Research Policy 45 (2016) 2125–2137

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

Is it better to "Stand on Two Boats" or "Sit on the Chinese Lap"?: Examining the cultural contingency of network structures in the contemporary Chinese academic labor market☆

Xiao Lu[a], Paul-Brian McInerney[b,*]

[a] Institute of Policy and Management, Institutes of Science and Development, Chinese Academy of Sciences, China
[b] Department of Sociology, University of Illinois at Chicago, United States

ARTICLE INFO

Article history:
Received 25 June 2015
Received in revised form 30 August 2016
Accepted 2 September 2016
Available online 17 September 2016

Keywords:
Network structure
Careers
Structural holes
guanxi

ABSTRACT

We examine the Chinese academic labor market to understand the cultural contingency of two different network structures: those affording structural holes and those that feature network closure. Empirical results show that the labor market benefits of network structures differ for returnees and domestically trained PhDs throughout their respective careers. Networks affording structural holes are only helpful for returnees' first promotion. Network closure benefits domestically trained PhDs gain their first promotion and subsequent promotions for all PhDs. The importance of cohesive networks of reciprocal favors (guanxi) for Chinese culture shapes the academic labor market for the advanced stages of academic careers.

1. Introduction

Historically, *guanxi* networks have served as an important feature of Chinese labor markets (Bian, 1997). *Guanxi* is the intricate system of relationships through which Chinese exchange favors, what informants in this study called "sitting on the Chinese lap." In the private sector, *guanxi* relationships have been shown to generate protection, resources, and opportunities for managers and entrepreneurs (Wank, 1999; Park and Luo, 2001; Luo et al., 2011; Peng and Luo, 2000). In Chinese labor market settings, many participants consider *guanxi* networks necessary to secure a desirable job.

However, with the globalization of labor markets, scholars and business people are beginning to question the importance of *guanxi* networks for job acquisition and career advancement (Guthrie, 1998). This is also true in Chinese academia, where reforms enacted in 1978 have emphasized qualifications and productivity over seniority (Yan, 2010). Chinese students are increasingly going abroad for their education, which may give them better qualifications, but at the expense of domestic *guanxi* ties that can help secure them jobs. Furthermore, these transnational scholars may build networks with ties in different countries. Such intersections of professional networks will offer those returning to China access to diverse ideas and brokerage opportunities for international collaboration. Connecting different social networks as these scholars do is colloquially known as "standing on two boats."

As the Chinese economy transitions toward markets and greater involvement with the global economy, some scholars have predicted that *guanxi* networks will become less important for business (Guthrie, 1998). However, Bian (1997) finds that *guanxi* remains important for job acquisition and advancement. In this paper, we address this conundrum: What better predicts positive academic job market outcomes: "standing on two boats" by exploiting the structural hole position between local actors and those abroad or "sitting on the Chinese lap" by taking advantage of the network closure afforded by tight *guanxi* networks? We use the empirical case of Chinese academic labor markets in mathematics and sociology to address these questions.

2. *Guanxi* as Networks and Culture

Guanxi is a complex concept rooted in traditional Chinese culture. Though it defies easy definition, *guanxi* consists of network and cultural components. Network ties constitute *guanxi*, as the concept captures the system of reciprocal favors among groups of egos and alters (Yueng and Tung, 1996). Scholars have relied on

☆ The research is supported by National Natural Science Foundation of China (Grant No. 71603249).
* Corresponding author.
E-mail address: pbm@uic.edu (P.-B. McInerney).

http://dx.doi.org/10.1016/j.respol.2016.09.001
0048-7333/

this observation to treat *guanxi* with standard network measures (Park and Luo, 2001). Luo (1997: 44) describes *guanxi* as: "the concept of drawing on connections in order to secure favors in personal relations. It is an intricate and pervasive relational network, which Chinese cultivate energetically, subtly, and imaginatively." Based on the network component of *guanxi*, scholars should expect the structure of connections matters for individual actors occupying specific positions within it. Certain actors should have advantages over others based on their relative positionality. Burt's (1992) theory of structural holes best captures this phenomenon.

Scholars have likened *guanxi* to Bourdieu's notion of social capital (Gold, Guthrie, and Wank, 2002). However, *guanxi* is a culturally specific form of social capital. For example, Eastern firms are said to be more socially closed than their Western counterparts (Wong, 1985). Yen, Barnes, and Wang (2011) break down the cultural aspects of *guanxi* into three cultural components: *ganquing*, *renquing*, and *xinren*. *Ganquing* is the emotional component, reflecting the affective nature of social ties. *Renquing* reflects the obligatory nature of social ties, that which motivates the reciprocation of gifts and favors. *Xinren* reflects the mutual trust necessary to maintain ongoing social ties. However, beyond trust that emerges from repeated interactions (Granovetter, 1985), *xinren* connotes the evaluative aspects of trust, i.e., how actors makes claims of trustworthiness while judging such claims of others.

The cultural component of *guanxi* reflects the broader culture of Confucianism that permeates Chinese everyday life. As emotionally, obligatory, and trustworthy social capital, scholars would expect *guanxi* to develop and flourish in closed, tightly knit networks, such as those represented by Coleman's (1988) social closure theory (Chai and Rhee, 2010). However, while *guanxi* is a uniquely Chinese concept, the broader phenomenon of network closure transcends cultural boundaries.

2.1. The structures of networks in the Chinese academic labor market

Scholars have long known that network structures shape labor market outcomes (Granovetter, 1973). However, there is an ongoing debate regarding the network structure most conducive to positive labor market outcomes. Coleman (1988) argues that network closure—in which everyone is connected with each other's mutual acquaintances—produces better outcomes for any given actor. According to network closure theory, cohesive networks facilitate trust and the regulation of norms (Moody and White, 2003). On the contrary, structural hole theory argues that actors connecting two or more disconnected alters may enjoy the benefits of brokerage and controlling resource flows (Burt, 1992). According to this theory, actors may optimize the structure (and density) of their networks to occupy the structural hole position and receive attendant benefits, which include the increased likelihood of having good ideas (Burt, 2004). However, scholars have found that the advantages of structural holes decline as more actors strategically pursue such advantageous network structures (Buskens and van de Rijt, 2008).

Scholars grapple with the contrasts between network closure and structural holes. Burt (2001) argues that network closure creates dense networks and lowers the risks associated with transactions and trust, while structural holes allow brokers to benefit across gaps. Podolny and Baron (1997) find that the effects of structural holes on promotion are positive for conveying resources and information and negative for ties that transmit identity and internalize expectations. Pfeffer (1983) argues that cohorts within organizations are more likely to form a collective identity and mutual support, which corresponds to network closure.

Scholars also argue that the facilitative effect of structural holes is rooted in individualistic culture (Xiao and Tsui, 2007). Structural hole theories emphasize individual rather than collective goals, assuming that actors aim to fulfill self-interest rather than accommodating social norms and collective responsibility (Burt et al., 2000). Western scholars' assumptions of individualism and self-interest do not hold up well in the collective culture of Chinese society. In Chinese culture, career advancement usually means avoiding boundary positions, such as structural holes. Such positions undermine trust in both groups. Occupying the structural hole position is colloquially called "standing on the two boats," a behavior that is discouraged in Chinese culture. Based on this key cultural difference one would predict that network closure, which facilitates trust, familiarity, and identity among members of a group rather than the pursuit individual self-interest would lead to better labor market outcomes than structural holes in the Chinese setting.

Yet, the reverse migration of scholars trained overseas means that many entering the workforce are likely to occupy structural hole positions between clusters of domestic and foreign scholars via their years of training in overseas graduate programs. This position ostensibly provides international collaboration opportunities after relocating back to the Chinese universities. Western-trained scholars possess advanced-trained research expertise, professional networks in the West, language skills and cultural awareness of the predominant scientific community (Ynalvez and Shrum, 2006, 2008, 2009; Wattanavitukul, 2002).

Thus, structural hole theory and the Chinese *guanxi* phenomenon predicts different career outcomes for these two groups of Chinese scholars: those who studied and worked in the Western institutions will benefit more from the non-redundant networks due to the openness of their network; while those with domestic training will benefit more from dense networks in which alters are connected through *guanxi*. Therefore, we hypothesize:

H1a: For the overseas returnees, networks that afford structural holes, i.e., those with fewer indirect ties among alters, are more beneficial to promotion than network structures that afford closure.

H1b: For domestic PhDs., network structures that afford closure, i.e., with more indirect ties among the alters, are more conducive to promotion than networks that afford structural holes.

International collaborative ties are another indicator of Chinese scientists occupying structural holes, as these scholars have access to foreign research communities that are not connected to the domestic *guanxi* networks. International collaboration and coauthorship among Chinese academics in both natural and social sciences has increased in the last two decades. For example, between 1990 and 2010, almost one out of six nanotechnology articles indexed in the Web of Science had coauthors from China and the U.S. (Tang and Shapira, 2011). Research has shown that papers resulting from international collaboration tend to have more citations as well as higher recognition and visibility, factors that lead to professional advancement for authors involved (Luukkonen et al., 1992). International collaboration also represents access to scientific elites across nation borders and reflects mutual intellectual or social influence (Edge, 1979; Stokes and Hartley, 1989). Papers published in Chinese journals tend to have a smaller readership and impact. Cao and Suttmeier (2001) has shown that Chinese scholars feel obligated to publish in high-impact international journals in order to gain status in the global scientific community. On the policy side, the Chinese universities have also adopted evaluative Western criteria for faculty promotion, which includes a record of international publications (Flowerdew and Li, 2009).

Due to the increasing importance of international collaborative papers, we suspect the presence of international collaboration ties, i.e., networks that afford structural holes, will be more effective for returnee scholars. For instance, Jin et al. (2007) explain that living, studying, or working in the United States affords opportunities for scientific collaboration between Chinese and Chinese-American scholars. Research shows that while returnees may lose their orig-

inal social capital, their social networks, experiences, and savings accumulated overseas help them overcome such constraints when they migrate back to their local culture (Woodruff and Zenteno, 2007; Wahba and Zenou, 2012).

For returnee scholars, Zweig et al. (2004) examined the transnational capital of overseas returned PhDs and find that they are more likely to establish foreign collaborative projects than domestic PhDs. International collaboration in both research projects and scientific papers should put the individual scholars on faster promotion track. Recognizing the importance of international collaboration, domestically trained Chinese scholars sometimes seek overseas postdoctoral or visiting positions to gain access to global scientific networks (Cao and Suttmeier, 2001). However, the limited duration of foreign stays and the lack of informal training on both research culture and language make it difficult for domestically trained Chinese scholars to establish international ties and publications compared to their international counterparts. Therefore, we hypothesize:

H2: *Scholars with evidence of international collaboration tend to have more rapid academic promotions, with positive effects being larger for overseas returnees.*

2.2. Collaboration networks and career trajectories

Although they have less Western formal training experience, domestic scholars have dense and cohesive local relations. Ynalvez and Shrum (2011) point out that despite growing global scholarship networks, local research systems and networks within countries remain important, especially for developing countries. Empirical studies of social capital have been limited to the Western context of open markets, free competition, and the individualistic culture of capitalist societies (Xiao and Tsui, 2007). Network structures operate differently within other cultural contexts, norms, and market dynamics. For example, Watanabe (1987, 1994) shows that respondents in a Tokyo survey in 1985 tend to learn about jobs though strong ties that are based on family and community networks rather than through weak ties. In the Chinese context, such networks are described as *guanxi* and are likened to a web of extended family relationships (Kipnis, 1997) or a cluster of patron-client exchange relationships that have instrumental benefits (Bian, 1997: 984; Walder, 1986; Wank, 1999; Xin and Pearce, 1996). The network composition of *guanxi* is dense and closed. In other words, the strength of *guanxi* rests in network closure.

Despite the flow of scholars returning from abroad, *guanxi* networks persist in Chinese academia. This arrangement has generated some telling features in Chinese universities. Chinese universities have hired their own graduates for a very long time. A 2008 university faculty survey of 3220 respondents in Beijing found that 45.2% of faculty hires graduated from the same department (Chen et al., 2008), in a process known as academic inbreeding. Despite efforts at reducing inbreeding, it remains a common practice in the East, where it contributes to organizational stability and the maintenance of organizational identities (See Horta et al., 2011 for an analysis of academic inbreeding in the Japanese university system and Yudkevich, 2014 regarding the Russian university system). Research on academic inbreeding (when universities hire the PhDs they train) shows that it leads to reduced productivity and intellectual insularity (Horta et al., 2010; Soler 2001). Horta (2013) refines the notion of academic inbreeding to account for varying levels of career mobility among academics. He finds that pure inbreds are far less productive than scholars with higher levels of career mobility. However, Cruz-Castro and Menendez (2010) find that non-mobile scholars find permanent positions earlier than their more mobile counterparts. Furthermore, faculty mobility remains relatively low among Chinese scholars, meaning that the networks that draw scholars to a particular university may also serve to keep them there (Yan et al., 2015).

Networks are important for returnee scholars, as relationships with domestic mentors and former cohort members from previous institutions they attended facilitate academic job placement and promotions.[1] Thus, the institutional and cultural interplay of the traditional academic system, market reforms, and recent waves of returnee scientists complicate the relationship network structures and career trajectories for Chinese academics. Networks are particularly important to returnee scholars, as the Communist Party in China has put into place program, such as the "1000 Talents" Plan in order to make returning a more attractive option for scholars who study abroad (Zweig and Wang, 2013). The "1000 Talents" Plan was put in place in 2007 and designed to facilitate international cooperation among scholars with the goal of making Chinese academia more creative and innovative, and therefore more attractive to returnees. Networks become important under such a plan, as incentivized returnees would likely mobilize extant professional networks when repatriating to Chinese academia.

The following hypotheses are proposed to evaluate the optimal network structure to facilitate social capital in Chinese academia, i.e., those that are most beneficial to individual scholar's job success under the cultural contingencies and reformed market dynamics of China. The literature on the concept treats *guanxi* as a cultural construct, providing no definitive structural measures of *guanxi* networks. However, network measures of size (numbers of ties to alters) and strength (number of repeated collaborative ties), as well as the relationships with the mentors reflect the important aspects of *guanxi*. Because larger *guanxi* networks afford more opportunities to exchange favors, H3 predicts that network size is positively associated with the career promotion of individual scholars. Social networks are not only conduits for research ideas, information, resources, but also act as core structures that facilitate scientific production, and the transmission of knowledge. For overseas returnees, social ties accumulated overseas and local networks enable them to establish larger network, which should be more effective for their promotion. H4 deals with the dominant characteristics of *guanxi*: closed networks and reciprocal favors. Domestic PhDs. should have more *guanxi* connections due to their educational and working experiences in the Chinese academia, such that stronger relationships will be more effective for career promotions.

H3: The size of the network varies positively with the odds of scholars being promoted, with such positive impact being more effective for overseas returnees.

H4: Strong collaboration ties will increase the odds of scholars being promoted, with such effect being more conducive for domestic scholars.

Previous research has demonstrated the significant influence of mentors' professional recognition on their students' productivity, recognition, and job prospects (Crane, 1965). Long Scott (1978) found that the prestige of biochemists' first academic appointment was influenced by the prestige of their PhD. department and the number of the citations to their mentors' publications. Status transfers from mentor to student. As a result, PhDs. with prominent mentors should have a competitive advantage in the early stages of their careers (Roebken, 2007). Moreover, if network structure affects job-seeking outcomes, fresh PhDs. should benefit from a better-known mentor who has access to a larger professional network (Granovetter, 1973; Bian, 1997). Maintaining academic relations with mentors opens opportunities for launching scholars' careers, not to mention opportunities to publish in the early

[1] It is also important to note that the circulation of academics has benefits for home countries, such as China, as they facilitate the networks that afford the flow of knowledge and information, not to mention opportunities for international collaboration (Ma and Pan, 2015; Welch and Zhen, 2008).

stages of one's career. Research shows that scholars are most productive when they publish not only with their mentors, but with their mentors' coauthors as well (Barufaldi et al., 2016). In Chinese academia, mentor prestige and the quality of relationships with mentees offer such supports, the effects of which should persist throughout the career of PhD. students due to the *guanxi* culture in China. In contrast to Western expectations regarding professional mentorship relations, *guanxi* ties are both professional and personal (Bian, 1997). The students under one advisor are usually considered to be a small in-group (Leung and Bond, 1984), called "*Shi Men*" among academics. In such arrangements, mentors are obligated to facilitate their students' job placement as well as their career development. Therefore, the strength of a mentor's *guanxi* network is also an important factor in Chinese academia to facilitate one's career success, especially at the early stages of one's career. Once established, Chinese academics will begin to mentor a new group of mentees or "Shi Men," renewing the cycle while distancing themselves from their mentors. Based on the mentorship model in Chinese academia, we hypothesize:

H5: *Strong collaboration networks with mentors, i.e., network closure with mentors, will increase the likelihood of individual scholars' promotions, especially the promotion from assistant professor to associate professor.*

In addition to the network configurations assisting different scholars in their careers, we compare the optimal career tracks and potential advantages of domestic scholars and overseas returnees. Research by Zweig et al. (2004) presents evidence that overseas returnees are more likely to be promoted and change jobs upon return. However, their study did not distinguish between promotions from academic positions to administrative positions. Administrative positions reflect a common career goal for Chinese academics and indicate strong positional power. Data show that between 1955 and 2005, only 31 of the 191 elected members of the Chinese Academy of Sciences (CAS), the highest honor of science in China, have not held an administrative position (Wang, 2013). Administrative positions in Chinese universities offer more career benefits and prestige than they do in the West (Xu and Wang, 2010). In Chinese academia, occupying administrative positions offers scholars more research and funding resources and magnifies a scholar's reputation, power, and scientific productivity. Such positions reflect both academic power and political authority (Lai, 2009). The factors and requirements that prompted one into administrative position are more complex and rigorous than professional promotion and depend not only on research performance but also other dimensions, such as institutional and community belonging, political identity, and engagement with the national scientific, political and educational communities. Walder (1995) noted that both educational and political credentials are important for promotion to administrative positions, for example, membership in the party is usually a prerequisite. Cao (2008) noted that engagement in local politics is equally important in the success of a Chinese academic, just as Nee and Opper's (2010)'s recent paper on political capital predicts. Political capital exists as an attribute of both positional power and relational ties rooted in institutional structure of the political order, that social connections especially those with the political actors are particularly essential for status attainment in Chinese society (Nee and Opper, 2010). As in a *guanxi* based society, we could predict that more reliable *guanxi* network, especially *guanxi* with the decision maker with political power would be critical for promotions to administrative head (Bian, 2005).

Domestic scholars usually have career advantages of deeply rooted *guanxi* within their home departments, or their advisors in high political positions, or they are actively engaged with prominent academic circle, which allows them to better cultivate network closure. We predict that domestic scholars, with the support of network closure in the form of *guanxi*, will have better chances for promotion to administrative positions. Conversely, overseas returnees who have spent long time overseas, it is highly possible that their domestic connection have weakened or lost that they did not belong to any domestic academic network or connect to any political or academic power. We predict that domestic scholars, with their overseas training and international collaboration, will still retain rapid professional promotion, but for administrative position that require more political engagement, they will have less opportunities than the domestic. We hypothesize on this comparative advantage:

*H6a: Overseas returnees will have more rapid promotion in academic positions, but will be less likely to be promoted to administrative positions within their department**s**.*

H6b: Domestic PhDs. will be more likely to be promoted to administrative positions within their department than the overseas returnees.

3. Data and methods

3.1. Sample and data

Ideally, we would identify and measure *guanxi* networks directly, as Yen et al., 2011 suggest. However, operationalizing *guanxi* as these scholars suggest is time-consuming and remains stubbornly tied to self-reports of affect, obligation, and trustworthiness. Instead, our study relies on indirect measures of *guanxi*. Data for this study come from bibliographic data drawn from Chinese scholars' curricula vitae (CVs) on the faculty list of the official website of the sampled departments. We retrieved educational background, career advances information, publications, and other related data from these CVs. We searched personal web pages, blogs, articles on public bulletin board or personal information released in their publications in the indexed journal list to supplement the data and fill in missing data. Measures for scientific production and publication were also obtained from CVs. Publication information drawn from CVs were validated against indexed journal lists, for example, we used CNKI[2] (China National Knowledge Infrastructure) for validation of national publications, and the Web of Sciences for international publications. Collaborative network data are generated from the validated publication data where we obtained a relatively complete ego network consisting of local and international co-authorship ties of each scholar. Coauthored publications are relatively reliable and well documented indicators of scientific collaboration (Endersby, 1996; Katz and Martin, 1997; Moed, 2002). A wide body of research in scientometrics uses bibliometric data from citation indexes as a measure for both scientific publications and the collaborative networks to examine how the research collaboration promotes scholarly productivity and recognition (Gordon, 1980; Narin et al., 1991; Wagner and Leydesdorff, 2005). CVs have also been used as a fertile data source to track scholars' educational backgrounds, employment histories, publications, and other scholarly outputs for the study of scientists' career trajectories (Cañibano and Bozeman, 2009). CVs record academic positions and accomplishments in relatively standardized formats, making it easier to connect research performance with career paths, as coauthorship data provides a window on patterns of collaboration matched with career trajectories.

Our sample is comprised of all faculty members who started their first academic job at doctorate degree-granting depart-

[2] CNKI (China National Knowledge Infrastructure) is a key national information database project which has built a comprehensive China Integrated Knowledge Resources System, including journals, doctoral dissertations, masters' theses, proceedings, newspapers, yearbooks, statistical yearbooks, ebooks, patents, standards, etc.

ments in sociology and mathematics in the "211-Projects Key Universities",[3] in China between 2000 and 2010. Collaboration among mathematicians is common and has become much more prevalent since 1950 (Grossman, 2002). Data from Mathematical Reviews shows that the overwhelming majority of contemporary papers in mathematics have more than one author. This reflects how better communication has promoted collaborative research in the discipline (Newman, 2004). For a greater representativeness of the field of knowledge and providing grounds for generalization to the Chinese academic labor market, we have analyzed similar data for the field of sociology[4] which is considered as a soft applied field compared to the mathematics as the hard pure science by Becher and Trowler (2001). Having two contrasting fields enables us to examine the network differences between disciplinary fields. In addition, it provides us a chance to study a less standardized and emerging labor market sector since sociology is an emerging discipline in China.

In total, our sample consists of 425 observations, including 339 mathematicians and 86 sociologists. We identified members of our sample by looking through the faculty list from each doctorate-granting department among the 100 key universities. There are in total 116 overseas trained PhDs. in our sample. Overall, 93.6% of the sampled scholars had some overseas experiences, ranging from earning a PhD., postdoctoral positions, visiting scholarships, or overseas work experiences.

We used logistic regression and multivariate analyses to identify optimal network ties and career trajectories for overseas versus domestic scholars throughout their career trajectories.

3.2. Measurement

3.2.1. Dependent variables: career advancement

Previously, the Chinese academic system does not have the same probation and tenure system as the United States and elsewhere, where the regular Chinese faculty rank distinctions are divided into instructors (a rough equivalent to assistant professor in the U.S. system), associate professor, and full professor. Chinese universities varied significantly in their requirements for promotion on many aspects, e.g., qualifications, grants, publications, time served at the university, overseas experiences, teaching evaluations, and involvement in national research projects, etc. Despite variability, universities generally require scholars a minimum of 3 years in the position of instructor to be eligible for apply for promotion to associate professor and a minimum of 5 years to be eligible for promotion to full professor. For example, the official human resource document of employment and promotion requirements of Peking University states: "The instructors have to work 3 years before they could be promoted to associated professor; the associate professors have to work 5 years before they are eligible to be promoted to full professor." (*Faculty Employment and Promotion Policy of Peking University,* 2004).

However, in recent years, top tier Chinese universities have started to introduce a tenure review system and probation period for faculty promotion as well as replacing the instructor level with that of assistant professor (Ma, 2000; Peking University, 2003). For example, in 2003, East China University reformed its faculty promotion and merit system and began to imitate the U.S. tenure-track system. In the same year, Peking University adopted a tenure-track system. Due to the adoption of western-style tenure systems, Chinese universities required probation periods of 6 years. Usually, the tenure review and ranking system apply only to new faculty members, leaving existing faculty members to be evaluated under the old system of Chinese faculty promotion requirements. Some universities place overseas returned faculty into the tenure-track system, with domestic trained faculty placed into the regular promotion system, creating what is described as the "dual-track system".

To operationalize career advancement and the different tracks, we created 4 binary variables, one for each promotion while accounting for the time between events. Two variables capture early stage advancement: the outcome variable was coded 1 if the individual was promoted from instructor to associate professor within 3 years in the regular track, and if the individual was promoted from assistant professor to associate professor within 6 years in the tenure track. The other two variables capture advanced promotion: whether the individual was promoted to full professor within 5 years and whether the individual has been promoted to administrative head position in his career.

3.2.2. Independent variables: network measures

The network is captured from the vantage of the ego, which consists of a focal node ("ego") and the nodes with whom ego has direct ties (the "alters") plus the ties, if any, among the alters. We incorporated three properties of an ego's collaboration network: size, indirect ties, and strong relationship. Size is measured as the number of direct ties between the ego and alters, ranging from 0 to N. Indirect ties among the alters are used as a proxy for the structural holes, which range from 0 to $N(N-1)/2$. The indirect ties among the alters are captured by the coauthorship among the alters without the ego. The existence of more indirect ties among the alters indicates greater redundancy and less structural hole advantages in the ego's network. Relationship strength is measured as three or more collaborations with one alter.

Two measures of network content are incorporated in the analysis. Relationship with mentor, which is the PhD supervisor of each scholar in our sample, is measured by the frequency of coauthorship with an ego's mentor. Mentors' names were obtained from the Chinese Digital Dissertation Index for those trained domestically or through the dissertation title or acknowledgement page for those trained abroad. The other network content measure is international collaboration, measured by the number of international collaborators shown in the CV publication data. Due to unique spelling in the Chinese Hanyu Pinyin system, we differentiated Chinese researchers from non-Chinese researchers based on his/her family name. Table 1 provides descriptive statistics about scholars' networks in our sample.

Table 1
Descriptive statistics of the network indicators for the full sample.

Variable	Median	Mean	SD	Range
Size (size)	7.29	6.15	0.87	2–13
Indirect ties (indirect)	13.24	17.53	0.76	0–28
Strength (strength)	5.18	5.32	0.34	0–8
Mentor effect (mentor)	4.32	5.67	0.52	0–11
International collaboration (international)	3.14	3.42	0.37	0–5

[3] "211-Projects Key University" is a program launched by the Chinese Education Ministry in 1990 with the aim to construct 100 universities with high quality of academic research and advanced education. The lists of universities in the project include most comprehensive and doctorate degree granting universities within every provinces of China. The acknowledged prestige of this 100 universities and the abundant funding guaranteed by the government policy give them priority in both attracting better students within China and also reattracting the overseas returnees. Universities within the 211 list also pioneer in their scientific, technical and human resources standard in order to meet the goal of cultivation.

[4] Sociology as a discipline remains under development in China. The first sociology department was established after the Chinese economic reform in 1980. By 2014, only 19 sociology departments nationwide are qualified to provide doctorate training to their students.

3.3. Control variables

3.3.1. International publications/National publication

Academic status attainment and career promotion depends heavily on a scholar's capacity to publish (Reskin, 1977; Long et al., 1979; Baldi, 1995). A faculty member's tenure promotion is a function of their productivity as measured by publications (Denning, 1997). Papers published internationally are generally key contributors to promotion, especially for scholars in countries with a smaller national scientific enterprise, whereas national publication connote the extent of engagement with the national scientific community, which may be critical for faculty to achieve an administrative position. The number of publications came from the reported number of peer-reviewed journal articles on faculty's CVs matched with each stage of their career promotion. International publications are measured by the number of papers published in international journals, as validated in Web of Science. National publications are measured by the number of papers published in Chinese journals, as validated in CNKI.

3.3.2. Cohort

The variable "*cohort*" is used as proxy of an ego's "academic age" in our analysis. It is measured by the year a bachelor degree was earned and categorized into four dummy variables for the purpose of analysis, as an indicator of their researching age. Cohort is divided into four periods, based on the events surrounding Tian An Men Square and subsequent reform timelines in Chinese society.

3.3.3. Ranking of graduate program

Prestige of doctoral education helps determine the initial research ability, job placement, and later academic potential for individual scholars. Studies show that graduates from more prestigious schools are more productive and have better job attainment than graduates of less prestigious universities (Reskin, 1977; Baldi, 1995). To evaluate the prestige and quality of graduate programs, we use the 2012 Jiaotong World University Ranking as a rough proxy for postgraduate education quality. We use the list as a reference for coding the variable into five tiers as an ordinal variable.

3.3.4. Ranking of undergraduate university

Graduates of prestigious colleges are more likely to attend leading universities at the doctoral level, which will directly affect the later career opportunities. 96.4% of the scholars in our sample have undergraduate degrees from domestic colleges and universities. We evaluate the quality of undergraduate education using the 2012 Chinese University Ranking published by the Ministry of Education of China. This list covers 199 Chinese universities and ranks them by selected indicators. The variable is coded into an ordinal variable with four tiers. Universities not appearing on the list are coded into to the fourth tier.

3.3.5. Gender

Gender explains many of the differences in the distribution of rewards in scientific communities (Cole and Zuckerman, 1987; Long, 1990; Long and Fox, 1995; Fox, 2001; Park, 2007). The data on gender come from the professors' pictures posted on the department web pages. If their pictures were not available, we inferred gender from first names (Tang and Shapira, 2011). Gender is coded as binary variables with female = 1, and male = 0. 81.3% of the scholars in our sample were male.

3.3.6. Postdoc experience

Although postdocs are temporary and feature varying responsibilities and less visibility, (Cantwell and Lee, 2010), recent studies have focused on the importance of postdoctoral experiences (Lin and Chiu, 2016). Some empirical studies show that engaging in postdoc positions prepares researchers for academic careers and has a positive effect in terms of finding a job in academia (Aerlind, 2009; Lin and Chiu, 2016). However, the relationship between postdoc positions and career advances is not homogenously positive (Recotillet, 2007). Horta (2009) studied a sample of Mexican scholars to show that holding a postdoc at the beginning of an academic career tended to help scholars access international academic and scientific networks, particularly for scholars that held postdocs in the developed countries. Scholars also find that postdoc positions sometimes delay entry to academic careers, as postdocs tend to work on a series of temporary contracts and become more specialized. This scenario reduces scholars' opportunities to achieve tenure-track positions and negatively affects their career satisfaction and prospects (Van der Weijden et al., 2016).

Therefore, we include postdoc experience in the analysis to help us evaluate the impact of such experiences for Chinese scholars along their career trajectories, from the beginning of their careers to more advanced promotions. 163 Ph.Ds. in our sample have worked as postdoc researchers. 96 did their postdocs in foreign institutions. Postdoc is coded as a dummy variable: 1 = with postdoc experience, 0 = no postdoc experience.

3.3.7. Discipline

To evaluate the disciplinary differences of the network effect on career promotions, we collected data within mathematics and sociology departments, hence, mathematicians in our sample are coded as 0, and sociologists in our sample are coded as 1.

4. Results

Descriptive statistics and bivariate correlations for the independent variables of interest are reported in Tables 2 and 3. Our findings indicate that domestic PhDs tend to have stronger relationships and mentor collaborations in their networks on average, while the overseas PhDs tend to have more collaborators and disconnected networks, as well as more international collaboration opportunities. Table 3 shows the correlations among the network measures, which range from 0.04 to 0.33. These correlations are substantively small, so that each network can be considered reasonably distinct.

Table 4 and Table 5 show complete regressions for intra-organizational mobility and disparities between overseas returnees and domestic PhDs for their early stage promotion and advanced promotion separately. For early stage promotion, we distinguished the Chinese regular track by promotion within 3 years, and the newly adopted tenure track that requires a probation period of 6 years, which are reported in Table 4. For advanced stage promotion, we analyzed the odds ratio of academic track promotion to full professor in 5 years that are stipulated in the Chinese regular promotion system, and the chances of administrative track promotion, which are reported in Table 5. For the tracks, four models are built with Models 1, 4, 7, 10 regressing the odds of promotion on overseas PhD identity and the control variables; Model 2, 5, 8, 11 add network measures to the models to test the overall network effects on career promotion for Chinese scholars; Models 3, 6, 9,12 add interaction terms for network measures and the overseas returned PhD identity as the dummy variable to test on the differences in network configurations between domestic PhDs and overseas returnees. For those coefficients for which there are contradictory hypotheses regarding their direction, we employ two-tailed tests of significance. For all others, we employ one-tailed tests. We run the analysis and report and the results in terms of odds ratios. We also intend to report marginal effects to verify the significance of the variables in logistic models (Wiersema and Bowen, 2009). Zelner (2009) noted that the issues with interacted variables are usually more serious than those with uninteracted terms. Therefore, in

Table 2
Descriptive statistics for network measures, by educational experiences and stage of career for the full sample.

	Educational background			Stage of career			
	Domestic Ph.D.	Overseas Ph.D.	Overseas Postdoc	Instructor/assistant prof	Associate prof	Full prof	Admin
Mean number of coauthors	5.46	6.78	7.02	5.38	7.45	9.26	10.67
Mean number of indirect ties among alters	8.13	9.73	8.92	5.33	6.54	7.86	8.34
Mean number of international collaborators	2.45	5.01	4.78	4.28	4.07	3.75	3.52
Mean number of strong collaborations (>3)	6.54	5.01	6.89	4.35	5.86	5.67	6.45
Mean number of mentor collaborations	5.98	4.37	6.54	4.65	4.16	3.32	3.06

Table 3
Description and Correlation Matrix of selected independent variables (all sample).

	Size	Indirect	Strength	Mentor	International	nationalpaper	Interpaper	Gender	Cohort	GradRanking	Undergrad Ranking
Size	1	0.28	0.22	0.24	0.33	0.30	0.25	−0.10	0.12	0.16	0.13
Indirect		1	0.19	0.15	0.16	0.29	0.16	0.10	−0.10	0.09	0.05
Strength			1	0.12	0.14	0.24	0.23	−0.13	−0.14	0.12	0.10
Mentor				1	0.13	0.28	0.23	0.09	0.15	0.13	0.12
International					1	0.24	0.34	−0.07	0.14	0.15	0.14
Nationalpaper						1	0.21	−0.10	0.19	0.10	0.09
Interpaper							1	−0.06	−0.07	0.15	0.16
Female								1	0.04	−0.07	−0.05
Cohort									1	0.14	0.17
GradRanking										1	0.30
UndergradRanking											1

Table 6, we reported the marginal effects of the interactions terms in model 3, 6, 9, 12, when all other variables are held fixed at its sample mean. After comparing the results of marginal effects and the odds ratios, we find the significances of the interactions terms are equivalent in the two methods, which indicate that the use of odds ratios in the following interpretation is valid.

4.1. Hypotheses 1a and 1b: effects of structural holes and network closure

Between the Chinese regular track and the tenure tack promotion, we find that the impact of network size, indirect ties and international ties is strengthened, while the impact of strong ties declines, and the mentor relationship loses its significance in tenure promotion.

Models for both tracks show that, considering the effect of network measures, the number of indirect ties among alters has a significant positive effect on career promotion, which indicates that more cohesive network is conducive to early academic promotion. However, once we add the interaction term to the model, the results reveal different implications for overseas returnees and domestic scholars. For domestic scholars, the number of indirect ties continues to have a positive, statistically significant effect for both tracks, but for overseas returnees, the effect becomes negative for both tracks. This indicates that networks affording structural holes give overseas returnees greater advantages regarding promotion, while the high trust and recognizable identity suggested by network closure gives domestic scholars better chances for promotion. This lends support to H1a and 1b. The number of indirect ties retains its positive impact from earlier career stages for the promotion of domestic PhDs' promotion, but it changes to positive for overseas returnees, meaning that for more advanced promotions, cohesive networks will facilitate overseas returnee's promotion more than the dispersed network. This means that the benefit of occupying a structural hole position diminishes over the course of one's career. These findings begin to bridge the literatures on overseas returnees (Ma and Pan, 2015) and domestic career ladders (Suttmeier and Cao, 2004; Tien, 2007).

4.2. Hypothesis 2: effect of international ties

Across the whole career trajectory and among different career tracks, we find a consistent significant effect of international ties on promotion, which indicates the growing emphasis that Chinese academia has addressed on international collaborations and publications. This lends support to H2. We find that the impact of international ties is especially strong for tenure track promotion and advanced academic promotion to full professor.

The effect of international relations provides further evidence that overseas and domestic scholars have different comparative advantages. International collaboration has positive and significant impact on the odds of promotion to associate professor for both tracks, especially for overseas returnees, which supports H2 on the impact of international networks. In addition, international collaborations significantly increase the odds of promotion to full professor with its impact greater for overseas returnees than for domestic PhDs with positive interaction terms of international ties and overseas scholar as the variables. Model 12 fully specifies the effect of networks on career disparities between domestic PhDs and overseas returnees, which shows that international networks differs in its impact for administrative promotion, with each additional international collaboration increasing the odds ratio of promotion for overseas returnees by 9% more than the odds ratio increase for their domestic counterparts, due in part to their chances of having more international collaborations than domestic scholars.

4.3. Hypothesis 3: effect of network size

We find a positive significant effect for overseas returnees in advanced academic promotion to full professor. Network size still has a positive effect at this stage. Each additional collaborator increases odds ratio of promotion within 5 years by 17% in model 8 and 20% in model 9.

Network size also matters for promotions to the administrative positions, which indicates the impact of broad networks in a *guanxi* culture like China. We also find that the interaction term of network size and overseas scholar loses significance, which indicates that overseas returnees and domestic scholars do not differ in how network size influences their chances of promoting to admin-

Table 4
Logistic Regressions of odds of promotion on network measures for the early stage promotion.

	Early stage promotion					
	Regular system: instructor to associate professor within 3 years			Tenure-track: assistant professor to associate professor within 6 years		
	Model1	Model2	Model3	Model4	Model5	Model6
Intercept	0.29	0.30	0.33	0.40	0.36	0.42
	1.27	1.35	1.39	1.49	1.43	1.52
	(0.81)	(0.90)	(0.86)	(0.88)	(0.82)	(0.79)
Overseas = 1	0.23**	0.21**	0.19**	0.26**	0.25**	0.23**
	1.26**	1.23**	1.21**	1.30**	1.28**	1.26**
	(0.07)	(0.09)	(0.08)	(0.09)	(0.07)	(0.10)
Network measures						
Size		0.17**	0.19**		0.23**	0.26**
		1.86**	1.21**		1.26**	1.30**
		(0.05)	(0.06)		(0.07)	(0.09)
Strong ties		0.72**	0.78**		0.69*	0.62*
		2.05**	2.18**		1.99*	1.86*
		(0.30)	(0.33)		(0.34)	(0.31)
Indirect ties		0.33**	0.36**		0.40**	0.43**
		1.39**	1.43**		1.49**	1.54**
		(0.12)	(0.16)		(0.16)	(0.13)
Mentor ties		0.28*	0.24*		0.15	0.14
		1.32*	1.27*		1.16	1.15
		(0.10)	(0.12)		(0.13)	(0.10)
International ties		0.12**	0.15**		0.18**	0.23**
		1.13**	1.16**		2.18**	1.26**
		(0.03)	(0.04)		(0.07)	(0.06)
Interaction terms						
Size*overseas			0.05*			0.07*
			1.05*			1.07*
			(0.02)			(0.03)
Strong ties *overseas			−0.09*			−0.12*
			0.91*			0.89*
			(0.04)			(0.05)
Indirect ties *overseas			−0.63*			−0.75*
			0.53*			0.47*
			(0.29)			(0.30)
Mentor ties *overseas			−0.05*			−0.04
			0.95*			0.96
			(0.02)			(0.04)
International ties			0.09*			0.11*
*overseas			1.09*			1.12*
			(0.04)			(0.05)
Control variables						
National paper	0.19**	0.22**	0.23**	0.17**	0.15**	0.14**
	1.21**	1.25**	1.26**	1.18** (0.06)	1.16*	1.15**
	(0.05)	(0.09)	(0.08)		(0.04)	(0.05)
International paper	0.26**	0.31**	0.34**	0.32**	0.35**	0.37**
	1.30**	1.36**	1.40**	1.37**	1.42**	1.45**
	(0.09)	(0.08)	(0.09)	(0.07)	(0.10)	(0.12)
Cohort	−0.17	−0.12	−0.13	−0.10	−0.15	−0.14
	0.83	0.88	0.87	0.90	0.85	0.86
	(0.12)	(0.14)	(0.11)	(0.13)	(0.14)	(0.12)
Gender(female = 1)	−0.12	−0.11	−0.10	−0.13	−0.14	−0.17
	0.88	0.89	0.90	0.87	0.86	0.83
	(0.15)	(0.16)	(0.14)	(0.12)	(0.13)	(0.15)
Grad ranking	0.39**	0.43**	0.46**	0.60**	0.56**	0.47**
	1.48**	1.53**	1.58**	1.82**	1.75**	1.60**
	(0.12)	(0.10)	(0.16)	(0.19)	(0.15)	(0.13)
Undergrad ranking	0.30**	0.37**	0.38**	0.35*	0.34*	0.38*
	1.35**	1.45**	1.46**	1.42*	1.40*	1.46*
	(0.11)	(0.12)	(0.13)	(0.16)	(0.14)	(0.17)
Postdoc	0.49**	0.52**	0.46**	0.23	0.25	0.27
	1.63**	1.68**	1.58**	1.25	1.28	1.31
	(0.15)	(0.19)	(0.14)	(0.21)	(0.19)	(0.20)
Discipline(math = 1)	0.09	0.11	0.08	0.13	0.10	0.09
	1.09	1.12	1.08	1.14	1.11	1.09
	(0.13)	(0.09)	(0.07)	(0.10)	(0.08)	(0.10)
R^2	0.30	0.32	0.35	0.31	0.33	0.36
N	425	425	426	425	425	425

Note: *** p < 0.001, ** p < 0.01, *p<0.05; First row of each model is the logistic model coefficient, the second row of each model is the odds ratio, the third row reports the standard error.

istrative head. This suggests that the cultural contingency of guanxi applies to not only to the business world (Xiao and Tsui, 2007), but to academia as well.

4.4. Hypothesis 4: effect of strong networks

Strong ties have a substantial and increasing effect across career trajectories. In the early stage of promotion, network strength has

Table 5
Logistic Regressions of odds of promotion on network measures for the advanced stage promotion.

	Advanced stage promotion					
	Full professor promotion			Administrative positions		
	Model7	Model8	Model9	Model10	Model11	Model12
Intercept	0.34	0.36	0.41	0.38	0.35	0.39
	1.40	1.43	1.50	1.46	1.42	1.48
	(0.62)	(0.79)	(0.68)	(0.75)	(0.79)	(0.82)
Overseas = 1	0.18**	0.16*	0.21*	−0.08	−0.06	−0.06
	1.20**	1.17*	1.23*	0.92	0.94	0.97
	(0.06)	(0.09)	(0.10)	(0.06)	(0.04)	(0.05)
Network measures						
Size		0.16**	0.18**		0.19*	0.21*
		1.17*	1.20*		1.21*	1.23*
		(0.05)	(0.04)		(0.09)	(0.08)
Strong ties		0.92*	0.97*		0.95*	0.91*
		2.51*	2.64*		2.59*	2.48*
		(0.40)	(0.39)		(0.41)	(0.38)
Indirect ties		0.46*	0.49*		0.53*	0.50*
		1.58*	1.63*		1.70*	1.65*
		(0.15)	(0.19)		(0.18)	(0.16)
Mentor ties		0.16	0.17		0.13	0.14
		1.17	1.18		1.14	1.15
		(0.10)	(0.09)		(0.11)	(0.12)
International ties		0.16*	0.19*		0.13*	0.15*
		1.17*	1.21*		1.14*	1.16*
		(0.07)	(0.09)		(0.06)	(0.07)
Interaction terms						
Size*overseas			0.10*			0.08
			1.10*			1.08
			(0.05)			(0.07)
Strong ties			−0.07*			−0.12
*overseas			0.93*			0.88
			(0.03)			(0.09)
Indirect ties			−0.35*			−0.21
*overseas			0.70*			0.81
			(0.13)			(0.18)
Mentor ties			−0.03			−0.04
*overseas			0.97			0.96
			(0.01)			(0.02)
International ties			0.08*			0.09*
*overseas			1.08*			1.09*
			(0.03)			(0.04)
Control variables						
National paper	0.20**	0.22**	0.21**	0.24**	0.23**	0.26**
	1.22**	1.25**	1.23**	1.27**	1.26**	1.30**
	(0.06)	(0.08)	(0.07)	(0.06)	(0.05)	(0.07)
International paper	0.27**	0.26**	0.29**	0.21**	0.23**	0.25**
	1.31**	1.30**	1.34**	1.23**	1.26**	1.28**
	(0.08)	(0.09)	(0.10)	(0.09)	(0.07)	(0.08)
Cohort	−0.12	−0.13	−0.12	−0.14	−0.15	−0.12
	0.88	0.87	0.88	0.87	0.86	0.88
	(0.10)	(0.11)	(0.12)	(0.11)	(0.13)	(0.12)
Gender(female = 1)	−0.17	−0.16	−0.11	−0.28*	−0.29*	−0.22*
	0.84	0.85	0.89	0.76	0.75	0.80
	(0.15)	(0.12)	(0.13)	(0.12)	(0.15)	(0.10)
Grad ranking	0.41*	0.38*	0.35*	0.28	0.21	0.18
	1.51*	1.46*	1.42*	1.32	1.23	1.20
	(0.19)	(0.15)	(0.13)	(0.20)	(0.17)	(0.15)
Undergrad ranking	0.31*	0.34*	0.35*	0.34*	0.28*	0.32*
	1.36*	1.40*	1.42*	1.40*	1.32*	1.38*
	(0.15)	(0.13)	(0.18)	(0.14)	(0.11)	(0.13)
Postdoc	0.25	0.24	0.28	0.34	0.31	0.28
	1.28	1.27	1.32	1.40	1.36	1.32
	(0.21)	(0.19)	(0.21)	(0.39)	(0.32)	(0.31)
Discipline(math = 1)	0.06	0.15	0.10	0.12	0.10	0.14
	1.06	1.16	1.11	1.13	1.11	1.15
	(0.14)	(0.10)	(0.09)	(0.10)	(0.09)	(0.10)
R^2	0.28	0.30	0.33	0.23	0.25	0.26
N	425	425	425	425	425	425

Note: *** p < 0.001 ** p < 0.01 *p < 0.05; First row of each model is the logistic model coefficient, the second row of each model is the odds ratio, the third row reports the standard error.

a positive and significant effect on the odds of promotion, which indicates that relying on strong ties is especially powerful in accelerating early promotion. However, for overseas returnees, the effect of strong relationships tends to be smaller compared to domestic scholars, which supports H4. In advanced promotion, the impact of strong ties for domestic scholars remains significant. The substan-

Table 6
Marginal effect of the interaction terms at variable means.

	Marginal effect of variable means.			
Interaction terms	Regular track (model3)	Tenure track (model6)	Full professor (model9)	Admin position (model12)
Size*overseas	0.02*	0.03*	0.04*	0.03.
	(0.01)	(0.01)	(0.02)	(0.12)
Strong ties*overseas	−0.05*	−0.07*	−0.04*	−0.06.
	(0.02)	(0.03)	(0.02)	(0.08)
Indirect ties*overseas	−0.10*	−0.13*	−0.09*	−0.07*
	(0.04)	(0.06)	(0.04)	(0.09)
Mentor ties*overseas	−0.03*	−0.02	−0.01	−0.01
	(0.01)	(0.05)	(0.04)	(0.06)
International ties*overseas	0.05*	0.07*	0.05*	0.03*
	(0.02)	(0.03)	(0.03)	(0.01)

Note: n = 425; *p < 0.05; First row reports the marginal effects, the second row is the standard error; Computed at sample mean value of Xs.

tive impact of network strength corresponds to the expectations of *guanxi* culture (Xin and Peace, 1996; Yeung and Tung, 1996). The Chinese academic labor market seems infused with *guanxi* relations, which is reflected in strong and close relationships.

4.5. Hypothesis 5: effect of mentor networks

The effects of mentor networks at the regular track are statistically significant for early career promotion with larger effects for domestic scholars than overseas returnees. The mentor relationship loses significance in the promotion to tenure. This shows that the influence of mentor is more prominent during the early years of one's academic life, but over time, its impact tends to disappear. This makes intuitive sense and is consistent with the findings of Barruffaldi et al. (2016). This result also lends support for H5.

Models for the advanced promotion show that the relationship with mentors does not significantly influence an academic's chance of being promoted to full professor or administrative positions, which is consistent with findings noted above regarding the decreasing importance of mentorship ties as one's career advances.

4.6. Hypothesis 6a and 6b: academic and administrative promotions

We find significant career advantages for overseas returnees for academic promotion to full professor in both regular and tenure-tracks, which lends support to H6a. However, overseas returnees lose this advantage when it comes to promotion to administrative positions. Despite their better performance in academic promotion, we find no significant difference between overseas returnees and domestic PhDs in advancing to the administrative positions.

4.7. Additional findings

Although the focus of the paper is on the effects of networks on academic careers, controlling for publication, cohort, educational background, gender, postdoc experiences, and discipline enables us to understand the Chinese academic labor market in better terms. We find that publications, especially international publications significantly impact career promotion. The impact of national publications increases the odds of promotion to administrative positions, which demonstrates that engagement with the national scientific communities may be critical for the faculty to achieve such a promotion (Flowerdew and Li, 2009). Graduate school prestige is especially significant for one's academic promotion and the prestige of undergraduate training remains important throughout one's academic and administrative career. Postdoc experience is significant on the early stage for the regular tracks, but over time, it loses its effect. We found no significant differences between the disciplines since the variable discipline does not reveal any statistical significance. There is no distinct gender disparity in the professional promotions on the academic tracks. The models show that there is no significant difference of chance of promotion for women and men regarding academic promotion to full professor, but women had significantly lower odds of being promoted to administrative positions than men, despite equal career performances. This suggests an implicit "glass ceiling" remains in place for women in achieving promotions to administrative positions, which possess greater prestige as well as access to and control over resources.

Table 7 summarizes the results of our analyses by hypothesis.

5. Discussion

In contrast to both Guthrie (1998) and Bian (1997), our study suggests that different forms of social capital matter at different times and tracks for the successful careers of local vs. overseas trained Chinese scholars. "Locally" and "Overseas" trained scholars can capitalize on the various benefits that different types of networks offer. "Locally" trained scholars benefit from high trust, cooperative behavior and informal norms in closed networks. "Overseas" returnees benefit from better salaries and university policies designed to draw them back (Wang et al., 2014). They also benefit from diverse information, opportunity, and control benefits in sparse networks that connect different clusters, regions, and countries. Our findings suggest that network closure and brokerage are not mutually exclusive. Rather, both structures can be effective depending on the temporal and cultural context. We also found that the benefits of network structures also varied according to different career stages and promotion goals. The benefit of large and sparse network for overseas returnees declines later in the career trajectories of Chinese academics. While initially benefiting from the presence of structural holes, network closure appears to better facilitate subsequent career advancement for overseas trained scholars. In other words, while "standing on two boats," helps a returnee secure their first position, "sitting on the Chinese lap" provides greater advantages for career advancement. For local scholars, network closure not only benefits their professional promotion, the deeply rooted trust and embeddedness within the institution leads to faster promotion to administrative positions. These findings contribute to the paradox of network forms in the context of contemporary Chinese academia (Chai and Rhee, 2010).

Furthermore, we find that the content and cultural context of networks matter for determining when networks that afford structural holes or closure offer the best strategy for getting and keeping a job. In this way, we contribute to Pachuki and Breiger's (2010: 215–216) challenge to studies of relationality: are the benefits of network structures, such as structural holes, "culturally contingent?" The benefits of networks that afford structural holes versus closure vary not only with the content of ties but also cross-culturally. The collectivist culture of China and the power of *guanxi*

Table 7
Hypotheses and the results revisited.

Hypothesis	Results	Early stage vs advanced stage	domestic vs overseas
H1a (effect of structural hole)	Mixed result	Positive for the overseas at early stages, negative at advanced stages	Stronger for the overseas
H1b (effect of network closure)	Supported	Constantly positive for the domestic	Stronger for the domestic
H2 (effect of international ties)	Supported	Constantly positive	Stronger for the overseas
H3 (effect of network size)	Supported	Constantly positive	Stronger for the overseas
H4 (effect of strong networks)	Supported	Constantly positive	Stronger for the domestic
H5 (effect of mentor networks)	Supported	Positive at early stage of regular system, not significant for tenure track and advanced stages	Stronger for the domestic
H6a (academic promotion)	Supported	/	Overseas benefit on the academic track
H6b (administrative promotion)	Fail to support	/	Overseas and domestic scholars have equal odds of promotion to administrative positions

reflect the need for network closure, which helps job seekers construct a sense of belonging and identity within Chinese universities and the larger society. The advantages of a returnees' structural position at the early stage of their career wane as they become more integrated into the academy. Our findings also point toward ways to reconcile the tension between "relationism and formalism" in social network analysis (Erikson, 2013). Our paper draws combines a formalist approach to networks, by analyzing network structures, with a relationist approach, by contrasting structures with cultural contexts and contingencies. Attention to the cultural contingency of network structures will help social scientists overcome the valorization of certain structural formations.

Among network content measures, relationship with mentors is conducive to early stage career advancement. However, its effects diminish as an actor's career advances. International collaboration retains its positive effect and significance across the career trajectories of domestic scholars and overseas returnees. A scientist's research ability combines an "expanded notion of human capital" with a "productive social capital network" (Bozeman et al., 2001). From this perspective, international collaboration is an effective way to gain access to cutting-edge scientific knowledge and technologies for scientists in developing countries such as China. Joint research with foreign colleagues and collaborators is an important way for scholars to achieve high quality publications. Domestically-trained scientists in China have few opportunities for international collaboration, as compared to overseas returnees, who usually have more international ties either from their PhD. training, visiting, or overseas working experiences. As research on academic inbreeding suggests, scholars with little mobility tend to be less productive as a result of the lack of opportunities (Horta et al., 2010; Soler, 2001).

Domestic PhDs. and overseas returnees had different professional network structures and as a result experienced different career opportunities. Overseas returnees were more likely to occupy structural holes between domestic academic departments and international scholars. This network structure tended to offer more rapid academic promotion from assistant professor to full professor. However, the advantage of the structural hole position diminished for more advanced promotions such as administrative positions. The groups did not differ significantly in their chances to for promotion to administrative head.

6. Conclusion

Our study contributes to the literature of network structure on academic job success. Much of the extant literature on networks and careers focuses on the private labor market in the North America and Europe. However, as our study demonstrates, network effects vary across cultural contexts. The significance of our study is enhanced by the changing nature of the Chinese academic labor market, in particular, the rise in the number of returnee academics. Furthermore, by distinguishing across several career stages and tracks, including regular track, tenure-track, advanced promotion to full professor and administrative positions, we show that network ties vary in importance between overseas returnees and domestically trained PhDs. throughout their careers. For example, while large networks are generally helpful for promotion, structural holes are only helpful for returnees' first promotion. In contrast, domestically trained scientists and those aiming for more advanced promotions benefit more from network closure.

Our study also contributes to the research literature on labor markets and transitional societies. This research is the first to compare Chinese *guanxi* and structural hole structures on labor market outcomes in the context of international labor flows, especially concerning reverse migration. This paper is sensitive to the salience of network structures on the labor market. We contribute to the literature on academic labor markets by identifying the optimal social network structures for advancement in the labor market and showing how they differ according to local and expatriate scholars.

One caveat to our study is that we do not have a formal or direct measure for *guanxi* (Yen et al., 2011). Our quantitative measure of *guanxi* comes from coauthorship and mentorship data, which is indirect. Self-reported data about *guanxi* would be problematic, as actors are unlikely to discuss such matters with researchers who are not themselves members of the network. However, future studies could develop more robust measures of *guanxi* to test our hypotheses with greater accuracy. However, our composite network measures reflect the much of what it means to participate in and benefit from *guanxi*. The strength of ties and the measure of indirect ties illustrate the significance of strong cohesive social relations within Chinese academia, which are essential attributes of *guanxi* networks. The analysis also shows specific content of such Chinese *guanxi*, for instance, *guanxi* with the mentor, and *guanxi* outside of the country as substantial social relations for career advancement for both domestic and overseas returned scholars. *Guanxi* implies a culturally specific form of network closure.

Additional limitations of the study include the specificity of our sampling frame. Our data is limited to two disciplines over a recent 10-year period. We assume that individual scholars and fields of knowledge in the broader population are exposed to similar organizational, institutional, and cultural pressures. Furthermore, the 10-year period under study is one of reformation, as the Communist Party in China put into place programs to incentivize returning

to China for academics studying abroad (Zweig and Wang, 2013). Beyond the lacking a direct measure of *guanxi*, our social network measures may express Western biases regarding network forms. *Guanxi* reflects a Chinese Confucian cultural background (Chai and Rhee, 2010). Therefore, our network measures may not capture some of the unique cultural features of *guanxi*. We also used the number of indirect ties as a proxy for structural holes, an approach taken from Podolny and Baron (1997). The uniqueness of the cultural and labor market setting we studied and the limitations of our data may limit the generalizability of our results beyond Chinese academia. Further work could be done to extend our findings of prominence of structural holes vs network closure to different market participants as well as other cultural, industrial or organizational settings. Finally, we focused on the time frame of 2000–2010. As noted above, top-tier academic departments in China have begun to adopt Western recruitment and advancement protocols, including a focus on qualifications and performance over seniority and connections. If this constitutes a trend, our findings will be further limited to the time frame under consideration. However, our findings may remain robust beyond this time frame, as the structure of a standard career may not undermine the importance of *guanxi*. Finally, our analysis assumes that the overall rate of repatriation does not affect the net chances of career mobility. While this assumption allowed us to focus exclusively on identifying optimal career trajectories, we understand that this assumption may compromise the generalizability of our findings over time.

The depth of our study is also limited by our data source. CVs are summaries of career trajectories, more highlight reel than comprehensive history. Because of this, we cannot tell much about particular scholars beyond certain key details. For example, we know little about the training international scholars receive or the networks to which they are exposed in their time abroad beyond degrees earned and papers published. Furthermore, we cannot know the degree to which education abroad was sponsored by domestic universities. Such arrangements would greatly facilitate earning positions when overseas scholars return, especially as such scholars would be able to take advantage of both structural holes and network closure. In this regard, we sacrificed depth for breadth to examine the career paths of academics in China.

Future research should examine stability and change across various networks structures in different marketized sectors of the economy. Our research leads us to suspect that the mechanisms of *guanxi* and trust will change over time as Chinese economic reforms advance and market dynamics take root and mature. With the marketization of American higher education, we suspect that Chinese universities will also be exposed to market reforms, which may change how *guanxi* networks operate in academia. Such networks may move from being explicit structures to more implicit structures. In other words, rather than providing explicit ties across actors, reformed *guanxi* networks may operate through reputation and endorsement. Such research would provide additional insight into the evolving relationship between networks and institutions (Powell et al., 2005) by showing how formal and informal social relations affect career mobility across cultural contexts. Future research should also focus on how social network effects on career are influenced by social categories other than where scholars earned their PhDs. For example, we anticipate that gender matters a great deal regarding access to workplace resources and career promotion opportunities (Maguire, 2002).

References

Aerlind, G.S., 2009. Postdoctoral research positions as preparation for an academic career. Int. J. Res. Dev. 1 (1), 84–96.

Baldi, Stephane, 1995. Prestige determinants of first academic job for new sociology PhD.s 1985–1992. Sociol. Q. 36 (4), 777–789.

Baruffaldi, S., Visentin, F., Conti, A., 2016. The productivity of science and engineering PhD students hired from supervisors' networks. Res. Policy 45 (4), 785–796.

Becher, Trowler, 2001. Academic Tribes and Territories: Intellectual Enquiry and the Culture of Disciplines, 2nd ed. Society for Research into Higher Education & Open University Press.

Bian, Y., 1997. Bringing strong ties back in: indirect ties, network bridges, and job searches in China. Am. Sociol. Rev. 62 (3), 366–385.

Bian, 2005. Guanxi. In: Beckert, J., Zafirovski, M. (Eds.), International Encyclopedia of Economic Sociology. Routledge, New York, 321–314.

Bozeman, Barry, Dietz, James, 2001. Scientific and technical human capital: an alternative model for research evaluation. Int. J. Technol. Manage. 22 (7-8), 716–740.

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

Burt, Ronald S., Hogarth, R.M., Michaud, C., 2000. The social capital of French and American managers. Organ. Sci. 11, 123–147.

Burt, R., 2001. Structural holes versus network closure as social capital. In: Lin, N., Cook, K., Burt, R.S. (Eds.), Social Capital: Theory and Research. Sociology and Economics: Controversy and Integration Series. Aldine de Gruyter, New York, pp. 31–56.

Burt Ronald, S., 2004. Structural holes and good ideas. Am. J. Sociol. 110 (2), 349–400.

Buskens, Vincent, van de Rijt, Arnout, 2008. Dynamics of networks if everyone strives for structural holes. Am. J. Sociol. 114 (2), 371–407.

Cañibano, C., Bozeman, B., 2009. Curriculum vitae method in science policy and research evaluation: the state-of-the-art. Res. Eval. 18 (2), 86–94.

Cao, C., Suttmeier, R.P., 2001. China's new scientific elite: distinguished young scientists, the research environment and hopes for Chinese science. China Q. 168, 960–984.

Cao, C., 2008. China's brain drain at the high end: why government policies have failed to attract first-rate academics to return. Asian Popul. Stud. 4, 331–345.

Cantwell, B., Lee, J., 2010. Unseen workers in the academic factory: perceptions of neoracism among international postdocs in the United States and the United Kingdom. Harvard Educ. Rev. 80 (4), 490–517.

Chai, Sun-Ki, Rhee, Mooweon, 2010. Confucian capitalism and the paradox of closure and structural holes in east asian firms. Manag. Organ. Rev. 6 (1), 5–29.

Chen, Y., Yan, F., Wen, D., 2008. The survey and analysis of educational backgrounds and career paths of faculty in high education institutions in Beijing. High Educ. Res. Eval. (in Chinese).

Coleman, J., 1988. Social capital in the creation of human capital. Am. J. Sociol. Suppl. 94, S95–120.

Crane, Diana, 1965. Scientists at major and minor universities: a study in productivity and recognition. Am. Sociol. Rev. 30, 699–714.

Cruz-Castro, Laura, Sanz-Menendez, 2010. Mobility versus job stability: assessing tenure and productivity outcomes. Res. Policy 39, 27–38.

Denning, P.J., 1997. A new social contract for research. Commun. ACM 40 (2), 132–134.

Edge, D., 1979. Quantitative measures of communication in science: a critical review. Hist. Sci. 17, 102–134.

Endersby, J.W., 1996. Collaborative research in the social sciences: multiple authorship and publication credit. Soc. Sci. Q. 77 (2), 375–376.

Erikson, Emily, 2013. Formalist and relationist theory in social network analysis. Sociol. Theory 31 (3), 219–242.

Granovetter Mark, Mark S., 1973. The strength of weak ties. Am. J. Sociol. 78 (6), 1360–1380.

Granovetter, M., 1985. Economic action and social structure: the problem of embeddedness. Am. J. Sociol. 91 (3), 481–510.

Flowerdew and Li, 2009. English or Chinese? The trade-off between local and international publication among Chinese academics in the humanities and social sciences. J. Second Lang. Writ. 18, 1–16.

Fox, Mary Frank, 2001. Women, science, and academia: graduate education and careers. Gender Soc. 15 (5), 654–666.

Gold, Thomas, Guthrie, Doug, Wank, David, 2002. An introduction to the study of guanxi. In: Gold, T., Guthrie, D., Wank, D. (Eds.), Social Connections in China: Institutions, Culture, and the Changing Nature of Guanxi. Cambridge University Press, New York, pp. 3–20.

Gordon, M.D., 1980. A critical reassessment of inferred relations between multiple authorship scientific collaboration, the production of papers and their acceptance for publications. Scientometrics 2, 193–201.

Grossman, J.W., 2002. The evolution of the mathematical research collaboration graph. Congressus Numerantium 158, 202–212.

Guthrie, D., 1998. The declining significance of guanxi in China's economic transition. China Q. 154, 254–282.

Horta, H., 2009. Holding a post-Doctoral position before becoming a faculty member: does it bring benefits for the scholarly enterprise? Higher Educ. 58 (5), 689–721.

Horta, H., 2013. Deepening our understanding of academic inbreeding effects on research information exchange and scientific output: new insights for academic based research. Higher Educ. 65 (4), 487–510.

Horta, H., Sato, M., Yonezawa, A., 2011. Academic inbreeding: exploring its characteristics and rationale in japanese universities using a qualitative perspective. Asia Pacific Educ. Rev. 12 (1), 35–44.

Horta, H., Veloso, Francisco M., Grediaga, R., 2010. Navel gazing: academic inbreeding and scientific productivity. Manage. Sci. 56 (3), 414–429.

Jin, B., Rousseau, R., Suttmeier, R.P., Cao, C., 2007. The role of ethnic ties in international collaboration: the overseas chinese phenomenon. In: In 11th International Conference of the International Society for Scientometrics and Informetrics, Madrid (Spain), 25-27 June 2007.
Katz, J.S., Martin, B.R., 1997. What is research collaboration? Res. Policy 26, 1–18.
Kipnis, A., 1997. Producing Guanxi, Sentiment, Self and Sub-culture in a North China Village. Duke University Press, Durham, NC.
Lai, Mahong, 2009. Challenges to the work life of academics: the experience of a Renowned university in the Chinese mainland. High Educ. Q.
Leung, K., Bond, M.H., 1984. The impact of cultural collectivism on reward allocation. J. Pers. Soc. Psychol. 47, 793–804.
Lin, E.S., Chiu, S.Y., 2016. Does holding a postdoctoral position bring benefits for advancing to academia? Res. High. Educ. 57 (3), 335–362.
Long Scott, J., 1978. Productivity and academic position in the scientific career. Am. Sociol. Rev. 6, 889–908.
Long, J. Scott, 1990. The origins of sex differences in science. Soc. Forces 68, 1297–1315.
Long, J. Scott, Allison, Paul D., McGinnis, Robert, 1979. Entrance into the academic career. Am. Sociol. Rev. 44, 816–830.
Long, J.S., Fox, Mary Frank, 1995. Scientific careers: universalism and particularism. Annu. Rev. Sociol. 21, 45–71.
Luo, Y., 1997. Guanxi: principles, philosophies, and implications. Hum. Syst. Manage. 16 (1), 43–51.
Luo, Yadong, Huang, Ying, Wang, Stephanie L., 2011. Guanxi and organizational performance: a meta-analysis. Manage. Organ. Rev. 8 (1), 139–172.
Luukkonen, Terttu, Olle, Persson, Sivertsen, Gunnar, 1992. Understanding patterns of international scientific collaboration. Sci. Technol. Human Values 17 (1), 101–126.
Ma, L.T., 2000. Suggestions to Establish a Healthy System of Faculty Career Ladders, Retrieved October 12, 2004 from http://202.121.15.143:81/document/2000-A/jy001003.htm (in Chinese).
Ma, Y., Pan, S., 2015. Chinese returnees from overseas study: an uunderstanding of brain gain and brain circulation in the age of globalization. Front. Educ. China 10 (2), 306–329.
Maguire, G.M., 2002. Gender, race, and the shadow structure: a study of informal networks and inequality in a work organization. Gender Soc. 16 (3), 303–322.
Moody, J., White, D.R., 2003. Structural cohesion and embeddedness: a hierarchical concept of social groups. Am. Sociol. Rev. 68 (1), 103–127.
Moed, H.F., 2002. Measuring China's research performance using the science citation index. Scientometrics 53 (3), 281–296.
Narin, F., Stevens, K., Whitlow, E.S., 1991. Scientific co-operation in Europe and the citation of multinationally authored papers. Scientometrics 21 (323).
Nee, V., Opper, Sonja, 2010. Political capital in a market economy. Soc. Forces 88 (5), 2105–2132.
Newman, M.E.J., 2004. Who is the best connected scientist? a study of scientific coauthorship networks. In: Ben-Naim, E., Frauenfelder, H., Toroczkai, Z. (Eds.), Complex Networks. Springer, Berlin, pp. 337–370.
Pachuki, Mark A., Breiger, Ronald L., 2010. Cultural holes: beyond relationality in social networks and culture. Annu. Rev. Sociol. 36, 205–224.
Park, Chan-ung, 2007. Gender in academic career tracks: the case of korean biochemists. Sociol. Forum 22 (4), 452–473.
Park, S., Luo, Y., 2001. Guanxi and organizational dynamics: organizational networking in Chinese firm. Strateg. Manage. J. 22, 455–477.
Peking University, 2003. The Plan of Improving Faculty Recruitment and Promotion System at the Peking University (Unpublished Manuscript), Retrieved October 12, 2004 from http://www.china.org.cn/chinese/zhuanti/bdgg/379463.htm (in Chinese).
Peng, M., Luo, Y., 2000. Managerial ties and firm performance in a transition economy: the nature of a micro-macro link. Acad. Manage. J. 43 (3), 486–501.
Pfeffer, J., 1983. Organizational demography. In: Cummings, L.L., Straw, L.L. (Eds.), Research in Organizational Behavior, 5. JAI Press, Greenwich CT, pp. 299–357.
Podolny, Joel M., Baron, J.N., 1997. Resources and relationships: social networks and mobility in the workplace. Am. Sociol. Rev. 62, 673–693.
Powell, W.W., White, D.R., Koput, K.W., Owen-Smith, J., 2005. Network dynamics and field evolution: the growth of interorganizational collaboration in the life sciences. Am. J. Sociol. 110 (4), 1132–1205.
Recotillet, I., 2007. PhD graduates with post-Doctoral qualification in the private sector: does it pay off? Labour 21 (3), 473–502.
Reskin Barbara, B.F., 1977. Scientific productivity and the reward structure of science. Am. Sociol. Rev. 42, 491–504.
Roebken, H., 2007. Departmental networks: an empirical analysis of career patterns among junior faculty in Germany. Higher Educ. 54 (1), 99–113.
Soler, M., 2001. How inbreeding affects productivity in Europe. Nature 411, 132 (.).
Stokes, T.D., Hartley, J.A., 1989. Coauthorship, social structure and influence within specialties. Soc. Stud. Sci. 19, 101–125.
Suttmeier, R.P., Cao, C., 2004. China's technical community: market reform and the changing policy cultures of science. In: Gu, E., Goldman, M. (Eds.), Chinese Intellectuals Between Market and State. Routledge, New York, pp. 138–157.
Tang, Li, Shapira, P., 2011. China-US scientific collaboration in nanotechnology: patterns and dynamics. Scientometrics 88 (1), 1–16.
Tien, F.F., 2007. Faculty research behaviour and career incentives: the case of Taiwan. Int. J. Educ. Dev. 27 (1), 4–17.
Van der Weijden, I., Teelken, C., de Boer, M., Drost, M., 2016. Career satisfaction of postdoctoral researchers in relation to their expectations for the future. High. Educ. 72 (1), 25–40.
Wagner, C.S., Leydesdorff, L., 2005. Network structure, self-organization, and the growth of international collaboration in science. Res. Policy 34 (10), 1608–1618.
Wahba, J., Zenou, Y., 2012. Out of sight, out of mind: migration, entrepreneurship and social capital. Reg. Sci. Urban Econ. 42, 890–903.
Walder, Andrew G., 1986. Communist Neo-Traditionalism: Work and Authority in Chinese Industry. University of California Press, Berkeley, CA.
Walder, Andrew G., 1995. Career mobility and the communist political order. Am. Sociol. Rev. 60, 309–328.
Wang, S., 2013. Affects and differences of administrative position between Chinese and foreign outstanding scientists. Sci. Technol. Prog. Policy 30 (6) (In Chinese).
Wang, Q., Tang, L., Li, H., 2014. Return migration of the highly skilled in higher education institutions: a chinese university case. Popul. Space Place, http://dx.doi.org/10.1002/psp.1855.
Wank, D., 1999. Commodifying Communism: Business, Trust, and Politics in a Chinese City. Cambridge University Press, New York.
Watanabe, S., 1987. Job-searching: a comparative study of male employment relations in the United States and Japan. In: Ph.d. Diss. University of California at Los Angeles.
Watanabe, S., 1994. Strength of ties and job-searching in Japan. In: Working Paper. Department of Sociology, Sophia University, Japan.
Wattanavitukul, P., 2002. Hai Gui: the Sea Turtles Come Marching Home. P.W., Shanghai.
Welch, A.R., Zhen, Z., 2008. Higher education and global talent flows: brain drain, overseas chinese intellectuals, and diasporic knowledge networks. High. Educ. Policy 21 (4), 519–537.
Wiersema, Margarethe, Bowen, Harry P., 2009. The use of limited dependent variable techniques in strategy research. Strateg. Manage. J. 30, 679–692.
Wong, S.-L., 1985. The chinese family firm: a model. Br. J. Sociol. 36 (1), 58–72 (.).
Woodruff, C., Zenteno, R., 2007. Migration networks and microenterprises in Mexico. J. Dev. Econ. 82, 509–528.
Xiao, Zhixing, Tsui, Anne S., 2007. When brokers may not work: the cultural contingency of social capital in chinese high-Tech firms. Adm. Sci. Q. 52 (1), 1–31.
Xin, K., Peace, J., 1996. Guanxi: connections as substitutes for formal institutional support. Acad. Manage. J. 39, 1641–1658.
Xu, F., Wang, S., 2010. The effect of administrative position of topping scientists: on innovation of science research Nobel laureates in comparison with academicians of CAS as an example. Stud. Sci. Sci. 28 (7), 981–985 (in Chinese).
Yan, F., 2010. The academic profession in China in the context of social transition: an institutional perspective. Eur. Rev. 18, S99–116.
Yan, G., Yue, Y., Niu, M., 2015. An empirical study of faculty mobility in China. High. Educ. 69, 527–546.
Ynalvez, M.A., Shrum, W., 2006. International training and the digital divide: computer and email use in the Philippines? Perspect. Glob. Dev. Technol. 5 (4), 277–302.
Ynalvez, M.A., Shrum, W., 2008. International graduate training, digital inequality and professional network structure: an ego-centric social network analysis of knowledge producers at the 'global south'. Scientometrics 76 (2), 343–368.
Ynalvez, M.A., Shrum, W., 2009. International graduate science training and scientific collaboration. Int. Sociol. 24 (6), 870–901.
Ynalvez, M.A., Shrum, W., 2011. Professional networks, scientific collaboration, and publication productivity in resource-constrained research institutions in a developing country. Res. Policy 40, 204–216.
Yen, D.A., Barnes, B.R., Wang, C.L., 2011. The measurement of *guanxi*: introducing the GRX scale. Ind. Market. Manage. 40, 97–108.
Yeung, I.Y.M., Tung, R.L., 1996. Achieving business success in Confucian societies: the importance of guanxi (connections). Organ. Dyn. 25 (2), 54–65.
Yudkevich, M., 2014. The russian university: recovery and rehabilitation. Stud. High. Educ. 39 (8), 1463–1474.
Zelner, B.A., 2009. Using simulation to interpret results from logit, probit, and other nonlinear models. Strateg. Manage. J. 30, 1335–1348.
Zweig, D., Chen, C., Rosen, S., 2004. Globalization and transnational human capital: overseas returnees scholars to China. China Q. 179, 735–757.
Zweig, D., Wang, H., 2013. Can china bring back the best? the communist party organizes China's search for talent. China Q. 215, 590–615.