Networks of Power: Using Social Network Analysis to understand who will rule and who is really in charge in the Chinese Communist Party

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Draft, November 2015

Abstract

Patronage networks are said to grant access to a regime's inner circle, but researchers have only systematically studied ties to powerful leaders. This paper examines the whole informal network among the Chinese Communist elite, the Central Committee members 1982-2012, by noting who has been promoted under whom in the past. Ties to patrons indeed double the chances of becoming a Politburo member, but links to former subordinates also have positive effects. Popularity as coalition partner along network ties (closeness centrality) can predict Politburo appointments up to 10 years ahead even when the identity of the patrons is not known. The patrons themselves can be identified by their betweenness central network position, which allows them to suppress coups within their faction. The paper demonstrates the use of social network analysis as a new theoretical and empirical approach to study political patronage and other informal institutions in a more rigorous and nuanced way.[1]

[1] I especially would like to thank Liu Mingxing for generously sharing data on the members of the 17th Central Committee and his insights into the data base in general, and Ma Xiao and Lu Fengming, as well as Victor Shih, for sharing data on the 17th and 18th Central Committee. Many thanks to Jenn Larson, Adam Przeworski, Joshua Tucker, Arturas Rozenas, Pablo Querubin, Victor Shih, Nils Weidmann, Armando Razo, Jérôme Doyon, Milan Svolik, Josef Woldense, Brett Carter, Tim Hazen, Kerry Brown, Dimitris Christopoulos, Xiaojun Yan, Christine Scheidegger, Jean Hong, Adam Harris, Pablo Barberá, Shana Warren, Alan Potter, and all the members of the NYU Dissertation Seminar for valuable comments and feedback. Errors remain my own. This research would not have been possible without the support of NYU's Global Research Initiative and the Center on US-China Relations.

1 Introduction

Why do some elites become part of a regime's inner circle? And why do some of them stay on, while others fall victim to coups or purges? The elites themselves are not the only ones who care about this question: leaders and their entourage determine a country's domestic and foreign policy (Jones and Olken, 2004), and the rise of new contenders threatens the stability of regimes without the conflict resolution mechanisms of established democracies (Przeworski, 2011).

Informal institutions and connections are clearly part of the answer. But they are difficult to identify, conceptualize, and measure in a manner that would allow comparisons across countries and different time periods. Quantitative studies have so far only examined the benefits of having direct connections to important leaders, so-called "patrons" (Shih et al., 2012; Willerton, 1992), but have ignored indirect connections or relationships between "clients". I demonstrate theoretically and empirically that these other ties matter as well - for instance for appointments to the Chinese Communist Party's inner circle, the Politburo, between 1982 and 2012.

I unveil these informal networks by parsing the CVs of all Central Committee members for instances when one had been promoted under the other. Unlike connections derived from insider information, these "promotion ties" are available and replicable for all individuals, because the biographical information is public. Promotion ties to patrons (current and former Politburo Standing Committee members) do indeed increase the chances of entering the party's inner circle. But so do ties to former subordinates, indicating that successful candidates also need to establish a broader power base among their peers. Ties to former superiors who are not patrons themselves, however, have at best no effect.

By examining all possible ties, I can construct the whole elite network and locate individuals within it. This allows me to identify future members of the inner circle and current patrons when insider sources disagree over the identity and power of specific patrons. *Closeness centrality*, for instance, predicts ascension to the Politburo up to 10 years ahead. It captures a candidate's popularity among peers and leaders, as I show in an illustration of a network theory of coalition formation. *Betweenness centrality*,

on the other hand, reflects a leader's ability to maintain control over their coalition, and therefore marks patrons. Social network analysis (SNA) thus helps understand the origins of a patron's power.

These findings are robust to the inclusion of possible confounders and persist in a variety of specifications. They are often highly significant, unlike those on most of the formal criteria or individual characteristics.

This paper introduces SNA theories, measures and methods to the increasingly popular research on authoritarian regimes. It illustrates how SNA can capture and formalize power configurations mentioned in qualitative research on leaders and their entourage, and how the historian's nuanced view can be combined with a statistical analysis of several hundred elites. But the findings speak to leadership selection more generally as well. Coworker and promotion ties likely also play an important role in democratic bureaucracies, party nominations, or even private companies.

The next section reviews the relevant literature. In the theory section 3, I link centrality measures from social network analysis (Wasserman and Faust, 1994) to the concepts of winning coalition formation from the research of authoritarian regimes (Bueno de Mesquita et al., 2003) to explain why some network positions benefit future and current leaders of a country. After a brief introduction to the Chinese political system (section 4), I discuss the "promotion network" in section 5. Section 6 presents the main results summarized above, and section 7 concludes.

2 Informal Networks and Authoritarian Regimes

Research on authoritarian regimes following Geddes (1999)'s foundational article has examined regime stability extensively (Art, 2012), often operationalized as the survival of the leader (Bueno de Mesquita et al., 2003; Svolik, 2012). But only a few articles, such as Arriola (2009) and Francois et al. (2014), examine the fate of the other members of the inner circle. Comparativists have also mainly focused on formal institutions, such as elections (Schedler, 2006), parties (Magaloni and Kricheli, 2010), or assemblies and parliaments (Gandhi, 2008). But country experts continue to emphasize informal politics, which is much harder to measure or conceptualize in cross-country comparisons. Unlike

formal institutions, the rules of informal politics are never explicitly described or even mentioned in official documents. On the contrary, the existence and influence of factions or personal connections are usually denied even when their effect is plainly visible. In this section, I propose that social network analysis (SNA) allows us to measure some of these elusive phenomena, and review the relevant literature.

Recently, Razo (2014) has suggested a social network approach to informal institutions and norms, arguing that they often have a relational component.[2] Helmke and Levitsky (2004)'s examples in their seminal article on informal institutions illustrate that point: clan membership is determined by a (potentially fictive) kinship relation to other members. Retiring Japanese state bureaucrats are awarded top positions in private corporations ("Amakudari") based on their connections to their former work unit. And Mexico's "dedazo" - the president appointing his successor - results in an outcome typical for informal rules, highly dependent on the identity of the implementer and his relations with the candidates.

Elite relationships are therefore the foundation of much of what we consider to be informal political institutions. Their informal network produces organizations, rules, and procedures that "structure social interaction by constraining and enabling actors' behavior" (Helmke and Levitsky, 2004, p. 727), such as patronage, factions, or nepotism. This is particularly true in authoritarian regimes, which often have weak rule of law. In the absence of strong formal institutions, the actions and influence of office holders depend mainly on two factors: their personal characteristics and power, and their relationship with other actors.

I thus propose to complement the current research of authoritarian institutions with a combination of two well-established methods: elite studies, with their focus on the characteristics of the elites who occupy official positions and implement the formal rules; and social network analysis, a method to analyze interpersonal relationships. In this combination, the social network acts as conceptual bridge between the individual elite and the societal level on which institutions are usually located. While ties emerge as the result

[2]This is not true for all informal institutions. Office selling, for instance, is only relational to the degree that the price or access to this market is determined by the relationship between buyer and seller. On the other hand, formal institutions can be networks. Examples are official communication channels, chains of command, or rights of appointment. The term "informal network" is thus not tautological.

of an individual's actions (e.g. marriages) or characteristics (e.g. shared geographical origin), the overall network and its specific shape is a society-level attribute (Emirbayer, 1997). For example, elites can form individual patronage ties, in the process likely reinforcing the institution, but cannot change the overall shape of the network or abolish it on their own. Like other informal institutions, these patronage networks can undermine or buttress existing formal institutions (Helmke and Levitsky, 2004). Patrons can use their informal ties to strengthen the organization they head, or to sabotage the official leader. Informal connections can reinforce official chains of command and communication if they coincide, or render them obsolete if they don't.

But even though observers of authoritarian regimes often use the term "network", they almost never employ social network analysis (SNA). Sociologists have studied the influence of political elites using SNA, but mainly in contemporary Europe and the US (see chapter 6 of Knoke (1994) for an overview). Only two recent studies explicitly integrate SNA with the study of authoritarian regimes: Razo (2008)'s book on the role of dense enterprise-bureaucracy networks in the emergence of property rights in turn-of-century Mexico, and Perez-Oviedo (2015)'s game theoretic model on coordinating revolutions. In the Chinese context, Opper et al. (2015) incorporate concepts such as homophily, but do not move beyond the factional literature quoted below in their theory or empirical findings.[3] Even the patronage literature makes at best passing references to SNA concepts (Scott, 1972; Nathan, 1973; Nathan and Tsai, 1995), despite SNA's otherwise steady inroads into political science.

As a result, both qualitative and quantitative analyses on patronage and appointments have examined only direct ties to the highest leaders (Shih et al., 2012; Willerton, 1992; Fisman, 2001). Those studies all find that elites with such factional affiliation are more likely to advance in the party hierarchy, irrespective of what the exact group of Chinese Communist Party (CCP) members and the definition of patron is(Shih et al., 2012; Zhang, 2009; Jia et al., 2015; Choi, 2012). This research is usually framed as a question of performance vs. patronage, in other words, the importance of formal vs. informal criteria for promotion (Bo, 2002; Li and Zhou, 2005; Chen et al., 2005).

[3]In addition, two recent unpublished PhD or Master theses (Sibayan, 2013; Gregory, 2013) use SNA on Chinese political elites to study policy outcomes.

While I do address this issue in section 6.1, I focus on refining our understanding of patronage networks as a whole in this article. The simple distinction between elites with and without connections found especially in quantitative research fails to capture the nuanced qualitative accounts of elite relationships in authoritarian regimes. They describe, for instance, individuals associated with more than one faction, or belonging to the core or the periphery of a group, which in turn can be more densely or loosely connected (Bo, 2007).

We have good reasons to believe that this complexity is relevant for the question at hand: Willerton (1992) notes in passing that Soviet officials with several patrons are more likely to survive purges. The two most recent Chinese presidents, Hu Jintao and Xi Jinping, are both reputed to have worked hard on establishing good relationships with different leaders (Nathan and Gilley, 2003, page 80ff, 137ff). Soviet and China experts talk about "power bases", support networks (Brown, 2014), or interest groups associated with Politburo candidates, implying that they require connections to a broader set of individuals. Mapping the complete network between the relevant elites helps explore this phenomenon.

In addition, this approach also moves beyond the simple aggregate observation that patrons promote clients. Instead we observe an informal institution that reproduces itself, a network in which patrons are connected to clients, who in turn act as patrons to other clients on a lower level, or at a later point once their patron has helped them ascend to the inner circle.

3 Coalition formation along network ties

This section combines a common theory of coalition formation in authoritarian regimes with concepts from social network analysis. I take the basic assumptions about individual elite behavior from the literature discussed above, and show their consequences on the aggregate network level. To provide the reader with an intuition for how certain network positions matter, I use a simplified model network with twelve individuals.[4]

The top of figure 1 reflects the CCP's official account on how Politburo members are

[4]For an alternative, more rigorous approach using an agent-based model of coalition formation along network ties, see Keller (2014).

selected. Individuals become part of the inner circle because of their personal characteristics, such as their accumulated experience, their educational background, their age, or their performance in previous positions (Qiao, 2013a,b; Zhou, 2007). In other words, they are selected through a fundamentally apolitical process according to objective criteria reflecting the interests of the party or the population. Relationships do not play any role.

Unsurprisingly, many outside observers, even within China (Xu, 2001; Zuo, 2001), disagree. Instead, they see a political struggle between powerful leaders, so-called patrons, trying to appoint their confidants. This is also how most researchers depict authoritarian politics nowadays. Bueno de Mesquita et al. (2003) have popularized the idea that aspiring dictators need to win a game of coalition formation among the selectorate, the individuals able to influence the selection of the leader. The subset of the selectorate which prevails in that struggle is called the winning coalition. Once in power, the dictator relies on the cooperation of his or her winning coalition members to implement policies and defeat competitors, and rewards them with private benefits for doing so.

This "selectorate theory" does not deal with the pressing question of who the winners will be, however. It discusses only the size of the winning coalition, and treats all selectorate members as identical and thus exchangeable. But in real life, affinity or connections to a leader are not just theoretical tie-breakers, they often confer a distinct advantage. Building on the patronage literature, I thus propose that the selectorate has a social structure in the form of a patronage network. Coalitions are more likely to form along network ties.[5] As a result, an individual's network position changes their chance of being a successful leader or a member of the winning coalition.

This modification of the selectorate theory seems particularly appropriate to authoritarian regimes, where the opposition are often coup conspirators or revolutionaries facing a strong surveillance regime. They will include in their coalition only individuals they know and trust personally, or for whom someone they know or trust can vouch. For authoritarian incumbents, informal ties may at first seem less important. But their winning coalitions are built on the exchange of private goods in return for loyalty, without an external enforcer to this contract. To make matters worse, the private goods are often

[5] In SNA terms: the coalition is a connected subgraph.

valuable resources or influential positions, which the coalition members could use to usurp power for themselves. Informal ties may facilitate these exchanges and the swift discovery of defectors. Finally, picking coalition members often also means selecting potential successors. And these have to be vetted carefully, if the retiring leaders want to enjoy their old age, as the trial of former Politburo Standing Committee member Zhou Yongkang has made clear. Personal connections may help alleviate this fear of selecting the wrong candidate, and therefore influence coalition formation in such a low-trust environment.

This is not to say that these are ties of unconditional trust, and that the two individuals would never betray each other or will always find themselves on the same side of an internal struggle. As I argue in a forthcoming article ((Keller, ming)) has argued, the network is just a social structure that enables or restricts their alliance formation. How or if elites use a tie to form alliances depends also on strategic considerations and external circumstances.

The middle of figure 1 illustrates the standard approach proposed by observers of authoritarian regimes, the patronage model. The observers then use insider information to identify the powerful leaders (P1 and P2) and individuals connected to them. These faction members (in blue and yellow) are thought to have a higher chance of entering the inner circle. The basic hypothesis of the alternative null model is therefore:

H1: Individuals connected to patrons are more likely to be appointed to the inner circle.

Several studies have found evidence in favor of this model (Shih et al., 2012; Zhang, 2009; Choi, 2012; Jia et al., 2015). But their findings raise additional questions: where does the power of the patrons stem from, especially if they do not hold any official position? And how to reliably identify the patrons in the first place? Also, the model seems rather simplistic compared to the historian's narratives of complex relationships involving multiple actors in the entourage of Mao Zedong or Stalin.

The network model therefore examines the relationships between all possible elite dyads. The bottom of figure 1 displays one possible network that could emerge from such an examination. The original clients (C1-6) hold quite distinct positions. C3 and

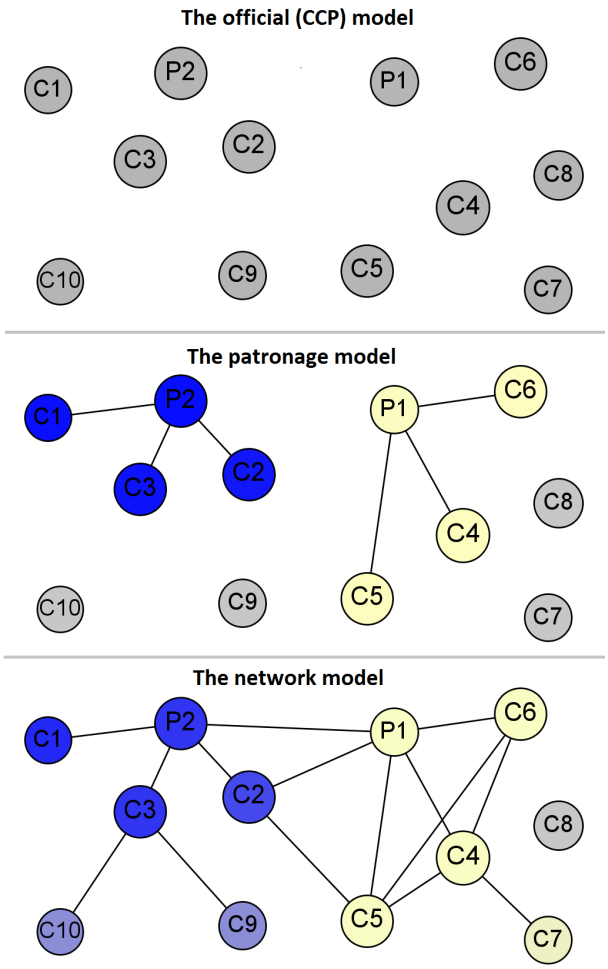

Figure 1: Different models of appointment to the Politburo.

Top: relationships do not play a role. **Middle**: clients (in blue and yellow) benefit from their ties to patrons. **Bottom**: the candidate's chances depend on their ties to patrons and other elites.

C4 have ties to previously unconnected actors (C7, C9, C10). C4-6 are connected among each other, unlike most of P2's clients. And upon closer inspection, C2 appears to have ties to the other patron P1 as well.

These positions can have a variety of consequences: P2 may be able to play his clients against each other, while P1's clients could use their mutual ties to counteract such a maneuver. C3 and C4 allow their respective patrons to expand their coalitions (in light blue and yellow), which may give them additional bargaining power. C2, finally, may threaten to defect to the other patron's coalition.

A client's number of connections, called *degree centrality* in social network analysis, can thus be interpreted as their "power base" or wider support among their peers.[6] Such well-connected clients may be rewarded with appointments to the Politburo, because they help their patrons expand their coalitions.

H2: Individuals with more connections to other elites (i.e. with a higher degree), are more likely to be appointed to the inner circle.

It is conceivable that connections have negative effects as well. Patrons may, for instance, prefer to appoint clients that do not have obligations to other powerful individuals.

So far, the model has assumed that the identity of the patrons is known. In reality, the different actors' ability to influence appointments is often hotly contested. Figure 2 illustrates how one can identify future Politburo members without prior knowledge about the patrons: by evaluating popularity as a coalition partner if alliances are formed along network ties.

Figure 2 illustrates the coalitions three different actors would prefer to form. The model assumes that elites prefer coalition partners closer along network ties to those farther away. P2 would thus likely include the individuals directly connected to him, P1 and C1-3. If he needs a majority coalition of six, he could ask either of them to recruit C4-6, C9, or C10. P1's choice would be P2, C2, and C4-6. C3, finally, is directly

[6] Mathematically, the degree centrality of a node p_k is defined as $C_D(p_k) = \sum_{i=1}^{n} a(p_i, p_k)$ where n is the number of nodes and $a(p_i, p_k) = 1$ if and only if p_i and p_k are connected, 0 otherwise (Freeman, 1979).

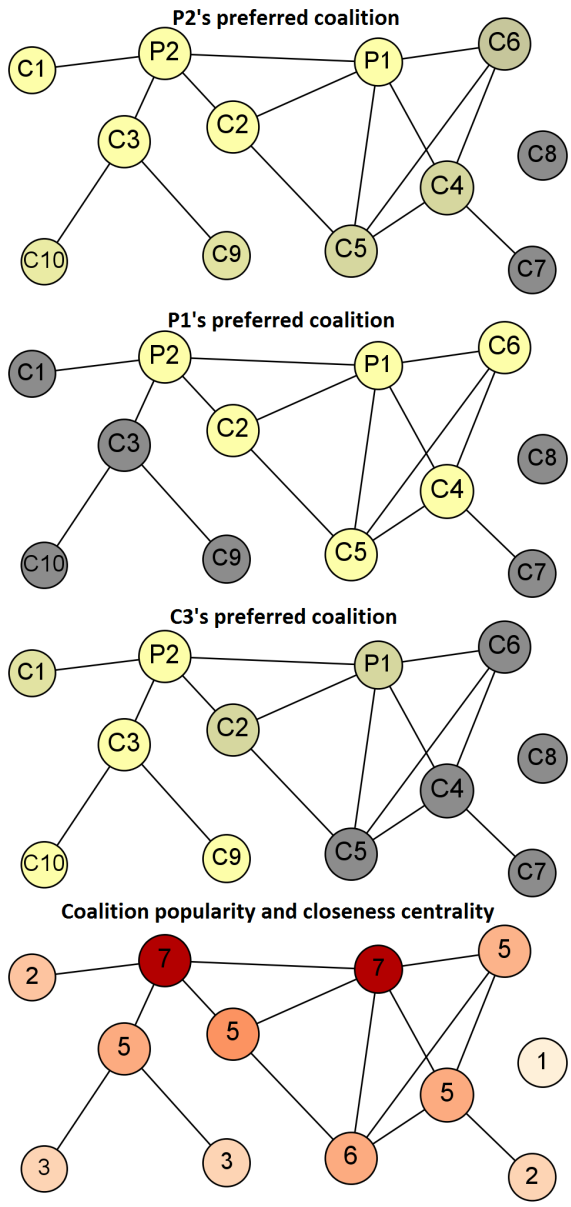

Figure 2: Model of coalition formation when the identity of patrons is unknown

Top three: preferred coalitions of P2, P1, and C3. **Bottom**: number of preferred coalition each individual is part of and relation to closeness centrality (more central individuals have a darker shade of red).

connected only to C10, C9, and P2, and might have to ask P1 to recruit C1, C2 or P2 to assemble a coalition of sufficient size. If we form each actor's preferred majority coalition and count how often each individual is among those who will have to be included, one reaches the tally in the bottom figure. P1 and P2 are the preferred partner of six other actors, and therefore the popular coalition partners. The color indicates that they also score high on a particular network measure, *closeness centrality*. It measures how closely an actor is connected to everyone else in the network.[7]

The correlation between this measure and popularity as coalition partner holds in networks of different size and shape (Keller, 2014). Thus even if we do not know the identity of the leaders forming coalitions, we can still tell who is likely popular with many of them:

H3: The higher an individual's closeness centrality, the higher the chances of being appointed to the inner circle.

A similar logic also makes closeness central individuals good leaders: they are more popular with their peers than possible competitors and therefore able to assemble larger supporting coalitions. But leaders also have to remain in charge of their coalition, avoid palace coups or being quietly sidelined. Unfortunately for them, many closeness central individuals are themselves surrounded by very popular individuals - see, for example, P1. In other words, their preferred coalition partners are also powerful competitors. P2 may thus be in a better leadership position than P1, despite his smaller number of direct connections. C1 is relatively weak, and so are potential additional coalition partners C9 and C10. C3, finally, cannot form any coalition larger than three without including P2, making her quite dependent on P2. P1's coalition partners, on the other hand, have the option of substituting him with C7, C1, or C3, and still form a connected coalition. Being indispensable to other elites in this way is captured well in another network measure, *betweenness centrality* (Keller, 2014).

Betweenness centrality is calculated by examining all possible pairs of individuals, de-

[7]Closeness or information centrality is technically defined as the inverse of the sum of distances to all other individuals on the closest possible path.The closeness centrality of node p_k is defined as: $C_c(p_k)^{-1} = \sum_{i=1}^{n} d(p_i, p_k)$, where $d(p_i, p_k)$ is the number of ties on the shortest path linking p_i to p_k (Freeman, 1979).

termining the shortest connecting path between them, and counting on how many such shortest paths each actor sits.[8] Betweenness central leaders are therefore positioned between their internal competitors and other coalition members that could join the coup. The power of such positions has been shown in other social settings (Padgett and Ansell, 1993), and allows individuals to manipulate or withhold information, or extract a brokerage premium (Burt, 1995). Betweenness centrality can also be interpreted as a leader's ability to play different parts of the network against each other, a strategy associated with successful authoritarian leaders. P2 might thus represent Mao Zedong in Huang (2006)'s account of how the chairman used purges to remain the only figure with strong connections both within the party and to different military factions. Betweenness centrality can therefore explain and measure a patron's informal power. Hypothesis 4 is thus:

H4: The higher an individual's betweenness centrality, the more likely that he or she is a patron.

This model is obviously a highly abstract conceptualization of informal politics. But the illustrations above have hopefully helped to show how network concepts can be linked to real-life elite constellations occurring, for instance, in the Chinese Communist Party's Central Committee, the selectorate examined in the remaining sections.

4 The Chinese Communist Party and its Central Committee

I start my examination with the CCP's 12th Central Committee, the first in a period of increasing stability and institutionalization after the tumultuous Cultural Revolution. Before 1982, selection into leadership positions likely followed a different, more violent, model and involved not just the party elite, but also the "Red Guards" and other forces not necessarily represented in the Central Committee (CC). Experts largely agree that the relevant political elites after 1982 is contained in the current and former CC members,

[8] Betweenness centrality of a node p_k is defined as $C_B(p_k) = \sum_{i}^{n}\sum_{<j}^{n} \frac{g_{ij}(p_k)}{g_{ij}}$, where g_{ij} is the number of shortest paths linking two other nodes p_i and p_j, and $g_{ij}(p_k)$ is the number of such paths containing p_k(Freeman, 1979).

who appoint the Politburo and its Standing Committee (Shih et al., 2012).

The CCP's Central Committee, officially the highest authority in the party, is elected every five years by the National Congress, which by now consists of up to 2200 representative party members. There are about 10-15% more candidates than CC seats, but both the delegates and the candidates go through a complicated vetting process steered from above. Turnover is nevertheless high, with only about a third of the CC members re-elected after five years (Li, 2012c). Once elected, the CC meets about seven times for plenary sessions. Its members simultaneously hold top positions in the party or the government. Reshuffling of positions shortly before or after the CC election is therefore not uncommon.

The Central Committee appoints the 20-25 members of the Politburo from among its midst during its first session, usually held in fall. The 4-9 Politburo Standing Committee (PSC) members are a particularly influential subset of the Politburo, and hold the highest formal positions. The public receives information about the proceedings and decisions of the National Party Congress and the Central Committee, but "with the exception of the Xinhua reporting on Politburo meetings in the 1987-88 period, PRC media since 1949 have been virtually silent about the schedule of the Politburo and its Standing Committee" (Miller, 2004, 3). The Politburo meets about every month, the PSC possibly every week. It allegedly decides by near consensus instead of majority vote, with the General Secretary having more influence due to his agenda-setting capacity (Miller, 2004).

5 Measuring the informal network

5.1 Creating the network based on promotions

Patronage relations are rarely public knowledge - so how to measure them? As possible basis for the formation of alliance ties, scholars have suggested common provincial origin, familial ties, shared ethnicity or past experience, as well as common workplace (Guo, 2001). In this study, I build on my previous research (Keller, ming), where I have found that coworker experience sealed with a promotion is one of the most precise measures. China watchers also regularly use shared work experience to infer factional ties, or argue that specific clients were promoted by certain leaders (Li, 2002; Opper and Brehm, 2007;

Pye, 1995).

I use an updated, expanded, and corrected biographical data set of all Central Committee members, building on Shih et al. (2012), combined with information from Lu and Ma (2014), and Meyer et al. (2015). I examine all possible pairings of the 1183 CC members between 1982 and 2012 to determine if (a) they have served in the same bureaucratic unit at the same time, and if (b) the lower-ranking individual was promoted within the same unit during that period. If this is the case, I assume that a directed link from the lower to the higher-ranking individual was formed at latest at the time when the promotion occurred. Higher-ranking cadres, in particular the party secretaries, can influence the promotion procedure in a variety of ways (Gong, 2008; Sun, 2008). Thus they likely did at least not oppose the particular promotion, and will probably be remembered positively by those promoted. I do not claim that these promotions involved corrupt practices. On the contrary, they may well be due to the subordinate's performance and ability: high-level cadres are tasked with talent-spotting, and can do that either for the greater good of the party, or to gain a capable supporter.

I discuss the details and validity of this approach to measuring patronage networks in the online appendix (sections A.1 and A.2). There, I show that the promotion network displays the expected characteristics. Individuals are more likely to be connected if they are from the same province or the same universities, or share similar experiences during the civil war (table 3). The same is true for members of factions as identified by experts (table 4). I also show that hailing from the same province or having attended the same university or college as a patron by itself does not improve one's chances of being appointed to the Politburo (table 5). Still, sceptics may worry that some individuals could have been promoted without any help of the superior they are tied to in the network. There are probably also dyads that share a longstanding connection formed outside workplace. And there may be alliance ties of convenience, formed for tactical reasons among the Central Committee members. To confirm that missing or mismeasured ties do not create bias, I show that the results hold even if up to 10% of the connections were included or left out by mistake (see figures 14 and 15 in the online appendix). Note, however, that CVs actually capture a large part of the environment in which these cadres could form informal ties. Unlike the elites of many other countries, they indeed spend most of their

lives with each other in the government and party institutions documented in their CVs.

5.2 Summary statistics

The result of the process is a network for each Central Committee, containing the relevant political elites, that is the CC members as well as all former PSC members - high-ranking party members often remain important actors even after retirement. The results are robust to contracting or expanding this definition, however (see tables 8, 10, and 9 in the online appendix).

The size of the seven networks vary between 293 (13th CC) and 395 (18th CC) nodes (individuals), with between 500 and 1117 ties. CC members do get promoted in their regular jobs, creating new promotion ties, and a handful of individuals pass away or get purged from the party, but the largest changes in the network are due to the turnover of up to 60%. I therefore measure the network only at the beginning of a every five-year term.

Figure 3 shows the network of the 17th Central Committee. The layout algorithm employed (Force Atlas as implemented in the open-source software gephi) places individuals connected to each other closer together than those not sharing a connection. The absolute position of the individuals does not have any specific meaning. The color spectrum indicates official position held five years later, in 2012. White denotes members that will not be part of the CC anymore, usually because they have reached retirement age, while grey indicates current and future retired PSC members. The size of the nodes is proportional to betweenness centrality, the measure for a strategic position with surrounding weaker or dependent actors.

The shape of the network is fairly typical for the period examined: there is one large component that connects the vast majority of CC members, a considerable number of disconnected individuals (isolates) and at best a few smaller components. The large component is made up of the civilian cadres (to the left) and a smaller, densely connected cluster of military cadres (to the right), with the General Secretary located in between. These two clusters are less distinct in earlier networks, as figures 9, 10, and 11 in the online appendix show.

Future members of the inner circle are all located on the main component and tend

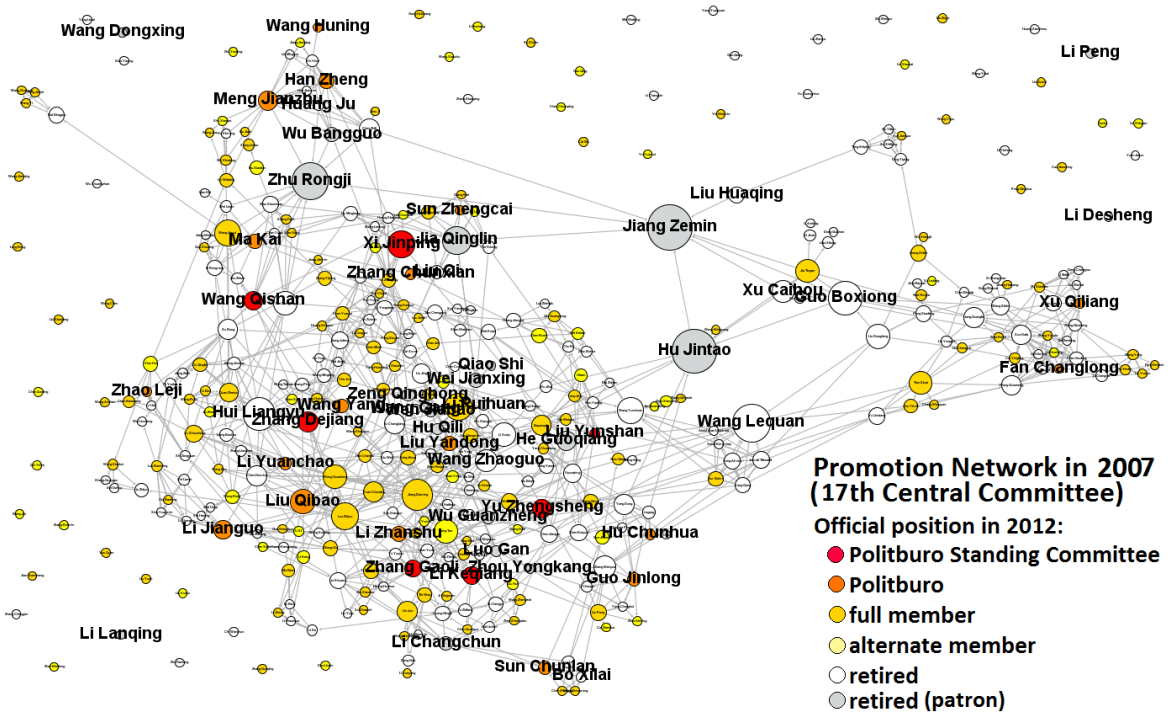

Figure 3: The promotion network among Central Committee members in 2007. Size of nodes proportional to betweenness centrality. Labels of current and future Politburo members, as well as former PSC members enlarged.

to occupy central positions: either towards the center of the network (Liu Yunshan, Liu Yandong, Yu Zhengsheng) or in strategic positions between parts of the network (Wang Qishan or Meng Jianzhu). The latter also marks powerful individuals about to retire, such as Wang Lequan, Guo Boxiong, or General Secretary Hu Jintao. The latter and his predecessor, Jiang Zemin, are the most betweenness central individuals, and thus likely the most powerful patrons. Informal network power thus correspond to what the hypotheses and experts would predict for those individuals.

6 Results

6.1 Endogeneity and possible confounders

In many situations, it is difficult to distinguish whether well-connected individuals attain a powerful position because of their ties, or because others recognized their leadership qualities in advance and therefore connected to them. This may at first seem like a valid concern here as well: promising candidates for top leadership positions are often known several years in advance, and are assigned advantageous or challenging posts to test their mettle (Zhang, 2009). But note that in this setting, clients, even more than patrons, are restricted in their tie formation, because their job assignments are determined by the powerful Organization Department. Bureaucrats cannot simply switch job position to serve under a promising leader in the hope of gaining him as a patron. Patrons and superiors admittedly have considerable discretion determining promotions occurring under them, as recent office-selling scandals have revealed (Gong, 2008; Zhu, 2008). But the effect of their leadership qualities in terms of forming such ties and advancing their supporters is exactly what I want to test with the "power base" hypothesis.

Still, the process of how bureaucrats help each other climb the hierarchy - so evocatively described by Jozsa (1980) as "roped parties" scaling a mountain - is clearly one in which ability and connections interact in complex ways, and worthy of its own, separate investigation. Individuals may accumulate ties because they have a talent for networking, because they have pre-exisiting ties, or because talented individuals make for useful clients. Thus an individual's level of connectedness broadly measures both patronage and talent. I therefore zoom in on the final career stage, taking the network formed until then

as given. The research question is how this network helps elites, who have passed the final hurdle and become members of the Central Committee, enter the inner circle of the party's Politburo.

To address remaining concerns about reverse causality and other forms of endogeneity, I lag the dependent variable, appointment to the Politburo, by five years, and correct for possible confounders suggested in the literature. I will first discuss confounders that were fixed before or in the early stages of their professional career, such as gender, ethnicity, or the level of education.

Older officials are in general more likely to be appointed to the Politburo because of their experience, but effect likely reverses as they approach the age limit (Kou and Tsai, 2014). They may also have more promotion ties simply because they having been around for a long time, and therefore have experienced and overseen many promotions. I thus include age, as well as its square and cube, as co-variates. Early entry into the party could have a similar confounding effect (Li and Walder, 2001), as could the time spent in high-level positions, i.e. in the Central Committee. All three are highly correlated, with the latter being most robustly significant.

Minorities and women are underrepresented in influential bodies. Their outsider status could also hinder their ability to form connections. Both are indeed less likely to be elected into the Politburo, in the case of the minorities significantly so.

Attending university grants opportunities for networking and for acquiring the credentials necessary for most top-level position. I include dummies for different educational levels, with the most common category "college" left out as the baseline. Only a lack of college education significantly decreases the chance of entering the Politburo, however.

The increasing importance of educational attainment has been seen as a meritocratic element in the selection process. The meritocracy hypothesis has also been tested using a variety of proxies for performance, such as GDP growth (Li and Zhou, 2005), tax collection (Shih et al., 2012), or even social development indicators. In the online appendix, I find that GDP growth does not influence Politburo appointments (table 6), but this could be due to the small number of CC members (134) that serve as heads of regions and for which we therefore have such data.[9]

[9]The data are from Shih et al. (2012) with missing values imputed.

According to official statements, work experience is another factor that influences advancement in the party (Nathan and Gilley, 2003). I therefore include a second set of confounders in table 7. The main goal of these more proximate covariates is to account for the "mechanical" accumulation of ties in the course of a career. For instance, every promotion creates the possibility of ties with superiors, even if they did not intervene in the process. If an individual's promotions were due to some unmeasured ability which also helps them enter the inner circle, then the network effect may in fact capture this ability instead. I therefore include the number of previous (within-unit) promotions, but do not find any significant effect.

We also know that promising young cadres are often put "on a fast track" and rotated quickly, allowing them to gain variegated job experiences. This process may also mechanically increase their ties. I proxy this with the number of different positions an individual has held so far. There is a significant effect in some, but not all models (table 7). Working at the very center of power may help the candidate gain a better grasp of what it takes to be appointed to the Politburo, or how to promote their own protégés and maneuver them into the right position. Neither appointments in Beijing in general nor in the Secretariat or the Organization Department do appear to have a robustly positive effect, though. Many Politburo members also have worked in one or more provinces, often at the helm of the local government or party. Experience in one such local unit turns out to be enough for a significant boost in the chance of Politburo appointment.

The main network effects discussed in the next section are robust to the inclusion of all these covariates. Adding work experience reduces the significance of the network variables somewhat - indicating that having the right connections may well allow a greater accumulation of formal "merit". This is consistent with the observation that elites with a patron can expect greater lateral as well as upward mobility. But while the informal network retains a significant influence on the chance of entering the inner circle, almost none of the formal criteria appear to have an effect by themselves.

6.2 The effect of direct ties

Here I test the hypotheses proposed in section 3 by estimating a hazard model: having first entered the Central Committee[10], each member not already in this inner circle is at "risk" of being appointed to the Politburo in the following five year periods until he or she retires. In the period under examination, there are no repeated risks: individuals are only appointed to the Politburo once, and usually leave the inner circle when they reach their retirement age. The main independent variable of interest are the different network positions five years earlier.

The first model in table 1 includes only a dummy variable for whether a CC member has a promotion tie to a patron, and polynomials for the number of periods spent in the CC to turn the logistic regression into a hazard model (Beck et al., 1998; Carter and Signorino, 2010). Individuals become valid patrons in the year when they first enter the Politburo Standing Committee and cease to be so only with their deaths. The second model adds the first set of covariates and two dummy variables that capture other potentially powerful connections: one for descendants of early party leaders ("princelings"), and one for officials who have served as *mishu*, as personal secretary, to one of the paramount leaders.[11] Both could increase the chances of a Politburo appointment and of being promoted more generally, as supervisors might try to ingratiate themselves with the parents or the secretary's superior. All three kinds of connections do provide benefits, but the *mishu* bonus - maybe due to the small number of such individuals - is not statistically significant.

Simulations show that the effects are quite substantial. An average princeling has a 13.6% chance of entering the Politburo, a regular CC member only 5.7%. This is similar to the effect of having a patron, which increases the chances by 7.4 percentage points.

The model in column 3 examines the effect of having multiple patrons by replacing the dummy with the number of patrons and its square. The effect seems to be roughly linear and again considerable, as figure 4 illustrates: while the chance of an individual without PSC patron is less than the average of about 5%, having one patron raises it to

[10] Only Zeng Qinghong and Tan Shaowen entered the Politburo at the same time as becoming CC members.

[11] Excluding *mishu* or the princeling dummy does not change results in this or in any other model presented here.

DV: app. to Politburo	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
has patron	0.89^{**}	0.94^{**}				
	(0.31)	(0.32)				
# of patrons			1.11^{*}			0.71^{**}
			(0.52)			(0.24)
# of patrons^2			-0.26			
			(0.22)			
# of patrons				0.90		
(as former subordinates)				(1.30)		
# of patrons				0.51^{*}		
(as former superiors)				(0.21)		
in-degree (# of					0.21^{***}	0.22^{***}
former subordinat					(0.06)	(0.06)
out-degree (# of					-0.06	-0.12^{*}
former superiors)					(0.05)	(0.06)
was mishu		0.37	0.37	0.38	0.32	0.32
(personal secretary)		(0.46)	(0.46)	(0.46)	(0.46)	(0.47)
princeling		0.92^{*}	0.92^{*}	0.91^{*}	0.92^{*}	$0.83^{\cdot}$
		(0.42)	(0.42)	(0.42)	(0.42)	(0.43)
high school or less		$-1.26^{\cdot}$	$-1.25^{\cdot}$	$-1.25^{\cdot}$	-1.00	-1.20
		(0.74)	(0.74)	(0.74)	(0.71)	(0.74)
postgraduate		-0.41	-0.41	-0.43	-0.41	-0.53
		(0.32)	(0.32)	(0.32)	(0.32)	(0.33)
minority		-2.32^{*}	-2.31^{*}	-2.31^{*}	-2.27^{*}	-2.20^{*}
		(1.02)	(1.02)	(1.02)	(1.02)	(1.03)
male		$1.09^{\cdot}$	$1.10^{\cdot}$	$1.15^{\cdot}$	0.83	1.07
		(0.64)	(0.64)	(0.65)	(0.63)	(0.67)
(Intercept)	-3.26^{***}	-38.60	-36.51	-39.63	-36.99	-49.24
	(0.21)	(91.32)	(91.14)	(91.46)	(90.42)	(92.18)
time in party,^{2},^{3}		✓	✓	✓	✓	✓
age,^{2},^{3}		✓	✓	✓	✓	✓
time,^{2},^{3} in CC	✓***	✓***	✓***	✓***	✓*	✓*
Indep. var. lag:	1 period	1 period	1 period	1 period	1 period	1 period
Num. obs.	960	960	960	960	960	960

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 1: Appointments to the Politburo from among the Central Committee members.

Logistic regression with duration. Standard errors in parentheses.

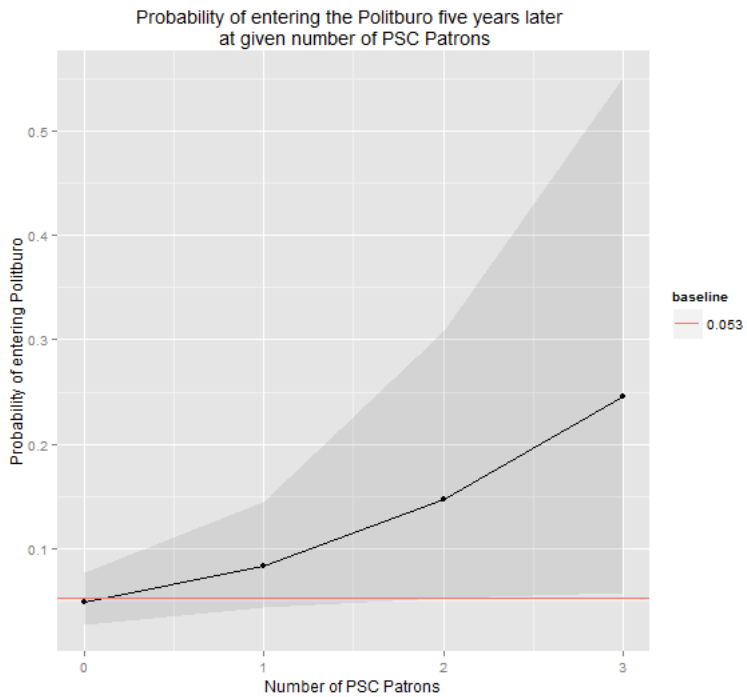

Figure 4: Effect of having one or several patrons

The chances of a Politburo appointment five years later as a function of the number of ties to current and former Politburo Standing Committee members. The red line indicates the baseline chance of being appointed (5.3%). The model used is that in column 3 of table 1, all other covariates held at mean, 95% confidence interval indicated by shaded area.

8%, and adding another to 15%. The effec is even larger if the patron in question is or was the General Secretary.

Model 4 differentiates between whether the patron in question used to be a former subordinate or superior. Both kind of ties have a positive effect, but only the latter is significant, which may simply be due to rarity of the former.

Having confirmed the importance of ties to patrons, I turn to the effect of direct ties to the wider elite, the "power base" effect, in model 5 and 6. In particular the number of promotion ties to former and current subordinates turns out to be a highly significant predictor. In other words, ambitious elites with and without ties to patrons can further increase their chances by promoting their subordinates and help them enter the Central Committee.

Figure 5 illustrates the effect size for the number of such promotion ties. Additional subordinates do not matter as much as additional patrons, but elites who have overseen

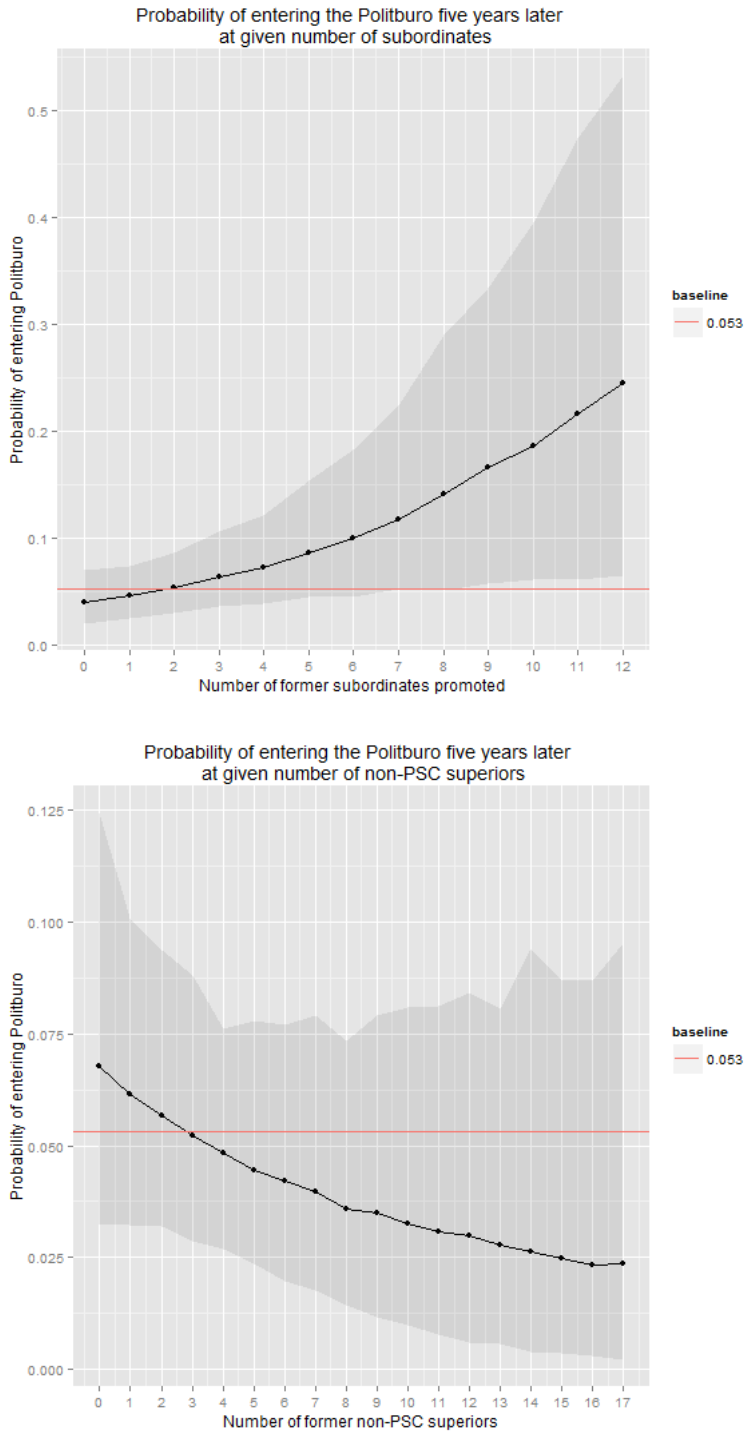

Figure 5: The effect of having one's own "power base"

The chances of a Politburo appointment five years later as a function of the number of ties to former subordinates (top) and former superiors (bottom). The red line indicates the baseline chance of being appointed (5.3%). The model used is that in column 5 of table 1, all other covariates held at mean, 95% confidence interval indicated by the shaded area.

the promotion of six colleagues roughly double their chance of a Politburo appointment over their average peers with only two such ties. Promotion ties to superiors, to whom the individual may still owe loyalty, however, may even be harmful, as the occasionally significant negative sign on the coefficient indicates.

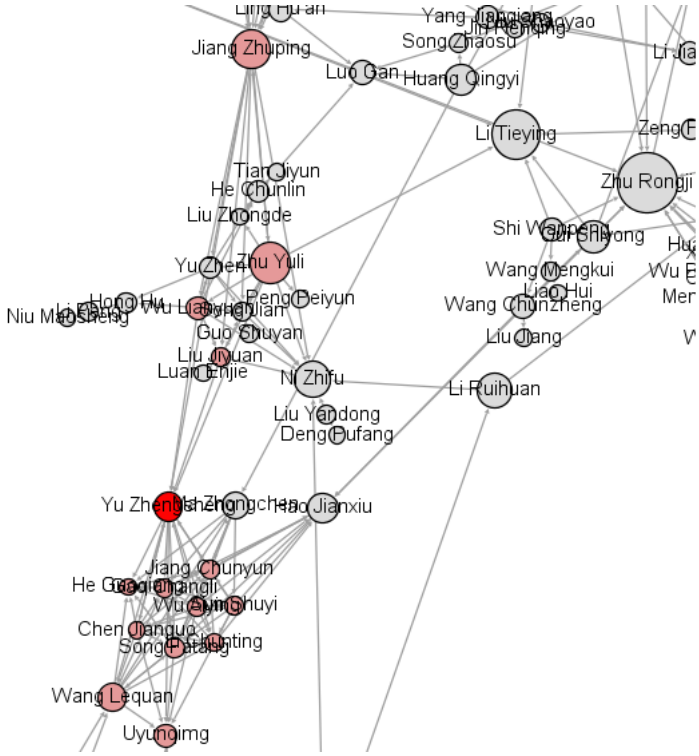

Figure 6: Yu Zhengsheng's position in 1997. Individuals directly connected to him in red. Enlarged from figure 10 in the online appendix.

An example for an individual with a strong network among peers before his appointment to the Politburo is Yu Zhengsheng. Observers have expounded on his close ties to the Deng family and his complex princeling status, with multiple kinship ties to important party leaders (Li, 2012b). Nevertheless, he did not have any promotion tie with a patron in 1997. However, there were seven former subordinates, and eight of his former superiors in the CC at that time, including future PSC member He Guoqiang and future Politburo member Wang Lequan. Most of them had been in Shandong when Yu rose to become Party Secretary of its capital, Qingdao. This group of supporters forms a clearly visible cluster just below him in figure 6. Observers had only noted a "disproportional representation of leaders from the east coast" under Jiang and Hu (Li, 2014), but it looks like this group was Yu's stepping stone for his eventual rise to the Politburo Standing

Committee in 2012.

Table 7 in the online appendix takes model 6 in table 1 and controls for different forms of work experience that the CC members had accumulated over time. Both the patron and the power base effect decrease only a little bit and remain significant. The result is also robust to mismeasurement of up to 10% of the relationships (tables 14 and 15) and to defining the elites relevant for the informal network more narrowly (current CC members only) or more broadly (including former Politburo or all former CC members), as table 8 shows.

6.3 The effect of network positions

So far we have assumed that we know who the patrons are, but this may not always be the case. Not every PSC member is willing or able to cling to power afterward - see the recent example of disgraced Zhou Yongkang. Also, the formally highest official is not necessarily the most influential figure: Deng Xiaoping famously never moved above being the official number three in the party hierarchy during this period. But even under these circumstances can the informal network help identify future members of the inner circle.

Figure 13 in the online appendix plots the CC members' *closeness centrality*, their popularity as a network coalition partners. Future Politburo members are on average more closeness central than peers who remain ordinary CC members. This is confirmed by the hazard analysis in column 1 of table 2, in which variables that require identifying influential leaders, such as the number of patrons, personal secretaries, or princelings, have been replaced by closeness centrality. This measure remains a significant predictor for Politburo appointment even when controlling for formal positions held (model 2), and up to 10 years ahead (model 3).[12] To give an idea of the effect size: moving from being among the 25% least to the 25% most closeness central individuals doubles the chance of a Politburo appointment from about 3.7% to 7.1%.

Different network centrality measures are usually correlated. Model 4 therefore examines if another, possible less complex, measure would perform better. Multicollinearity

[12]Especially in a network analysis setting, one might worry that one elite's centrality measure is related to that of other elites in the same network. However, this poses a problem for empirical models mainly if the dependent variable is interdependent, while the same phenomenon in the independent variable is less problematic (Butts, 2008).

Dep. Variable:	PB 1	PB 2	PB 3	PB 4	Patron 1	Patron 2
closeness centrality	5.73**	4.79*	5.68*	4.76·		−4.59
("coalition popularity")	(1.92)	(2.19)	(2.89)	(2.63)		(3.57)
in-degree (# of				0.11		0.05
former subordinates)				(0.07)		(0.07)
out-degree (# of				−0.07		−0.28*
former superiors				(0.07)		(0.13)
betweeness centrality				3.98	35.91*	46.60*
("strategic position")				(29.91)	(17.42)	(19.85)
high school or less	−1.10	−1.19	−1.66	−1.11	−1.05*	−1.03·
	(0.71)	(0.76)	(1.26)	(0.76)	(0.52)	(0.54)
postgraduate	−0.46	−0.50	−0.35	−0.51	−0.16	−0.06
	(0.32)	(0.33)	(0.43)	(0.34)	(0.49)	(0.51)
minority	−2.45*	−2.35*	−2.14*	−2.26*	−17.16	−17.40
	(1.02)	(1.03)	(1.05)	(1.03)	(890.57)	(871.56)
male	1.04·	1.28·	0.78	1.18·	16.74	16.59
	(0.63)	(0.65)	(0.68)	(0.65)	(1043.43)	(1036.89)
# of promotions		−0.24	−0.30	−0.15	0.47***	0.59***
		(0.16)	(0.25)	(0.18)	(0.13)	(0.15)
worked in OrgDep		−1.07	−18.62	−0.94	0.78	0.74
		(1.22)	(6029.07)	(1.23)	(0.55)	(0.55)
worked in Secretariat		0.75	0.08	0.75	0.85*	0.91*
		(0.57)	(1.09)	(0.58)	(0.37)	(0.39)
# of positions held		0.11	0.20	0.09	0.14·	0.10
		(0.09)	(0.15)	(0.10)	(0.07)	(0.07)
worked in 1 prov.		1.00*	0.83	0.82	1.99*	1.85*
		(0.49)	(0.64)	(0.50)	(0.82)	(0.80)
worked in 2+ prov.		0.61	0.37	0.36	1.57·	1.65*
		(0.54)	(0.73)	(0.56)	(0.82)	(0.82)
worked in center		0.59·	0.30	0.53	1.32*	1.30*
		(0.35)	(0.47)	(0.35)	(0.63)	(0.64)
# of current positions		0.25	−0.38	0.26	0.08	0.12
		(0.20)	(0.33)	(0.20)	(0.11)	(0.12)
(Intercept)	−36.15	−36.51	207.66·	−45.74	79.83	63.09
	(90.28)	(95.04)	(112.50)	(96.70)	(1044.00)	(1037.51)
time in party,^{2},^{3}	✓	✓	✓	✓	✓*	✓*
age,^{2},^{3}	✓	✓	✓	✓	✓	✓
time,^{2},^{3} in CC	✓**	✓**	✓	✓*	✓***	✓***
Indep. var. lag:	1 period	1 period	2 periods	1 period	none	none
Num. obs.	960	960	328	960	2438	2438

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 2: Identifying future Politburo members and current patrons

Logistic regression with duration, dependent variable indicated at the top (PB or Patron): PB1-4 = appointment to Politburo in later periods. Patron1-2 = current or former Politburo Standing Committee member.

reduces the significance level to 10%, but the other measures don't even reach this level. Closeness centrality thus wins this horse race against the number of subordinates, on its own is also a significant predictor. In other words, it is not just the direct connections that matter for entering the inner circle, but the wider position in the elite network.

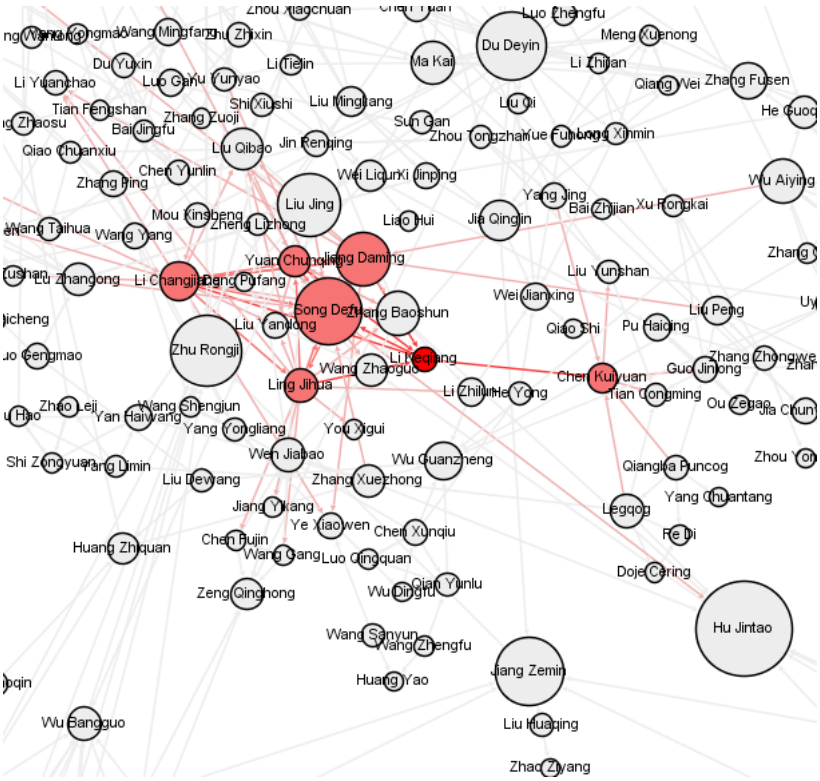

Figure 7: Li Keqiang's position in the 2002 promotion network. Individuals directly connected to him in red. Enlarged from figure 11 in the online appendix. Li Keqiang is surrounded by, but not directly connected to, several powerful figures, such as outgoing premier Zhu Rongji, incoming premier Wen Jiabao, outgoing General Secretary Jiang Zemin, and incoming General Secretary Hu Jintao.

An illustrative example for the importance of indirect connections is current Premier Li Keqiang, five years before he was appointed to the Politburo's Standing Committee in 2007. Li is often thought to be part of the Youth League Faction (Bo, 2014), but he is not directly connected to its leader Hu Jintao in the promotion network. They do, however, share an indirect connection through Song Defu, under whom Li Keqiang became Youth League Secretary in 1993, and who earlier had been promoted to that position by Hu. Li Keqiang also has a tie to Hu's "most important aide" Ling Jihua (Li, 2012a), who became director of the office of the Youth League Secretariat under him in 1988. The network approach reveals the connection between the two despite the absence of a direct

tie. Note also that the number of Li's direct ties (6) is barely above average, but he is 17th in terms of closeness centrality among those young enough to be eligible for the Politburo. He may owe his advancement less to specific direct ties, but to his central position relatively close to several patrons in the network, as seen in figure 7.

Closeness centrality or direct connections can of course not explain all appointments to the Politburo, as four relatively well-known examples with few connections and low centrality show. The first is Jiang Zemin in 1987 - but Deng Xiaoping may have selected him exactly as a less powerful and more pliable backup in case the newly appointed General Secretary Zhao Ziyang would turn out to be just as headstrong as his disgraced predecessor Hu Yaobang. Li Peng's appointment could be due to his princeling status as adopted son of Zhou Enlai, an influential CCP leader second only to Mao Zedong. Princeling Bo Xilai may also have profited from his parentage. Or maybe his low centrality score reflects exactly the lack of support that led to his downfall five years after his father's death. Zhou Yongkang, finally, had not a single promotion tie before his appointment in 2002. Even in the following decade, his closeness centrality remained barely above average, and he ranked clearly below his fellow patrons in terms of betweenness centrality discussed below. His weak informal position may thus also have presaged his eventual downfall.

Model 5 in table 2, finally, tests if we can identify patrons based on the network alone. The dependent variable in this case is current or former membership in the innermost circle, the Politburo Standing Committee. This status is indeed significantly associated with betweenness centrality, even after other centrality measures are added in model 6. Among the other network measures, only out-degree is significantly and negatively associated with patron status, likely because most of their former superiors have already passed away. There is thus evidence that patrons do indeed occupy strategic parts of the informal network, connect different elite groups, and are surrounded by weaker elites dependent on them. They are also not beholden to former superiors. All of this grants them informal power even after they have given up formal positions.

In the online appendix, I show that these results, too, hold if 10% of the ties are added or removed at random or with alternative definitions of the relevant elites.[13]

[13]The only exception is the result on betweenness centrality in the network that also contains all former

To further illustrate the effect of betweenness centrality, figure 8 traces this measure of informal power for the CCP General Secretaries over time. Starting with the 14th CC, after Tian'anmen, the Party Secretary is indeed among the two most powerful individuals, and continues to loom large even after retirement. Jiang Zemin is second in terms of informal power in 1992, and first five years later. Hu Jintao takes the lead in 2002, but comes in just a bit short of Jiang in 2007. And in 2012, the new General Secretary Xi Jinping moves to the number one spot from ninth place in the previous Central Committee. Among the other very betweenness central individuals are current or former PSC members, and PLA officers in the Central Military Commission (CMC). The latter also form bridges between the military and the civilian cluster - see the position of Guo Boxiong or Xu Caihou in figure 3.

In the first two periods, the unstable 1980s, the informal power hierarchy is less clear. While Zhao Ziyang starts out as relatively betweenness central figure, he is not among the top 20 when he actually becomes Party Secretary in 1987. His predecessor Hu Yaobang is also not very central, but neither is the actual paramount leader, Deng Xiaoping. This is probably because the promotion network does not contain some of the powerful connections created during the revolution and the civil war among the older generation of elites still active in the 1980s.

Finally, note that there is also no significant positive association between patron status and the combined number of direct connections (in-degree + out-degree), unless one at least differentiates between connections to subordinates and superiors. Studies measuring the strengths of incumbents and contenders in the CCP through direct connections (Shih et al., 2010) could thus potentially profit from a more nuanced network approach.

But the betweenness centrality measure does not only let us identify powerful grey eminences. It also help us understand why being connected to a patron is beneficial: because a powerful patron grants strategic access to a wider network that the clients by themselves may not be able to reach.

CC members (column 3 in table 10). It remains significant if some covariates that are very strong direct proxies for PSC membership are removed, however.

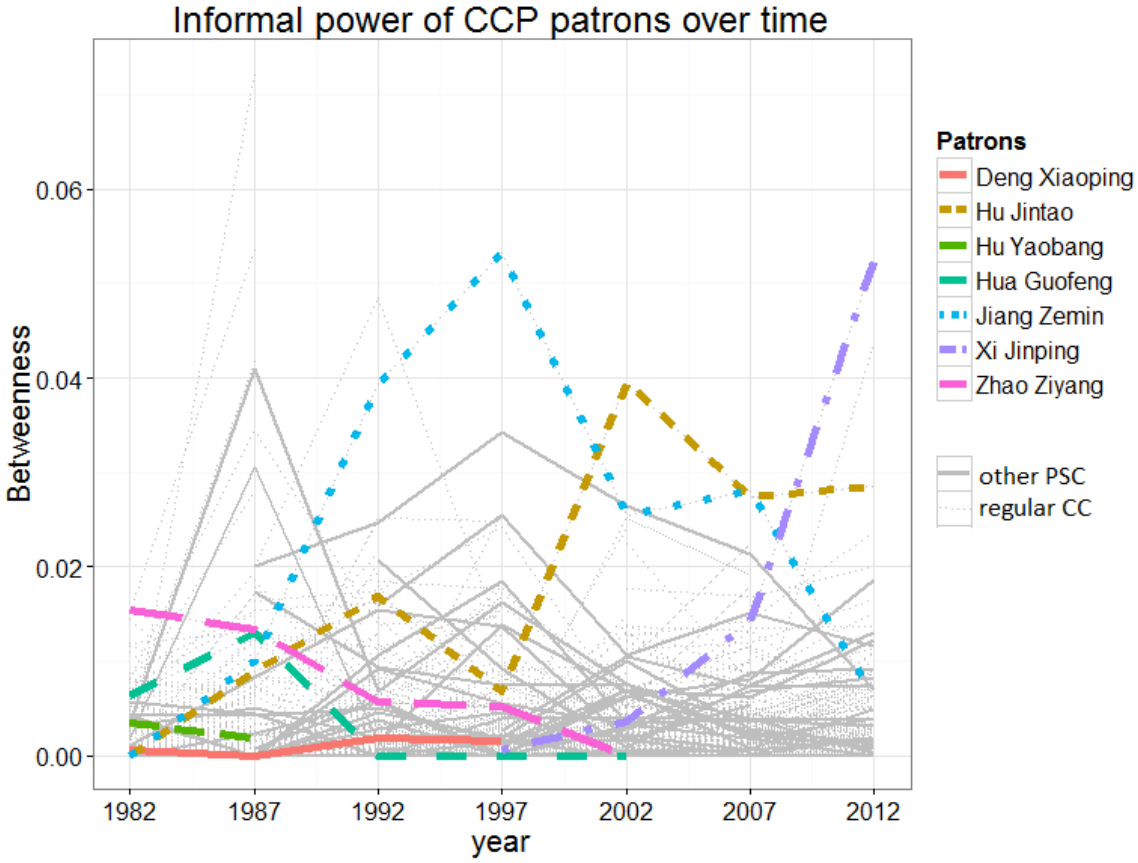

Figure 8: Betweenness centrality of important Chinese leaders (patrons) over time.

Betweenness centrality of Chinese political elites. Thick lines in color indicate current and former Party Secretaries and Deng Xiaoping. Thin grey lines indicate other Politburo Standing Committee members, dotted grey lines other regular Central Committee members.

7 Conclusions

In this paper, I have argued for a social network approach to examining authoritarian regimes and their inner workings - both conceptually and in the empirical research. To illustrate my argument, I have chosen one particular informal institution, elite patronage networks, in one country, the People's Republic of China. I have shown how we can capture this informal network using publicly available data, by examining who has been promoted under whom during their earlier career. I have also developed a model of how we would expect the network and individual network positions to matter in the coalition formation struggle among the selectorate.

The research on patronage in the China and other countries has limited itself to studying the effect of direct ties between clients and patrons. I have provided evidence for the importance of the relationships between all relevant elites. Being connected to a patron does indeed double the chance of entering the inner circle five years later, but it is also important to have a "power base" among one's peers. Ties to former subordinates are particularly useful, while those to former superiors outside the inner circle may be more of a liability.

Network measures can be useful when we do not know the identity of the patrons. *Closeness centrality* - a measure of an individual's popularity as coalition partner - is significantly associated with being appointed to the Politburo as far as ten years ahead. Another network measure, *betweenness centrality*, identifies informal leaders, and explains how such patrons exert influence even after having retired from their official positions: they control the access of their followers to the rest of the network.

These results are all robust to the inclusion of a variety of confounders, changing definitions of the relevant elite, and possible mismeasurement of ties. Nevertheless, the number of Politburo appointments (73) and patrons (28) among the almost 1200 individuals examined is small, and the results should thus be treated with caution.

The network model developed in this paper has much broader applicability, however. The network positions singled out as important in the model should have a similar effect whenever informal connections play a role in coalition formation. They may well be relevant in regimes with stronger formal institutions, such as established Western democ-

racies, or outside the political realm - for example for appointments in board rooms or company leadership. They likely also play a role in the fall of elites, for example during purges and anti-corruption campaigns.

With this initial study, I hope to have shown that it does not just matter who you are connected to in an informal network, but also who your connections are connected to. And when trying to understanding elite politics in authoritarian regimes, we should go beyond asking the question "who is well-connected?" to examining the effects of the whole elite network.

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A Online Appendix

A.1 The promotion network in different time periods

The network ties in the images below denote instances in the past where two individuals were working in the same bureaucratic unit at the same time, during which the lower-ranking individual was promoted within the unit to a position not higher-ranked than the higher-ranking individual. In determining the relevant units, I follow the original codebook by Shih et al. (2012), with some modifications: a few codes that conflate multiple agencies were dropped. Having served in the same Central Committee, or similar large bodies that meet only for a limited amount of time each year, like the Standing Committees of the National Peoples Congress or the Chinese Peoples Political Consultative Conference, were also dropped. Finally, co-work in the Politburo and its Standing Committee was also ignored: these ties are directly connected to the dependent variable, and could bias the centrality measures unduly in favor of finding evidence for the hypotheses. Some of the "units" in the data set are rather large: the whole government and party administration of each province, for instance, is taken to be one unit. But the internal hierarchy of those units is not coded in a very fine-grained manner. In the case of provinces, for instance, the categories are (1) Provincial Party Secretary, (2) Provincial Governor, (3) Provincial Vice Secretary/Vice Provincial Governor and Provincial Standing Committee Member, (4) Provincial People's Congress and People's Political Consultative Conference Chair and Vice Chair, (5) provincial level party and government positions, (6) prefecture, city or county level position. In the case of ministries, the hierarchy is usually Minister, Vice Minister, Bureau or Department Head, and cadre or leader of enterprise administered by the ministry. It thus seems unlikely that anyone would rise to the second lowest coded level of a unit without those above at least getting to know him or her in the selection process.

Promotions can of course occur also when individuals move between units. Unfortuantely, lateral movements between ministries and provinces are much harder to classify unambiguously as promotions, as the hierarchy among those different units is not undisputed.

Finally, if a client was promoted several times under the same patron, the dyad could have multiple ties. This is the case in about 20% of the connected pairs. It seems

likely that multiple promotions create stronger ties, but it is not clear how that would differ from, for instance, a single promotion after having worked together for an extensive time period, or a promotion into a position that is otherwise difficult to attain or skips intermediary bureaucratic levels. I therefore treat the network as binary.

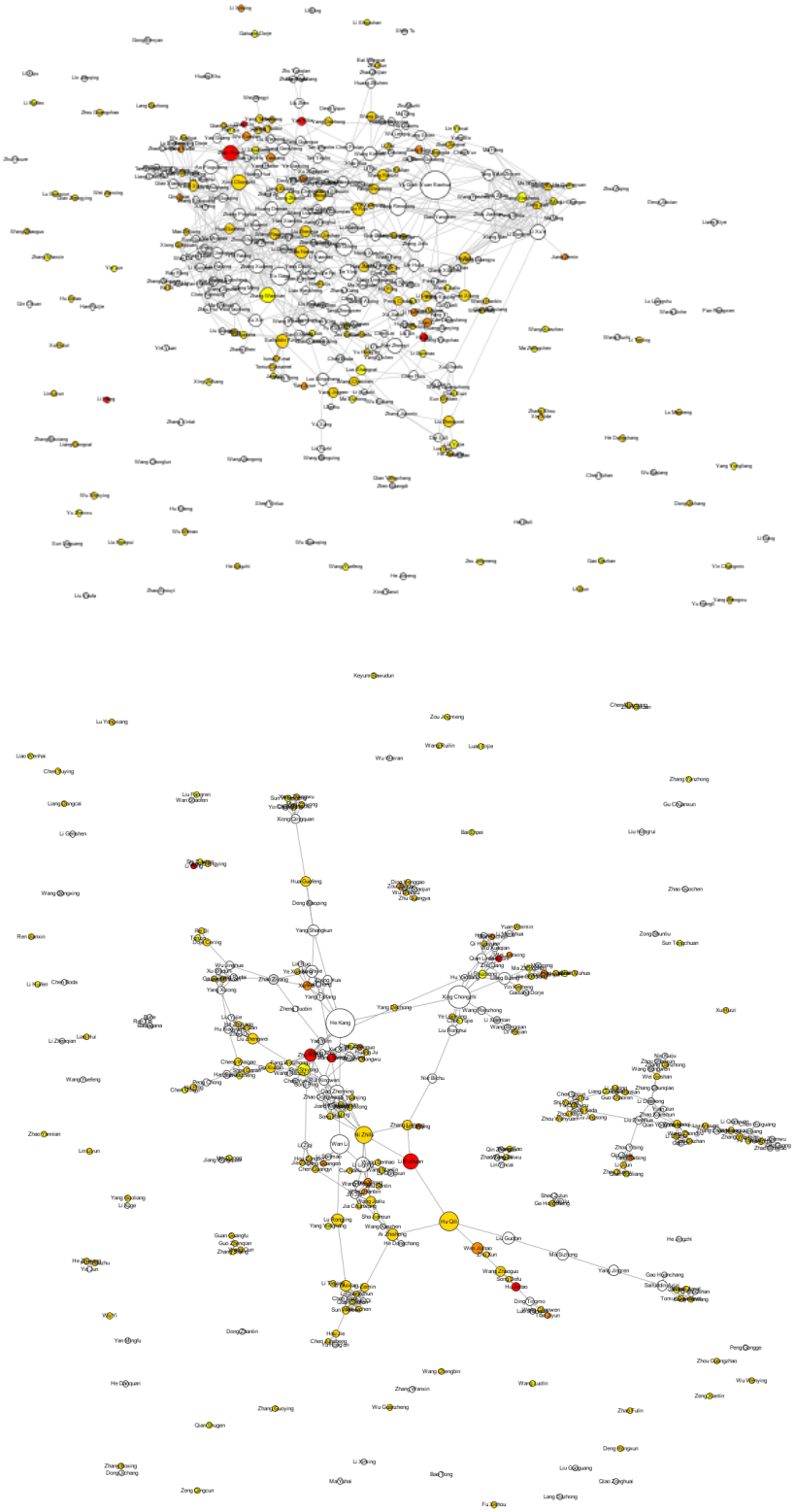

Figure 9: The promotion network among Central Committee members in 1982 (top) and 1987 (bottom). Future PSC members in red, Politburo in orange, full CC members in yellow, alternate members in pale yellow. Future retired members in white, except for those who have held PSC membership (in grey). Size of nodes proportional to betweenness centrality. Layout: Force Atlas as implemented in gephi.

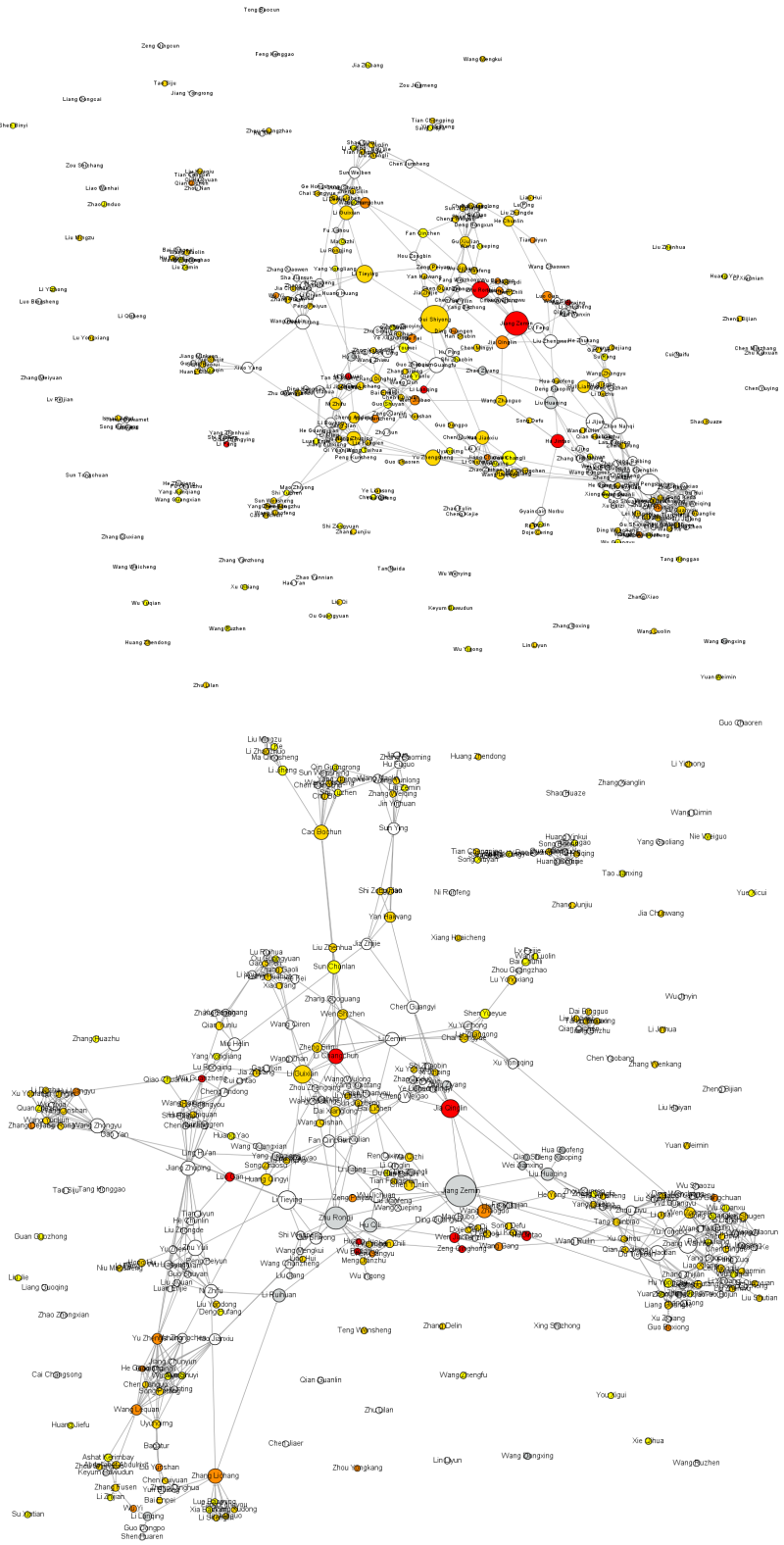

Figure 10: The promotion network among Central Committee members in 1992 (top) and 1997 (bottom). Future PSC members in red, Politburo in orange, full CC members in yellow, alternate members in pale yellow. Future retired members in white, except for those who have held PSC membership (in grey). Size of nodes proportional to betweenness centrality. Layout: Force Atlas as implemented in gephi.

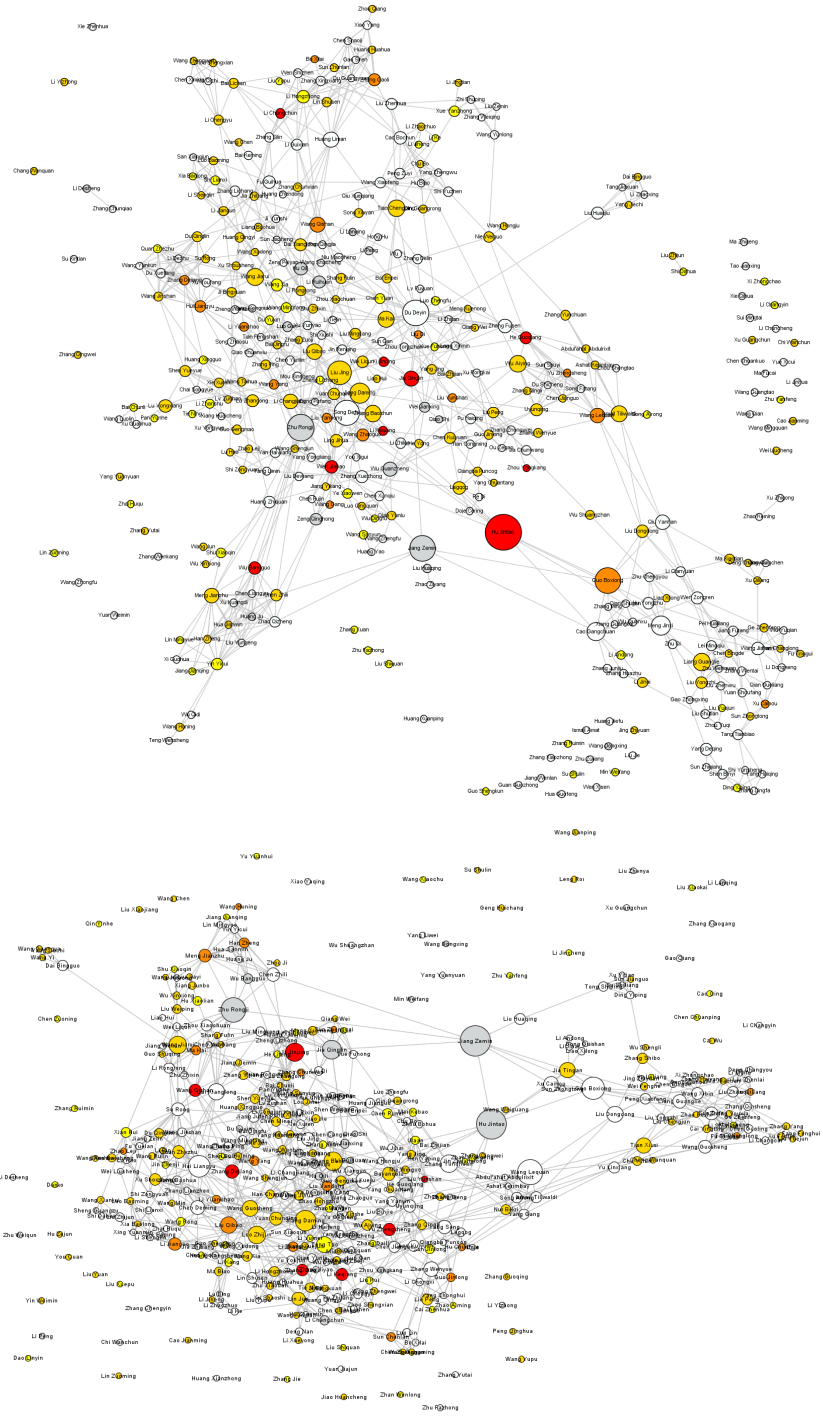

Figure 11: The promotion network among Central Committee members in 2002 (top) and 2007 (bottom). Future PSC members in red, Politburo in orange, full CC members in yellow, alternate members in pale yellow. Future retired members in white, except for those who have held PSC membership (in grey). Size of nodes proportional to betweenness centrality. Layout: Force Atlas as implemented in gephi.

A.2 Validity

Validating if the promotion network does indeed capture the relevant relationship among the Central Committee members is difficult: the researcher cannot ask the actors about their interactions and attitudes towards each other, as is often done in other contexts. In this section, I provide additional supportive evidence instead. I show that ties in the promotion network appear to get formed in a manner consistent with qualitative accounts (1), that ties are more common among members of factions as identified by outside observers (2), and that promotion ties to patrons are more likely to predict advancement than alternative ties (3).

Several sources claim that when officials assume a new position, they often search for allies by establishing links with individuals with whom they share certain characteristics, like common geographic origin (Lieberthal and Oksenberg, 1988). According to Whitson (1969), having served in the same field army during the civil war also helped form enduring ties, as did presumably other shared experiences during that period. In SNA terms, we would thus expect homophily in these networks, i.e. a higher likelihood of a tie forming between individuals with shared provincial origins or common past experience.

This is indeed the case, as the analysis via ERGM (exponential random graph model) in table 3 shows. ERGMs are a family of models for statistical inference on networks, in particular the processes that might have led to the formation of the observed network (Lusher et al., 2012). The size of ERGM coefficients is not directly interpretable. However, a positive coefficient means that a certain network feature appears more often than would be expected at random - after having taken into account all other network features in the model. The positive coefficients in rows 3-10 thus indicate that network displays more reciprocated ties (meaning that individuals promote those who have promoted them earlier) and more ties between individuals from the same province, with the same ethnicity, etc., than in a random network of similar size. All the statistics are significant on the 95% level except for the homophily parameter for ethnicity, which is only significant on the 10% level. This is likely due to small sample size, as each minority is at best represented by one or two individuals. The results thus suggests that bureaucrats are more likely to have experienced a promotion when serving under an official hailing from

edges	-5.43803***	-4.55596***	-4.72849***
("edges")	(0.10024)	(0.08200)	(0.08835)
reciprocity	3.32965***	3.33608***	3.33363***
("mutual")	(0.12611)	(0.12606)	(0.12682)
shared birth province	0.53590***	0.48739***	0.50106***
("nodematch.birthprovince")	(0.08639)	(0.08286)	(0.08392)
shared ethnicity	0.14821+	0.02553	0.04392
("nodematch.ethnicity")	(0.08855)	(0.6191)	(0.06727)
served in same field army	0.74003***	0.61991***	0.65379***
("nodematch.farmy")	(0.11496)	(0.10292)	(0.10546)
both did/did not participate in Long March	0.21320**	0.21831***	0.22171***
("nodematch.lmarch")	(0.06996)	(0.05905)	(0.06168)
same unit/location (1927-34)	0.65485***	0.63037***	0.63434***
("nodematch.base1")	(0.12593)	(0.10895)	(0.11382)
same unit/location (1935-45)	0.34055***	0.23339***	0.25744***
("nodematch.base2")	(0.07910)	(0.06780)	(0.07111)
same unit/location (1946-49)	0.29359***	0.15278**	0.18202**
("nodematch.base3")	(0.07099)	(0.05827)	(0.06208)
geometrically weighted out-degree		-2.79987***	
("gwodegree(0.75, fixed=T)")		(0.11615)	
geometrically weighted in-degree			-2.24259***
("gwidegree(0.75, fixed=T)")			(0.12093)
AIC	11042	10570	10772
BIC	11129	10667	10868

Significance levels: $+$: 10% $*$: 5% $**$: 1% $***$: 0.1%

Table 3: Exponential random graph model on the promotion network among Central Committee members in 1983.

the same province, or one who has served in the same field army or has gone through similar formative experiences during the civil war.

The analysis in table 3 was performed on the network of the 12th Central Committee in 1983. Results for other time periods were similar, with the reciprocity and the shared provincial origin coefficient retaining statistical significance throughout. The only exceptions are the coefficients on past revolutionary experience, which lose significance for the more recent networks, because very few individuals with such experience remain in the Central Committee after the mid-1990s.

The second validation approach compares the network with expert analysis of factions

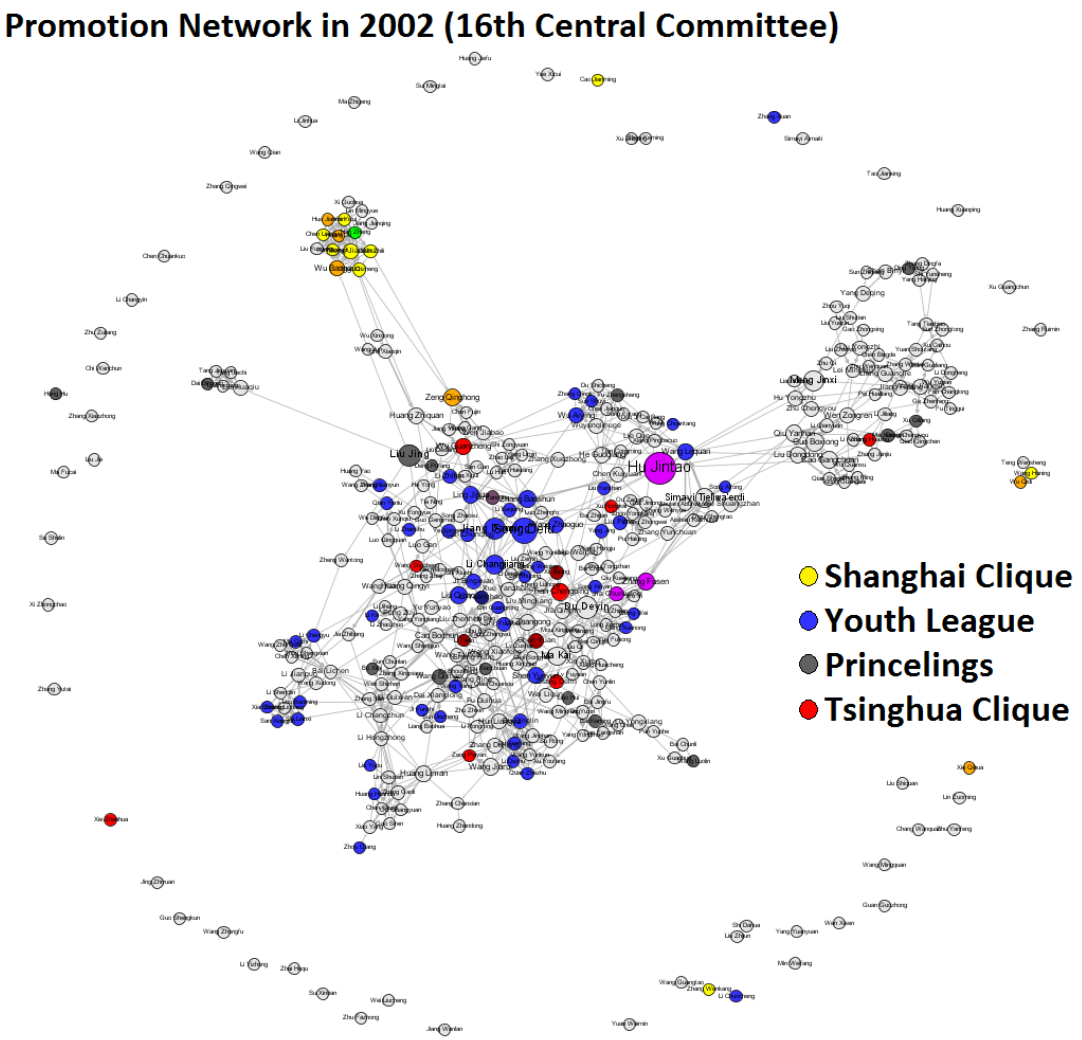

Figure 12: The promotion network among the members of the 16th Central Committee in 2002. Factional affiliation is coded according to Bo (2007). Mixed colors indicate affiliation with more than one faction. Size of node proportional to betweenness centrality. Layout: Force Atlas as implemented by gephi.

in the Communist Party (Li, 2001; Bo, 2007). If members of these groups have indeed supported each other during their career, we would expect them to be connected through promotion ties in the networks. Testing for homophily - this time based on faction membership - can thus tell us if there is some overlap between the social structure captured in the factional analysis and in the promotion network.

Even a simple visual inspection of the network in figure 12 reveals that faction members do indeed cluster together. In this figure, yellow marks the members of the Shanghai Gang (individuals who have made a considerable part of their career in Shanghai),

blue the Youth League Faction (individuals who have served in the Party's youth organization), red the Qinghua Clique (alumni of the eponymous university) and black "princelings" (descendants of earlier party leaders). Mixed colors indicate individuals with multiple factional affiliations - Hu Jintao as a Qinghua alumni and member of the Youth League is colored in a mix of blue and red, i.e. purple.

The members of the Shanghai Gang at the top (yellow, orange and green) are a clearly discernible cluster. The blue, greyish blue and purple Youth League representatives are also often connected to each other. The Qinghua alumni as a clique (red, dark red, purple and orange), proposed by Li (2001), is more disputed. The coherence of the "princelings" (black and dark red/blue) is also sometimes contested (Bo, 2007) - one would expect their ties to lead to their fathers or mothers (and maybe their acquaintances), not necessarily to fellow descendants of early party leaders. Consequently, they form less clearly visible clusters, but the ERGM analysis in table 4 shows that they, too, have an increased tendency to promote each other.

In the ERGM analysis in table 4, the "nodematch" coefficient captures homophily, while the "nodefactor" coefficient captures the tendency of those groups to form more links. The homophily effect is strongest in the network of the 16th Central Committee, probably because earlier Committees do not yet contain as many of the individuals mentioned by Bo (2007), thus reducing the effective sample size.

Finally, if we are willing to believe that connections to former or current PSC members confer an advantage for the appointment to the Politburo (see section 6.2), then it is possible to evaluate ways of constructing informal networks by testing the effect of different client-patron ties on the likelihood of such an appointment. In table 5 I test two other common bases for "guanxi": shared provincial origin and shared college or university. Ties based on shared experience in the civil war, while presumably important, become rare as time progresses. As there are not enough Politburo appointments in those early time periods, it is not possible to test their importance that way.

In model 1 and 2, a Central Committee member is connected to a patron if he or she hails from the same province, in model 3 and 4 if he or she has attended the same college or the same graduate school. Results with additional covariates (as in table 7) or allowing for a non-linear effect of the number of patrons are similar. Neither the dummy

	14th CC	15th CC	16th CC
edges	-3.43360	-7.2498***	-7.79318***
("edges")	(67.02028)	(0.6868)	(0.28645)
homophily princelings	-3.93351	0.3147	0.38694*
("nodematch.Princelings")	(67.01802)	(0.5213)	(0.18993)
factor attribute princelings	-4.35603	0.0003	0.46316**
("nodefactor.Princelings")	(67.01758)	(0.5029)	(0.17042)
homophily Youth League	0.47350+	0.2868+	0.48141***
("nodematch.YouthLeague")	(0.25147)	(0.1514)	(0.07909)
factor attribute Youth League	0.53040*	0.4252**	0.58337***
("nodefactor.YouthLeague")	(0.22953)	(0.1322)	(0.05698)
homophily Qinghua Clique	0.25948	-0.0700	0.33692*
("nodematch.QinghuaClique")	(0.45716)	(0.3961)	(0.16447)
factor attribute Qinghua Clique	0.07286	-0.2789	0.45105**
("nodefactor.QinghuaClique")	(0.44107)	(0.3820)	(0.14633)
homophily Shanghai Clique	2.06509***	2.1192***	1.85007***
("nodematch.ShanghaiClique")	(0.27864)	(0.1927)	(0.14013)
factor attribute Shanghai Clique	2.33327***	1.8600***	1.57952***
("nodefactor.ShanghaiClique")	(0.23425)	(0.1275)	(0.08719)
AIC	11563	12502	13400
BIC	11649	12589	13488

Significance levels: $+$: 10% $*$: 5% $**$: 1% $***$: 0.1%

Table 4: Exponential random graph model on the "promotion network" among Central Committee members in 1996, 2001, and 2006.

nor the number of ties to patrons measured this way seem to have an impact on Politburo appointments. This may surprise observers used to discussing the influence of factions such as the "Shanghai Clique". But note that only a few members of this clique were born in Shanghai - most of them worked (and were promoted) there. The Shanghai clique is thus based on shared work experience, not birth place.

In many ways, these null results should not surprise us: at this stage of their careers, most members of the Central Committee likely know each other at least by sight. A similar dialect or cuisine, or being an alumni from the same university, may help breaking the ice when two bureaucrats first meet at a new unit. It may even end up facilitating a promotion at that stage, explaining the homophily effect in the ERGM analysis above. But it seems unlikely that a patron would chose his or her candidate for a Politburo position from among Central Committee members just based on that criteria.

	Model 1	Model 2	Model 3	Model 4
has Patron	0.20		−0.03	
	(0.30)		(0.28)	
# of Patrons		0.08		−0.07
		(0.16)		(0.08)
has served as	0.36	0.36	0.37	0.35
personal secretary	(0.45)	(0.45)	(0.45)	(0.45)
princeling	0.97*	0.97*	0.98*	1.01*
	(0.42)	(0.42)	(0.42)	(0.42)
high school or below	−1.04	−1.06	−1.08	−1.15
	(0.70)	(0.70)	(0.72)	(0.71)
postgraduate	−0.33	−0.34	−0.33	−0.30
	(0.32)	(0.32)	(0.31)	(0.31)
minority	−2.25*	−2.28*	−2.35*	−2.36*
	(1.03)	(1.03)	(1.02)	(1.02)
male	1.02	1.03	1.02	1.01
	(0.64)	(0.64)	(0.64)	(0.64)
(Intercept)	−31.57	−32.70	−33.25	−33.44
	(90.21)	(90.05)	(90.15)	(90.61)
time in party,^{2},^{3}	✓	✓	✓	✓
age,^{2},^{3}	✓	✓	✓	✓
time,^{2},^{3} in CC	✓**	✓**	✓**	✓**
Indep. var. lag:	1 period	1 period	1 period	1 period
Num. obs.	960	960	960	960

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 5: Robustness check for table 1. Logistic regression with duration, dependent variable: appointment to Politburo from among the Central Committee members. Standard errors in parentheses. In model 1 and 2, a Central Committee member is connected to a patron (current of former PSC member) if he or she hails from the same province, in model 3 and 4 if he or she has attended the same college or the same graduate school. Results with additional covariates (as in table 7) or allowing for non-linear effect of the number of patrons are similar.

A.3 Robustness to inclusion of further covariates

	Model 1	Model 2
# of Patrons	0.65^{*}	
	(0.25)	
# of former	0.20^{**}	
subordinates	(0.07)	
# of former	-0.1	
superiors	(0.07)	
closeness centrality		5.34^{*}
		2.11
gdp growth	-0.05	-0.03
	(0.04)	(0.04)
# of promotions	-0.07	$-0.26^{\cdot}$
	(0.18)	(0.16)
worked in OrgDep	-0.90	-1.08
	(1.23)	(1.22)
worked in Secretariat	0.83	0.80
	(0.59)	(0.58)
# of positions held	0.1	$0.15^{\cdot}$
	(0.09)	(0.09)
worked in 1 prov.	0.64^{*}	0.60^{*}
	(0.29)	(0.29)
worked in center	0.37	0.47
	(0.34)	(0.33)
# of current positions	0.17	0.19
	(0.21)	(0.20)
has served as	0.13	
personal secretary	(0.49)	
princeling	$0.82^{\cdot}$	
	(0.47)	
high school or below	$-1.39^{\cdot}$	-1.25
	(0.79)	(0.77)
postgraduate	$-0.55^{\cdot}$	-0.53
	(0.34)	(0.33)
minority	-2.24^{*}	-2.4^{*}
	(1.03)	(1.03)
male	$1.21^{\cdot}$	1.32^{*}
	(0.67)	(0.67)
time in party,^{2},^{3}	✓	✓
age,^{2},^{3}	✓	✓
time,^{2},^{3} in CC	✓**	✓**
Indep. var. lag:	1 period	1 period
Num. obs.	960	960

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 6: Robustness check including gdp growth as a measure of performance. Logistic regression with duration, dependent variable: appointment to Politburo from among the Central Committee members. Standard errors in parentheses. Intercept not displayed to preserve space.

DV: app. to Politburo	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
# of Patrons	0.72^{**}	0.67^{**}	0.62^{*}	0.61^{*}	0.57^{*}	0.58^{*}
	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)
in-degree (# of	0.22^{***}	0.21^{***}	0.18^{**}	0.17^{*}	0.16^{*}	0.17^{*}
former subordinates)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)
out-degree (# of	-0.14^{*}	$-0.12^{\cdot}$	-0.10	-0.09	-0.09	-0.08
former superiors)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)
was mishu	0.32	0.23	0.17	0.19	0.20	0.27
(personal secretary)	(0.46)	(0.47)	(0.47)	(0.47)	(0.47)	(0.48)
princeling	$0.85^{\cdot}$	$0.83^{\cdot}$	0.70	$0.77^{\cdot}$	0.75	0.75
	(0.44)	(0.44)	(0.45)	(0.46)	(0.46)	(0.46)
high school or less	-1.20	-1.26	$-1.31^{\cdot}$	$-1.34^{\cdot}$	$-1.32^{\cdot}$	-1.26
	(0.74)	(0.77)	(0.78)	(0.78)	(0.78)	(0.78)
postgraduate	-0.53	-0.52	-0.53	-0.53	-0.53	-0.53
	(0.33)	(0.34)	(0.33)	(0.34)	(0.34)	(0.34)
minority	-2.20^{*}	-2.11^{*}	-2.08^{*}	-2.23^{*}	-2.22^{*}	-2.20^{*}
	(1.03)	(1.03)	(1.03)	(1.03)	(1.03)	(1.03)
male	1.05	1.02	1.02	$1.20^{\cdot}$	$1.23^{\cdot}$	$1.20^{\cdot}$
	(0.67)	(0.66)	(0.66)	(0.67)	(0.67)	(0.67)
# of promotions	0.06	0.04	-0.12	-0.16	-0.11	-0.09
	(0.16)	(0.16)	(0.18)	(0.18)	(0.18)	(0.18)
worked in OrgDep		-0.50	-0.69	-0.86	-0.89	-0.94
		(1.24)	(1.21)	(1.26)	(1.24)	(1.23)
worked in Secretariat		1.43^{**}	$0.95^{\cdot}$	0.86	0.85	0.73
		(0.52)	(0.57)	(0.58)	(0.57)	(0.58)
# of positions held			0.17^{*}	0.19^{*}	0.14	0.09
			(0.07)	(0.08)	(0.09)	(0.10)
worked in 1 prov.				$0.86^{\cdot}$	0.98^{*}	0.99^{*}
				(0.49)	(0.50)	(0.50)
worked in 2+ prov.				0.35	0.56	0.57
				(0.53)	(0.56)	(0.56)
worked at center					0.43	0.46
					(0.35)	(0.35)
# of current positions						0.25
						(0.20)
time in party,[2],[3]	✓	✓	✓	✓	✓	✓
age,[2],[3]	✓	✓	✓	✓	✓	✓
time,[2],[3] in CC	✓***	✓***	✓***	✓***	✓*	✓*
Indep. var. lag:	1 period	1 period	1 period	1 period	1 period	1 period
Num. obs.	960	960	960	960	960	960

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 7: Appointment to Politburo from among the Central Committee members

Logistic regression with duration. Controls for work experience. Standard errors in parentheses. Constant omitted to save space.

A.4 Closeness Centrality

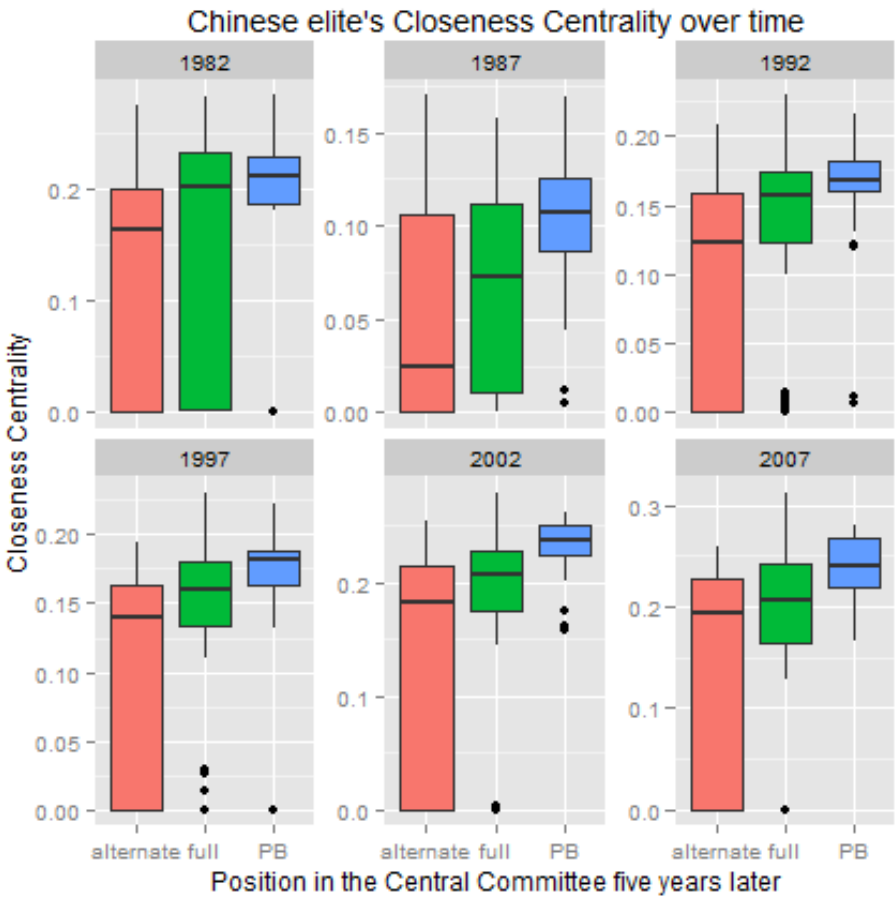

Figure 13: Boxplots of closeness centrality in different Central Committees.

The distribution of CC member's closeness centrality by their position five years later. Future alternate members are less central than full members, which in turn are more peripheral than future Politburo members.

A.5 Robustness to connection measurement error

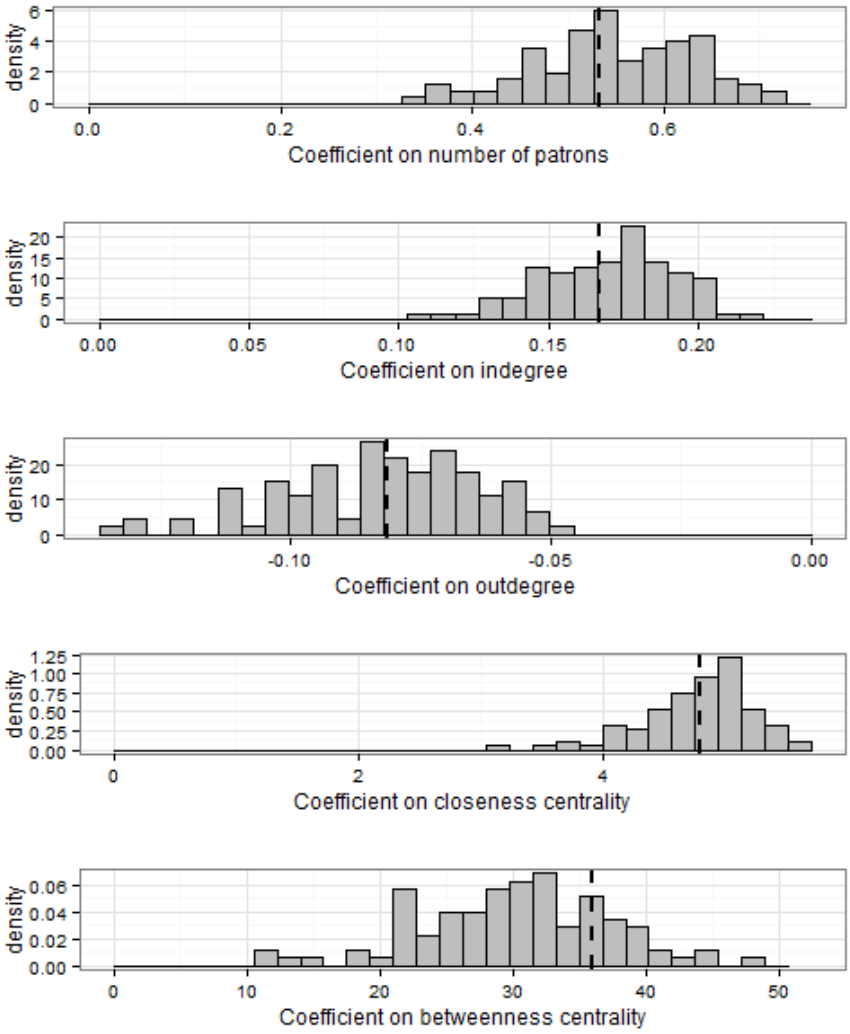

Figure 14: Robustness of main results to mismeasurement of ties. The histogram shows the size of the coefficients on the number of patrons, the number of promoted subordinates (indegree) and supervisors overseeing their promotion (outdegree) in model 6 of table 7, on closeness centrality ("coalition popularity") in model PB3 and on betweenness centrality ("strategic position") in model Patron1 in table 2 if 10% of the existing ties are deleted at random. The dashed black line indicates size of the coefficient on the original network. The coefficients remain positive in all 100 simulations. Thus even if 10% of the connected pairs in the network did not form a special relationship because of the promotion, the results still hold.

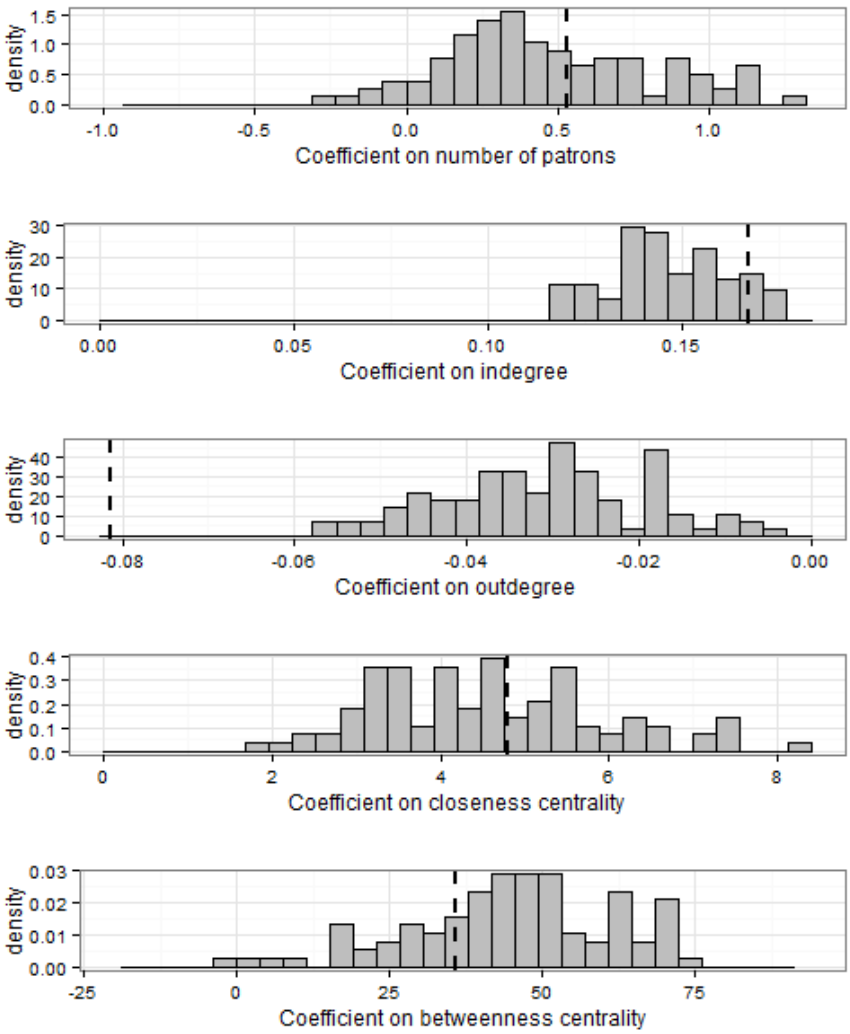

Figure 15: Robustness of main results to mismeasurement of ties. The histogram shows the size of the coefficients on the number of patrons, the number of promoted subordinates (indegree) and supervisors overseeing their promotion (outdegree) in model 6 of table 7, on closeness centrality ("coalition popularity") in model PB2 and on betweenness centrality ("strategic position") in model Patron1 in table 2 if 10% more ties are added to the network. The dashed black line indicates size of the coefficient on the original network. In most of the 100 simulations, the coefficients remain positive. Thus even if an additional 10% of the pairs in the network form other relationships without having worked together or promoted each other, the results still hold.

A.6 Robustness to alternative specification of the relevant elite

NW with current CC	+ former PSC	+ former PB	+ former CC	only
# of Patrons	0.53^{*}	0.54^{*}	0.45^{*}	0.49^{*}
	(0.24)	(0.24)	(0.23)	(0.23)
# of former	0.17^{*}	0.17^{*}	0.12^{*}	0.16^{*}
subordinates	(0.07)	(0.07)	(0.06)	(0.07)
# of former	-0.08	-0.09	-0.02	-0.07
superiors	(0.07)	(0.06)	(0.03)	(0.06)
# of promotions	-0.09	-0.08	-0.17	-0.11
	(0.18)	(0.18)	(0.20)	(0.18)
worked in OrgDep	-0.91	-0.95	-0.93	-0.91
	(1.23)	(1.24)	(1.23)	(1.23)
worked in Secretariat	0.74	0.73	0.76	0.75
	(0.58)	(0.58)	(0.57)	(0.58)
# of positions held	0.09	0.09	0.10	0.09
	(0.10)	(0.10)	(0.10)	(0.10)
worked in 1 prov.	0.99^{*}	1.00^{*}	1.00^{*}	0.99^{*}
	(0.50)	(0.50)	(0.50)	(0.50)
worked in 2+ prov.	0.57	0.57	0.57	0.57
	(0.56)	(0.56)	(0.56)	(0.56)
worked in center	0.46	0.46	0.49	0.47
	(0.35)	(0.35)	(0.35)	(0.35)
# of current positions	0.25	0.25	0.25	0.25
	(0.20)	(0.20)	(0.20)	(0.20)
has served as	0.25	0.26	0.26	0.25
personal secretary	(0.48)	(0.48)	(0.48)	(0.48)
princeling	0.74	$0.77^{\cdot}$	0.69	0.74
	(0.46)	(0.46)	(0.46)	(0.46)
high school or below	-1.29	$-1.31^{\cdot}$	$-1.49^{\cdot}$	-1.28
	(0.79)	(0.79)	(0.82)	(0.79)
postgraduate	-0.52	-0.51	-0.54	-0.52
	(0.34)	(0.34)	(0.34)	(0.34)
minority	-2.21^{*}	-2.20^{*}	-2.18^{*}	-2.22^{*}
	(1.03)	(1.03)	(1.03)	(1.03)
male	$1.20^{\cdot}$	$1.21^{\cdot}$	$1.23^{\cdot}$	$1.20^{\cdot}$
	(0.67)	(0.67)	(0.66)	(0.67)
time in party,^{2},^{3}	✓	✓	✓	✓
age,^{2},^{3}	✓	✓	✓	✓
time,^{2},^{3} in CC	✓**	✓**	✓**	✓**
Indep. var. lag:	1 period	1 period	1 period	1 period
Num. obs.	960	960	960	960

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 8: Robustness check for table 7. Logistic regression with duration, dependent variable: appointment to Politburo from among the Central Committee members. Standard errors in parentheses. The relevant definition of the set of elites included in the network varies in models 2-4 and is indicated in the first row. Intercept not displayed to preserve space.

NW with current CC	+ former PSC	+ former PB	+ former CC	only
(Intercept)	−36.51	−36.13	−34.90	−37.20
	(95.04)	(95.10)	(96.20)	(95.28)
closeness centrality	4.79*	4.74*	5.14·	4.78*
	(2.19)	(2.37)	(2.84)	(2.19)
# of promotions	−0.24	−0.24	−0.28·	−0.24
	(0.16)	(0.16)	(0.17)	(0.16)
worked in OrgDep	−1.07	−1.01	−1.02	−1.04
	(1.22)	(1.21)	(1.20)	(1.21)
worked in Secretariat	0.75	0.76	0.81	0.75
	(0.57)	(0.57)	(0.57)	(0.57)
# of positions held	0.11	0.12	0.12	0.11
	(0.09)	(0.09)	(0.09)	(0.09)
worked in 1 prov.	1.00*	1.01*	1.04*	1.01*
	(0.49)	(0.49)	(0.49)	(0.49)
worked in 2+ prov.	0.61	0.62	0.72	0.61
	(0.54)	(0.54)	(0.53)	(0.54)
worked in center	0.59·	0.60·	0.66·	0.59·
	(0.35)	(0.35)	(0.35)	(0.35)
# of current positions	0.25	0.24	0.25	0.25
	(0.20)	(0.20)	(0.20)	(0.20)
high school or below	−1.19	−1.18	−1.15	−1.20
	(0.76)	(0.76)	(0.74)	(0.76)
postgraduate	−0.50	−0.46	−0.37	−0.50
	(0.33)	(0.33)	(0.32)	(0.33)
minority	−2.35*	−2.34*	−2.34*	−2.36*
	(1.03)	(1.03)	(1.03)	(1.03)
male	1.28·	1.27·	1.20·	1.29*
	(0.65)	(0.65)	(0.65)	(0.65)
time in party,^{2},^{3}	✓	✓	✓	✓
age,^{2},^{3}	✓	✓	✓	✓
time,^{2},^{3} in CC	✓**	✓**	✓**	✓**
Indep. var. lag:	1 period	1 period	1 period	1 period
Num. obs.	960	960	960	960

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 9: Robustness check for model PB2 table 2. Logistic regression with duration, dependent variable: appointment to Politburo from among the Central Committee members. Standard errors in parentheses. The relevant definition of the set of elites included in the network varies in models 2-4 and is indicated in the first row.

NW with current CC	+ former PSC	+ former PB	+ former CC	only
betweenness centrality	35.91*	34.72*	−2.20	46.51*
	(17.42)	(16.99)	(49.91)	(19.61)
high school or below	−1.05*	−0.99**	−1.51***	−2.16*
	(0.52)	(0.38)	(0.34)	(0.91)
postgraduate	−0.16	−0.09	−0.03	0.01
	(0.49)	(0.48)	(0.48)	(0.62)
minority	−17.16	−16.76	−17.17	−16.85
	(890.57)	(889.33)	(938.31)	(1404.91)
male	16.74	16.67	16.59	16.72
	(1043.43)	(1026.32)	(902.61)	(1692.69)
# of promotions	0.47***	0.44***	0.61***	0.53**
	(0.13)	(0.10)	(0.10)	(0.17)
worked in OrgDep	0.78	0.73·	0.90*	0.46
	(0.55)	(0.40)	(0.38)	(0.69)
worked in Secretariat	0.85*	0.31	0.73**	0.57
	(0.37)	(0.28)	(0.28)	(0.49)
# of positions held	0.14·	0.22***	0.37***	0.20*
	(0.07)	(0.05)	(0.05)	(0.10)
worked in 1 prov.	1.99*	1.96**	1.98**	2.34·
	(0.82)	(0.63)	(0.63)	(1.34)
worked in 2+ prov.	1.57·	1.27*	1.31*	2.19·
	(0.82)	(0.62)	(0.62)	(1.32)
worked in center	1.32*	1.15·	1.50**	2.20·
	(0.63)	(0.61)	(0.57)	(1.19)
# of current positions	0.08	0.22*	0.36***	0.62***
	(0.11)	(0.10)	(0.09)	(0.18)
time in party,^{2},^{3}	✓*	✓*	✓*	✓*
age,^{2},^{3}	✓	✓	✓	✓
time,^{2},^{3} in CC	✓***	✓***	✓***	✓***
Indep. var. lag:	none	none	none	none
Num. obs.	2438	2621	7165	2362

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 10: Robustness check for model Patron1 table 2. Logistic regression with duration, dependent variable: being current or former Politburo Standing Committee member. Standard errors in parentheses. Intercept omitted. The relevant definition of the set of elites included in the network varies in models 2-4 and is indicated in the first row. Betweenness centrality is a significant predictor in all models except model 3, where it would only retain its significance if the number of previous positions and the number of simultaneous positions last held were removed from the model. These two covariates are excellent predictors of PSC membership. PSC members almost always hold several positions simultaneously *ex officio*, and are allowed to continue their upward trajectory at a time when other elites hit the "age ceiling" (Kou and Tsai, 2014). While these covariates may thus be very good at identifying current and former PSC members, it is unclear if they would also be good at identifying patrons that have never been part of the PSC.