COMPARATIVE NETWORK RESEARCH IN CHINA

December, 2018

Ronald S. Burt
University of Chicago Booth School of Business, Chicago, IL 60637
Tel: +1 312-953-4089, ron.burt@chicagobooth.edu

Bat Batjargal
Oklahoma State University, Spears School of Business, Stillwater, OK 74078
Tel: +1 405-744-1310, bat.batjargal@okstate.edu

COMPARATIVE NETWORK RESEARCH IN CHINA

ABSTRACT

Using recent substantive results on China and the West, we highlight some virtues to Mill's method of residues for comparative network research. The result is research that combines the emic-etic approaches discussed by Leung (2009) with the spirit of Whetten's (2009:49) efforts to make "theory borrowing more context sensitive." We draw on recent comparative research about the competitive advantage enjoyed by network brokers, trust facilitated by embedding a relationship in a closed network, the subset of Chinese relations that constitute guanxi, the idea of American and European guanxi, different business environments maintained by the same network mechanism, cocoon networks, small-world networks, the longer history apparent in Chinese networks, and job search via colleagues, friends, and family. We also illustrate the value of data graphs for the expository value of the method of residuals in comparative network analyses.

Management and Organization Review (MOR) was created "specifically for authors who study employees and firms in China" as a place where authors did "not have to justify a Chinese sample."[1] To know what is Chinese, of course, one needs to know what is not Chinese, so comparative research is inherent in the mandate, and MOR has flourished as a source of quality comparative research on China (e.g., Batjargal, 2007a). To paraphrase a conclusion from DiTomaso and Bian's (2018) comparison of Chinese and U.S. labor markets, the two countries come from different origins, and are steeped in different rhetoric, but have evolved to a similar condition of network connections providing competitive advantage for certain people and groups to secure more attractive positions and projects (cf. Boisot and Child, 1996; Peng et al. 2019 on "network capitalism" in emerging markets). In this paper we apply Mill's "method of residues" to specific examples of comparative network analysis, but the principles generalize across research topics. The message of this paper will be new to some readers, a productive reminder to most readers, and quite familiar to a few readers, but even for the last, there is value in having succinct illustration available to share with colleagues and students. The paper is in three parts: We introduce the method of residues with comparative evidence on the competitive advantage enjoyed by network brokers, then move to our main point about iterative residues — using comparative evidence on the connection between network closure and trust and other examples, then close with the use of data graphs to improve yield from iterative residues.

THE METHOD OF RESIDUES

Consider a familiar bit of network theory: People with networks rich in structural holes have information advantages of breadth, timing, and arbitrage that give them an advantage in detecting and developing opportunities. This bit of theory emerged from multiple sources in the late 1970s, becoming more articulate and established through the early 2000s (review in Burt, Kilduff & Tasseli, 2013).

——— Figure 1 About Here ———

The data in Figure 1 are illustrative supporting evidence from 4,137 business leaders, and illustrative application of Mill's method of residues. The relative performance of individuals varies on the vertical axis. Network closure — the opposite of structural holes — varies across the horizontal. To the left are "network brokers," people whose large, open networks reach across the structural holes separating social clusters (illustrated by the sociogram of a person's network below the left side of the horizontal axis). To the right are people embedded in a closed network of interconnected colleagues (illustrated by the sociogram at the bottom right of the horizontal axis). The metric across the horizontal is network constraint, which measures the extent to which a person's social contacts are limited to one group (Burt, Kilduff & Tasselli, 2013). The data plotted in Figure 1 are average values of the horizontal and vertical axes within five-point intervals on the horizontal axis within each of several study populations. The solid dots describe a thousand managers from two study populations in Asia, primarily China. The hollow squares describe a thousand managers from three study populations in Europe. The hollow circles describe two thousand managers from seven study populations in the United States. As predicted by network theory, and reported in published studies of the populations, a manager's relative performance decreases as his or her network becomes more closed.[2]

Figure 1 is an illustration of what John Stuart Mill termed the "method of residues," which in contemporary language involves taking out of data what is already understood to better see what remains to explain (the source reference is section 5, chapter 8, volume 1 of Mill's influential 1846 work, *A System of Logic*, but the method is familiar practice in formal modeling, e.g., Coleman, 1964: Chap. 15).

Comparison Facilitated by Residues

The network theory illustrated in Figure 1 predicts that people with more open networks have information advantages that manifest as performance higher than peers. Examples are higher compensation than peers, more positive job evaluations than peers, faster promotions than peers, and so on. But raw performance metrics covary

with factors that can obscure the performance-network association. For example, the performance data in Figure 1 include annual compensation for investment bankers and supply chain managers. We know the bankers on average earn higher compensation than the managers, but the higher banker earnings have nothing to do with the network theory of advantage; that is an industry difference — so industry and job function differences are removed from the performance data. Among the bankers, we know that partners earn higher compensation, on average, than vice presidents, which is correlated with, but distinct from, the network theory of advantage — so differences due to job rank are removed from the performance data.

Adjusting raw performance for known confounding factors defines a residual measure of relative performance that can be compared across populations. The adjustment is as follows: Within a study population, typically the senior management in an organization, a measure of performance used for evaluation within the population is regressed across individual differences uninteresting for the study at hand, but known to covary with performance. The performance measure and performance correlates are often different in different study populations (see footnote 2). The resulting regression model is illustrated by the diagonal line through the hypothetical data in the small graph to the upper left in Figure 1. Raw performance on the vertical axis is predicted within a study population by a set of performance-relevant variables. Note Bob and Jim marked with squares in the small graph. Bob and Jim have similar raw performance scores. If performance were measured by annual compensation, the two squares similarly located on the vertical axis would indicate that Bob and Jim earn similar levels of compensation. But Bob holds a job that is typically not well compensated, which makes his compensation high relative to peers. Jim holds a job that is typically well compensated, which makes his compensation low relative to peers. Z-score relative performance in Figure 1 is a person's raw performance score minus the performance score expected for the person in their study population, quantity divided by the standard deviation of expected performance scores in the study population. A z-score of zero indicates a person who is performing at a level typical for them in their study population

(observations right on the regression line in the small graph to the upper left in Figure 1). The person's performance could be high or low on an absolute scale, but it is typical among the person's peers in the study population. Positive numbers indicate performance standard deviations ahead of peers. Negative numbers indicate performance standard deviations below peers. Performance variation between study populations is removed, and explicit controls for job rank, function, and other individual differences further clarifies how well an individual is performing relative to peers.

The definition of residual performance privileges the control variables over a network predictor since performance variation associated with the controls is removed before networks are allowed to predict performance. Since networks are associated with many of the controls (e.g., managers with large open networks tend to be promoted sooner to senior job rank), statistical tests of the network predictor are better conducted within a study population. What the residual measure of relative performance in Figure 1 does is display a strikingly consistent network association with performance in Asia (r = -.79), Europe (r = -.73), and the U.S. (r = -.75).

Comparison across three continents is explicit in Figure 1, but there are a great many other comparisons also in the evidence. Investment bankers from two continents are compared to engineering managers from the three continents — along with managers from a variety of other functions: HR, finance, human resources, operations, research, sales, and so on. More, the Asia data in Figure 1 include 258 managers in a large Asia-Pacific organization mixed with data from an area probability survey of 700 Chinese entrepreneurs (footnote 2). Thoughtful readers might be troubled by comparisons between entrepreneurs and managers.

Concern about the similarity of compared groups is valid, but not as severe an issue as it might seem. Ideally, one wants to draw comparison inferences from similar data on the populations being compared. An area probability sample of Chinese entrepreneurs should be compared to a similarly broad area probability sample of Western entrepreneurs, using the same kind of network data, with respect to the same measures of performance. The point holds as well for comparing two groups within the

same society. For example, Holm, Opper, and Nee (2013) do a comparative analysis of trust behavior by a stratified random sample of Chinese entrepreneurs versus a matched random sample of Chinese household respondents to show that the entrepreneurs are more willing to trust within a competitive social situation (extended to *guanxi* in Opper, Nee & Holm, 2017). However, the comparisons in Figure 1 are not absent theory. They rest on a well-supported network theory of advantage. The theory predicts that complex projects are more successful when led by a person in a network rich in brokerage opportunities across structural holes. The theory is agnostic on the substance of the project, be it the arts, government, war, science, or business. The key to comparing different populations with respect to such a general theory is to have performance and network data appropriate to each population in order to compare how the theory works in connecting performance and network within each population. The managers in Figure 1 are measured for their work discussion networks and their relative pay, evaluation, or promotion. Those metrics are appropriate for managers. The entrepreneurs in Figure 1 are measured for their supportive contact networks and their relative success in growing their business. Adjusting performance for manager and entrepreneur differences reveals a consistent performance-network association across the diverse business activities in which the 4,137 people in Figure 1 are involved.

ITERATIVE METHOD OF RESIDUES

Figure 1 illustrates the method of residues used to show consistency across elements being compared, which can be useful in establishing the generality of a theoretical prediction. If we were to stop here, we would be supporting what Przeworski and Teune (1970:25) famously termed the "postulate of substitutability:" "The bridge between historical observations and general theory is the substitution of variables for proper names of social systems in the course of comparative research." For example, one can account for heart attacks being more likely in the U.S. than Japan with a cultural story about social support mechanisms in Japan (Matsumoto, 1970). Or, one can replace the culture-laden proper names, Japan and U.S., with outcome-relevant variables: Relative

to the Japanese, Americans eat a diet of sugar and certain fats that increases the risk of heart attack, so it follows that Americans are more likely victims of heart attack, and Japanese who eat an American diet should be at higher risk of heart attack than other Japanese (Keys, 1957; Ueshima et al., 2008).[3] In a similar vein, network closure replaces country in Figure 1. All we need to know to predict a manager's relative performance is how closed the social network is around the manager. The more closed the network, the weaker the manager's relative performance, whether the manager is American, Chinese, or European (or a banker, an entrepreneur, or other kind of manager). The evidence contradicts the occasional prior arguments, for example, that Chinese culture inhibits behavior so as to eliminate the advantages productive for network brokers in the West (see Burt & Burzynska, 2017:226-228, for discussion, Batjargal, 2010).[4]

We use the phrase "iterative method of residues" to refer to the method of residues employed sequentially between contexts being compared — applying what is known in one context to highlight what is different in the other context, then taking what has been learned in the second context back to better understand the first, highlighting new details to b explained; and repeating the process back and forth as often as is productive in strengthening the power of general theory that cuts across both contexts.

Using the iterative back and forth between contexts, we steer a course through the research strategy gap Goldthorpe (1997) summarizes by contrasting Przeworksi and Teune's variable-oriented comparative research against traditional case-oriented comparative research in which the social system is understood as indivisible elements, each made meaningful in its connection with one or more other elements (see Ragin, 1987, Chaps. 3-4 for rich description of case-oriented versus variable-oriented research strategies). The gap is analogous to the one spanned by the extremes of a "theory of Chinese management" versus a "Chinese theory of management" discussed by Barney and Zhang (2009). We have in mind Goldthorpe's (1997:42) guidance for navigating the gap he describes (and see Levi Martin, 2017: Chap. 7, for practical cautions): "What is required is that, in the process of comparison, cases should always remain

identifiable as such, rather than being decomposed into variables that are then interpreted only in the course of the simultaneous analysis of the entire sample of cases under investigation." We see our course as an operationalization of the combined emic-etic approach discussed by Leung (2009), as well as in the spirit of Whetten's (2009:49) efforts to make "theory borrowing more context sensitive."[5]

Network Closure and Trust

Consider a bit of network theory that has benefitted in the last few years from the proposed strategy: network closure's association with trust and reputation, which traces back to the golden age of social psychology (Festinger, Schachter & Back, 1950). The closure-trust association was revitalized with the popularity of network metaphors (Granovetter, 1985; Coleman, 1988), and enriched with research applications to organizations and markets (Acheson, 1988; Greif, 1989; Ellickson, 1991; Bernstein, 1992; Barker, 1993; Uzzi, 1997; Burt, 2005: Chaps. 3-4). The gist of the story is as follows: the more connected the people in a network, the higher the reputation cost for bad behavior, the more likely bad behavior will be detected and sanctioned, so the less likely bad behavior will occur, which lowers the risk of trust within the network, which thereby increases the probability of trust within the network. The closure-trust association is a central metaphor in Nee and Opper's (2012) story about the rise of entrepreneurial business in China. One of their survey respondents is quoted (Nee & Opper, 2012:105): "In my industry, there are fewer than 100 players. … We get together now and then at business meetings. ... We all know each other. And hear about the other entrepreneurs at these meetings." As if to continue the thought, another respondent is quoted on the next page: "Whoever dares to do something bad, everyone will know about it. Everyone will stop giving credit, and there will be no hope of making it in this business." And another respondent chimes in on the same page with the opinion: "this is why people repay their loans. ... To keep their reputation. We actually never had any default." Given two people, ego and alter, the network prediction is that ego's trust in alter is higher as the network around ego and alter is closed by strong

indirect connection between ego and alter through mutual colleagues as third parties to the ego-alter relationship.

——— Figure 2 About Here ———

The regression line marked A to the left in Figure 2 is illustrative evidence of the closure-trust association established in the West. The network data are from American and European investment bankers and analysts making annual evaluations of the colleagues with whom they worked this year. The horizontal axis varies from left to right with increasing closure around evaluator and colleague. To the left, the sociogram beneath the axis shows evaluator and colleague with no mutual colleagues this year (low closure). To the right, evaluator and colleague have many mutual colleagues (high closure). The vertical axis indicates the probability that the evaluator chooses to work with a colleague again next year and gives the colleague a top evaluation. Across 46,231 relationships, the dashed regression line marked A to the left in Figure 2 shows a strong tendency for the most positive colleague evaluations to occur next year within networks closed this year.

Burt and Burzynska (2017) use the network-trust association established in the West as a baseline for analyzing the trust Chinese entrepreneurs have in business contacts. The initial result is the dashed regression line marked B to the right in Figure 2. Trust from a Chinese entrepreneur increases with network closure in a nonlinear, upward sloping association similar to the association observed in the West. Like Figure 1, the associations in Figure 2 marked "A" and "B" are evidence of the same network mechanism operating in China and the West.

However, Burt and Burzynska also found outlier Chinese relations that did not fit the closure-trust model established in the West. Illustrated by the solid lines marked C to the right in Figure 2, the outlier relations involve a high level of trust with or without the reputational support of a closed network around the relations. These relations tend to be with contacts known for many years, sometimes family, but more often with people outside the family (Burt and Burzynska, 2017:235; Burt, Bian, and Opper, 2018:17). The characteristic that the outlier relations have in common is a contact cited as "most

valued" during a significant event in the history of the entrepreneur's business. Particularly deviant from the closure-trust model are the people cited as most valued in helping the entrepreneur to found the business. Test statistics in Figure 2 measure trust's dependence on network closure. The dependence is strongest for nonevent current contacts (25.79 t-test) and weakest for contacts most valued in founding the business (3.01 t-test) — the relationship between entrepreneur and the person who helped to found the business is sufficiently strong that trust is there least dependent on the safety of a closed network.

Burt and Burzynska (2017) note an analogy between the outlier relations and the Chinese image of *guanxi*. *Guanxi* ties are a subset of relationships in which a person feels toward another (1) familiarity, (2) trust, and (3) mutual obligation (Bian, 1997, 2018, 2019; Chen, Chen & Huang, 2013; Farh, Tsui, Xin & Cheng, 1998). Burt and Burzynska (2017:239-241) propose with the outlier relations in Figure 2 a network definition: *Guanxi* are relations involving high trust relatively independent of network closure (typically built over time through acts of personal support).[6] An example of *guanxi* is illustrated in the following interview quote with a Chinese venture capitalist: "Liu was my dorm-mate at Nankai University about 20 years ago. But we did not keep in touch for some reasons. Then, we met 2 years ago again at a conference on leveraged buy-out. Although my firm does not invest in new and small firms such as his, we started to talk about possible business opportunities. My partners and I have got to know well of what these guys are up to. Although we were not sure of their business model, we liked their product: a special device that serve as router between mobile and non-mobile communications equipment. Eventually, I linked this team to a university-funded venture capital firm that focuses on telecom and IT ventures" (Batjargal, 2007b: 1001).

Lin (2001) long ago suggested that that guanxi should be considered a subset of all relationships. Armed with high-quality data, Burt and Burzynska provide a concrete distinction between *guanxi* and not-*guanxi* relations analogous to Granovetter's (1992) conceptual distinction between relational and structural embedding. Not-*guanxi*

relations are the usual business relations in which trust increases with network closure (structural embedding and the usual explanation of trust ensured by reputation cost for bad behavior). *Guanxi* relations are business relations in which trust is high and relatively independent of network closure (relational embedding). *Guanxi* relations by this network definition can occur in closed networks (e.g., within a family), but trust does not depend on closure. Once you know someone really well, you do not require the pressure of social opinion to ensure their good behavior; you know from experience that they will behave well, toward you at least. Independence from closure distinguishes *guanxi* relations from relations in a proverbial "old boys network," wherein connected peers enforce reputation cost for bad behavior.

The contrast between *guanxi* and not-*guanxi* relationships holds up under closer scrutiny (Bian, 2017; Burt & Opper, 2017; Burt, Bian & Opper, 2018), but our interest in this paper is the next step. Given the network definition of "*guanxi*" relations in China, why wouldn't a similar kind of strong connection exist in the West? Lin (2001) suggests that *guanxi* is a global phenomenon existing well beyond China. Shouldn't there be *guanxi*-like relations, for example, among the investment bankers and analysts in Figure 2?

There are. The regression line marked D to the left in Figure 2 goes through data that Burt and Burzynska (2017) took from an earlier unpublished analysis of decay in the investment banker and analyst relations. For relations that survived two years, the evaluator and colleague knew one another well enough such that trust no longer depended on mutual contacts. The flat regression line marked "D" shows a high level of positive evaluation that is independent of network closure (0.81 negligible z-score logit test statistic). Thus, there are American *guanxi* that correspond by network definition to Chinese *guanxi* (though general American language doesn't have a word for them, perhaps because of their infrequency), so the theoretical association between trust and network closure has two tracks, the usual nonlinear positive trust association with closure among current contacts (lines A and B in Figure 2), and at a high level of trust, relatively independent of closure, around long-standing relations that have evolved into

guanxi ties (lines C and D in Figure 2). At the same time that *guanxi* relations are defined by the upper lines D and C in Figure 2, not-*guanxi* relations are distinguished by the lower lines A and B: Not-*guanxi* is a relationship within which trust depends on an audience of observing third parties — which is the positive nonlinear trust association with closure so often observed in business relationships.

The iterative process giving rise to the new understanding is illustrated in Figure 3: (1) Social capital research in the U.S. establishes a positive association between trust and network closure, which (2) is replicated in China, but (3) reveals outlier relations analogous to the Chinese image of *guanxi* ties, which (4) turn out to be similarly existent in the West. As displayed in Figure 3, the iterative method of residues involves determining what is similar in compared contexts, to highlight what is unique, to then discover the similar underlying the unique.

——— Figure 3 and Figure 4 About Here ———

To say with Figure 3 that the network association with trust is the same in China and the West does not mean that the business environments are identical. As illustrated in Figure 4, the number of relations that qualify to be *guanxi* ties is much lower among Western bankers and analysts. About one in ten cited colleague relations in the West are *guanxi* (9%), of which about half are current contacts (54%). In contrast, two thirds of business relations cited by the Chinese entrepreneurs are *guanxi* ties (65%), of which three fourths are current contacts (74%). In a phrase, there is more history in the networks around the Chinese entrepreneurs.

Now come the new research questions: Is the China difference a substantive difference between Chinese and Western culture, a substantive difference between the personal network around an entrepreneur versus the "what have you done for me lately" network around an investment banker, or perhaps a methodological artifact of explicitly asking the Chinese entrepreneurs for contacts valued during the history of the business? How prevalent are *guanxi* ties in the West (now that we know what to look for), how often are they active as current contacts, and to what extent does success in the West depend on them as it does in China?

Other Examples

We use the Figure 2 illustration because it has developed largely in the pages of MOR. We discuss a selection of related examples here in four categories.[7] The four categories refer to kinds of work, distinguished here to further clarify what we mean by iterative residues in comparative research.

Category 1: Non-Comparative Studies

The baseline category is research that describes social networks and correlates in a single context. Often-cited examples, are Granovetter's (1973) "weak tie" study of networks used in job searches by white-collar workers in Newton, MA, or Burt's (1992) "structural hole" study of the networks associated with early manager promotion in a New England computer company. Chinese research in this category is often more comparative than corresponding research in the West, because the Chinese work so often uses work in the West as a foil to argue that China is different. For example, Bian (1997) uses Granovetter's study as a foil for his argument that "strong ties" rather than weak ties are used in job search in China, and Xiao and Tsui (2007) use Burt's study as a foil for their argument that the structural holes valuable in the West deviate from the norm in China.

Category 2: Different Networks

A next category of work involves comparing networks. Networks in two or more contexts can be different in size, density, composition, use, or anything else. For example, Bian and Ang (1997) compare Tianjin and Singapore for kinds of contacts used to find a new job. Job markets in Singapore were more developed than in Tianjin. Nevertheless, people job searching in both cities turn to strong ties significantly more often than weak ties, which Bian and Ang interpret in terms of both cities being densely Chinese Han, for whom *guanxi* ties are where one goes for help (cf., Lee, Ruan, and Lai, 2005). An exemplary piece of work in this category is Ruan's (1998) comparison of the networks generated by Chinese versus Americans in response to the name generator used in the General Social Survey. Ruan (1998: 261) concludes that the

"GSS discussion question generated a range of social ties, which accounts, to a great extent, for an important part of the social world of a Chinese individual. … Thus, the current study has provided supporting evidence for the comparability of the discussion networks in urban China and America. That is, they are both 'core discussion networks'." The primary difference is that the Chinese networks are more anchored on co-workers than are the American networks (co-workers are 44% of the Chinese networks on average, versus 18% of the American networks; see Ruan et al., 1990, for initial publication and explanation of the results; Chen, 2014: 185, for similar results with national sample data on job-search networks: 50% co-workers in China, 40% in Taiwan, and 20% in the U.S.). Throughout her analysis, Ruan is careful about methodological differences since network characteristics can be so greatly affected by how network data are gathered (e.g., a single name generator can be expected to generate smaller networks than multiple generators, and archival data such as email or peer evaluations can be expected to generate larger, less dense, networks than networks generated by survey interviews).

Comparing networks using the method of residues is most common in the form of network metrics that measure observed population network structure as a deviation from a baseline random structure. Substantively diverse populations can be compared for the extent to which observed structure contains some theoretically meaningful network characteristic more that would be expected by random chance. This is the early strategy that Holland and Leinhardt (1970) used to measure the extent to which networks in a population contain more transitive triads that would be expected by random chance (beginning an evolution to contemporary p* and exponential random graph models, Robins et al., 2007; cf., Faust & Skvoretz, 2002, for p* comparisons across animal and human networks).

Freeman and Ruan (1997) compare networks in nine countries (Australia, China, the U.S., and six countries in Europe) for their pattern of associations between six kinds of exchanges (household help, borrowing money, personal advice, etc.) and nine kinds of roles (spouse, friend, co-worker, etc.). Do people in the different countries do the

same kinds of exchanges with the same kinds of people? Freeman and Ruan define a baseline of associations between the kinds of exchanges and roles independent of differences in naming contacts for specific kinds of exchanges and roles (iterative proportional fitting), and report similar patterns in all of the countries except China. In China, friend, neighbor, and co-worker roles are clustered together as alternative partners for the same kinds of exchanges, and family roles are spread apart for specific kinds of exchanges with certain kinds of family roles. Freeman and Ruan (1997:111) conclude: "The principal difference between the Chinese pattern and that of the other eight countries is that the Chinese make their primary distinction, not between financial matters and all others, but rather between family matters and all others." (See Batjargal et al, 2013, for similar results on France and Russia.)

More relevant to the brokerage and closure predictions illustrated in Figures 1 and 2, and so often discussed with respect to business networks, residue from a random baseline is foundation for measuring the extent to which a population constitutes a "small world." A population is a small world if it contains sparsely interconnected dense clusters (i.e., social clusters of closed networks occasionally connected across clusters by network brokers). Watts and Strogatz's (1998) widely-adopted metrics measure the extent to which (a) clustering in a population network is higher, and (b) indirect connections in the population network are shorter — than would be expected in a random network of the same size and density. The Watts and Strogatz metrics have been used to show the diversity of populations with a small world structure (e.g., film actor network, power grid network, a worm network in Watts & Strogatz, 1998; and the comparative studies assembled in Kogut, 2012, in which countries are compared for the extent to which governance of their leading public corporations is structured as a small world, noting for MOR readers that China is among the countries showing low evidence of small world structure in the 1990s, Guthrie et al., 2012:125; the multiple-country network data are available for analysis.[8]

Category 3: Different Network Correlates

A third category of work involves comparing network correlates. For example, Figure 1 generalizes earlier analyses by Burt, Hogarth, and Michaud (2000), Merluzzi (2013), and Burt and Burzynska (2017) showing similar performance returns to network brokerage in Asia, Europe, and the U.S. Substantive applications of the small-world metrics show the expected stability and performance correlates of clustering (e.g., Kogut & Walker, 2001, on corporate ownership, acquisitions, and stability in Germany), and bridges across clusters (e.g., Uzzi & Sprio, 2005, on production team networks and annual ticket sales for Broadway plays).

More often, the goal is to reject the null by showing different correlates in different contexts. For example, Bian, Hao, and Li (2017) adjust responses to a "how happy are you" question in national surveys in Australia, Britain, and China (so responses are comparable across the contexts) to reveal culture interacting with local networks: Expressions of well-being are higher in Britain and Australia than in China, especially among the rural Chinese, but contact with friends and family has significantly less positive effect in Britain and Australia, especially in Britain.

The most ambitious comparative network analysis to date was led by Nan Lin coordinating research efforts in China, Taiwan, and the U.S. Similar network data were gathered in national probability surveys in each country followed by a second wave of surveys two years later (rural areas excluded in China). The work was informed by separate analyses within more than the three study countries (Lin & Erickson, 2008; cf. David & Westerhuis, 2014, for a similar research strategy of juxtapositioning country-specific analyses). Reporting on the coordinated surveys, most chapters in Lin, Fu, and Chen (2014) are comparative analyses of the data from two or all three of the study countries (see Son, 2013, for a book-length comparative analysis of the first wave data, and Kogut, 2012, for a similar corporate-network research strategy in which most chapters are comparative analyses across countries).

For example, one of the chapters (Chen, 2014) digs into a core proposition for the kind of network analysis used in the book: Job seekers find higher status jobs when

they go through bridge relations to high-status contacts in other groups, and those bridge relations tend to be historical rather than current, making them "weak ties" in a person's current network (Granovetter, 1973; Lin, Ensel & Vaughn, 1981). Using network data on the chain of contacts through whom respondents found their current job, Chen reports that the weak-tie proposition holds in China, Taiwan, and the U.S., but the proposition holds differently in the three societies. Americans are most likely to have found their job through personal contacts (p. 180: 34% in China, 44% in Taiwan, 54% in the U.S.), and they require the shortest chains of intermediaries to reach the final weak-tie contact in their search (p. 180: 38% of Chinese had job-search chains of more than one person, versus 22% of the Taiwanese, and 20% of the Americans), largely because the Asians are more likely to begin with friends and family close to the searcher, who know little more than the searcher, before their search breaks out of their own group to reach the final weak-tie contact in another group (pp. 182-184: 11% of Chinese begin their search with someone less than close, as do 21% of Taiwanese, versus 38% of Americans).

Category 3 research requires more caution than the lower two categories because residues in category 3 can require level and slope adjustments to make the residues comparable. The Xiao and Tsui (2007) study cited above — a early comparative analysis of performance returns to network brokerage in China — illustrates the point. In contrast to Figure 1 showing lower performance from managers in more closed networks, Xiao and Tsui (2007) report negligible or opposite association in four Chinese organizations, and conclude their comparative network analysis on page 23: "Although structural holes may bring positive returns to individual actors in a market-like, low-commitment organizational culture, it is network closure that will bring advantages to the actors, by facilitating trust, reciprocity, and reputation, in a clan-like, high-commitment organization with a strong cohesive culture." The conclusion is attractive for its fit to popular images of Chinese culture, but seems unlikely given the clear association in Figure 1 showing Chinese managers in many organizations disadvantaged in proportion to network closure (the supportive evidence on Chinese entrepreneurs in Batjargal et

al., 2013, Batjargal, 2007c, is noteworthy here). If not Chinese culture, then what? One possibility is that Xiao and Tsui's organizations gave managers little discretion in their jobs, which would erode the advantages of network brokers, but job rank seems a likely explanation. The magnitude of the performance-network association in Figure 1 covaries with job rank. The more senior the job rank, the more a manager is the author of his or her job, obliged to figure out what to do, and from whom support is needed, which means network brokers are advantaged. The 4,137 managers in Figure 1 primarily hold middle and senior job ranks. At low levels of management in the West, there is often no performance association with open networks (Burt, 1992: 133, 138; 2005: 156-162). It is not surprising, therefore, to see the lack of a performance-brokerage association, or even a reversed association depending on what controls are in the prediction, in Xiao and Tsui's analysis because the study managers are young and disproportionately in low job ranks (see Burt, 2010: 61n, for explicit comparison with another Asian technology organization). Among such managers, one would not expect in the West to see the usual brokerage association with performance. Still, the Xiao and Tsui article warrants serious attention because it shows that quality data are not enough. Their data are of exceptional quality, especially for such an early comparative study — full networks are measured around each study manager in four different organizations. The problem is that the quality data describe people doing jobs unlikely to show the performance benefits of an open network.[9]

Category 4: Iterative Exploration of Different Network Correlates

The next level up is to expand network theory by digging into systematic deviations from baseline network correlates. This is the work we illustrate using the trust association with network closure in Figures 2, 3, and 4. This is the work for which we had difficulty finding examples, and expert opinion agreed is largely absent in comparative network research on China (footnote 9).

Here are a few illustrative bits of work: The network-broker solution to segregation in management populations was discovered by studying the networks around female

managers in an organization in which women were outliers from the brokerage-performance association illustrated in Figure 1 (Burt, 1992: Chap. 4, 1998). Kogut and Walker (2001) move their small-world analysis to a next iteration when they subject the German social structure to variably severe exogenous shock to explore the stability implications of their initial analysis. The advantage in China of a "cocoon" network around the launch of an entrepreneurial venture was discovered in residuals from the brokerage-performance association (Burt & Opper, 2017), then re-affirmed upon returning to the West to find corresponding results in multiple unpublished research projects (Zhao & Burt, 2018).

DATA GRAPHS ENHANCE THE METHOD OF RESIDUES

Greve (2018) and Levine (2018) argue in MOR for authors to make more use of data graphs to improve the accuracy, reliability, and fecundity of empirical research (see Schwab, 2019, for related discussion, and Healy & Moody, 2014, for a lively, succinct, broad introduction to data visualization). In closing, we add to their good counsel that data graphs facilitate and enhance use of the method of residues.

Figure 5 is one of many possible examples. Graphs A and B correspond to the graphs that Burt and Burzynska (2017:226) use to support their argument that closed networks are a disadvantage for Chinese entrepreneurs just as they are known to be a disadvantage for business leaders in the West. Graphs A and B show strong negative associations between network constraint and relative performance.

——— Figure 5 About Here ———

Olav Sorenson, who generously agreed with MOR's editor to comment on Burt and Burzynska (2017), looked at the graphs A and B in Figure 5 and commented (Sorenson, 2017:275): "Although the relationships between success and structural holes appear similar, note that the two panels differ in the ranges of their horizontal axes. Managers in China appear far more constrained on average than their Western counterparts (i.e., they have fewer brokering relationships). Within the overlapping

range of the data, moreover, the relationship between success and structural holes appears much steeper in China. Social capital, in the form of brokerage, therefore, appears both less common and far more valuable in the East." He is quite correct in his reading of the graphs — and note that such inspection is made possible and facilitated when data graphs are presented rather than just presenting correlation/regression coefficients. Burt and Burzynska wanted to highlight the smooth clustering of the Chinese data along a negative performance association with network closure — clearly rejecting prior arguments that network brokerage offers no advantage in China — so they scaled the axes of graph B to the minimum and maximum of the Chinese data. In scaling the axes the way they did, however, Burt and Burzynska obscured the relative slope of association in the two graphs.

It is easier to visually compare the slope of association across the Chinese to the slope of association across the Americans and Europeans if the axes of graphs A and B are the same scale. Graph C in Figure 5 presents the data plotted in graph B, now plotted on the graph A axes.

Two points are made more obvious. First, the slope of association between success and network constraint in graph C is similar to the relatively flat slope at high levels of constraint on the American and European managers in graph A. The similarly flat slopes show there is no evidence of social capital, in the form of brokerage, being more valuable in China. Second, it is certainly true that networks around the Chinese entrepreneurs are more closed than the networks around the Western managers. The data distribution in graph C varies across the right half of the horizontal axis. There are no observations to the extreme left, where the largest networks, richest in structural holes, are found. However, we suspect the more closed networks around the Chinese entrepreneurs is not a characteristic of Chinese culture so much as a reflection of organization size. The observed Americans and Europeans work in organizations that number tens of thousands of employees. On average, the Chinese entrepreneurs work in much smaller organizations. The median number of employees is 67. More, Asian managers drawn from large organizations have the large, open networks to the extreme

left on the horizontal axis (in Figure 1, there are solid dots to the left on the horizontal axis, and from the lack of data to the left in Figure 5C, none of the solid dots to the extreme left in Figure 1 are Chinese entrepreneurs).

We find the above a productive comparative discussion made possible by data graphs. Of course, the graphs are not statistical evidence. Statistical evidence is presented in the source articles in a table of regression results. The purpose of the graph is to provide an easily digested visual image of the data around the proposed association, while providing sufficient detail to reveal nonlinearities, outliers, or distinct clusters of observations (see Healy & Moody, 2014:107; Levine, 2018:434). The purpose does not require sophisticated display; a simple two-dimensional graph will do. In our experience, the purpose is served by aggregating data up to a handful to a couple dozen average observations. Aggregation for Figure 2 is obvious since the network metric is an interval measure. Scores beyond the highest level displayed are combined because they are rare and pretty much consistent with the display. To create Figure 1, on the other hand, the continuous network index on the horizontal axis was divided into five-point intervals, and values of scores on the horizontal and vertical axis were averaged within each interval for each study population. The resulting 140 data points, summarizing 4,137 observations, is sufficiently detailed to lower the odds of data abnormalities, while communicating a smooth nonlinear association between performance and network closure consistent across the three continents. Similar graphs have been used to show the performance-network association increasing with job rank as the success of people in more senior ranks became more contingent on their social network (Burt, 1992:138), contradictory network associations with performance for men and women in sexist organizations (Burt, 1998; 2010:196), good ideas less likely to come from people in closed networks (Burt, 2004; 2005:92), and network closure in China more hierarchical than in the West (Burt, 2019a).

CLOSING

We have argued for, and illustrated, the method of residues applied to comparative network research in the context of China. We introduced the method of residues with comparative evidence on the competitive advantage enjoyed by network brokers, then moved to our main point about iterative residues — using comparative evidence on the connection between network closure and trust and other examples, then closed with the use of data graphs to improve yield from iterative residues. We see our course as one operationalization of the combined emic-etic approach discussed by Leung (2009), and in the spirit of Whetten's (2009:49) efforts to make "theory borrowing more context sensitive."

We close with illustrative questions for future research. Figures 1 and 5 display striking consistency for the performance association with network brokerage (-.79 correlation in Asia, -.73 correlation in Europe, -.75 correlation in the U.S.). To what extent are known exceptions also similar between East and West? We know that the performance association with network brokerage disappears for Western managers in low job ranks (Burt, 1997; 2004; 2005:159-162), and the same seems to be true for managers in China (Xiao and Tsui, 2007). How widespread is the similarity?

Further, we know that the performance association with network brokerage disappears, and can even reverse, for Western managers who do not have the social standing to be accepted as brokers (Burt, 1998; Rider, 2009; Burt and Merluzzi, 2014), and it has certainly been argued that reputation matters in Chinese business. Nee and Opper (2012: 211) describe Chinese entrepreneurs building reputation in the course of brokering connections: "Through personal introductions and fine-grained information passed through social networks, the 'broker' typically signals trustworthiness and reputation of the prospective business partners. Moreover, it is in the broker's interest to make good recommendations, as most business partners will tend to reward their networking contacts in one way or another. Such introductions can span the social gaps, or 'structural holes' between groups." How widespread is the East-West similarity

in the requirement for broker social standing, and is the cure in the West of being sponsored by a network broker (Burt, 1998) similarly the cure in the East? In other words, does the performance of a women in a firm that typically focuses on men for senior leadership require the sponsorship of a well-connected man? Do would-be entrepreneurs from outside the city require the sponsorship of a well-connected insider? There are anecdotes and suspicions to answer "yes" to these questions, but we await empirical comparative evidence.

And how precise can we, or should we, make the comparison of East and West? In our opening pages, we highlighted the legitimacy for the purposes here of comparing network results on Chinese entrepreneurs with network results on diverse kinds of managers in the West. East and West, entrepreneurs are different in many ways from managers, and investment banking managers are different in many ways from HR officers and engineers — but the network theory used here makes similar predictions for all, which is one of the theory's attractive features. At the same time, comparison could be more precise if comparison was between people in more similar kinds of work.

Given the strong accumulation of evidence on Western managers, a few strategic studies of senior Chinese management networks would have inferential power disproportionate to their numbers. Xiao and Tsui (2007) set the stage for such work, we just need to shift the research to more senior management. There is a long tradition of such work in the West, reflecting business interest in any research capability likely to help the business run more effectively or efficiently. With the rapid expansion of research-active business schools in China, we look forward to the results of similar university collaborations with large Chinese organizations.

Less network evidence has accumulated on entrepreneurs in East or West. A model is Batjargal et al's (2013) comparative network analysis of entrepreneurs in China, France, Russia, and the United States. The data are not from area probability samples, and the network data collected are lean, but the article is exemplary for its effort to analyze comparable data across contexts. The time is ripe for a network study

of American entrepreneurs using data comparable in quality to the Chinese data we had available here.

Shifting to the trust association with closure, how prevalent are *guanxi* ties in the West now that we know what to look for? In other words, how prevalent are ties that could be termed American and European *guanxi*? The Chinese have a word for *guanxi* ties, but the graphs in Figure 2 show that Americans have relationships that are similarly strong and independent of network structure, so how prevalent are such American and European *guanxi*? Is there a local rhetoric used in the West to distinguish such ties? For example, how does email language between people tied by *guanxi* compare with the language in not-*guanxi* ties — both not-*guanxi* ties in which trust is supported by a closed network, and not-*guanxi* bridge ties bereft of such support? When we observe current contacts, how often do we capture a person's *guanxi* ties? The Venn diagrams in Figure 4 show that *guanxi* ties are rare among the American analysts and bankers (9%) but about half of their *guanxi* ties are current (54%). *Guanxi* ties are more common in the networks of the Chinese entrepreneurs (65%), and three fourths of their *guanxi* ties are current (74%). Are these East-West differences a substantive difference between Chinese and Western culture, a substantive difference between the personal network around an entrepreneur versus the "what have you done for me lately" network around an analyst or investment banker, or perhaps a methodological artifact of explicitly asking the Chinese entrepreneurs for contacts valued during the history of the business?

At the same time that the comparative analysis opens up new research questions about American and European *guanxi*, it opens up deeper research questions about the meaning of *guanxi* in the source society. The network distinction between *quanxi* versus not-*guanxi* relations provides a contrast variable with which we can dig into the meaning of *guanxi* (and hopefully take that back to the West at some point to better understand American and European *guanxi*). Why has no one asked Chinese business people to distinguish what they consider to be their *guanxi* relationships? There is a great deal of semantic acrobatics concerning the meaning of the word *guanxi* (citations

deliberately not given), but no research to our knowledge in which a representative sample of business people inventory their key contacts, and are asked to distinguish the subset of contacts who are *guanxi*: "Yang and Guo are *guanxi*, the others not so much." This is a piece of research that cries out to be done. Armed with such data, new questions can be asked: (1) Do respondent distinctions between *guanxi* and not-*guanxi* match the network distinction in Figures 2 and 3? (2) How do individuals differ in their distinction between *guanxi* and not-*guanxi* relations? For example, are needy people more likely to interpret relations as *quanxi* in the hope of exploiting contact resources? Do resource-rich contacts react by avoiding such people? (3) How do *guanxi* relations differ in their origins from not-*guanxi* relations? The Chinese business people used here for illustration find some *guanxi* with family, but most originate outside the family (Burt, Bian and Opper, 2018). (4) How do *guanxi* versus not-*guanxi* differ in the network structure around them? One could argue that *guanxi* relations are stable anchors for closed networks with friends of one's *guanxi* ties. On the other hand, not-*guanxi* ties might cluster into closed networks because trust in such relations is more likely within a closed network.

The above are only a few of the questions raised by comparative network research on China. We offer example questions not as specification, but merely as concrete illustration. Further, answers could come from diverse kinds of research — from archival big data on network structure and content, to survey based network analyses, across to qualitatively rich ethnographic descriptions of context specific social ties — all of which are likely to be more productive with iterative use of Mill's method of residues to highlight promising new research results and frontiers.

NOTES

[1]Quotes are from the journal's founding editor, Anne Tsui, in a 2014 interview (see the Cambridge Core blog: http://blog.journals.cambridge.org/2014/10/30/an-interview-with-the-founding-editor-of-management-and-organization-review/).

[2]The data in Figure 1 come from a variety of studies. For the purposes of this paper, we do not burden the text with data details, but provide here explanation for readers interested. The Asia data come from two studies, each of which discusses variables held constant to compute relative performance for the vertical axis in Figure 1: Burt (2010) and Merluzzi (2013) for 258 managers in an Asia-Pacific software company, and Burt and Burzynska (2017) for an area probability survey of 700 Chinese CEOs of entrepreneurial ventures in the Shanghai and adjacent Jiangsu and Zhejiang provinces. Data on individuals are averaged in Figure 1 for each of the two study populations separately within five-point intervals of network constraint (30 Asia data points are plotted in Figure 1). The E.U. data come from three organizations: 60 managers in a chemical company (Burt, Hogarth & Michaud, 2000), 654 managers in a financial services organization (Burt, 2018), and 380 managers in a healthcare organization. Network and performance data on managers in the healthcare organization are not described in a published report, but networks were obtained with the web survey used in Burt (2010) and performance is measured by annual performance evaluations, adjusted for individual differences as salary is adjusted in Burt (2010). Data on individuals are averaged in Figure 1 for each of the three organizations separately within five-point intervals of network constraint (29 E.U. data points are plotted in Figure 1). The U.S. data come from seven organizations: 170 male managers from a computer manufacturer (Burt, 1992), 283 HR managers in a commercial bank, 531 investment bankers, 354 stock analysts in a financial organization (Burt, 2010), 455 supply chain managers in an electronics firm (Burt, 2004), 113 software engineers (Burt, 2018), and 179 managers in an electronics organization. Network and performance data for the electronics organization are not described in a published report, but the network data

were gathered by a web survey like the one used with the supply chain managers and performance is measured by annual performance evaluations adjusted with background data from company personnel records. Data on individuals are averaged in Figure 1 for each of the organizations separately within five-point intervals of network constraint (81 U.S. data points are plotted in Figure 1).

[3]In fairness to Matsumoto, we hasten to add that he is well aware of the diet prediction. His argument in the cited paper is that in addition to a healthier diet, the Japanese are embedded in social support activities that could also be a factor explaining their lower risk of heart attack. And the stress argument is not a straw man. Analyzing Twitter texts from a sample of middle-age Americans and a corresponding sample Tokyo residents to measure stress in terms of expressed anger, and blood samples from survey respondents to measure biological health risk, Kitayama et al. (2015) show associations between anger and health risk, holding constant health status and healthy behavior. In the U.S., people expressing more anger are at higher health risk. In Japan, people expressing more anger are at lower health risk. The country difference is attributed to culture. In the U.S., people are free to express their emotions, so expressed anger indicates exposure to stressful events. In Japan, people are expected to keep their emotions to themselves — unless the person feels he or she holds a dominant, privileged position, so the anger expression is an indicator of feeling dominant and privileged, which is associated with lower health risk.

[4]Performance is measured in different ways in different study populations, so country differences in mean performance are ambiguous. Therefore, means are removed in the residue measure of performance. Fortunately, the empirical question for structural hole theory is the slope of residue performance across network closure. Figure 1 shows that network closure is similarly a disadvantage in America, China, and Europe.

[5]For comparing several to many contexts, we would turn to Ragin's (1987) qualitative comparative analysis (QCA, see Abel, 1989, for thoughtful executive summary; Breiger 2009 for network analyst discussion), but for a small number of

contexts (e. g., two: China versus the West) in which one is modeling individuals (e.g., the brokerage-performance association or the closure-trust association), an analysis of covariance design with a thorough rooting around in the residuals has advantages of simplicity, clarity, and familiarity to diverse readers.

[6]Notice that the *guanxi* inference was not purely inductive. Residuals from the known closure association with trust did not say "*guanxi*." Burt and Burzynska knew about *guanxi*, and the residuals looked consistent with what they understood to be *guanxi* characteristics. This is much like a doctor running the tests that definitively rule out certain explanations for an ailment so the doctor can look for evidence of alternative explanations for which there are less definitive tests. In this, the iterative strategy involved a deductive element of searching through the residuals with an eye informed by alternative theories. See also the advantage for comparisons provided by a well-supported network theory of advantage (last paragraph in section "Method of Residues Illustrated"). We thank Nan Lin for highlighting the deductive element here.

[7]We were surprised at the small number of studies we found in searching for other examples, so we wrote to colleagues for examples. We began with friends in China who are also experts in the comparative analysis of networks, then expanded to other scholars, and snowballed into recommended others. A typical response was: "I don't know of such research, but here are a couple example studies that might be useful." We discuss a selection of the suggested studies in the text. We are grateful for the generosity of the people who responded to our inquiry (see acknowledgement note).

[8]https://www8.gsb.columbia.edu/leadership/research/smallworlds/datadl

[9]If you suspect that job rank is obscuring returns to brokerage, correct for level and slope effects of rank (e.g., Burt, 2004: 371). Instead of regressing P for performance across logC for log network constraint, create dummy variables R1, R2, etc. for the rank one step below the highest (R1), two steps below the highest (R2), down through the broad lowest rank, then estimate a regression equation with adjustments for job rank: P = a + b logC + b1 R1 + b2 R2 + g1 R1logC + g2 R2 x logC, which contains a bi level adjustment for each job rank Ri, and a gi slope adjustment for each job rank Ri (and

whatever other control variables, of course). Coefficient b is the returns to brokerage for the highest rank people, bi is the difference in performance for network brokers at job rank Ri, and gi is the difference from b in returns to brokerage for people in job rank Ri (i.e., b – gi is returns to brokerage for job rank Ri). Typically, gi is statistically significant for job ranks Ri well below the top, and coefficient b shows statistically significant returns to brokerage. This does not guarantee that b is statistically significant. It just corrects b for including in the analysis job ranks in which, for whatever reason, managers do not benefit from access to structural holes.

REFERENCES

Abel, Peter. 1989. Review of The Comparative Method. *International Review of Social History*, 34(1), 103-109.

Acheson, James M. 1988. *The Lobster Gangs of Maine*. Lebanon, NH: University Press of New England.

Barker, James R. 1993. "Tightening the iron cage: concertive control in self-managing teams." *Administrative Science Quarterly*, 38(3), 408-437.

Barney, Jay B. and Shujun Zhang. 2009. The future of Chinese management research: a theory of Chinese management versus a Chinese theory of management. *Management and Organization Review*, 5(1), 15-28.

Batjargal, Bat. 2007a. Comparative social capital: networks of entrepreneurs and venture capitalists in China and Russia. *Management and Organization Review*, 3(3), 397-419.

Batjargal, Bat. 2007b. Network Triads: Transitivity, Referral and Venture Capital Decisions in China and Russia. *Journal of International Business Studies*, 38 (6): 998-1012.

Batjargal, Bat. 2007c. Internet entrepreneurship: Social capital, human capital, and performance of Internet ventures in China. *Research Policy*, 36 (605-618).

Batjargal, Bat. 2010. The effects of network's structural holes: polycentric institutions, product portfolio, and new venture growth in China and Russia. *Strategic Entrepreneurship Journal*, 4(2), 146-163.

Batjargal, Bat, Michael A. Hitt, Anne S. Tsui, Jean-Luc Arregle, Justin W. Webb, Toyah L. Miller. 2013. Institutional polycentrism, entrepreneur's social networks, and new venture growth. *Academy of Management Journal*, 56(4), 1024-1049.

Bernstein, Lisa. 1992. Opting out of the legal system: extralegal contractual relations in the diamond industry. *Journal of Legal Studies*, 21(1), 115-157.

Bian, Yanjie. 1997. Bringing strong ties back in: indirect ties, network bridges, and job searches in China. *American Sociological Review,* 62(June), 366-385.

Bian, Yanjie. 2017. The comparative significance of *guanxi*. *Management and Organization Review*, 13(2), 261-267.

Bian, Yanjie. 2018. The prevalence and increasing significance of *guanxi*. *China Quarterly*, 235, 597-621.

Bian, Yanjie. 2019. *Guanxi, How China Works*. Cambridge, UK: Polity Press.

Bian, Yanjie, and Soon Ang. 1997. "Guanxi networks and job mobility in China and Singapore. *Social Forces*, 75(3), 981-1005.

Bian, Yanjie, Mingsong Hao, and Yaojun Li. 2017. Social networks and subjective well-being: a comparison of Australia, Britain, and China. *Journal of Happiness Studies*, DOI 10.1007/s10902-017-9926-2

Boisot, Max and John Child. 1996. From fiefs to clans and network capitalism: explaining China's emerging economic order. *Administrative Science Quarterly*, 41(4): 600-628.

Breiger, Ronald L. 2009. On the duality of cases and variables: correspondence analysis (CA) and qualitative comparative analysis (QCA). Pp. 243-259 in *The SAGE Handbook of Case-Based Methods*, edited by David Byrne and Charles C. Ragin. Los Angeles, CA: University of California Press.

Burt, Ronald S. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.

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

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

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

Burt, Ronald S. 2005. *Brokerage and Closure: An Introduction to Social Capital*. Oxford: Oxford University Press.

Burt, Ronald S. 2010. *Neighbor Networks: Competitive Advantage Local and Personal*. Oxford: Oxford University Press.

Burt, Ronald S. 2018. Life course and network advantage in organizations: peak and transitional ages," Pp. 67-87 in *Social Networks and the Life Course*, edited by Duane Francis Alwin, Diane H. Felmlee, and Derek Kreager. Basel, Switzerland: Springer.

Burt, Ronald S. 2019a. Network disadvantaged entrepreneurs: density, hierarchy, and success in China and the West. *Entrepreneurship Theory and Practice*, 43(1), 19-50.

Burt, Ronald S. 2019b. A note on the networks and success of female entrepreneurs in China. Working Paper, Booth School of Business, University of Chicago.

Burt, Ronald S., Yanjie Bian, and Sonja Opper. 2018. More or less *guanxi*: trust is 80% network, 10% individual differences. *Social Networks*, 54(July), 12-25.

Burt, Ronald S. and Katarzyna Burzynska. 2017. Chinese entrepreneurs, social networks, and *guanxi*. *Management and Organization Review*, 12(2), 221-260.

Burt, Ronald S., Hogarth, Robin M. and Michaud, Claude. 2000. The social capital of French and American managers. *Organization Science,* 11(2), 123-147.

Burt, Ronald S., Martin Kilduff, and Stefano Tasselli. 2013. Social network analysis: foundations and frontiers on network advantage. *Annual Review of Psychology*, 64, 537-547.

Burt, Ronald S. and Jennifer Merluzzi. 2014. Embedded brokerage: hubs versus locals. Pp. 161-177 in *Research in the Sociology of Organizations*, edited by Stephen P. Borgatti, Daniel J. Brass, Daniel S. Halgin, Giuseppe Labianca, and Ajay Mehra. Cambridge, MA: Emerald Group Publishing.

Burt, Ronald S. and Sonja Opper. 2017. Early network events in the later success of Chinese entrepreneurs. *Management and Organization Review*, 12(3), 497-537.

Chen, Chao C., Xiao-Ping Chen, and Shengsheng Huang. 2013. Chinese guanxi: an integrative review and new directions for future research. *Management and Organization Review*, 9(1), 167-207.

Chen, Chih-jou Jay. 2014. Job search chains and embedded resources: a comparative analysis among Taiwan, China, and the U.S. Pp. 169-196 in *Social Capital and Its*

Institutional Contingency: A Study of the United States, China, and Taiwan, edited by Nan Lin, Yang-chih Fu, and Chih-jou Jay Chen. New York: Routledge

Coleman, James S. 1964. *Introduction to Mathematical Sociology*. New York: Free Press.

Coleman, James S. 1988. Social capital in the creation of human capital. *American Journal of Sociology* 94(S): S95-S120.

David, Thomas and Gerarda Westerhuis. 2014, Eds. *The Power of Corporate Networks: A Comparative and Historical Perspective*. New York: Routledge.

DiTomaso, Nancy and Yanjie Bian. 2018. The structure of labor markets in the US and China: social capital and *guanxi*. *Management and Organization Review*, 41(1), 5-36.

Ellickson, Robert C. 1991. *Order without Law*. Cambridge, MA: Harvard University Press.

Farh, Jiing-Lih Larry, Tsui, Anne, Katherine Xin, and Bor-Shiyuan Cheng. 1998. The influence of relational demography and Guanxi: The Chinese case. *Organization Science*, 9 (4): 471-488.

Faust, Katherine, and John Skvoretz. 2002. Comparing networks across space and time, size, and species. *Sociological Methodology*, 32, 267-299.

Festinger, Leon, Stanley Schachter, and Kurt W. Back. 1950. *Social Pressures in Informal Groups: A Study of Human Factors in Housing*. Stanford, CA: Stanford University Press.

Freeman, Linton C., and Danching Ruan. 1997. An international comparative study of interpersonal behavior and role relationships. *L'Année Sociologique*, 47(1), 89-115.

Goldthorpe, John H. (1997) 2007. Current issues in comparative macrosociology. " Pp. 39-60 in *On Sociology, Vol. 1: Critique and Program*. Stanford, CA: Stanford University Press.

Granovetter, Mark. 1973. The strength of weak ties. *American Journal of Sociology,* 78(6), 1360-1380.

Granovetter, Mark. 1985. Economic action, social structure, and embeddedness. *American Journal of Sociology*, 91(3), 481-510.

Granovetter, Mark. 1992. "Problems of explanation in economic sociology." In *Networks and Organizations*, ed. Nitin Nohria and Robert G. Eccles, 29-56. Boston, MA: Harvard Business School Press.

Greif, Avner. 1989. "Reputation and coalitions in medieval trade: evidence on the Maghribi traders." *Journal of Economic History,* 49(4), 857-882.

Greve, Henrich R. 2018. Show me the data! Improving evidence presentation for publication. *Management and Organization Review*, 14(2), 423-432.

Guthrie, Doug, Ilya Okhmatovskiy, Roger Schoenman, and Zhixing Xiao. 2012. Ownership networks and new institutional forms in the transition from communism to capitalism. Pp. 117-149 in *The Small Worlds of Corporate Governance*, edited by Bruce Kogut. Cambridge, MA: MIT Press.

Healy, Kieran and James Moody. 2014. Data visualization in sociology. *Annual Review of Sociology*, 40, 105-128.

Holland, Paul W. and Samuel Leinhardt. 1970. A method for detecting structure in sociometric data. *American Journal of Sociology*, 76(3), 492-513.

Holm, Häkan J., Sonja Opper, and Victor Nee. 2013. Entrepreneurs under uncertainty: an economic experiment in China. *Management Science*, 59(7), 1671-1687.

Keys, Ancel. 1957. Diet and the epidemiology of coronary heart disease. *Journal of the American Medical Association*, 164(17), 1912-1919.

Kitayama, Shinobu, and 10 others. 2015. Expression of anger and ill health in two cultures: an examination of inflammation and cardiovascular risk. *Psychological Science*, 26(2), 211-220.

Kogut, Bruce. 2012, Ed. *The Small Worlds of Corporate Governance*. Cambridge, MA: MIT Press.

Kogut, Bruce and Gordon Walker. 2001. The small world of Germany and the durability of national networks. *American Sociological Review*, 66(3), 317-335.

Lee, Rance P. L., Danching Ruan, and Gina Lai. 2005. Social support and support networks in Beijing and Hong Kong. *Social Networks*, 27(3), 249-274.

Leung, Kwok. 2009. Never the twain shall meet? Integrating Chinese and Western management research. *Management and Organization Review*, 5(1), 121-129.

Levine, Sheen S. 2018. Show us your data: connect the dots, improve science. *Management and Organization Review*, 14(2), 433-437.

Levi Martin, John. 2017. *Thinking Through Methods: A Social Science Primer*. Chicago, IL: University of Chicago Press.

Lin, Nan. 2001. *Guanxi*: a conceptual analysis. Pp. 153-166 in *The Chinese Triangle of Mainland, Taiwan, and Hong Kong*, edited by Alvin So, Nan Lin, and Dudley Poston. Westport, CT: Greenwood.

Lin, Nan, Walter M. Ensel, and John C. Vaughn. 1981. Social resources and strength of ties: structural factors in occupational status attainment. *American Sociological Review*, 46(4), 393-405.

Lin, Nan and Bonnie Erikson. 2008, Eds. *Social Capital: An International Research Program*. New York: Oxford University Press.

Lin, Nan, Yang-chih Fu, and Chih-jou Jay Chen. 2014, Eds. *Social Capital and Its Institutional Constituency: A Study of the United States, China, and Taiwan*. New York: Routledge.

Matsumoto, Y. Scott. 1970. Social stress and coronary heart disease in Japan: a hypothesis. *Milbank Memorial Fund Quarterly*, 48(1), 9-36.

Merluzzi, Jennifer. (2013). Social capital in Asia: investigating returns to brokerage in collectivistic national cultures. *Social Science Research*, 42(3), 882-892.

Nee, Victor and Sonja Opper. 2012. *Capitalism from Below: Markets and Institutional Change in China*. Cambridge, MA: Harvard University Press.

Opper, Sonja, Victor Nee, and Häkan J. Holm. 2017. Risk aversion and *guanxi* activities: a behavioral analysis of CEOs in China. *Academy of Management Journal*, 60(4), 1504-1530.

Peng, Mike, Sergey Lebedev, Christina O. Vlas, Joyce C. Wang and Jason S. Shay. 2019. The growth of the firm in (and out of) emerging economies. *Asia Pacific Journal of Management* 36: In Press.

Przeworski, Adam, and Henry Teune. 1970. *The Logic of Comparative Social Inquiry*. New York: Wiley-Interscience.

Ragin, Charles C. 1987. *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Los Angeles, CA: University of California Press.

Rider, Christopher I. 2009. Constraints on the control benefits of brokerage: a study of placement agents in U.S. venture capital fundraising. <u>*Administrative Science Quarterly,*</u> 54(4), 575-601.

Robins, Garry, Pip Pattison, Yuval Kalish, and Dean Lusher. 2007. An introduction to exponential random graph (p*) models for social networks. *Social Networks*, 29(2), 173-191.

Ruan, D. (1998). The content of the General Social Survey discussion networks: an exploration of General Social Survey discussion name generator in a Chinese context. *Social Networks*, 20(3), 247-264.

Ruan, Danching, Zhou, Lu, Blau, Peter M. and Walder, Andrew G. 1990. A preliminary analysis of the social networks of residents in Tianjin with a comparison to social networks in America. *Social Sciences in China*, 3(1), 68-89.

Schwab, Andreas. 2018. Investigating and communicating the uncertainty of effects: the power of graphs. *Entrepreneurship Theory and Practice*, 42(6), 823-834.

Son, Joonmo. 2013. *Social Capital and Institutional Constraints: A Comparative Analysis of China, Taiwan, and the U.S.* New York: Routledge.

Sorenson, Olav. 2017. Entrepreneurs and social capital in China. *Management and Organization Review*, 13(2), 275-280.

Uzzi, Brian. 1997. "Social structure and competition in interfirm networks: the paradox of embeddedness." *Administrative Science Quarterly*, 42(1), 35-67.

Uzzi, Brian, and Jarrett Spiro. 2005. Collaboration and creativity: the small world problem. *American Journal of Sociology*, 111(2), 447-504.

Watts, Duncan J., and Steven H. Strogatz. 1998. Collective dynamics of "small-world" networks. *Nature*, 393(6684), 440-442

Whetten, David A. 2009. An examination of the interface between context and theory applied to the study of Chinese organizations. *Management and Organization Review*, 5(1), 29-55.

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.

Zhao, Chenlin and Ronald S. Burt. 2018. A note on business survival and social network. *Management and Organization Review*, 14(2), 377-394.
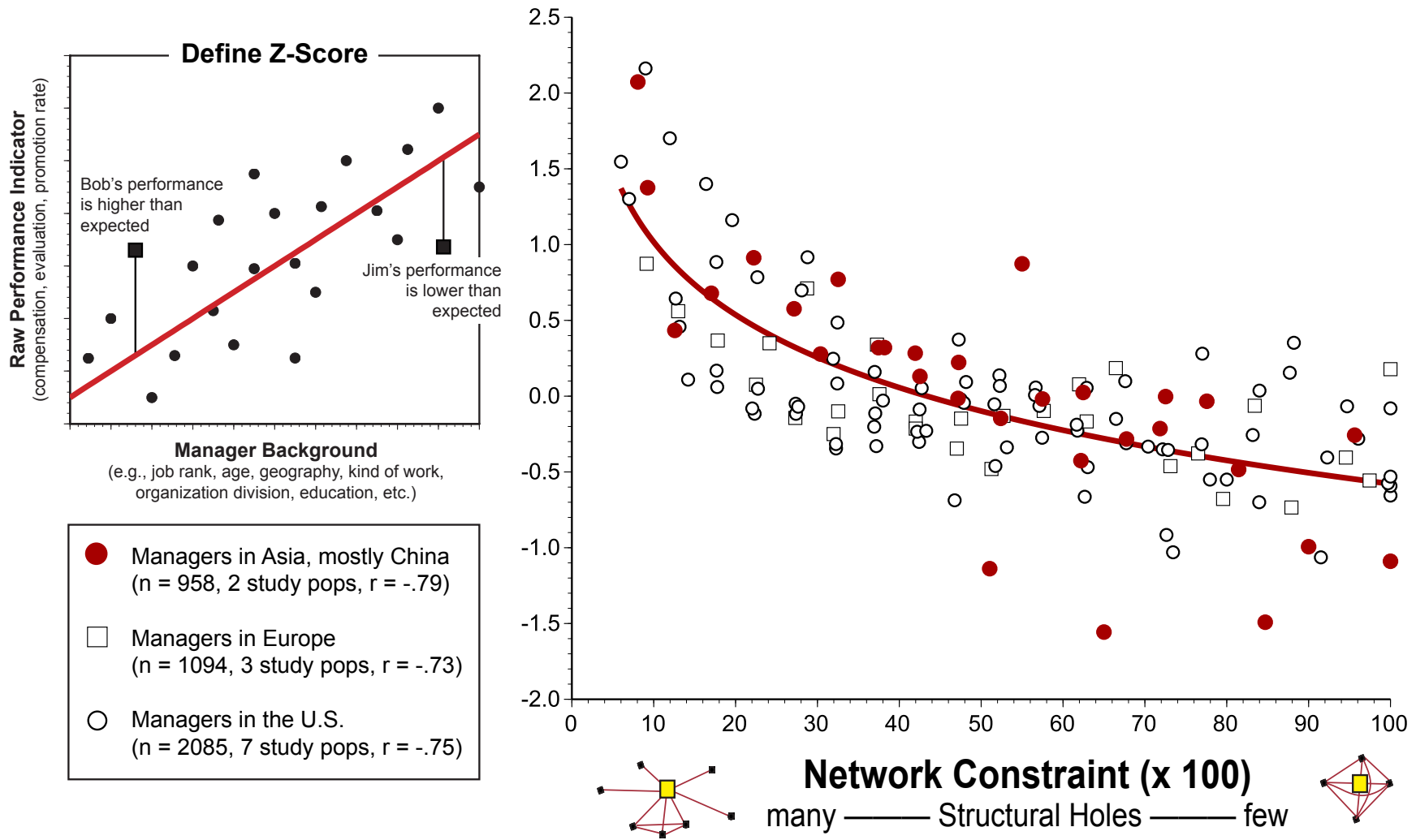
Figure 1. Returns to Brokerage Illustrate Method of Residues.

NOTE — Plotted data are average scores for a five-point interval of network constraint within a study population (adapted from Burt, 2019b: Figure 1; see footnote 2 for sources). Correlations are computed from the plotted data using log network constraint. Inset graph to the upper left contains hypothetical data illustrating computation of z-score relative performance. Main graph shows success increasing with more structural holes in the networks around American, Asian, and European managers (further detail in text).

Western Analysts and Bankers

Chinese Entrepreneurs

(left y-axis) Probability that Relationship is Cited Next Year as Good or Outstanding

(right y-axis) Respondent Evaluation of Trust in Contact (1 for suspect, 5 for complete trust)

D. Relations with Continuing Colleagues (first cited two years ago, z = 0.81)

A. Relations with Current Colleagues (z = 14.88)

C. Event Contacts

B. Relations with current nonevent contacts (t = 25.79)

● C. Founding Event Contacts (t = 3.01)
○ C. Other Event Contacts (t = 10.19)

Network Closure
Number of Third Parties Linking this Year Evaluator with Evaluated

Network Closure
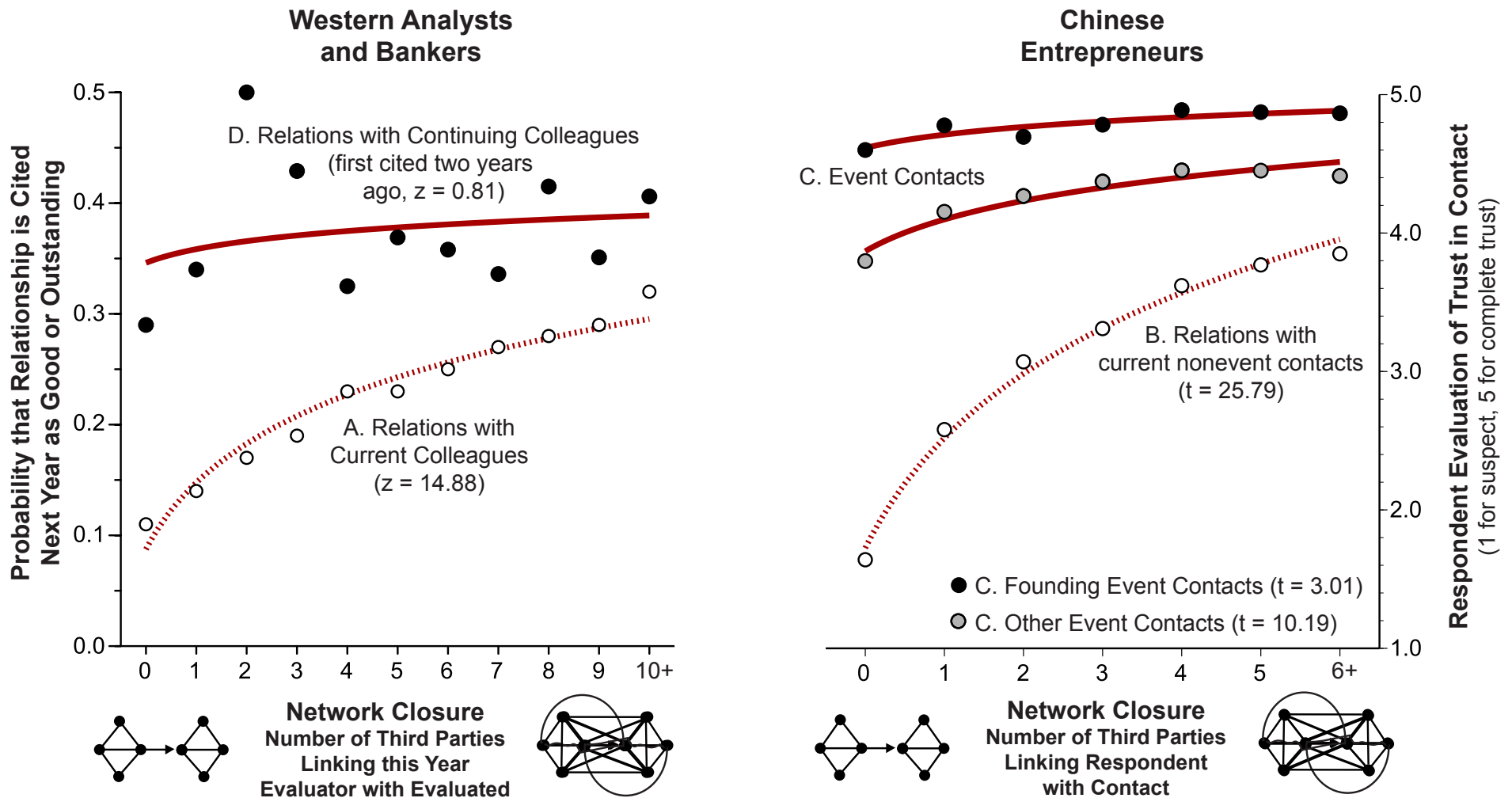Number of Third Parties Linking Respondent with Contact

Figure 2. Network Closure and Trust

NOTE — Dots are average Y scores at each level of X. Graph A describes 46,231 observed colleague relations with analysts and bankers over a four-year period (Burt, 2010:173-176). Vertical axis is proportion of relations cited next year as good or outstanding. Horizontal axis is number of mutual contacts this year. Graph B describes 4,464 relationships cited by 700 Chinese entrepreneurs. Vertical axis is mean respondent trust in the contact, measured on a five-point scale. Horizontal axis is the number of other people in a respondent's network connected with the contact being evaluated for trust. Test statistics are estimated in both graphs with controls for differences in network size and adjusted for autocorrelation between relationships. Figure is adapted from Burt and Burzynska (2017: 234).
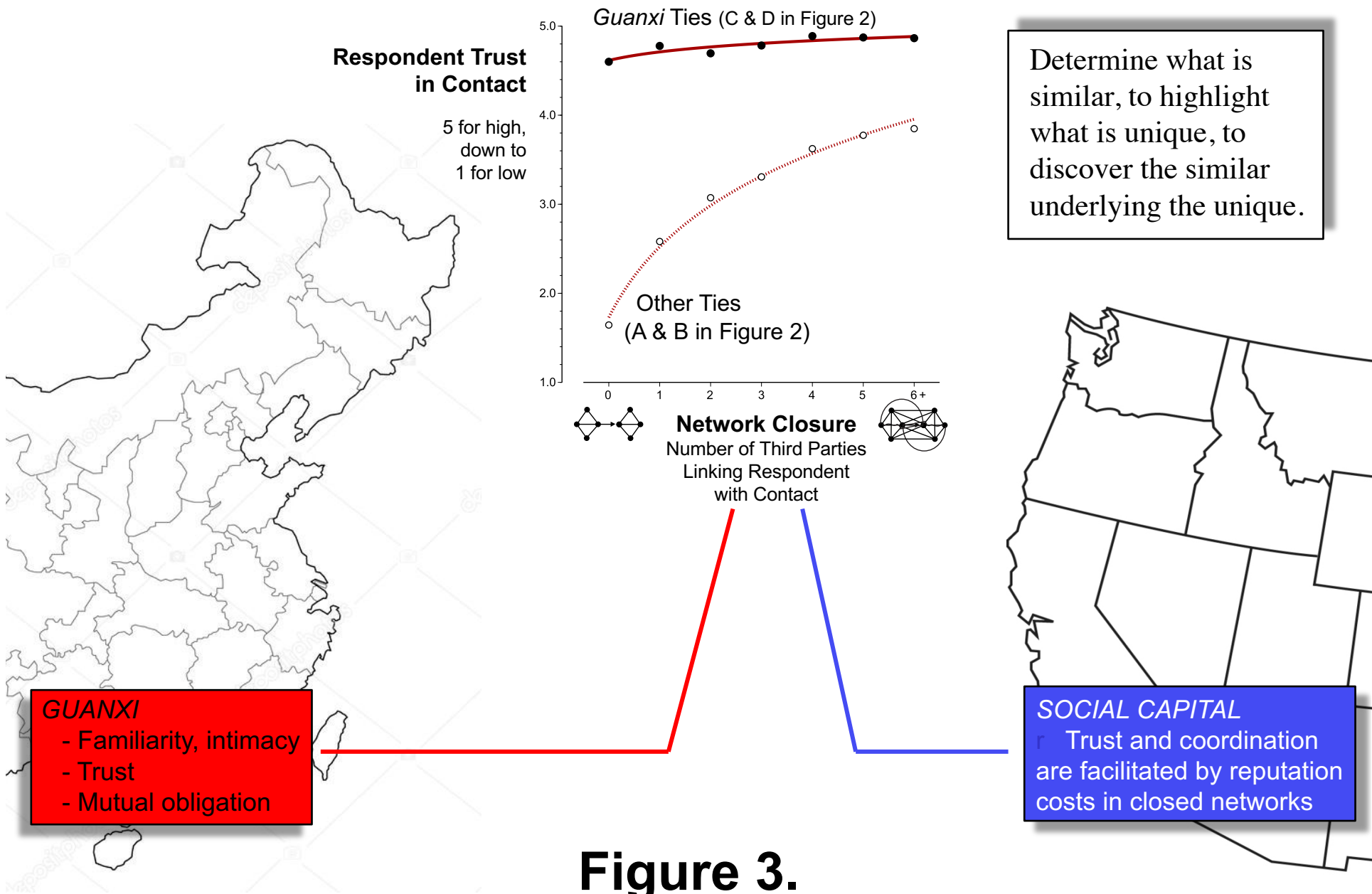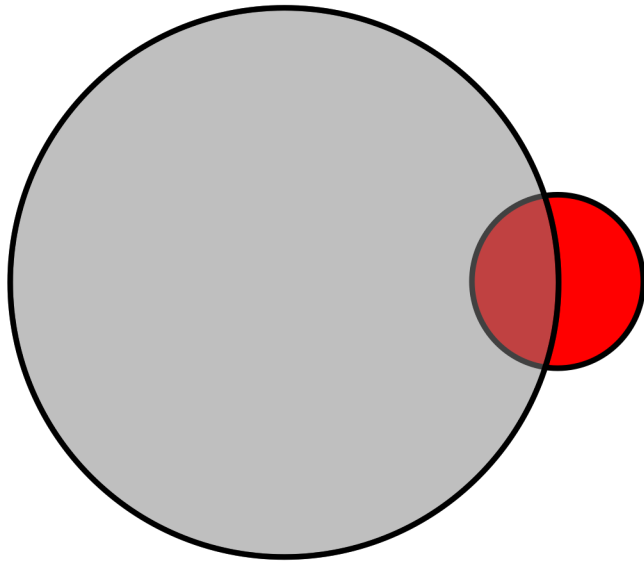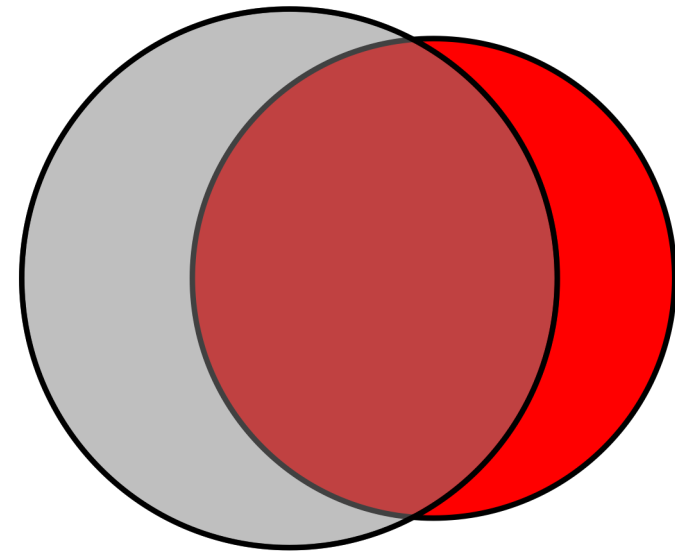
Figure 3.

Illustrative Comparative Network Analysis

Text within figure:

Guanxi Ties (C & D in Figure 2)

Respondent Trust in Contact

5 for high, down to 1 for low

Other Ties (A & B in Figure 2)

Network Closure
Number of Third Parties Linking Respondent with Contact

Determine what is similar, to highlight what is unique, to discover the similar underlying the unique.

GUANXI
- Familiarity, intimacy
- Trust
- Mutual obligation

SOCIAL CAPITAL
Trust and coordination are facilitated by reputation costs in closed networks

Western Analysts and Bankers
1,233 of 13,148 Ties Are *Guanxi* (9%,
of which 54% are current contacts)

Chinese Entrepreneurs
2,905 of 4,464 Ties Are *Guanxi* (65%,
of which 74% are current contacts)

Figure 4.
Same Network Mechanism, with Different Mixtures,
Can Define Different Business Environments

NOTE: Grey area is current contacts (contacts cited this year by analyst or banker, contacts cited as current or met daily by Chinese entrepreneur). Red area is proportional to number of *guanxi* ties (known for more than two years for analyst or banker, most valued help in significant event for Chinese entrepreneur). Overlap indicates *guanxi* ties in current network.
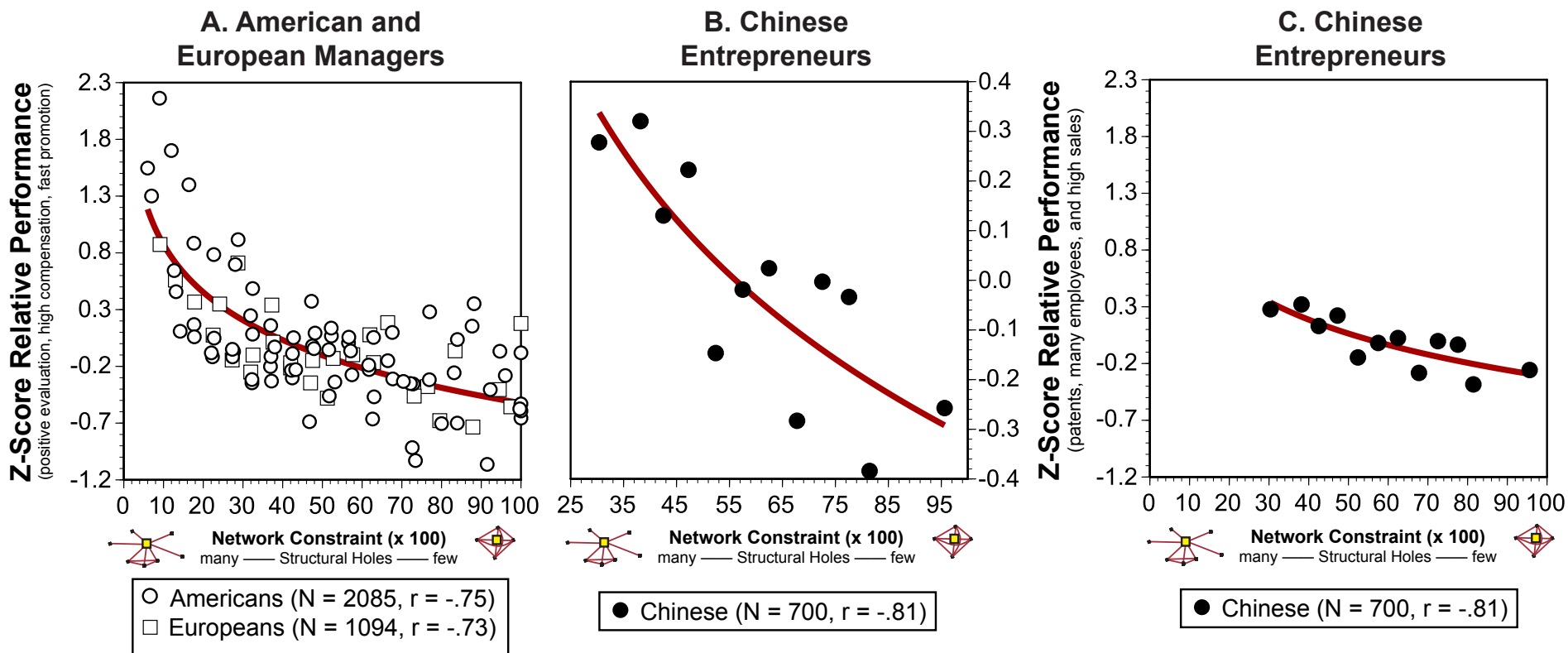
Figure 5. Performance Returns to Network Brokerage

NOTE — Plotted data are average scores for a five-point interval of network constraint within a study population (within company for the American and European managers). Correlations are computed from the plotted data. Lines are vertical axis predicted by log network constraint. Graph A shows relative performance increasing with more structural holes in the networks around American and European managers (from Figure 1). Graphs B and C show relative performance increasing with more structural holes in networks around Chinese entrepreneurs (relative performance is a z-score defined by the first principal component of patents, employees, and sales adjusted for having a research and development department, from Burt & Burzynska, 2017:226). The data in graphs B and C are the same, but the axes in graph B vary from the top to the bottom of the sample entrepreneurs, while the axes in graph C vary from the top to the bottom of the Americans and Europeans in graph A.