Chinese Networks as a Mirror to Better See Networks in the West: An Exercise in Comparative Network Analysis

These slides report work with Yanjie Bian, Katarzyna Burzynska, Håkan J. Holm, Jar-der Luo, Sonja Opper, and Chenlin Zhao. Manuscripts are available at http://faculty.chicagobooth.edu/ronald.burt.
My Motivations Behind the Research

At the 2011 IACMR meetings in Singapore,* China looked especially promising for comparative network analysis. I believed that social networks were likely to have been important in the rise of entrepreneurial private enterprise in China -- likely in theory, but especially likely given work such as Nee and Opper's (2012) *Capitalism from Below*, which combines high-quality data with an encouraging story: in the absence of supporting formal institutions, entrepreneurs built upon local interpersonal institutions, particularly social networks.

From several visits to China to teach and present research, I wanted to document with authoritative evidence how network mechanisms are similar between East and West, so as to highlight elements for study that are unique to each.

* IACMR – International Association for Chinese Management Research
Chinese Networks as a Mirror to Better See Networks in the West: An Exercise in Comparative Network Analysis
Ron Burt, University of Chicago

**NETWORK DATA** (current contacts versus significant-event contacts)
Sample
Network items
Event name generators
Example closed & open networks

**BROKERAGE-SUCCESS ASSOCIATION** (brokers are more successful, but early “cocoon” closed network is significant for later broker success, though not visible in later broker network)
Consistent evidence in China and West
Forms of closure & kinds of events; theory robust
"Cocoon" hypothesis, success, and survival
"Cocoon" dissolves in subsequent brokerage

**CLOSURE-TRUST ASSOCIATION** (trust increases with network closure, but guanxi ties rise above closure, and cooperation beyond ego’s network is unlikely from people successful with a closed network)
Consistent evidence in China and West
"Guanxi" ties in China and West
Contact attributes negligible when network held constant
Predicting cooperation beyond a network from the structure within
Chinese Networks as a Mirror to Better See Networks in the West: An Exercise in Comparative Network Analysis

Network Data (event contacts)
(current versus significant-event contacts)

Brokerage, Success, and Survival
(network brokers are more successful, but early “cocoon” closed network is significant for later broker success, though not visible in later broker network)

Closure, Trust, and Guanxi
(trust increases with network closure, but guanxi ties rise above closure, and cooperation beyond ego’s network is unlikely from people successful with a closed network)
Stratified Random Sample of 700 Chinese Entrepreneurs from Seven Cities in Three Provinces of China’s Yangtze Delta Area.

(20% 2013 China GDP, 32% 2013 China imports/exports)
65% entirely self-funded start-ups
29% partial (avg 58% self, 12% fam, 10% frnd)
6% no self-funding (avg 65% bank funds)

<table>
<thead>
<tr>
<th>Sample Characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small (10 - 100)</td>
<td>468</td>
<td>67%</td>
</tr>
<tr>
<td>Medium (101 - 300)</td>
<td>169</td>
<td>24%</td>
</tr>
<tr>
<td>Large (&gt; 300)</td>
<td>63</td>
<td>9%</td>
</tr>
<tr>
<td>Textiles</td>
<td>170</td>
<td>24%</td>
</tr>
<tr>
<td>Transportation Equipment</td>
<td>171</td>
<td>24%</td>
</tr>
<tr>
<td>Machinery</td>
<td>180</td>
<td>26%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>77</td>
<td>11%</td>
</tr>
<tr>
<td>Electronics</td>
<td>102</td>
<td>15%</td>
</tr>
<tr>
<td>Respondent is Founder</td>
<td>559</td>
<td>80%</td>
</tr>
</tbody>
</table>

Year Born 1967 median, 8.4 sd, 1938-1988
Yr Founded 2001 median, 4.6 sd, 1982-2011

The map is taken from the Wikipedia entry for “Yangtze River Delta” with the delta proper indicated in green. Bold lines separate provinces. Bars indicate small, medium, and large firms in the sample 100 entrepreneurs from each city (respectively, light, dark grey, and black areas of city bar). This is Figure A1 in Burt and Burzynska, 2017 Management and Organization Review (MOR).
# A Network Measure of Respondent’s Social Style

## Name Generator Items

- **(Founding)** Who was the one person who was most valuable to you in founding the firm? (500 contacts cited)

- **(Three to Five Other Events)** Now please do the same thing for each of the significant events you listed. The first significant event you listed was (say first event) in (say year). Who was the person most valuable to you during that event? 1,955 contacts cited

- **(Core Current)** Shifting now to business this year, and thinking about people inside or outside your firm, who are the three or four people who have been most valuable to your business activities this year? (1,689 contacts cited)

- **(Difficult)** In contrast to people who help and are valued in your business activities, there are usually some people who make life difficult. Without mentioning the person’s name, who was the most difficult person to deal with in your business activities this year? Just jot a name or initials in the box below. Only you are going to know who this person is. (500 contacts cited)

- **(Employee)** Shifting to happier thoughts, who do you think was your most valuable senior employee this year? (500 contacts cited)

- **(N.E.C.)** Now that you have a list of contacts on the roster worksheet, please look it over quickly. **Is there anyone particularly significant for your business who has not been mentioned?** If yes, please enter their name at the bottom of the list. There are many people you could mention. These would just be people particularly significant for your business. (16 contacts cited)

## Name Interpreter Items

- Contact **Gender** (male, female)

- **Emotional Closeness** to Contact (especially close, close, less close, distant)

- **Duration** of Connection with Contact (years known)

- **Frequency** of Contact (daily, weekly, monthly, less often)

- **Trust** in Contact (1 to 5, low to high trust) “Think about your trust level towards him/her. Please circle the closest option (1 least trust; 5 highest trust).” In Chinese: 想一想您对他/她的信任程度；请在表意最接近的选项上画圈 (1最不信任-5最信任)

- Contact **Role** (circle all that apply: family, extended family, neighbor, party, childhood, classmate, colleague, military, business association)

## Matrix of Connections between Contacts

- **Network Size:** Number of people cited

- **Network Density:** Mean connection between people cited (mean \( z_{ij} \), varies from 0 to 1 with connection strength).

- **Network Constraint, C:** measures closure around ego i:

\[
C = \sum_j c_{ij} = \sum_j (p_{ij} + \sum_q p_{iq}p_{qj})^2, q \neq i,j (p_{ij} \text{ proportional } z_{ij})
\]

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**NOTE** — Name generators, listed in order asked in interview, identify respondent contacts (number of cited contacts in parentheses). Name interpreters flesh out relationships with each cited contact, and define connections among the contacts. Name generators are asked first in the interview, followed by the name interpreters. This is Table 2 in Opper, Holm, and Burt (2017).
Business Event Name Generator

The next five questions generate a summary picture of the business network. To draw the picture, you will be asked about people, but we do not want to know any one's name. I will go through this network worksheet with you, asking about people who were useful to your business in one way or another. Without mentioning anyone's name to me, please write on your worksheet the names of people who come to mind in response to the questions. We will create a list of names then refer to people by their order on the list. No names. You will keep the worksheet to yourself.

Q1. Let me begin with an example so you can see how the interview protects your confidentiality at the same time that a picture of the business network emerges. Your business time line shows that your firm was founded in __(say founding year)___. Please think back to your activities in founding the firm. Who was the one person who was most valuable to you in founding the firm?

Q2. Now please do the same thing for each of the significant events you listed on your business time line. The first significant event you listed was __(say first event)__ in __(say year)___. Who was the person most valuable to you during that event? Please write on the first line below the person's name. The person most valuable in this event could be the same person who was most valuable to you in founding the firm. You would just enter the name again.

This is Figure A2 in Burt and Burzynska, 2017 MOR.
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later broker success, though not visible in later broker network)

Closure, Trust, and Guanxi
(trust increases with network closure,
but guanxi ties rise above closure, and cooperation beyond ego’s
network is unlikely from people successful with a closed network)
Management Social Network Is a Map of Belief and Behavior
Relatively similar within social groups, and dissimilar between groups.
Management Social Network Is a Map of Belief and Behavior

Two roles for individuals in the sticky information market of management.
Management Social Network Is a Map of Belief and Behavior

Relatively similar within social clusters — groups — and dissimilar between groups.

JIM is a WARLORD in US BUSINESS:
Close the network around your contacts to promote trust and efficiency.
Management Social Network Is a Map of Belief and Behavior

Relatively similar within social clusters — islands — and dissimilar between islands.

CEO
C-Suite
Heir Apparent
Other Senior Person

Back Office

Front Office

Europe and Emerging Markets

BOB and YANJIE are NETWORK BROKERS:
Broaden your network across the structural holes between groups — to create information advantages of breadth, timing, and arbitrage across groups — to promote growth and performance.

(Huateng “Pony” Ma, founder-CEO Tencent)
Management Social Network

Relatively similar within social clusters -

Europe and Emerging Markets

Asia

U.S.

BOB and YANJIE are NETWORK BROKERS:

Broaden your network across the structural holes between groups — to create information advantages of breadth, timing, and arbitrage across groups — to promote growth and performance.

Back Office

Front Office

Management Social Network

Relatively similar within social clusters -
The Research Task Is To Distinguish People by the Extent To Which They Are a Network Broker, To See How Much They Excel in Creativity and Performance

Here network constraint – the extent to which a person’s network is limited to a single group, which means they have no access to structural holes (other popular measures distinguishing brokers are network size, density, betweenness, and effective size).

Data are easily available from surveys, 360°, email, other electronic trace (badges, chat rooms, social media, virtual worlds, etc.).
A Network More Closed than Average

Line thickness indicates closeness. No line is “distant” relation. Square is respondent.

Network Metric, Z-Score: Size (5, -0.93), Effective Size (1.86, -1.25), Hierarchy (0.223, 2.11), Constraint (81.2, 1.74)

1. Uncle known 41 years who is a valued current contact (meets daily), as well as most valued contact at founding, and during first and second significant events.

2. Brother known 18 years who is a valued current contact (meets weekly), as well as most valued employee, and most valued contact during third and fourth significant events.

3. Brother known 23 years who is a valued current contact (meets weekly), as well as most valued contact during fifth significant event.

4. A valued current contact known 3 years, meets weekly.

5. Person most difficult for respondent this year, known 8 years (left company, taking away several customers).

Respondent founder of 13-year business, now 21 employees.

Event Time Line
- Founding
- Lost major supplier
- Big contract
- Replace equipment
- Financial crisis, reduced demand

Figure 1 in Opper, Burt, and Holm (2017)
A Network More Open than Average

Line thickness indicates closeness. No line is “distant” relation. Square is respondent. Gold dots are people not cited as currently most valued contacts. Fig 2, Burt and Burzynska (2017 MOR) Network Metric, Z-Score: Size (10, 2.45), Effective Size (7.25, 2.49), Hierarchy (.057, -.78), Constraint (34.7, -1.55)

1. Neighbor known 35 years, now met weekly, most valued contact at founding
2. Contact known 27 years, now rarely met, most valued during first significant event
3. Contact known 17 years, now rarely met, most valued through second significant event
4. Contact known 15 years, now met weekly, most valued through third significant event
5. Contact known for 11 years, now met weekly, most valued through fourth significant event
6. Contact known for 4 years, now met weekly, most valued through fifth significant event
7. Most valued senior employee known 3 years, now met weekly, and currently one of respondent’s most valued contacts
8. One of respondent’s most valued current contacts (known 4 years, met daily)
9. One of respondent’s most valued current contacts (known 5 years, met daily)
10. Person most difficult for respondent to deal with this year, known 10 years (didn’t help fund expansion)

Respondent founder of 27-year business, now 81 employees
Performance Returns to Network Brokerage

Data are averaged within intervals of the network metric.

Managers in Asia, mostly China (n = 958, r = -.79)

Z-Score Business Success
(positive evaluation, high compensation, fast promotion)

Network Constraint
many ——— Structural Holes ——— few

with
Sonja Opper,
Lund
University
Performance Returns to Network Brokerage

Data are averaged within intervals of the network metric.

Managers in Asia, mostly China (n = 958, r = -.79)

Managers in Europe (n = 1094, r = -.73)

Network Constraint

many ——— Structural Holes ——— few
Performance Returns to Network Brokerage

Data are averaged within intervals of the network metric.

Managers in Asia, mostly China (n = 958, r = -.79)
Managers in Europe (n = 1094, r = -.73)
Managers in the U.S. (n = 2085, r = -.75)

with
Sonja Opper,
Lund
University
Closure by Density (cliques) versus Hierarchy (partner networks)

Clique
C = 54.0
(.80 density, .00 hierarchy)

Partner
C = 51.7
(.40 density, .21 hierarchy)

Broker
C = 23.6
(.07 density, .05 hierarchy)
Network Constraint in China is More Hierarchical

NOTE — Bold lines connect average hierarchy scores within 5-point intervals of constraint. Broker networks are indicated by white circles (low constraint, low hierarchy). Cliques are indicated by solid circles (high constraint, low hierarchy). Partner networks are indicated by triangles (high hierarchy, examples displayed in Figures 5 and 6 are indicated). High-low distinctions are defined by sample medians for the Chinese, company medians for the Americans and Europeans. This is Figure 4 in Burt (2018).
Network, Family, Performance:

Family is prominent in extreme partner networks, though the majority of such networks contain no family.

NOTE — These are the 700 entrepreneurs partitioned as in prior figure by kind of business network. Percent family contacts differs significantly between the kinds of networks (35.62 F(3,696), P << .001), as does percent of networks in which family member is the most central contact (48.66 chi-square, 3 d.f., P << .001). Figure is from Tables 2 and 3 in Burt (2018).
Business Success Is Associated with Having a Large, Open Network, But Not Current Contacts Alone

History Matters

NOTE — Dots are average success scores within five-point intervals of network constraint. Business success is measured by the first principal component of patents, employees, and sales adjusted for having a research and development department. Solid dots are averages for network scores computed from current contacts plus all event contacts. Hollow dots are averages for network scores computed from only current contacts. Lines are success predicted by the natural logarithm of network constraint. Test statistics are from Tables 6 and 7. The network association with success clearly depends on including event contacts. This is Figure 9 in Burt and Opper (2017, MOR)
Beyond Current Contacts, the Initial Two Contacts Are Key to Predicting Business Success

<table>
<thead>
<tr>
<th>Entrepreneur’s Network</th>
<th>Network Constraint Lowers Success</th>
<th>Standard Error</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only Current Contacts (3,123 contacts)</td>
<td>-.026</td>
<td>.108</td>
<td>-0.24</td>
</tr>
<tr>
<td>Plus Founding Contacts (add 321 contacts)</td>
<td>-.339</td>
<td>.138</td>
<td>-2.45 *</td>
</tr>
<tr>
<td><strong>Plus Event-One Contacts (add 215 contacts)</strong></td>
<td><strong>-.410</strong></td>
<td><strong>.136</strong></td>
<td>**-3.02 **</td>
</tr>
<tr>
<td>Plus Event-Two Contacts (add 225 contacts)</td>
<td>-.360</td>
<td>.125</td>
<td>-2.88 **</td>
</tr>
<tr>
<td>Plus Event-Three Contacts (add 212 contacts)</td>
<td>-.352</td>
<td>.120</td>
<td>-2.94 **</td>
</tr>
<tr>
<td>Plus Event-Four Contacts (add 199 contacts)</td>
<td>-.405</td>
<td>.116</td>
<td>-3.49 ***</td>
</tr>
<tr>
<td>All Contacts (add 169 contacts for total of 4,464)</td>
<td>-.414</td>
<td>.114</td>
<td>-3.64 ***</td>
</tr>
</tbody>
</table>

NOTE — Each row is the estimated regression coefficient predicting business success from log network constraint using the model in Table 6, but with networks limited to the row contacts. Networks in the top row exclude all contacts not cited as current. Networks in the bottom row include all current and all event contacts, which are the networks used to get the estimates in Table 6. * P < .05  ** P < .01  *** P < .001  This is Table 7 in Burt and Opper (2017 MOR). First event is an average of 2.14 years after founding (17.3% of business life), and second event is 4.56 years after founding (36.0% of business life).
Cocoon Hypothesis — Success is more likely, and greater, for network brokers who begin their project within a closed network, which dissolves in subsequent brokerage.

An initial closed network provides safe haven for engaging and surviving the exploratory trial and error of getting a project launched.

Network brokers enjoy the information breadth, timing, and arbitrage advantages associated with project success.
The graph shows benefit to entrepreneurs of having an early multi-person, closed network subsequently expanded into a large, open network characteristic of a broker.

A tournament is defined across the horizontal axis. Entrepreneurs are removed when they use a contact for help on more than one significant event in building the business.

This is from Figure 11 in Burt and Opper (2017, MOR), Figure 3 in Zhao and Burt (2017, MOR).
But the Initial Cocoon Is Invisible in the Later Network.

The graph shows benefit to entrepreneurs of an early multi-person, closed network subsequently expanded into a large, open network characteristic of a broker. From left to right, entrepreneurs are removed from the tournament when they use a contact for help on more than one significant event in building the business. This is from Figure 11 in Burt and Opper (2017, MOR).
The cocoon imagery in Burt & Opper (2017) has been observed elsewhere:

In her unpublished doctoral dissertation describing a convenience sample of 151 Silicon Valley entrepreneurs, Yoo (2003: 126, 191-192) shows that a closed (high density) network is advantageous in securing funds to launch a business, after which an open (low density) network is advantageous in securing funds to expand the business.

In a working paper describing for 1980 through 2009 US start-ups backed by venture capital funds, Everton, Kang, and Thornton (2013) show that having a closed (high constraint) network of venture investors is associated with successful exit during the seed stage, after which having an open (low constraint) network of venture investors is associated with successful exit from late stage investments.

In a working paper describing songwriters in the Korean pop music market, Lee and Gargiulo (2018) show that a closed (high density) network is advantageous for getting a song out, but an open (low density) network is advantageous for having the song be a hit. It is not too great a stretch to jump from songwriters to earlier research documenting the advantage of network closure early in a career, followed by diversity later in the career. Studying the careers of film actors, Zuckerman et al. (2003) show that less-experienced actors (termed “novice”) benefit from concentrating their work with one director in a single genre, while the opposite is true for “veteran” actors, who benefit from working in multiple genres with multiple directors. Zuckerman et al (2003:1059) summarize: "Among novices, an increase in maximum concentration to .90 raises the probability of working during the next period from 16.4% to 21.3%. Among veterans, the same increase in concentration reduces this estimated probability from 38.4% to 33.5%." Concentration in a director-genre is analogous to network closure in the sense that the actor is focusing on a relatively connected audience of people likely to discuss the same films and actors, which establishes a reputation for the actor. After the actor’s reputation is established with one audience, advantage shifts to building a diverse constituency with multiple directors in multiple genres.
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Network Data (event contacts)
(current versus significant-event contacts)

Brokerage, Success, and Survival
(network brokers are more successful, but early “cocoon” closed network is significant for later broker success, though not visible in later broker network)

Closure, Trust, and Guanxi
(trust increases with network closure, but guanxi ties rise above closure, and cooperation beyond ego’s network is unlikely from people successful with a closed network)
Network Closure and Trust

A. Western Analysts and Bankers

- Probability that Relationship is Cited Next Year as Good or Outstanding
- Current Colleagues: \( z = 14.88 \)

B. Chinese Entrepreneurs

- Respondent Evaluation of Trust in Contact (1 for suspect, 5 for complete trust)
- Founding Contact: \( t = 3.01 \)
- Other Event Contact: \( t = 10.19 \)
- NonEvent Current Contact: \( t = 25.79 \)

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 (adapted from Burt, 2010:174-175). Vertical axis is the 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 the 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 (Stata “cluster” option, see Table 4 for estimates with further controls). From Figure 4 in Burt and Burzynska (2017 MOR).
Network Closure and Trust, on Return to the West

A. Western Analysts and Bankers

Probability that Relationship is Cited Next Year as Good or Outstanding

- Current Colleagues (z = 14.88)
- Continuing Colleague (first cited two years ago, z = 0.81)

B. Chinese Entrepreneurs

Respondent Evaluation of Trust in Contact

- Founding Contact (t = 3.01)
- Other Event Contact (t = 10.19)
- NonEvent Current Contact (t = 25.79)

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SOCIAL CAPITAL, Rule 1

Trust and coordination is facilitated by reputation cost in closed networks.

GUANXI
- Familiarity, intimacy
- Trust
- Mutual obligation

Comparative Network Analysis

Respondent Trust in Contact
5 for high, down to 1 for low

Network Closure
Number of Third Parties Linking Respondent with Contact

Trust in Contact: 5 for high, down to 1 for low
Cooperation beyond ego’s network

Summary,
Tie Strength
In and Beyond
the Network
Around
a T-Shaped Manager

("strong relation" is an aggregate of trust, responsibility, cooperation, coordination)

Central tenet in network analysis: How to do a thing depends on the social context in which you do it.

Inside the network (dark dots — ego network, personal network, first-order zone):
- Relational Embedding: Relations stronger with frequent contact over many years, some of which develop into guanxi.
- Structural Embedding: Relations stronger with many mutual contacts, i.e., within closed network.
- RULE 1: Close the network to promote trust, responsibility, cooperation, coordination (i.e., efficiency on known task).

Beyond the network (hollow dots — friends of friends, neighbor networks, second-order zone):
- Friends of Friends: Relations stronger with friends of closest contacts.
- Homophily: Relations stronger with people of distinguishing attributes (attributes you share that few others share).

Further Out (strangers undistinguished by attributes [no homophily], with no known connections into your network):
- The more connected the inside, the more suspicious the outside.
# A Behavioral Measure of Cooperation

This is Table 1 in Opper, Holm, and Burt (2017).

## Move by Other Player

<table>
<thead>
<tr>
<th>Your Move:</th>
<th>Cooperate</th>
<th>Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperate</td>
<td>250, 250</td>
<td>50, 400</td>
</tr>
<tr>
<td>Defect</td>
<td>400, 50</td>
<td>100, 100</td>
</tr>
</tbody>
</table>

**NOTES** — “Like you, the other player is CEO of a Chinese firm and a Chinese citizen.”

Game Version: abstract (above table)
- concrete (train needed employee talent, or hire it from other CEO’s firm)

Game Order: first in a sequence of three games during the interview
- second in the sequence of three
- third in the sequence of three
Cooperation and Social Network for the Entrepreneurs

Observations are averages for 5-point intervals on X, with tails of X truncated for infrequency. Test statistics control for non-network differences. More successful run businesses that earned profit above median last year. Bars below graph show number of observations averaged for data points in the graph (white bars count less-successful entrepreneurs).

From Figures 3 & 4 in Opper, Burt, and Holm (2017).

All Entrepreneurs (-1.08 logit coefficient, -2.35 test statistic)

More Successful Entrepreneurs (-2.24 logit coefficient, -3.31 test statistic)
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