no matter how competitive the access.

Turning to DID models, in which we analyze changes in the effects of structural holes on future performance due to the crisis, the first three models in Table 4 present estimates for three measures of brokerage positions. In Model 4, we start with Burt's (1992) *brokerage* measure, which does not differentiate between *exclusive* and *shared* structural holes. Here, we see that the interaction of *Year* × *Treatment* × *brokerage* is negative and precisely estimated in 2000, with larger standard errors in the ensuing years.[6] This result suggests that banks with more access to *general* structural holes do not gain additional advantages in crisis conditions.

Model 5 replaces Burt's *brokerage* with *unweighted betweenness*. For the three-term interaction of *Year* × *Treatment* × *unweighted betweenness*, the effect is positive and precisely estimated in 2001 and 2002, indicating that the crisis amplifies the favorable effect of *exclusive* structural holes on subsequent bank performance. This effect holds, and even becomes stronger, when we use *weighted betweenness* to measure exclusive structural holes in Model 6.[7]

[4]We also use the dqd command in Stata (Mora & Reggio, 2015) to test the parallel assumption for our three models. The matched samples yield test results with $p = .39$ for *brokerage*, $p = .87$ for *unweighted betweenness* and $p = .39$ for *weighted betweenness*; we therefore accept the null hypothesis that the matched observations exhibit parallel trends in all models.

[5]Point estimate for *brokerage*: $b = 0.626$, $p = .000$, 95% CI: 0.316 to 0.937; point estimate for *unweighted betweenness*: $b = -0.015$, $p = .559$, 95% CI: −0.065 to 0.035; point estimate for *weighted betweenness:* $b = -0.014$, $p = .552$, 95% CI: −0.059 to 0.032.

[6]Point estimates of *Year* × *Treatment* × *Brokerage* for 1999: $b = -1.590$, $p = .063$, 95% CI: −3.267 to 0.087, for 2000: $b = -2.602$, $p = .036$, 95% CI: −5.030 to −0.174; for 2001: $b = -2.242$, $p = .097$, 95% CI: −4.893 to 0.409; and for 2002: $b = -2.443$, $p = .162$, 95% CI: −5.870 to 0.985.

[7]Point estimates of *Year* × *Treatment* × *Unweighted betweenness* for 1999: $b = -1.437$, $p = .458$, 95% CI: −5.244 to 2.369; for 2000: $b = -1.216$, $p = .681$, 95% CI: −7.022 to 4.590; for 2001: $b = 2.942$, $p = .016$, 95% CI: 0.555 to 5.330; and for 2002: $b = 3.428$, $p = .000$, 95% CI: 1.871 to 4.984.

Point estimates of *Year* × *Treatment* × *Weighted betweenness* for 1999: $b = -0.635$, $p = .686$, 95% CI: −3.723 to 2.453; for 2000: $b = -1.769$, $p = .465$, 95% CI: −6.528 to 2.990; for 2001: $b = 3.490$, $p = .007$, 95% CI: 0.944 to 6.036; and for 2002: $b = 5.344$, $p = .007$, 95% CI: 1.496 to 9.193.

TABLE 1 Matching results for models of the dot-com crisis

	Before matching			After matching		
	Means		Significance	Means		Significance
	Treatment	Control	|*t*-value|, *p*-value	Treatment	Control	|*t*-value|, *p*-value
1a. *Brokerage*						
Brokerage	0.697	0.257	15.56, $p = .000$	0.548	0.546	0.03, $p = .974$
Status	0.783	0.021	10.30, $p = .000$	0.064	0.069	0.37, $p = .708$
No. of lead deals (log)	1.705	0.250	20.17, $p = .000$	0.658	0.571	1.13, $p = .260$
No. of co-lead deals (log)	2.526	0.642	23.08, $p = .000$	1.563	1.491	0.59, $p = .555$
Isolates	0.014	0.303	7.48, $p = .000$	0.030	0.030	0.00, $p = 1.000$
Observations	144	594		66	340	
Hotelling test	$F = 139.221$, $p = .000$			$F = 1.372$, $p = .234$		
1b. *Unweighted betweenness*						
Unweighted betweenness	2.612	0.020	7.12, $p = .000$	0.035	0.034	0.06, $p = .954$
Status	0.783	0.021	10.30, $p = .000$	0.041	0.041	0.00, $p = .999$
No. of lead deals (log)	1.705	0.250	20.17, $p = .000$	0.547	0.506	0.55, $p = .586$
No. of co-lead deals (log)	2.526	0.642	23.08, $p = .000$	1.386	1.292	0.85, $p = .396$
Isolates	0.014	0.303	7.48, $p = .000$	0.033	0.033	0.00, $p = 1.000$
Observations	144	594		60	350	
Hotelling test	$F = 141.135$, $p = .000$			$F = 0.430$, $p = .828$		
1c. *Weighted betweenness*						
Weighted betweenness	2.744	0.021	6.68, $p = .000$	0.054	0.049	0.30, $p = .763$
Status	0.783	0.021	10.30, $p = .000$	0.051	0.052	0.13, $p = .894$
No. of lead deals (log)	1.705	0.250	20.17, $p = .000$	0.556	0.541	0.18, $p = .855$
No. of co-lead deals (log)	2.526	0.642	23.08, $p = .000$	1.385	1.292	0.73, $p = .468$
Isolates	0.014	0.303	7.48, $p = .000$	0.037	0.037	0.00, $p = 1.000$

TABLE 1 (Continued)

	Before matching			After matching		
	Means		Significance	Means		Significance
	Treatment	Control	$\lvert t\text{-value}\rvert$, p-value	Treatment	Control	$\lvert t\text{-value}\rvert$, p-value
Observations	144	594		54	291	
Hotelling test	$F = 141.453$, $p = .000$			$F = 0.361$, $p = .875$		

We illustrate our findings in Figure 2, in which we plot the total marginal effects of structural holes on future performance for the treated (red color) and the control banks (blue color) across our time range. These figures clearly demonstrate the advantages of treated banks with *exclusive* access to structural holes in the crisis. When the crisis hit, general structural holes exert similar effects on treated banks and control banks (Figure 2a), but the total marginal effects of exclusive structural holes for the treated group deviate significantly from the ones for the control group and grow positive in 2 years 2001 and 2002 (Figure 2b,c).

To evaluate the economic significance of our findings, we calculate the differences in changes in the revenue between the treatment group and the control group given a one standard deviation increase in structural hole measures. We measure changes in both absolute values and percentages. Details of our calculation are described in Online Appendix A2. The effect size of the dot-com crisis on the benefits of structural holes is substantial. For *general* structural holes (Model 4), a one standard deviation change in *brokerage* in the treatment group decreased revenue by 24.19% compared with the same change in the control group in 2000. Conversely, for *exclusive* structural holes (Model 6), a one standard deviation change in *Weighted betweenness* in the treatment group increased revenue by 4.98% (corresponding to 10.10 million USD) higher than the same change in the control group in 2001 and by 9.48% (corresponding to 30.50 million USD) higher in 2002. Taken together, the results suggest that *exclusive* access to structural holes is particularly helpful for firms in a crisis.

3.1 | Examining strategic responses

Guided by research on firms' responses to crisis (Wenzel, Stanske, & Lieberman, 2020) and on ambidexterity (March, 1991; Tushman & O'Reilly, 1996), we next examine the effects of exclusive brokerage on three alternative dependent variables: new partners, new clients, and sectoral stability. Wenzel, Stanske, & Lieberman (2020) describe two strategic responses—innovating and persevering—that, when pursued jointly, form an ambidextrous response (O'Reilly & Tushman, 2013). Such a response, as prior work suggests, will be advantageous in crisis conditions (Siggelkow & Rivkin, 2005). According to O'Reilly and Tushman (2021), p. 13), "organizations faced with disruption need to somehow compete in mature businesses where continual improvement and cost reduction are often the keys to success (exploitation) *and* pursue new technologies and business models that require experimentation and innovation (exploration)."

We start at the exploration side of the ambidexterity continuum with models predicting new partners and new clients. These analyses are important for determining whether exclusive brokerage is conducive to the strategic response that Wenzel, Stanske, and Lieberman (2020), p. V13) refer to as innovating or "conducting strategic renewal in response to crisis." In a crisis, when new capabilities are mandated and new resources must be found, brokers appear well-positioned to obtain these novel capabilities and resources. Control and information benefits (Burt, 1992, 2021) likely enable them both to flexibly acquire new partners and their skills and to offer the innovative solutions necessary to secure new clients. Such benefits may be particularly pronounced for exclusive brokers, which are unencumbered by diffuse competition from third parties in their efforts to explore.

Turning from exploration to exploitation, we also estimate models predicting strategic stability at the level of market sectors, a measure whose details we describe below, to investigate whether exclusive brokerage is conducive to exploitation or persevering in a known domain (Dunbar, 2000). Persevering—that is, preserving "the status quo of a firm's business activities in

TABLE 2 Descriptive statistics and correlations on matched sample for models of the dot-com crisis

	Max	Min	Mean	Std.	1	2	3	4	5	6	7	8
2a. *Brokerage*												
1. Revenue$_{t+1,t+2}$	9.248	0	3.227	2.516	1							
2. Brokerage	0.920	0	0.474	0.350	0.304	1						
3. Status	7.595	0	0.102	0.204	0.384	0.464	1					
4. Lead deals	5.198	0	0.630	0.777	0.328	0.582	0.627	1				
5. Colead deals	4.875	0	1.392	1.120	0.415	0.818	0.693	0.589	1			
6. Isolates	1	0	0.189	0.391	0.046	−0.653	−0.241	−0.306	−0.599	1		
7. Inactive (t)	1	0	0.351	0.477	−0.250	−0.607	−0.312	−0.423	−0.593	0.581	1	
8. Inactive ($t-1$)	1	0	0.329	0.470	−0.039	−0.617	−0.306	−0.397	−0.594	0.610	0.211	1
2b. *Unweighted betweenness*												
1. Revenue$_{t+1,t+2}$	9.248	0	2.995	2.409	1							
2. Unweighted betweenness	47.02	0	0.061	0.620	0.084	1						
3. Status	7.595	0	0.068	0.159	0.294	0.707	1					
4. Lead deals	5.198	0	0.509	0.697	0.181	0.248	0.514	1				
5. Colead deals	4.277	0	1.221	1.016	0.362	0.152	0.602	0.441	1			
6. Isolates	1	0	0.205	0.404	0.075	−0.050	−0.218	−0.260	−0.610	1		
7. Inactive (t)	1	0	0.380	0.485	−0.208	−0.069	−0.266	−0.355	−0.597	0.569	1	
8. Inactive ($t-1$)	1	0	0.354	0.478	−0.001	−0.063	−0.261	−0.327	−0.572	0.582	0.161	1
2c. *Weighted betweenness*												
1. Revenue$_{t+1,t+2}$	8.865	0	2.967	2.483	1							
2. Weighted betweenness	5.008	0	0.063	0.230	0.208	1						
3. Status	1.876	0	0.078	0.145	0.469	0.485	1					
4. Lead deals	3.761	0	0.569	0.735	0.264	0.473	0.656	1				
5. Colead deals	4.234	0	1.238	1.068	0.441	0.355	0.767	0.508	1			

TABLE 2 (Continued)

	Max	Min	Mean	Std.	1	2	3	4	5	6	7	8
6. Isolates	1	0	0.198	0.399	0.064	−0.137	−0.267	−0.262	−0.576	1		
7. Inactive (t)	1	0	0.373	0.484	−0.224	−0.184	−0.335	−0.362	−0.588	0.551	1	
8. Inactive ($t-1$)	1	0	0.336	0.472	−0.039	−0.172	−0.326	−0.348	−0.554	0.579	0.155	1

TABLE 3 Effects of different structural hole measures on future performance in the equity market pre-crisis

Dependent variable: Revenue$_{t+1,t+2}$ (log)	1	2	3
Brokerage	0.626 (0.158)		
Unweighted betweenness		−0.015 (0.026)	
Weighted betweenness			−0.014 (0.023)
Status	0.216 (0.081)	0.196 (0.104)	0.200 (0.109)
Number of lead deals (log)	0.149 (0.054)	0.187 (0.054)	0.186 (0.054)
Number of co-lead deals (log)	0.091 (0.069)	0.201 (0.063)	0.200 (0.063)
Isolates	1.007 (0.079)	0.984 (0.080)	0.984 (0.081)
Constant	1.257 (0.137)	1.357 (0.133)	1.358 (0.133)
Observations	7381	7381	7381

Note: All models have year fixed effect, firm fixed effects, and two inactive variables. The year fixed effect is included as dummy variables for the full period, but the effects of these variables are not reported. Clustered standard errors in parentheses.

times of crisis" (Wenzel, Stanske, & Lieberman, 2020, p. V13)—could be valuable in a market disruption, because of the corrosive effects of recurrent pivots in strategic direction (Stieglitz et al., 2016). When market opportunities contract, firms may lack the endowments necessary for pursuing high-risk exploration. Excessively exploring completely unknown business areas may then be seen as inefficient (Levinthal & March, 1993). Taken together, earlier lines of work thus suggest that firms which can find new fitness peaks in terms of partners and clients, all while staying within the domain of their accumulated experience, may be especially advantaged.

Models 7–9 in Table 4 report estimates using the same DID specification to examine the effects of exclusive structural holes, measured by *weighted betweenness*, on three additional dependent variables: *number of new partners*$_{t+1,t+2}$, *number of new clients*$_{t+1,t+2}$, and *sector similarity*$_{t+1,t+2}$. The first two outcomes capture how investment banks re-configure their business relationships by searching for new opportunities. To create these variables, we simply count the numbers of new partners and new clients in the period $\{t+1,t+2\}$ compared with the period $\{t-1,t\}$, and take the natural log to reduce skewness in their distributions.[8]

The third variable *sector similarity*$_{t+1,t+2}$ captures the extent to which investment banks sustain their industry presence after the crisis hit the market.[9] We construct this variable by assessing the degree of similarity between two sets of sectors in which the focal bank does business: the first, time-fixed set of sectors is measured over the pre-crisis time period, from 1994 to 1998; the second, time-varying set of sectors is measured over the period $\{t+1,t+2\}$.[10] We

[8]For the variable *number of new clients*$_{t+1,t+2}$, we only operationalize over lead deals of the focal bank due to the passive roles of colead banks in finding and working with clients. All the results hold if we use all deals to operationalize this variable.

[9]For the business scope domain, we focus on investment banks' sustaining instead of renewing strategy since during crisis, it may be ineffective for banks to quickly reshape their sets of industries due to established knowledge, reputation, and experience. For robustness checks, we also experiment with other measures of renewing strategy and all results are consistent.

[10]We use the 5-year period before the crisis as the baseline for our comparison since it allows us to capture the stability in an investment bank's strategy regarding its industry presence. Similar patterns are found when the baseline is the period $\{t-1,t\}$.

TABLE 4 Changes in the effects of different structural hole measures on future performance, new partners, new clients, and sector similarity during the dot-com crisis

	DV: Revenue$_{t+1,t+2}$ (log)			DV: New partner$_{t+1,t+2}$	DV: New client$_{t+1,t+2}$	DV: Sector similarity$_{t+1,t+2}$
	4 brokerage	5 unweighted betweenness	6 weighted betweenness	7 weighted betweenness	8 weighted betweenness	9 weighted betweenness
Structural hole	0.822 (0.704)	0.647 (0.376)	0.606 (0.373)	0.118 (0.123)	0.143 (0.115)	0.002 (0.036)
Structural hole × Treatment	0.693 (0.947)	−0.035 (1.500)	0.727 (0.716)	0.171 (0.250)	0.016 (0.191)	0.072 (0.071)
Year						
1999	−0.467 (0.222)	−0.742 (0.152)	−0.714 (0.177)	−0.291 (0.065)	−0.021 (0.040)	−0.097 (0.024)
2000	−1.393 (0.247)	−1.224 (0.239)	−1.213 (0.291)	−0.384 (0.115)	0.042 (0.088)	−0.106 (0.034)
2001	−1.509 (0.335)	−1.256 (0.254)	−1.333 (0.297)	−0.372 (0.123)	−0.013 (0.099)	−0.096 (0.037)
2002	−0.663 (0.346)	−0.906 (0.348)	−0.832 (0.383)	−0.005 (0.154)	0.076 (0.085)	−0.081 (0.044)
Year × Structural hole						
1999	−0.983 (0.533)	−1.221 (1.401)	−1.675 (1.157)	−0.266 (0.573)	−0.219 (0.679)	0.016 (0.173)
2000	−0.113 (0.708)	0.907 (1.964)	−0.915 (1.867)	−0.767 (0.969)	0.027 (0.769)	−0.336 (0.217)
2001	0.093 (0.921)	0.130 (0.523)	−0.345 (0.968)	−0.868 (0.335)	−0.435 (0.330)	−0.277 (0.065)
2002	−0.964 (1.041)	−0.595 (0.225)	−1.894 (1.721)	−2.959 (0.932)	−1.983 (0.830)	0.234 (0.105)
Year × Treatment						
1999	0.489 (0.411)	0.017 (0.299)	0.243 (0.291)	−0.116 (0.106)	−0.130 (0.067)	−0.006 (0.038)
2000	0.498 (0.579)	−0.750 (0.379)	−0.538 (0.428)	−0.216 (0.162)	−0.226 (0.102)	−0.079 (0.048)
2001	−0.250 (0.526)	−1.035 (0.384)	−1.097 (0.424)	−0.241 (0.192)	−0.225 (0.100)	−0.089 (0.051)
2002	−0.242 (0.720)	−1.027 (0.453)	−1.146 (0.512)	−0.507 (0.258)	−0.197 (0.093)	−0.072 (0.059)
Year × Treatment × Structural hole						
1999	−1.590 (0.853)	−1.437 (1.936)	−0.635 (1.570)	−0.238 (0.756)	−0.514 (0.663)	−0.255 (0.181)
2000	−2.602 (1.235)	−1.216 (2.954)	−1.769 (2.420)	−0.050 (1.110)	−0.498 (0.763)	0.282 (0.239)

TABLE 4 (Continued)

	DV: Revenue$_{t+1,t+2}$ (log)			DV: New partner$_{t+1,t+2}$	DV: New client$_{t+1,t+2}$	DV: Sector similarity$_{t+1,t+2}$
	4 brokerage	5 unweighted betweenness	6 weighted betweenness	7 weighted betweenness	8 weighted betweenness	9 weighted betweenness
2001	−2.242 (1.349)	2.942 (1.215)	3.490 (1.295)	1.956 (0.604)	2.185 (0.456)	0.552 (0.128)
2002	−2.443 (1.744)	3.428 (0.792)	5.344 (1.957)	4.484 (1.090)	4.719 (1.100)	−0.063 (0.155)
Status	0.443 (0.479)	−0.231 (1.947)	−0.395 (1.424)	−1.138 (0.575)	−0.306 (0.638)	−0.189 (0.082)
Number of lead deals (log)	−0.519 (0.284)	−0.337 (0.252)	−0.640 (0.193)	−0.077 (0.076)	0.027 (0.067)	0.008 (0.021)
Number of co-lead deals (log)	0.254 (0.217)	0.554 (0.252)	0.388 (0.253)	0.318 (0.101)	0.167 (0.113)	0.034 (0.017)
Isolates	1.484 (0.222)	1.838 (0.255)	1.589 (0.293)	−0.502 (0.103)	0.094 (0.128)	0.065 (0.040)
Constant	3.460 (0.481)	2.923 (0.381)	3.254 (0.434)	1.046 (0.180)	0.064 (0.198)	0.285 (0.047)
Observations	1632	1648	1372	1372	1372	1372

Note: Variable *Year* represents the second year of the 2-year time window, that is, year 2000 corresponds to the period 1999–2000. Clustered standard errors in parentheses; all models have year fixed effects, firm fixed effects, and two inactive variables. In model 9, we also control for undefined Jaccard index.

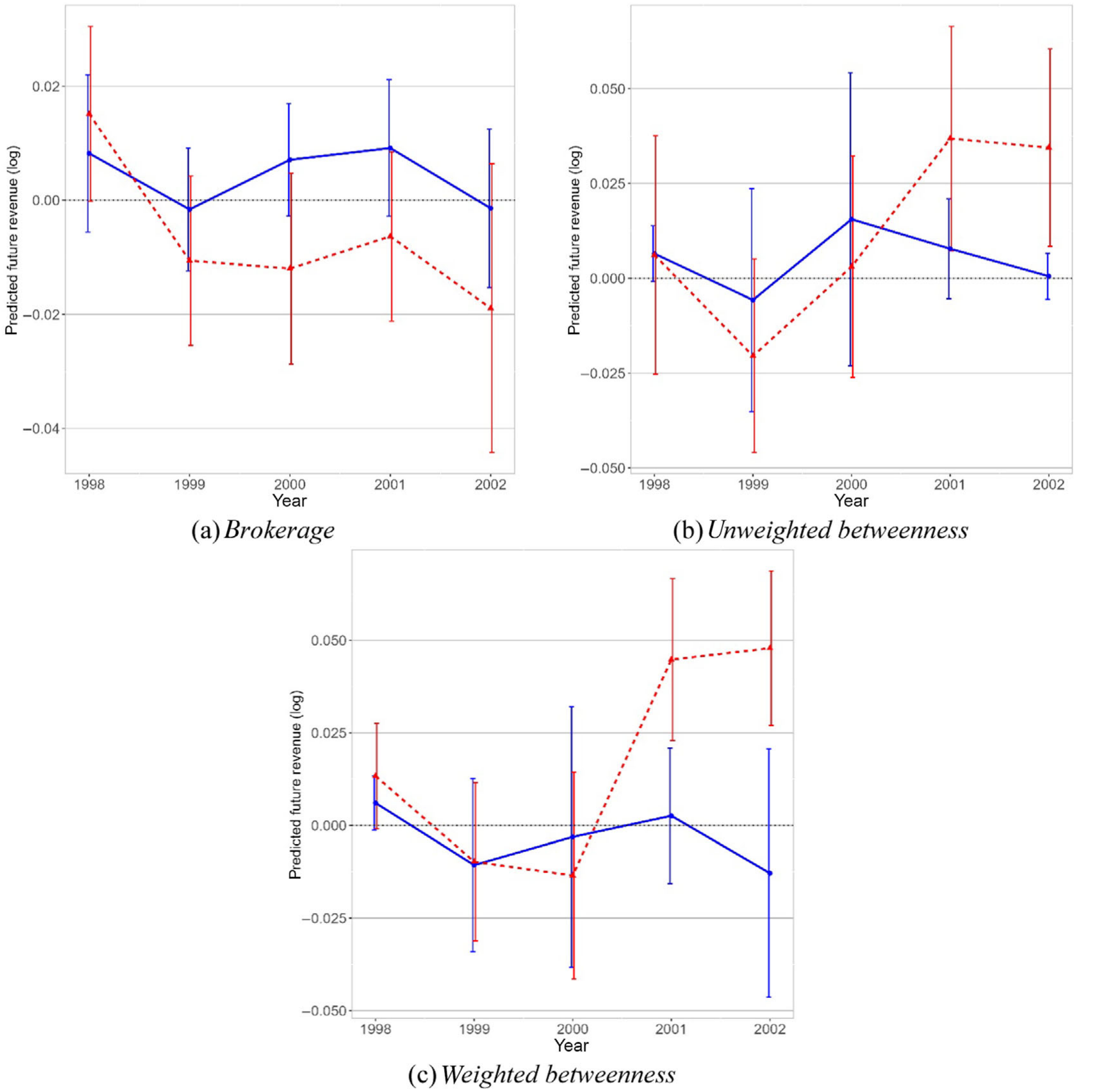

FIGURE 2 Point estimates and 95% CI of the total marginal effect of different structural hole measures on future performance for the treated and control group during the dot-com crisis. Part figure (a) visualizes the effects of *brokerage* estimated in model (4) of Table 4; part figure (b) and (c) show the effects of *unweighted betweenness* and *weighted betweenness* in model (5) and model (6) or Table 4, respectively.

proceed by first classifying each deal into 10 sector categories based on its standard industrial classification (SIC). Following Shipilov (2009), we use these sector categories: agriculture, forestry, and fishing (SIC codes 01–09); mining (SIC codes 10–14); construction (SIC codes 15–17); manufacturing (SIC codes 20–39); transportation and public utilities (SIC codes 40–49); wholesale trade (SIC codes 50–51); retail trade (SIC codes 52–59); finance, insurance, and real estate (SIC codes 60–67); services (SIC codes 70–87); and public administration (SIC codes 91–99). We then calculate our similarity variable as:

$$Sector\ similarity_{t+1,t+2} = \frac{a}{a+b+c}$$

in which a represents the number of sectors in which the focal bank worked both pre-crisis and in $\{t+1,t+2\}$; b represents the number of sectors in which the focal bank participated pre-crisis and but not in $\{t+1,t+2\}$ and c represents the number of sectors in which the focal bank worked in $\{t+1,t+2\}$ but not pre-crisis. This metric, known as Jaccard's similarity coefficient, helps us to measure the similarity between two sets while avoiding overestimation due to mutual absences (Ruef, 1997). The metric varies from 0 to 1, capturing extent to which the focal bank pursued a persevering strategy in terms of sectoral scope.

Aligned with the results of Model 6, the coefficients of the interaction *Year* × *Treatment* × *weighted betweenness* are positive in 2 years 2001 and 2002 in Models 7 and 8. These results indicate that the beneficial effects of exclusive structural holes on new business relationships—either partnerships or clientships—are intensified for treated banks during the crisis.[11] Figure 3a,b visualizes the estimates in Models 7 and 8. We see that the 95% CIs for *weighted betweenness* predicting *number of new partners* and *number of new clients* of the treated group deviate entirely from those of the control group and rise above the zero line in 2001 and 2002. Treated banks with more exclusive structural holes in their networks are clearly better poised to form new business relationships in post-crisis phases.

In Model 9 of *sector similarity*, the coefficient of the interaction *Year* × *Treatment* × *weighted betweenness* is positive and precisely estimated in 2001.[12] Figure 3c depicts the total marginal effects of *weighted betweenness* for this model. The figure reveals that the effects of exclusive structural holes on *sector similarity* for the treated group increase and are above the zero-line in 2001 and 2002, and that this pattern also deviates completely from the one of the control group in 2001. Our results indicate that exclusive access to structural holes allows treated banks to sustain their footing in known industrial sectors.

Coupled with the results regarding *new partner* and *new client*, the finding from the *sector similarity* model suggests an underlying process by which exclusive structural holes help firms in crisis: with advantages in searching for new partners and new clients, exclusive brokers can also extract value from their existing market segments. More generally, this mix between innovating in one domain while persevering in another can be seen as an ambidextrous response to crisis on the part of exclusive brokers.

4 | DISCUSSION

Our interest in the moderating effect of crisis on the brokerage-performance relationship led us to analyze how two market crises shaped investment banks' ability to convert brokerage

[11]Point estimates of *Year* × *Treatment* × *Weighted betweenness* on $New\ partner_{t+1,t+2}$ for 1999: $b = -0.238$, $p = .753$, 95% CI: −1.726 to 1.250; for 2000: $b = -0.050$, $p = .964$, 95% CI: −2.233 to 2.133; for 2001: $b = 1.956$, $p = .001$, 95% CI: 0.769 to 3.144; for 2002: $b = 4.484$, $p = .000$, 95% CI: 2.341 to 6.628. Point estimates of *Year* × *Treatment* × *Weighted betweenness* on $New\ client_{t+1,t+2}$ for 1999: $b = -0.514$, $p = .439$, 95% CI: −1.817 to 0.789; for 2000: $b = -0.498$, $p = .515$, 95% CI: −1.998 to 1.003; for 2001: $b = 2.185$, $p = .000$, 95% CI: 1.287 to 3.083; for 2002: $b = 4.719$, $p = .000$, 95% CI: 2.557 to 6.882.

[12]Point estimates of *Year* × *Treatment* × *Weighted betweenness* on $sector\ similarity_{t+1,t+2}$ for 1999: $b = -0.255$, $p = .161$, 95% CI: −0.611 to 0.102; for 2000: $b = 0.282$, $p = .238$, 95% CI: −0.187 to 0.752; for 2001: $b = 0.552$, $p = .000$, 95% CI: 0.300 to 0.803; for 2002: $b = -0.063$, $p = .684$, 95% CI: −0.368 to 0.242.

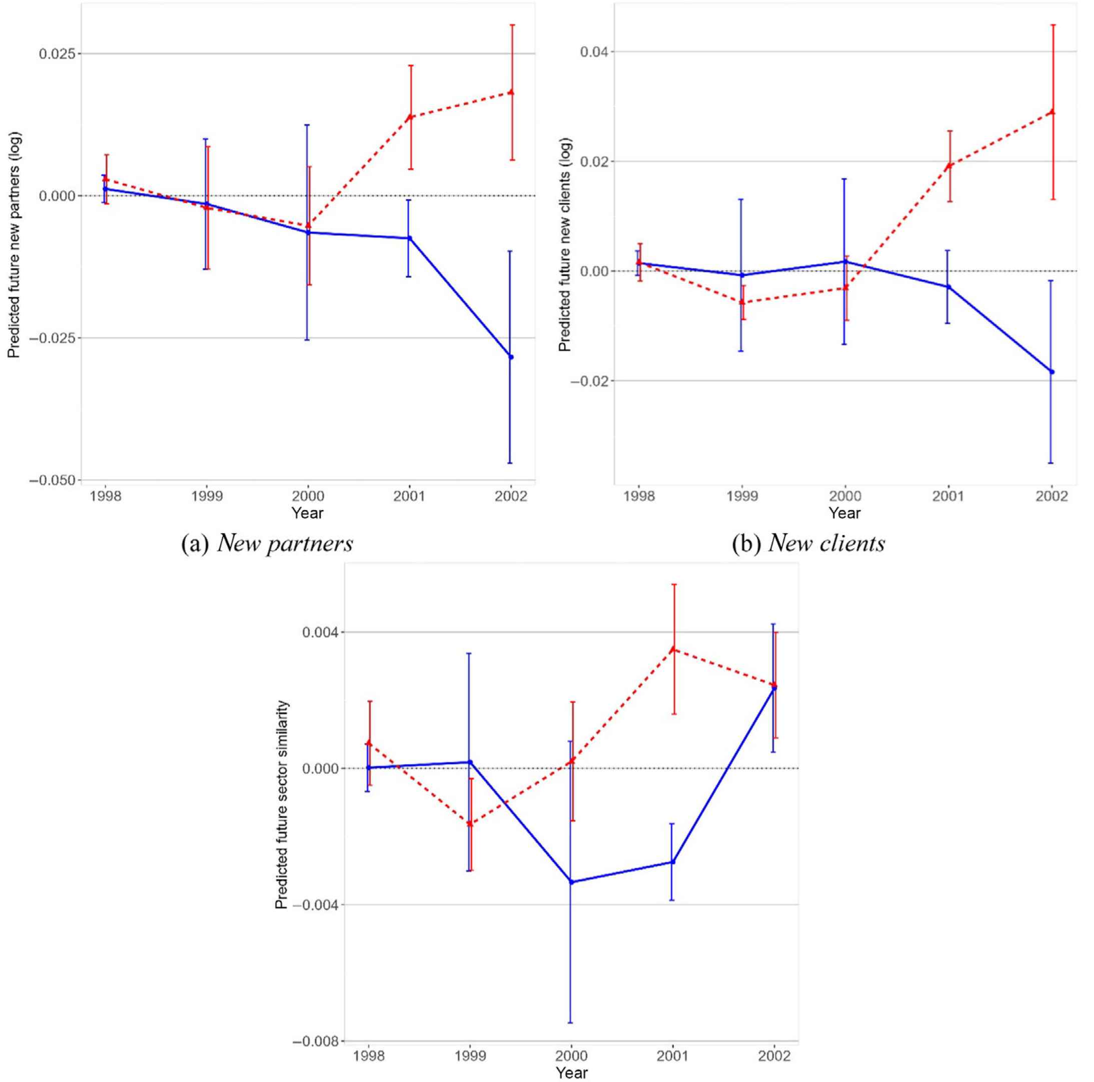

FIGURE 3 Point estimates and 95% CI of the total marginal effect of weighted betweenness on three mechanism variables for the treated and control group during the dot-com crisis. Part figure (a) visualizes the effects of *weighted betweenness* on *number of new partners*$_{\{t+1,t+2\}}$ estimated in model (7), part figure (b) shows the effects of *weighted betweenness* on *number of new clients*$_{\{t+1,t+2\}}$ in model (8) and part figure (c) presents the effects of *weighted betweenness* on *sector similarity*$_{\{t+1,t+2\}}$ in model (9) of Table 4.

positions into performance advantages. In our study, we sought to "explore and deal with [two] unexplored boundary conditions" (Busse et al., 2017, p. 575) on structural hole theory: crisis at a macrolevel and exclusive versus shared brokerage at a microlevel.

Our quasi-experimental analyses yielded findings that both converge with and diverge from (Geletkanycz & Tepper, 2012, p. 258) a long-standing body of network theory. On the one hand, our finding that the dot.com crash of 2000 amplified the favorable effect of brokerage on future performance concurs with a portrayal of brokers as especially well-suited for the suddenly imposed scarcity and uncertainty of crisis conditions (Rowley et al., 2000). On the other hand, the result that, in this episode, *only* exclusive brokerage translated into substantial advantage is aligned primarily with very recent work highlighting the potential benefits of monopolistic access to structural holes (Burt, 2015). We also found further evidence of the benefits of exclusive brokerage in crisis conditions by replicating our analysis in the case of the 2008 financial crisis (Online Appendix A1).

Our analyses also incorporated steps that seek to address two built-in limitations of the DID design we have adopted. The first arises from a strong assumption of parallel trends, which is untestable given the unobservable trajectories of treated banks in the counterfactual case in which crisis did not occur (Angrist & Pischke, 2009). Our use of matching, however, increases our confidence that the parallel trends would have persisted had crisis not happened. The second limitation concerns the possibility of anticipatory effects (Malani & Reif, 2015). There is potential for bias due to the chance that exclusive brokers may be disproportionately able to foresee the crisis. While we cannot fully rule out this possibility, we see no theoretical reason to expect that exclusive brokerage, more than a general form of brokerage (Burt, 1992), grants a pre-crisis vision advantage (Burt, 2004). In addition, even if exclusive brokers could somehow foresee one crisis, the probability that they foresee two different crises in ways that systematically bias our results is very low. Consistent findings across two market crises thus offer assurance that, despite these limitations, our empirical approach is appropriate for examining how crisis affects the brokerage-performance relationship.

More generally, we can summarize our findings with simple reference to Figure 1: the open triangles of exclusive brokerage, rather than the diamond-like structures of shared brokerage, confer advantage in crisis. Using Figure 1 as our point of reference, we next sketch an analytic narrative in keeping with our findings, and state two corresponding propositions on the benefits of exclusive brokerage in crisis conditions. This approach is a part of a "creative inferential process aimed at producing new hypotheses and theories based on surprising research evidence" (Tavory & Timmermans, 2014, p. 5). Our narrative is an attempt at the "development of an initial explanation" (Behfar & Okhuysen, 2018, p. 323), such that our propositions should be "subject to further test" in future research (Bamberger, 2019, p. 103; Schurz, 2008). Importantly, these propositions are also *themselves* subject to boundary conditions. Sketching these auxiliary boundary conditions in turn allows us to formulate further propositions on generalizability.

4.1 | Initial explanation and propositions

Suppose *J* and *K* in Figure 1 are two producers competing in the same market over a multi-year time frame. Some years are "normal." Other years are crisis-ridden. *J* and *K* are also linked to other producers. *J* is connected to *D* and *E*, and *K* is connected to *Y* and *Z*. These connections arise through their joint efforts on "deals," which they undertake to earn revenue. *J* and *K* could be biotech firms interlinked in strategic alliances (Powell et al., 1996), scientists connected to other colleagues through co-authorship teams (Stuart & Ding, 2006) or, as in our empirical context, banks tied other banks in investment syndicates. The core feature of these inter-producer networks, as far as competitive advantage is concerned, is the extent to which they offer brokerage opportunities (Burt, 1992, 2005).

Suppose further that, in any given year, the structural holes bridged by *J* generally mirror the open, exclusive triad on the right of Figure 1. In contrast, the structural holes bridged by *K* typically resemble the open yet shared triad on the left. In normal (i.e., non-crisis) years, we expect—in terms of *outcomes*—that the structural holes bridged by *J* and *K* are virtually equivalent: *J*'s exclusive ties (Cook et al., 1983) to *D* and *E* are not significantly more advantageous than *K*'s ties to *Y* and *Z*, which, though also separate, are indirectly linked through *V*, *W*, and *X*. In normal years, many brokers can in principle benefit from a single structural hole, and the potential for future partnerships (Burt, 2015, pp. 151–153) between *K* and *V*, *W*, or *X* may even privilege *K* over *J*.

Now imagine, however, that a crisis encircles *J*, *K*, and other similarly situated banks. Scarcity and uncertainty are at the epicenter of this crisis. Transactions to which *J* and *K* had grown accustomed are abruptly gone. For instance, they can no longer usher internet startups into public markets. Or they must stop doing mortgage deals with iconic investment banks—who are now failing or merging. Capabilities that *J* and *K* had leveraged pre-crisis are now less relevant. Not unlike manufacturers whose supply chains cracked during the COVID-19 pandemic (Okamoto, 2020), or firms striving to adopt new digital strategies to keep pace with the "new normal" (Giustiziero et al., 2022), crisis-ridden banks are straining to survive. *J* and *K* must migrate to new business opportunities (Shipilov & Li, 2008), even as uncertainty over how best to migrate is as extreme as originally imagined by Knight (1921).

In response, *J* and *K* consider *retrenching*, that is, cutting costs and/or reducing their business activities. Nevertheless, intense competition and uncertainty over the length of the crisis makes more attractive a combination of two other strategies: *persevering*—alleviating negative effects of the crisis to maintain business continuity—and *innovating*—redesigning their business strategies (Wenzel, Stanske, & Lieberman, 2020, pp. V9–V12). By following this mixture of strategies, such crisis-exposed banks can pursue an ambidextrous response so that they simultaneously stabilize and renew their strategies, which is crucial for improving performance in the crisis (Levinthal & March, 1993; March, 1991; Raisch & Birkinshaw, 2008).

In the crisis conditions, we expect *J* to have a discernible advantage over *K*. *J* is a monopolistic broker, uncrowded (Bothner et al., 2007; Burt, 1997) by lurking third parties. *J*'s monopolistic brokerage is conducive to what is arguably the most important advantage in a crisis: adaptability. Uncontested by *A*, *B*, or *C* for the perceived benefits arising from *D*, *E*, or a *D*–*E* synthesis, *J* is the only runner in its lane in a race for priority (Merton, 1988). Attention and effort need not get sunk in the task of luring *D* and *E* away from producers structurally equivalent to *J*. Similar to a powerful CEO unencumbered in crisis by otherwise stubborn board members (Dowell et al., 2011), *J* moves adaptively to gain new capabilities, resources, and opportunities afforded by new partners or new customers. Assuming again that most of *J*'s triads mirror the wide-open structure shown in Figure 1, the absence of crowding also relieves *J* of normative pressure to broker in any predefined way (Burt, 1997).

In parallel, keeping with our analyses of sector-level perseverance, *J* has the added advantage of being able to stay put—as far as its market position is concerned. The monopolistic brokerage of *J* enables it to move to new partners, while preserving stability in the market sectors in which these new network ties are formed. *J*'s approach thus differs from the tendency toward flight that often surfaces in a crisis (Weick, 1993, pp. 638–639): our results imply that *J* pursues an ambidextrous response that brings together the exploration of new partners and clients with the exploitation of sector-level opportunities.

K's predicament brings into further relief *J*'s advantageous position. Most obviously, *K* is subject to diffuse competition from *V*, *W*, and *X*. Two consequences follow. First, if *K* senses a new prospect residing in the *Y*–*Z* hole, *V*, *W*, and *X* may sense it simultaneously and compete with *K* for the chance to develop it. In the end, *K* may be unable to bring the opportunity to fruition (Buskens & van de Rijt, 2008). This prohibitive friction is compounded by the array of shadow brokers (Everett & Borgatti, 2020), which together obscure *K*'s visibility among prospective exchange partners.

Second, even if *K* starts developing a new opportunity apart from direct intrusions from *V*, *W*, or *X*, more bargaining power is exerted by *Y* and *Z* on *K* than on *J* by *D* and *E* (Bruggeman et al., 2003). Exploiting their own options, *Y* and *Z* may work to engage more intensively with other, substitute brokers (e.g., *V* or *W*) that are structurally equivalent to *K*. The risk of competition from these other brokers leads *K* to lock into relationships with *Y* and *Z*, at the expense of pursuing other opportunities. Consequently—and in sharp contrast to *J*'s adaptability, which can combine exploitation and exploration in different domains—*K* is forced to stay with its current exchange partners, or else *K* is compelled to move on in search of different market segments, where it has limited experience.

Consistent with these arguments, we expect *J* both to perform better than *K* in a crisis and to exhibit a more ambidextrous response than *K* in crisis conditions. Stated formally:

Proposition 1. *Relative to shared structural holes, exclusive structural holes improve firm performance in a crisis.*

Proposition 2. *Relative to shared structural holes, exclusive structural holes are conducive to an ambidextrous strategic response to a crisis.*

The preceding two propositions are subject to boundary conditions at the environmental level. One boundary condition concerns the speed at which crisis encroaches, while two concern the magnitude of the crisis itself. Each is an "out-of-range" environmental state that limits the generality of our propositions (Busse et al., 2017, p. 583).

First, not all crises are fast-burning ('t Hart & Boin, 2001). Some crises instead emerge slowly, over a "long incubation" (Boin et al., 2021, p. 3) period, and are thus neither sudden nor unexpected. Such gradual disruptions give firms time to prepare. They also trigger less intense competition and interject less uncertainty. In a crisis that "creeps up rather bursts out" ('t Hart & Boin, 2001, p. 33), exclusive brokerage is unlikely to confer advantage.

Second, not all crises force systemic change. Some induce only local, modest changes. In this regard, Meyer et al. (1990) distinguish between two orders of change—first and second. First-order change occurs around an organization when there are continuous, incremental variations in its environment, but the system in which organization exists stays unchanged. Moderate fluctuations of stock prices or subtle variation in credit-worthiness of a firm's partners are examples of first-order change, in which exclusive brokerage will not provide a comparative advantage. In fact, moderate changes may not even be labeled as crises (White, 2008, p. 300), and so may fail to license the ruthless competitive behavior that a more grave emergency legitimizes. By contrast, second-order change "transforms fundamental properties or the states in the system" (Meyer et al., 1990, p. 94), such as what happens when entire economic sectors go out of fashion or key industry players disappear almost overnight. Exclusive brokerage is unlikely to help during first-order change.

Third, at the other end of the spectrum, some crises are likely *too extreme* for exclusive brokerage to serve as a differentiator. Consider, for instance, a nuclear attack—which is not only "unimagined" but also "unimaginable" (Grandori, 2020, pp. 495–496). Such an existential shock may activate norms and network dynamics very different from those apparent in our empirical domain. We speculate that unimaginable crises will prompt affected actors to work together in pursuit of system-preserving stability. In unthinkable scenarios, where collective efforts are (ideally) valued above competitive reactions (cf. Xiao & Tsui, 2007), exclusive brokerage (and perhaps any form of brokerage) will not confer any advantage. In such circumstances, closure and the banding of all organizations together to deal with a common enemy for the survival of the social system as a whole would likely be the chosen strategy. Consequently, while crises are "environmental changes that render path reproduction inefficient and threaten organizational survival" (Wenzel, 2015, p. 266), changes that threaten societal survival, as in literal "fog of war" conditions (Clausewitz, 1768) in case of a nuclear attack, are beyond the scope of the two propositions we have stated. We thus offer further, environmental-level propositions for future research on brokerage in crisis.

Proposition 3. *Propositions 1 and 2 will not hold when the crisis emerges slowly.*

Proposition 4. *Propositions 1 and 2 will not hold when the crisis is either too moderate or overly extreme.*

For our results to be reproducible, the focal crisis must reside beyond all characteristics identified in Propositions 3 and 4. If the focal crisis is significantly disruptive, although also slow burning, then we do not expect our results replicate. In such circumstances, we instead anticipate that brokerage of any kind, not necessarily exclusive brokerage, will improve performance. Alternatively, in the case of a rapidly arriving—but also cataclysmic, existential—crisis, we would expect closure, not brokerage, to help affected organizations to coordinate and respond.

Turning from the environment to the focal broker, Propositions 1 and 2 are also subject to an actor-level boundary condition: we do not expect Propositions 1 and 2 to receive empirical support if exclusive brokerage positions are too costly to maintain. There are egocentric and altercentric sources of such cost (Podolny, 2001). The ongoing work of maintaining exclusive structural holes may extract extraordinary attention and time from the focal ego (cf. Clement et al., 2018). Constructing entry barriers around a given structural hole may require much monitoring (Rowley & Baum, 2004), as well as the careful cultivation of the loyalties at both ends of that structural hole. If efforts to monopolize structural holes are strenuous (Lee et al., 2023), then in crisis, the focal broker may be too depleted and may not be able to perform well in the new reality. In addition, the prospective partners appraising the focal broker may view that broker's exclusive position with caution—or even trepidation. The exclusive broker is by definition highly un-embedded and thus at risk of being seen as dangerously distant from the network mechanisms that undergird rational trust (Coleman, 1990). If this (perception of) untrustworthiness impedes the generation of new exchange relations, exclusive brokerage cannot bring benefit. More formally:

Proposition 5. *Propositions 1 and 2 will not hold when the costs of maintaining exclusive brokerage positions are high, relative to their benefits.*

To sum up, there are two necessary criteria that limit the generalizability of Propositions 1 and 2. First, the crisis itself must be sudden and unexpected, and reside in an intermediate range between first-order continuous change (which favors any type of brokerage) and a system-wide catastrophe (that makes moral calls for collective action). Second, an exclusive brokerage position must not deplete its occupant of the resources needed to act on the opportunities that crises present. When all of these criteria are satisfied, we expect future research to replicate the patterns we have found.

4.2 | Implications for crisis research, brokerage theory, and practice

Our study has a primary implication for crisis research, especially work stressing the need for adaptability and broad search in response to crisis. Our finding that crisis favorably affects the brokerage-performance relationship suggests future work should ask whether exclusive brokerage is valuable for eluding one of the most seductive options facing organizations engulfed in crisis: the tendency to reproduce strategic behaviors that worked well pre-crisis (Weick, 1993; Wenzel, 2015). A subtle danger of market shocks is that those struck by them may be inclined to "dig in their heels" and find self-deluding comfort in strategic inertia, as "they regress to their most habituated ways of responding" (Weick, 1993, p. 639). Exclusive—more than shared—brokers may be best positioned to avoid the "myopic blind spots" (Wenzel, 2015, p. 285) that can plague network-constrained producers. This privileged, panoramic view has its roots in the extreme diversity of stimuli reaching exclusive brokers. As sole mediators between unconnected partners, they face uniquely low risk that other third-parties homogenize the perspectives they face. Consequently, we speculate that future research on crises and path dependence will reveal that exclusive brokerage yields the greatest freedom from strategic myopia.

Turning to implications of our study for brokerage theory, we stress our agreement with Hamilton et al.'s (2020, p. 1) observation that "dominant research on brokerage does not distinguish between pairs of actors linked via one broker and actors linked by multiple brokers [and that these] distinctions can have important consequences for the net benefits of brokerage." Our finding that, across two market crises, only exclusive brokerage was associated with greater performance, suggests the following: whether structural holes are monopolized or contested is essential for any model seeking to clarify the benefits of brokerage in contexts marked by suddenly imposed scarcity and uncertainty. Crises are phase transitions in the contexts in which brokers act, calling for modifications of our understanding of the nature and benefits of a structural hole when crises occur. Importantly, alternative brokers—those sharing a structural hole with a focal firm—may yield outcomes just as far-reaching as the direct closure of these holes. We are persuaded that future research must do more to pinpoint the environmental conditions when "the gains associated with brokerage … disappear as more and more people build bridges across the same structural hole" (Burt, 2000, p. 356).

Crisis, although the focus of our current study, need not serve as the only relevant contextual moderator for the relationship between brokerage and performance. Other contingencies, identifiable in future studies, may also reveal the importance of exclusive brokerage. Artistic production could be an example of a cultural context (cf. Xiao & Tsui, 2007) giving advantage to exclusive brokerage. In music (Askin & Mauskapf, 2017) or fashion (Godart et al., 2015), the sole integrator across disparate domains could be perceived as ingenious, innovative, or exceptionally charismatic. In contrast, if there are multiple integrators across the same disparate domains, they may be considered mere imitators. Such cultural contexts at times operate as winner-take-most markets for intangible and tangible rewards, disproportionately privileging the unique "linking pins" (Scott & Davis, 2016, p. 66) who creatively meld elements of otherwise incompatible groups.

Taking a wider perspective on network theory, we note that our study followed Burt's (2010) suggestion to narrow our focus to the ego-network. One alternative route involves moving beyond the ego-network toward the entire network, and examining how broader structural patterns interact with crisis conditions to shape organizational outcomes. Within the scope of our work, we identify two promising directions for future research, leveraging these broader network properties. The first is to examine whether the connectivity-levels of the cliques bridged by a monopolistic broker impact its brokerage-related advantages during crises. Greater density within these cliques might offer further benefits to the monopolistic broker, or might instead render exclusivity less consequential. Second, drawing on information in the entire global network, the "poles" of otherwise-equal exclusive structural holes vary in status. A broker acting as a sole bridge between elite partners may fare better than a broker mediating exclusively between less prestigious partners. Our conditioning variables included an adjustment for the status of the focal firm. A straightforward next step is to explore the performance-related consequences of the status-levels of the partners bridged via that focal firm.

Our study also carries an important implication for management practice: network-related resources that appear excessive and even seem tangential in normal situations could become crucial for firms' survival in crises. Stated in terms of the behavioral theory of firm, these network-related resources are instances of "slack" (Cyert & March, 1963; Wenzel, Stanske, & Lieberman, 2020, p. V11). "Exclusive access to contacts in many different groups" (Burt, 2015, p. 161) can be thought of slack in social capital that requires considerable investment. Maintaining exclusivity, like other investments in slack, often requires monitoring and associated interventions to keep disparate contacts fully apart and thus unlikely to connect via a proximate third party. While preserving these excess resources is expensive in normal, non-crisis-ridden phases, the recent, mounting frequency and intensity of crises suggest that managers may need to prioritize these resources, to ensure they have them on hand when crisis strikes. Uncontested structural holes are therefore not unlike insurance policies that can seem expensive while they are being maintained, but which prove invaluable when crises erupt.

5 | CONCLUSION

Market crises significantly affect organizations and society. Our study indicates that researchers as well as practitioners should be attentive to different kinds of brokerage, whenever organizations are forced to respond to these crises. We find that exclusive brokerage is the basis for network advantage when crisis hits and for the subsequent strategic responses, even though the effects of exclusive brokerage are indistinguishable from those of shared brokerage in more stable environments. We hope that new research will test the propositions we have developed and will sharpen our understanding of how crisis conditions alter the relationship between network position and organizational performance.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the authors upon reasonable request.

REFERENCES

Ahuja, G. (2000). Collaboration networks, structural holes and innovation: A longitudinal study. *Administrative Science Quarterly*, *45*(3), 425–455.

Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.

Askin, N., & Bothner, M. S. (2016). Status-aspirational pricing: The "Chivas Regal" strategy in us higher education, 2006–2012. *Administrative Science Quarterly*, *61*(2), 217–253.

Askin, N., & Mauskapf, M. (2017). What makes popular culture popular? Product features and optimal differentiation in music. *American Sociological Review*, *82*(5), 910–944.

Bamberger, P. A. (2019). On the replicability of abductive research in management and organizations: Internal replication and its alternatives. *Academy of Management Discoveries*, *5*(2), 103–108.

Baum, J. A. C., Rowley, T. J., Shipilov, A. V., & Chuang, Y. T. (2005). Dancing with strangers: Aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly*, *50*, 536–575.

Becker, P., & Bodin, Ö. (2022). Brokerage activity, exclusivity and role diversity: A three-dimensional approach to brokerage in networks. *Social Networks*, *70*, 267–283.

Behfar, K., & Okhuysen, G. A. (2018). Perspective—Discovery within validation logic: deliberately surfacing, complementing, and substituting abductive reasoning in hypothetico-deductive inquiry. *Organization Science*, *29*(2), 191–353.

Benjamin, B., & Podolny, J. (1999). Status, quality, and social order in the california wine industry. *Administrative Science Quarterly*, *44*(3), 563–590.

Boin, A., Ekengren, M., & Rhinard, M. (2021). *Understanding the creeping crisis*. Springer Nature.

Bonacich, P. (1987). Power and centrality: the family of measures. *American Journal of Sociology*, *92*(5), 1170–1183.

Bothner, M. S., Kang, J. H., & Stuart, T. E. (2007). Competitive crowding and risk taking in a tournament: Evidence from NASCAR racing. *Administrative Science Quaterly*, *52*(2), 208–247.

Bruggeman, J. P., Carnabuci, G., & Vermeulen, I. (2003). A note on structural holes theory and niche overlap. *Social Networks*, *25*(1), 97–101.

Burniske, C., & Tatar, J. (2017). *Cryptoassets: The innovative investor's guide to Bitcoin and beyond*. McGraw Hill Professional.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Harvard University Press.

Burt, R. S. (1997). The contingent value of social capital. *Administrative Science Quarterly*, *42*(2), 339–365.

Burt, R. S. (1998). The gender of social capital. *Rationality and Society*, *10*(1), 5–46.

Burt, R. S. (2000). The network structure of social capital. In R. I. Sutton & B. M. Staw (Eds.), *Research in organizationl behavior*. JAI Press.

Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, *110*(2), 349–399.

Burt, R. S. (2005). *Brokerage and closure: An introduction to social capital*. Oxford University Press.

Burt, R. S. (2010). *Neighbor Networks: Competitive advantage local and personal*. Oxford University Press.

Burt, R. S. (2015). Reinforced structural holes. *Social Networks*, *43*, 149–161.

Burt, R. S. (2021). Structural holes capstone, cautions, and enthusiasms. In M. L. Small, B. L. Perry, B. Pescosolido, & E. B. Smith (Eds.), *Personal networks: Classic reading and new directions in egocentric analysis*. Cambridge University Press.

Burt, R. S., & Soda, G. (2021). Network capabilities: Brokerage as a bridge between network theory and the resource-based view of the firm. *Journal of Management*, *47*(7), 1698–1719.

Buskens, V., & van de Rijt, A. (2008). Dynamics of networks if everyone strives for structural holes. *American Journal of Sociology*, *114*(2), 371–407.

Busse, C., Kach, A. P., & Wagner, S. M. (2017). Boundary conditions: What they are, how to explore them, why we need them and when to consider them. *Organizational Research Methods*, *20*(4), 574–609.

Castellucci, F., & Ertug, G. (2010). What's in it for them? Advantages of higher status partners in exchange relationships. *The Academy of Management Journal*, *53*(1), 149–166.

Clausewitz, C. (1768). *On war. Edited and Translated by Michael Howard and Peter Paret (1984)*. Princeton University Press.

Clement, J., Shipilov, A. V., & Galunic, C. (2018). Brokerage as a public good: The externalities of network hubs for different formal roles in creative organizations. *Administrative Science Quarterly*, *63*(2), 251–286.

Coleman, J. S. (1990). *Foundations of social theory*. Harvard University Press.

Cook, K. S., Emerson, R. M., Gillmore, M. R., & Yamagishi, T. (1983). The distribution of power in exchange networks: Theory and experimental results. *American Journal of Sociology*, *89*(2), 275–305.

Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs.

Dowell, G. W. D., Shackell, M. B., & Stuart, N. V. (2011). Boards, CEOs, and surviving a financial crisis: Evidence from the internet shakeout. *Strategic Management Journal*, *32*(10), 1025–1045.

Dubin, R. (1978). *Theory building (revised edition)*. Free Press.

Dunbar, C. G. (2000). Factors affecting investment bank initial public offering market share. *Journal of Financial Economics*, *55*(1), 3–41.

Everett, M. G., & Borgatti, S. P. (2020). Unpacking Burt's constraint measure. *Social Networks*, *62*, 50–57.

Federo, R., & Bustamante, X. (2022). The ties that bind global governance: Using media-reported events to disentangle the global interorganizational network in a global pandemic. *Social Networks*, *70*, 253–266.

Freeman, L. C. (1977). A Set of Measures of Centrality Based on Betweenness. *Sociometry*, *40*(1), 35–41.

Freeman, L. C. (1979). Centrality in social networks conceptual clarification. *Social Networks*, *1*, 215–239.

Gargiulo, M., & Benassi, M. (2000). Trapped in your own net? Network cohesion, structural holes, and the adaptation of social capital. *Organization science*, *11*(2), 183–196.

Geletkanycz, M., & Tepper, B. (2012). Publishing in AMJ-Part 6: Discussing the implications. *The Academy of Management Journal*, *55*(2), 256–260.

Giustiziero, G., Kretschmer, T., Somaya, D., & Wu, B. (2022). Hyperspecialization and hyperscaling: A resource-based theory of the digital firm. *Strategic Management Journal*, *44*(6), 1391–1424.

Godart, F. C., Maddux, W. W., Shipilov, A. V., & Galinsky, A. D. (2015). Fashion with a foreign flair: Professional experiences abroad facilitate the creative innovations of organizations. *Academy of Management Journal*, *58*(1), 195–220.

Gould, R. V., & Fernandez, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. *Sociological Methodology*, *19*, 89–126.

Graebner, M. E., Knott, A. M., Lieberman, M. B., & Mitchell, W. (2022). Empirical inquiry without hypotheses: A question-driven, phenomenon-based approach to strategic management research. *Strategic Management Journal*, *2022*, 1–8.

Graham, A. V., McLevey, J., Browne, P., & Crick, T. (2022). Structural diversity is a poor proxy for information diversity: Evidence from 25 scientific fields. *Social Networks*, *70*, 55–63.

Grandori, A. (2020). Black swans and generative resilience. *Management and Organization Review*, *16*(3), 495–501.

Gulati, R., Nohria, N., & Zaheer, A. (2000). Strategic networks. *Strategic Management Journal*, *21*(3), 203–215.

Hällgren, M., Rouleau, L., & De Rond, M. (2018). A matter of life or death: How extreme context research matters for management and organization studies. *Academy of Management Annals*, *12*(1), 111–153.

Hamilton, M., Hileman, J., & Bodin, Ö. (2020). Evaluating heterogeneous brokerage: New conceptual and methodological approaches and their application to multilevel environmental governance networks. *Social Networks*, *61*, 1–10.

Iacus, S. M., King, G., & Porro, G. (2009). CEM: software for coarsened exact matching. *Journal of Statistical Software*, *30*(9), 1–27.

Imbens, G. W., & Wooldridge, J. M. (2009). Recent developments in the econometrics of program evaluation. *Journal of Economic Literature*, *47*(1), 5–86.

Jensen, M. (2008). The use of relational discrimination to manage market entry: when do social status and structural holes work against you? *The Academy of Management Journal*, *51*(4), 723–743.

Knight, F. H. (1921). *Risk, uncertainty and profit. Reprints of Economic Classics*. Augustus M. Kelley.

Koka, B. R., & Prescott, J. E. (2002). Strategic alliances as social capital: A multidimensional view. *Strategic Management Journal*, *23*(9), 795–816.

Koka, B. R., & Prescott, J. E. (2008). Desigining alliance networks: The influence of network position, environmental change, and strategy on firm performance. *Strategic Management Journal*, *29*(6), 539–661.

Kozyrkov, C. (2020). *To recognize risks earlier, invest in analytics* (p. 2020). *Harvard Business Review*.

Kwon, S.-W., Rondi, E., Levin, D. Z., De Massis, A., & Brass, D. J. (2020). Network Brokerage: An Integrative Review and Future Research Agenda. *Journal of Management*, *46*(6), 1092–1120.

Lee, J. W., Quintane, E., Lee, S. Y., Ruiz, C. U., & Kilduff, M. (2023). The strain of spanning structural holes: How brokering leads to burnout and abusive behavior. *Organization Science*. 1–18.

Levinthal, D. A., & March, J. G. (1993). The myopia of learning. *Strategic Management Journal*, *14*(S2), 95–112.

Madhavan, R., Koka, B. R., & Prescott, J. E. (1998). Networks in transition: How industry events (re) shape interfirm relationships. *Strategic Management Journal*, *19*(5), 439–459.

Malani, A., & Reif, J. (2015). Interpreting pre-trends as anticipation: Impact on estimated treatment effects from tort reform. *Journal of Public Economics*, *124*, 1–17.
March, J. G. (1991). Exploration and exploitation in organization learning. *Organization Science*, *2*, 71–87.
Merton, R. K. (1988). The Matthew Effet in Science, II: Cumultive advantage and the symbolism of intellectual property. *Isis*, *79*(4), 606–623.
Meyer, A. D., Brooks, G. R., & Goes, J. B. (1990). Environmental jolts and industry revolutions: organizational responses to discontinuous change. *Strategic Management Journal*, *11*, 93–110.
Mora, R., & Reggio, I. (2015). didq: A command for treatment-effect estimation under alternative assumptions. *The Stata Journal*, *15*(3), 796–808.
Obstfeld, D. (2005). Social networks, the Tertius Iungens orientation, and involvement in innovation. *Administrative Science Quarterly*, *50*(1), 100–130.
Ofek, E., & Richardson, M. (2003). Dotcom mania: The rise and fall of internet stock prices. *The Journal of Finance*, *58*(3), 1113–1137.
Okamoto, G. (2020). Knightmare Uncertainty. *Financial & Development*, 10–11.
O'Reilly, C. A., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present, and future. *Academy of Management Perspectives*, *27*(4), 324–338.
O'Reilly, C. A., & Tushman, M. L. (2021). *Lead and disrupt: How to solve the innovator's dilemma*. Stanford University Press.
Pearson, C. M., & Clair, J. A. (1998). Reframing crisis management. *The Academy of Management Review*, *23*(1), 59–76.
Podolny, J. (2001). Networks as the pipes and prisms of the market. *American Journal of Sociology*, *1*, 33–60.
Podolny, J. (2005). *Status signals*. Princeton University Press.
Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly*, *41*(1), 116–145.
Quintane, E., & Carnabuci, G. (2016). How do brokers broker? Tertius gaudens, tertius iungens, and the temporality of structural holes. *Organization Science*, *27*(6), 1343–1360.
Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, *34*(3), 375–409.
Rowley, T. J., & Baum, J. A. (2004). Sophistication of interfirm network strategies in the Canadian investment banking industry. *Scandinavian Journal of Management*, *20*(1-2), 103–124.
Rowley, T. J., Behrens, D., & Krackhardt, D. (2000). Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industry. *Strategic Management Journal*, *21*(3), 369–386.
Ruef, M. (1997). Assessing organizational fitness on a dynamic landscape: an empirical test of the relative inertia thesis. *Strategic Management Journal*, *18*(11), 837–853.
Schurz, G. (2008). Patterns of abduction. *Synthese*, *164*(2), 201–234.
Scott, W. R., & Davis, G. F. (2016). *Organizations and organizing: Rational, natural and open system perspectives*. Taylor & Francis Group.
Shipilov, A. V. (2009). Firm scope experience, historic multimarket contact with partners, centrality, and the relationship between structural holes and performance. *Organization Science*, *20*(1), 85–106.
Shipilov, A. V., & Li, S. X. (2008). Can you have your cake and eat it too? Structural holes' influence on status accumulation and market performance in collaborative networks. *Administrative Science Quarterly*, *53*(1), 73–108.
Shipilov, A. V., & Li, S. X. (2012). The missing link: The effect of customers on the formation of relationships among producers in the multiplex triads. *Organization Science*, *23*(2), 472–291.
Siggelkow, N., & Rivkin, J. W. (2005). Speed and search: Designing organizations for turbulence and complexity. *Organization Science*, *16*(2), 101–122.
Soda, G., Tortoriello, M., & Iorio, A. (2018). Harvesting value from brokerage: Individual strategic orientation, structural holes, and performance. *The Academy of Management Journal*, *61*(3), 896–918.
Stieglitz, N., Knudsen, T., & Becker, M. C. (2016). Adaptation and inertia in dynamic environments. *Strategic Management Journal*, *37*(9), 1854–1864.
Stuart, T. E., & Ding, W. W. (2006). When do scientists become entrepreneurs? The social structural antecedents of commercial activity in the academic life science. *American Journal of Sociology*, *112*(1), 97–144.

Stuart, T. E., Hoang, H., & Hybels, R. (1999). Interorganizational endorsements and performance of entrepreneurial ventures. *Administrative Science Quarterly*, *44*(2), 315–349.

't Hart, P., & Boin, A. (2001). Between crisis and normalcy: The long shadow of post-crisis politics. In U. Rosenthal, A. Boin, & L. Comfort (Eds.), *Managing crises: Threats, dilemmas, opportunities* (pp. 28–46). Charles C Thomas.

Taleb, N. N. (2007). *The black swan: The impact of the highly improbable*. Random House.

Tavory, I., & Timmermans, S. (2014). *Abductive analysis: Theorizing qualitative research*. The University of Chicago Press.

Tushman, M. L., & O'Reilly, C. A. (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, *38*(4), 8–29.

Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly*, *38*(4), 628–652.

Wenzel, M. (2015). Path dependence and the stabilization of strategic premises: How the funeral industry buries itself. *Business Research*, *8*, 265–299.

Wenzel, M., Krämer, H., Koch, J., & Reckwitz, A. (2020). Future and organization studies: On the rediscovery of a problematic temporal category in organizations. *Organization Studies*, *41*(10), 1441–1455.

Wenzel, M., Stanske, S., & Lieberman, M. B. (2020). Strategic responses to crisis. *Strategic Management Journal*, *41*, V7–V18.

Whetten, D. A. (1989). What constitutes a theoretical contribution? *The Academy of Management Review*, *14*(4), 490–495.

White, H. C. (2008). *Identity and control: How social formations emerge*. Princeton University Press.

Xiao, Z., & Tsui, A. S. (2007). When brokers may not work: The cultural contingency of social capital in Chinese high-tech firms. *Administrative Science Quarterly*, *52*(1), 1–31.

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

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