

# 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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## Abstract

Patronage networks are said to help elites advance into a regime's inner circle. But researchers have only systematically studied individual patron-client ties instead of taking advantage of the tools provided by social network analysis (SNA). This paper shows that in the case of the Chinese Communist elite 1982-2012, such networks can be inferred from publicly available information, by noting who has been promoted under whom. A hazard analysis demonstrates that direct connections to patrons double the chance of being appointed to the Politburo. But links to current and former subordinates - unlike those to superiors - among the other elite also have a significant positive effect. Finally, network centrality measures can identify current patrons and predict appointments to the inner circles five or ten years later even if the identity of the patrons is unknown. Future Politburo members are found in network positions that capture popularity as a coalition partner (closeness centrality), while patrons hold network positions from which they can prevent the formation of opposing coalitions (betweenness centrality). The paper thus shows the importance of analyzing informal elite networks instead of just the ties between one specific leader and his or her followers. It also proposes SNA as a new theoretical and empirical approach to the understudied informal institutions of authoritarian regimes, suggesting a more principled, but also more nuanced way of measuring one such institution: political patronage.<sup>1</sup>

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<sup>1</sup>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

# 1 Introduction

Why do some political elites become members of a ruler’s inner circle? And why do some of them stay on for a long time, while others fall victim to coups or purges? The answer to this question has implications well beyond the elites involved: authoritarian political elites usually have considerable leeway in determining economic, foreign, and security policy (Jones and Olken, 2004), and the rise of new contenders for power can lead to violent struggles in regimes without an established democracy’s conflict resolution mechanisms (Przeworski, 2011).

Researchers have long asserted that informal institutions and connections matter greatly in that process. But empirical studies have struggled with identifying, conceptualizing, and measuring them in a rigorous manner that would allow comparisons across cases. A growing body of quantitative research has established the relevance of direct ties to important leaders, often called “patrons”, in several different countries and for a variety outcomes (Fisman, 2001; Shih et al., 2012; Willerton, 1992). In this paper, I refine this approach: by parsing biographical data, I establish who has been promoted under whom during their career decades earlier. Unlike connections derived from insider sources, these “promotion ties” are replicable, because the biographical information is publicly available. More importantly, I expand the approach to unveil not just the leader’s connections, but the whole party’s informal elite network by examining every possible pair of elites for such a “promotion tie”.

Using the Chinese Communist Party’s (CCP’s) Central Committee members between 1982 and 2012 as an example, I demonstrate theoretically and empirically that these other ties matter. For instance, promotion ties to former subordinates also increase the chances of an appointment to the party’s inner circle, the Politburo. Ties to former superiors, however, only matter if the superiors are current or former Politburo Standing Committee members (i.e. patrons). I also show that even if we - as is often the case - don’t know

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as Victor Shih, for sharing data on the 17th and 18th Central Committee. Many thanks to Jenn Larson, Adam Przeworski, Joshua Tucker, Victor Shih, Nils Weidmann, Armando Razo, Jérôme Doyon, Milan Svolik, Josef Woldense, Brett Carter, Tim Hazen, Kerry Brown, Dimitris Christopoulos, Xiaojun Yan, Christine Scheidegger, 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.

the identity of the patrons, we can still identify future members of the inner circle and current patrons from their network position alone. Summarized in centrality measures from social network analysis (SNA), these positions capture and formalize the complex informal power structure reflected in historical accounts of specific leaders and their entourage. *Closeness centrality*, for instance, captures the “popularity” of a candidate among peers and leaders, while *betweenness centrality* reflects the ability of a leader to maintain control over his or her own coalition.

But even the less complex SNA configurations have an intuitive corresponding interpretation. The finding that the number of ties to former subordinates (*in-degree*) matters above and beyond ties to patrons resonates with qualitative accounts of how successful elites need to establish an independent power base. It may also provide evidence for a more decentralized mode of decision making: elites who want to become part of the inner circle don’t just need good relations with powerful leaders, but also need to get along with their peers and advance their own followers.

These different findings on the influence of networks are robust to the inclusion of possible confounders and persist in a variety of different specifications. They are often highly significant, while only few of the covariates based on formal criteria or individual characteristics influence appointments to the Politburo.

This paper’s main contribution is introducing SNA theories, measures and methods to the growing subfield of research on authoritarian regimes. It thereby combines the historian’s nuanced view of the elite network with statistical analysis of several hundred elites simultaneously. But the findings speak to leadership selection more generally. Coworker and promotion ties likely play a role in democratic bureaucracies or private companies as well. With this new approach, we can test hypotheses about the effect of the broader network and of indirect connections. As this paper shows, it is often not just one’s own ties that matter, but also who one’s connections are connected to.

I further elaborate on this *disciplined social network analysis* approach in the literature review in section 2. 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 are advantageous for 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

Most research on authoritarian regimes after Geddes (1999)’s foundational article has focused on explaining regime stability (Art, 2012), often operationalized as the survival of the leader (Bueno de Mesquita et al., 2003; Svolik, 2012). Only a few, such as Arriola (2009) and Francois et al. (2014), examine the fate of individual members of the inner circle, as this paper does. The field as a whole has established the importance of formal institutions, such as elections (Schedler, 2006), parties (Magaloni and Kricheli, 2010), or assemblies and parliaments (Gandhi, 2008). But experts on individual countries often emphasize the importance of informal politics over formal structures. Unfortunately, informal structures and norms are much harder to measure or conceptualize in a manner that would allow for cross-country comparisons.

Recently, Razo (2014) has suggested a social network approach to informal institutions and norms, arguing that they often have a relational component.<sup>2</sup> Helmke and Levitsky (2004)’s examples in their seminal article on informal institutions illustrate that point: clans are by definition groups in which 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 presumed connections to their bureaucratic unit beneficial to the corporation. And Mexico’s informal rule that the president gets to appoint his successor (“dedazo”) is an example for a general instruction where the result is highly dependent on the identity of the implementer and his relationships to the candidates.

A network of specific relationships among political elites is therefore the foundation

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<sup>2</sup>The term “informal network” is not tautology, however, because not all informal institutions have a relational component. “Office buying” in a corrupt system only has a network component if the price is determined by the relationship between the buyer and the seller, or if only individuals with pre-existing trust ties may engage in such transactions. On the other hand, there exist formal networks. They usually connect official positions or bureaucratic units instead of their office holders. Prime examples are organigrams that specify official communication channels, chains of commands, or rights of appointment.

of much of what we consider to be informal institutions in politics. These relationships manifest themselves in organizations, rules, and procedures that “structure social interaction by constraining and enabling actors’ behavior” (Helmke and Levitsky, 2004, p. 727), such as patronage, factions, cliques, or nepotism. But unlike formal institutions, they are never explicitly described or even mentioned in official documents. On the contrary - the existence and influence of factions or personal connections is usually denied even if their effect is plainly visible.

Because of the lack of rule of law, political systems steeped with informality are often, but not exclusively, authoritarian. In these systems, the actions and power of office holders depend more on their personal characteristics and relationships than on the official position itself. It would thus help to complement the study of official organizations and written rules and procedures with two things: Firstly, an examination of the characteristics of the individuals occupying official positions in those organizations and implementing the formal rules and procedures. Secondly, their relations among each other and to the targets of the rules and procedures. For this task, I propose a combination of two already existing approaches: Elite studies with their focus on elite’s personal characteristics, and social network analysis as 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 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). In the case of the patronage networks, individuals can form patronage ties, in the process likely reinforcing the institution. They may even attempt to break or create other pair’s patronage ties, but they are unlikely to individually change the overall shape of the network - just as would be the case with other institutions.

As Helmke and Levitsky (2004) have noted, those informal structures can then either undermine or buttress existing formal institutions. Patrons can use their informal position to empower 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.

The particular informal institution examined in this paper - patronage ties among

authoritarian elites - has been documented in a wealth of qualitative and some quantitative studies (Shih et al., 2012; Willerton, 1992; Fisman, 2001). But the only attempts at integrating those findings with network analysis are Razo (2008)'s study on how dense networks between bureaucrats and business leaders protect property rights and support limited dictatorship in turn-of-century Mexico under Porfirio Diaz, and Perez-Oviedo (2015)'s game theoretic model involving a dictator and surrounding connected or disconnected individuals trying to coordinate a revolution.<sup>3</sup> While studying patronage networks and clientelism had a long tradition even before the re-emergence of research on authoritarian regimes (Scott, 1972; Miller, 1989), only Nathan (1973) and Nathan and Tsai (1995)'s seminal work makes passing references to SNA concepts.<sup>4</sup> As a result, studies tend to only examine the individual relationship between a few prominent patrons and their clients, or membership in factions (Bo, 2007; Li, 2002).

Social network analysis of elites associated with the regime - what Mills (1956) called the “power elite” - appears to be mainly the domain of sociologists (Domhoff, 1990; Useem, 1984). It has been applied mostly in the West and the US in particular (see chapter 6 of Knoke (1994) for an overview), or else to very particular time periods and geographic regions.<sup>5</sup>

Quantitative analyses on the specific topic of this paper, the influence of informal connections on top-level appointments of Chinese elites, have focused on the above mentioned direct ties to patrons. Shih et al. (2012) find that Central Committee members with factional ties to the pre-eminent leaders are more likely to advance in the party hierarchy. Zhang (2009) had discovered a similar effect for top provincial officials, while Jia et al. (2015) find an effect of ties to current Politburo members for those officials only in combination with good performance.<sup>6</sup> Choi (2012), finally, provides evidence for

<sup>3</sup>Two recent unpublished PhD or Master theses (Sibayan, 2013; Gregory, 2013) also use SNA to examine Chinese political elites, but are more concerned with policy outcomes.

<sup>4</sup>Social network analysis has otherwise made steady inroads into other subfields of political science, like International Relations (Cranmer and Desmarais, 2011, for example) and American Politics (Fowler, 2006), in particular Policy Analysis (Berardo and Scholz, 2010). In Comparative Politics, the focus has been on opposition networks and social media (González-Bailón et al., 2011).

<sup>5</sup>Most famous is probably Padgett and Ansell (1993)'s study on the Medici family's rise in Renaissance Italy. A lesser-known example is Easter (1996)'s description of the personal network between Transcaucasian Communist leaders and its contribution to the institutionalization of the early Soviet Union.

<sup>6</sup>The research on appointments in the Chinese Communist Party is usually framed as a question of performance vs patronage, i.e. of the importance of formal vs. informal criteria for promotion (Bo, 2002;

a patronage effect limited to appointments to the more political positions of provincial secretaries, and not for provincial governors.

These scholars use different methods to infer the presence of patron-client ties. I follow Keller (2015), who evaluates different approaches to construct patronage networks, including manually coding expert opinions. She concludes that the networks that most closely capture patronage ties are based on whether Chinese elites have worked together in the same ministry or province at the same time in the past. Even better are refinements thereof, which take into account the duration or the number of instances in which elites worked together, or whether the lower-ranking individual was promoted during that period.

One problem that affects some of those quantitative and most qualitative studies is a possible *ex post* sampling bias of the relevant patrons. If experts observe that a group of elites tied to an individual ascend in the hierarchy and subsequently conclude that this individual must have been an important patron facilitating their appointments, then any argument about an effect of being tied to the patron so identified becomes circular.<sup>7</sup> This issue has been largely ignored in the literature, however.<sup>8</sup> I address this problem by following Jia et al. (2015) in identifying patrons purely on their characteristics in the current or past time periods. Specifically, I assume that all current and past members of the innermost circle, the Politburo Standing Committee, are patrons.

But the main shortcoming of the the quantitative literature on patronage is its rather simplistic conceptualization of informal networks. A dichotomous distinction between elites with and without connections falls short of the nuanced qualitative narratives of elite networks in authoritarian regimes. Those accounts describe individuals associated with more than one faction, or belonging to the core or the periphery of a group, which

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Li and Zhou, 2005; Chen et al., 2005). They tend to find an effect of at least some form of informal connections and some measurement of performance. Exceptions to the latter are Shih et al. (2012), who only examine the small sample of those Central Committee members that also serve as leaders of provinces, and Zhang (2014).

<sup>7</sup>A similar problem pertains to the commonly employed analysis of factions (Li, 2001): probability dictates that, given enough characteristics to chose from, there will always be some larger than average group of people that shares a specific characteristics with the current leader - be it geography (Jiang Zemin's "Shanghai Gang"), career paths (Hu Jintao's "Youth League Faction") or education (the "Qinghua Clique").

<sup>8</sup>Note that this is not an argument about endogeneity, i.e. about whether promoting followers may help the leader advance. It's simply about stipulating who the expected patron is before or independent of observing him successfully promote his clients.

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. And 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). According to qualitative accounts, ties also extend downwards: Soviet elites assemble “roped parties”, i.e. chains of clients (Jozsa, 1980) throughout their career climbing the hierarchy. 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.

To implement such a more *disciplined social network analysis* approach to authoritarian politics, three elements are of particular importance: Firstly, constructing the network from publicly available data whenever possible to ensure replicability. Secondly, examining the whole elite network, that is every possible pair from among the elites of relevance. Thirdly, specifying a theory for why and how specific ties or more complex network positions or constellations produce the outcome of interest (as illustrated in the next section).

But by actually mapping the patronage network, social network analysis 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 winning coalition formation in authoritarian regimes (Bueno de Mesquita et al., 2003) with concepts from social network analysis. I derive basic hypotheses about individual-level behavior from the literature. In order to show the consequences of this behaviour on the aggregate level, I explain the intuition

behind the results of an agent-based model of coalition formation along network ties developed in Keller (2014). To this purpose, I use an exemplary toy model, in which the relevant elite consist of only 12 individuals.

The top of figure 1 displays the Chinese Communist Party’s official account on how Politburo members are selected. According to this most basic null model, individuals become part of the inner circle because of their personal characteristics: their accumulated experience, their educational background, their age, or their performance in previous positions (Qiao, 2013a,b; Zhou, 2007). The appointment is thus a fundamentally apolitical process: candidates are selected according to some objective criteria by a group of faceless people representing the party’s (and the wider population’s) interests. Relationships do not play any role in this decision.

Unsurprisingly, many outside observers, even within China (Xu, 2001; Zuo, 2001), disagree with this portrayal of the process. They perceive it instead as a competition for power among elites, with powerful leaders, so-called patrons, struggling to appoint individuals with whom they share some form of connection.

This alternative model fits into the way authoritarian politics is viewed in the field more generally. In the wake of Bueno de Mesquita et al. (2003), theories on the formation of winning coalitions<sup>9</sup> from a selectorate<sup>10</sup> in authoritarian regimes have become popular. This “selectorate theory” thus chimes with the observation that a dictator’s power is rarely unlimited, and that he requires the cooperation and support of other powerful actors in order to implement policies and defeat competitors. However, when it comes to forming such a winning coalition or “inner circle”, the theory treats all selectorate members as identical and thus exchangeable, predicting only the relative size of the winning coalition.

But we are often more interested in the question of who the winners will be. In real life, affinity or connections to a leader are not just theoretical tie-breakers, as they are in the selectorate theory. Instead, individuals with the right kind of connections appear to have a distinct advantage. Drawing on the patronage literature reviewed in

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<sup>9</sup>The winning coalition in an authoritarian regime is not always easy to identify. In Bueno de Mesquita et al. (2003)’s terms, it is a subset of the elite (the selectorate) that supports the leader against a potential contender and receives private benefits for doing so.

<sup>10</sup>The selectorate are those individuals that are able to influence the selection of the leader.

the previous section, I thus propose to impose a social structure on the selectorate, in the form of a trust network. In this - admittedly highly abstract - alternative, incumbents and contenders form (or are more likely to form) their coalitions along network ties.<sup>11</sup> An individual's network position thus determines his or her likelihood of being a successful leader or a member of the winning coalition.

Similar to the original selectorate theory, the modified version likely applies to democratic regimes as well. But this specific restriction seems especially appropriate to authoritarian regimes, where the opposition are often coup conspirators or revolutionaries facing a strong surveillance regime. In these circumstances, anyone - no matter how seemingly fervent a regime critic or how valuable an asset - could be an agent bent on exposing the undertaking. Contenders are thus likely to include in their coalition only individuals they know and trust personally, or for whom someone they know or trust can vouch.

The need for secrecy and coordination along trust ties may seem less important for the incumbent's coalition, being the legitimate government. But as there is no external enforcer to the exchange of private goods to coalition members in return for their loyalty to the leader, both sides might only be willing to coordinate with individuals they trust. This problem is exacerbated by the fact that those private goods are often valuable resources or influential positions, which the coalition members could use to usurp power for themselves. In regimes where such a coup threat is negligible, the ruling elite might still be worried of a reformer like Gorbachev emerging from their midst, as is apparently the case in China ([Nathan and Gilley, 2003](#)). Finally, as the recent trial of former Politburo Standing Committee member Zhou Yongkang for corruption shows, retiring leaders have to be careful in picking docile and trusted successors if they want to enjoy their old age. In all those cases, selectorate members who are known and trusted not to belong to the “bad bunch” might be preferred.

It should be noted that “trust” in this context does not mean that the two individuals would never betray each other or will always find themselves on the same side of an internal struggle. The network is just a social structure that enables or restricts their alliance formation. Whether they activate some of those ties to recruit their network

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<sup>11</sup>In SNA terms: the coalition has to be a connected subgraph.

neighbors will also depend on strategic considerations and external circumstances. And the presence of a tie does not prevent a betrayal if it is politically opportune.

The illustration in the middle of figure 1 begins with the most basic representation of the outside observer's null model of CCP Politburo appointments or coalition formation. Among the toy model's 12 political elites, one or more individuals are identified as powerful leaders or patrons - here labeled P1 and P2. Observers then identify other individuals connected to the patrons. It is assumed that such individuals join their patron's coalition, as indicated through the blue and red colors in central illustration of figure 1.

In other words, the colored individuals should have a higher chance of ending up in the winning coalition. 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). However, it does have some shortcomings: Firstly, the identification of the patrons does not always follow clear criteria, as discussed in the previous section. Secondly, the model cannot explain where the power of the patrons stems from, particularly if they do not hold any official position. Thirdly, who the powerful players behind the scene are is often disputed: what to do if the identity of the patrons is unknown? Finally, 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.

For instance, one additional concept often encountered in those narratives is that of an individual's "power base" or support network (Brown, 2014). Such an extended network can be captured quite easily by examining not just the patron's ties, but those of all elites deemed relevant. The bottom of figure 1 displays a possible network among the 12 elites in the toy model. There, clients C4, C5 and C6 may be in quite a different position vis-à-vis patron P1 than C1, C2 and C3 in relation to their patron, P2. In the latter configuration, the patron may be able to play one client against each other, potentially reducing the private transfers that he has to distribute to each of them in return for their

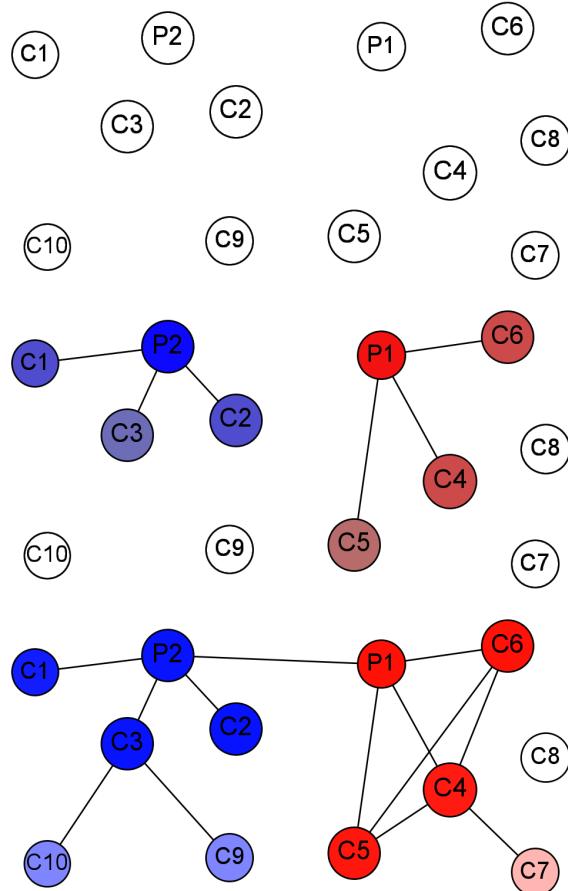


Figure 1: **Top: official model** - members of the inner circle (the Politburo) are selected based on their personal attributes and achievements. Relationships do not play any role. **Middle: connection model** (coalition formation along ties as hypothesized in literature so far) - clients benefit from their ties to patrons. Patrons P1 and P2 (red and blue) recruit individuals directly connected with them to their coalitions (same color, slightly darker hue). **Bottom: network model** - clients benefit from ties to their patrons and from ties among their own. They may coordinate with other clients of the same patron, or grant the patron access to additional coalition members (pink and light blue).

loyalty. P1’s clients may discover and counteract such a move more easily because of their shared connections. C3 and C7’s ties to elites not directly connected to either patrons (C7, C9, C10) may also give them additional bargaining power (e.g. for a position in the Politburo): if the patron lacks enough direct connections to form a coalition of sufficient size, he may expand his coalition with indirect connection recommended by his clients (indicated through the light blue and pink shade).

A more complex hypothesis regarding the effect of patronage networks thus includes the effect of a candidate’s own connections. The latter, also called *degree centrality* in social network analysis, can thus be interpreted as the size of an elite’s “power base” among the wider elite, and should increase their chances of entering the inner circle.<sup>12</sup>

**H2: The more connections with other elites (i.e. the higher degree), the higher the chances of being appointed to the inner circle.**

The remaining two hypotheses are more complex, and deal with the situation when there is no reliable insider information that would allow us to identify the relevant patrons. A possible solution is to evaluate an actor’s popularity as a coalition partner if alliances are formed along network ties.

Figure 2 illustrates the preferred coalitions of four different actors: P2 would likely include P1 and C1-3. If he needs a sixth member for his coalition, he can choose among C4-6 or C9 and C10 (in pink), all of which are only two steps removed from him. P1’s first choice would be P2 and C4-6. She as well has plenty of options for the sixth member (C1-3, C7). C10, on the other hand, has only one direct connection, and would have to recruit the remaining 4 coalition members from his network neighbors two steps removed (C1, C3, C9 and P2). C4, finally, would recruit C5-C7 and P1, and, if necessary, P2.

It would thus appear that some individuals, such as P1 and P2, could show up in almost every coalition, while more peripheral players, such as C9, C10 or C7, rarely do. Thus even if we do not know the identity of the leader who gets to form the coalition, we may still be able to tell who has the highest probability of ending up in the winning

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<sup>12</sup>Mathematically, 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).

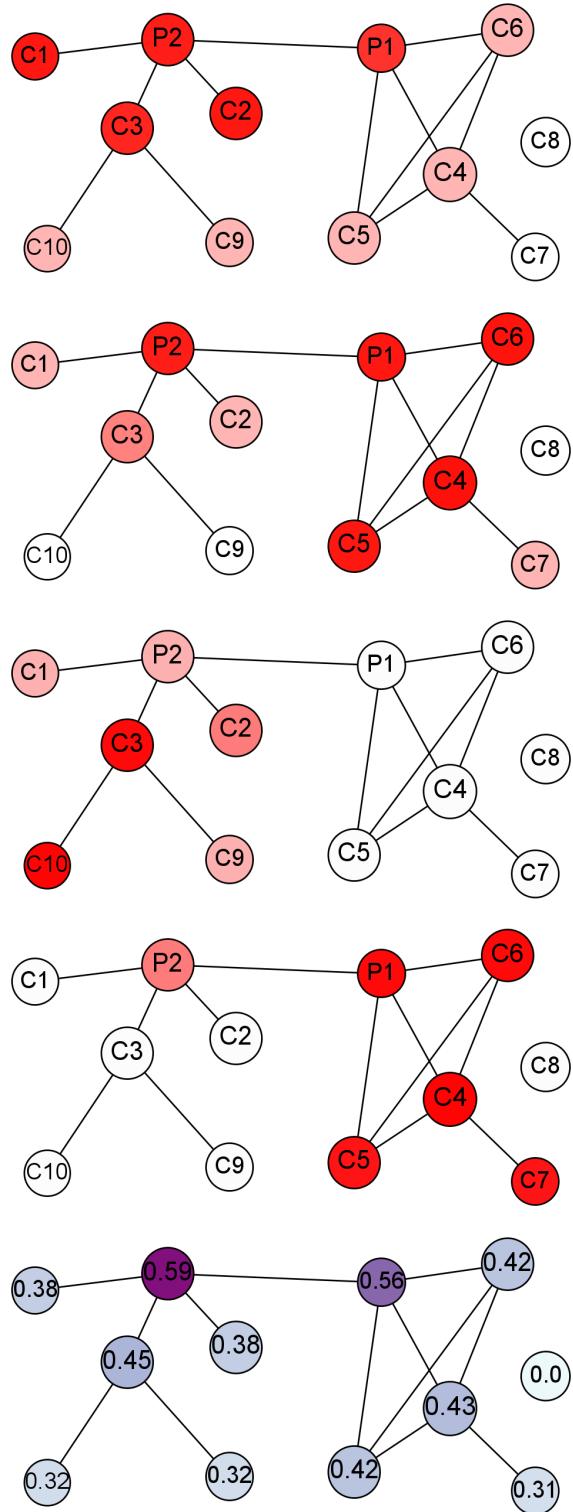


Figure 2: **Hypothesis 3:** Coalition formation when the identity of patrons is unknown. The top four plots illustrate the preferred coalitions of P2, P1, C10, and C4, respectively. The last plot summarizes the results of all possible thought experiments using closeness centrality (equal to the number on each actor). Individuals that have a larger probability of joining any coalition have a darker hue of purple.

coalition just by looking at his or her position in the network.

The simulations in Keller (2014) show that this probability correlates quite closely with a measure for network centrality, **closeness centrality**. Closeness or information centrality is technically defined as the inverse of the sum of distances to all other individuals on the closest possible path.<sup>13</sup> Highly closeness central individuals are most likely to be the preferred coalition partner of the unknown patron(s):

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

The bottom of figure 2 shows the most closeness central individuals in a dark shade of purple. The number on each node are the values of the undirected, normalized closeness centrality measure.

Simulations of two competing leaders forming coalitions help shed a light on who might be a suitable leader: betweenness central actors (summarized in the bottom image of figure 3). Betweenness centrality is calculated by examining all possible pairs of individuals, determining which is the shortest connecting path between each of the pairs, and counting on how many such shortest paths each node sits.<sup>14</sup> To understand how this helps a potential leader, consider the most betweenness central actor, P2: in the top image, he faces the most formidable challenger, P1, the second most betweenness central individual. But the latter could at most recruit the four actors to the left. The same is true if any of C4-7 were to challenge him. On the other side of the network, C3 is in the best position to challenge him, but will be joined only by two other individuals. Within P2's immediate surroundings, there is thus no-one who could successfully challenge him - and he is the most powerful among his potential allies.

Depending on the density and shape of the network, such a clear leadership position may not always exist. But more betweenness central individuals will have an advantage

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<sup>13</sup>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).

<sup>14</sup>Betweenness centrality of a node  $p_k$  is defined as  $C_B(p_k) = \sum_i^n \sum_{j < i} \frac{g_{ij}(p_k)}{g_{ij}}$ , 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).

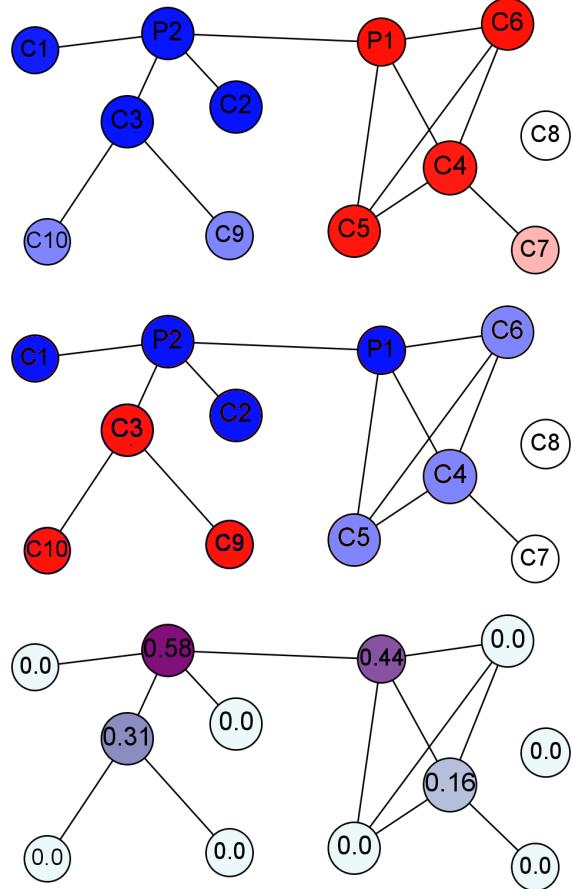


Figure 3: **Hypothesis 4:** High betweenness centrality (indicated by a higher number and darker shade of purple in the plot on the bottom) are the hallmark of hard-to-dislodge coalition leaders. P2 can form a majority coalition members of either side of the network. No other individual can form a larger coalition - the top and middle plot show attempts by the most promising opposition leaders.

over less betweenness central actors when trying to maintain the leadership position among their coalition, because they are positioned between their internal competitors and other coalition members that the competitors could recruit. It has been shown in other social settings that such positions allow individuals to manipulate or withhold information, or extract a brokerage premium (Burt (1995)'s "structural holes"). Another way of looking at betweenness centrality in this setting is that such leaders are able to play off different parts of the network against each other, an ability often associated with leaders that manage to stay in power for a long period of time. P2's position may thus resemble Mao Zedong's in Huang (2006)'s account of how the chairman used purges to remain the only figure with both strong connections within the party and to different military factions.

Betweenness centrality can therefore explain how patrons can maintain informal power even if they do no hold formal positions (anymore): if other elites are aware of their network position, they may not even try to challenge them, and will instead seek their council whenever they need to form a coalition to push through a specific policy. Hypothesis 4 is thus:

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

I am aware that even my extended model of Bueno de Mesquita et al. (2003) is a simplification that captures only part of what little we know about the actual process of selecting the next Politburo and its Standing Committee. It apparently resembles a bargaining among (some of the) current and past office holders (Nathan and Gilley, 2003) in which personal ties are only one of many factors. However, the purpose of a model is not to reproduce reality perfectly, but to help us understand one aspect of it. The illustrations above have hopefully helped to show how abstract network concepts can be linked to real-life elite constellations occurring, for instance, in the Chinese Communist Party's Central Committee, the selectorate examined below.

## 4 The Chinese Communist Party and its Central Committee

I start my examination of the Chinese Communist Party's selectorate with the 12th Central Committee (CC) elected in 1982, 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. For the period after 1982, experts largely agree that the current and former members of the Chinese Communist Party's Central Committee (CC), who appoint the Politburo and its Standing Committee, contain the relevant political elites (Shih et al., 2012).<sup>15</sup>

The CCP's Central Committee, officially the highest authority in the party, is elected every five years by now more than two thousand party members, the delegates of the National Congress. While there are about 10-15% more candidates than the 200 regular and 150 alternate seats available, this election is hardly democratic: the delegates and the candidates go through a complicated vetting process steered from above. There is a high turnover: only about a third of the members are re-elected after five years (Li, 2012c). The Central Committee meets about seven times for plenary sessions, and most of its members simultaneously hold one or several top positions in the party or the government at the center or in the provinces.

The Central Committee appoints the about 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. While the public has been at least partially informed about the proceedings and decisions of the National Party Congress and the Central Committee, the deeds of the Politburo and PSC have remained opaque. In fact, "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). This has not

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<sup>15</sup>The CCP increasingly includes businessmen in their ranks, and high-ranking officials have used their political clout to succeed in the market. At least the economic elite connected to state-owned enterprises is thus also well-represented among the CC members.

changed under Xi Jinping (Miller, 2015). The Politburo meets about every month, the PSC possibly every week, and decides by near consensus instead of majority vote. The General Secretary, the leader of the party who is always a member of the PSC, appears to have more influence, also due to his agenda-setting capacity (Miller, 2004). PSC members are appointed to some of the highest positions in the party and the government (e.g. CPC General Secretary, President, Premier) and hold those posts simultaneously. Reshuffling of positions shortly before the election of a new Central Committee is not uncommon, but occurs also after the first session. Regardless of how their decisions are made, few would dispute that the Politburo and especially its Standing Committee contains some of the most powerful figures in the *de facto* only party in Mainland China.<sup>16</sup>

## 5 Measuring the informal network

### 5.1 Creating the network based on promotions

Informal relations are rarely public knowledge - so how to measure them? Scholars have suggested common provincial origin, familial ties, shared ethnicity or past experience, as well as common workplace, as possible basis for the formation of informal connections (Guo, 2001). In this study, I focus on instances of cowork and promotions. China watchers regularly use shared work experience and promotions as arguments for why a particular individual belongs to a specific faction, or why an individual follows the lead of a more senior party member (Li, 2002; Opper and Brehm, 2007; Pye, 1995). Higher-ranking cadres, in particular the party secretaries, are known to wield considerable influence in the promotion procedure (Gong, 2008; Sun, 2008). And while not all cadres of a unit may like each other (as critics have noted), a promotion should at least indicate that the higher-ranking individual is not strictly opposed to the promoted individual. Testing different methods for constructing patronage networks among Chinese elites, Keller (2015) has found that ties between co-workers best capture the phenomenon, but that the duration of the co-work experience or the occurrence of a promotion can further

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<sup>16</sup>Note, however, that Miller (2004, 3) claims that in the early 1980s, the Party Secretariat had acquired considerable decision-making power under then-general secretary Hu Yaobang, who was afterwards accused of having abused his position.

refine the inference. The results presented in the validity section of the online appendix support this conclusion. There I also show that hailing from the same province or having attended the same university or college as a patron does not improve one's chances of being appointed to the Politburo (table 6).

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 individuals that are members of the Central Committee between 1982 and 2012 and check if (a) they have ever served in the same bureaucratic unit, and if (b) the lower-ranking individual has been promoted within the same unit during that period. If this is the case, I propose that a directed link from the lower to the higher-ranking individual was formed at latest at the time when the promotion occurred. In other words, I assume that the higher-ranking official has either supported or at least not prevented the lower-ranking individual's advance in the hierarchy.<sup>17</sup>

I do not imply that those promotions are due to corrupt practices, on the contrary: one of the tasks assigned to high-level cadres is talent-spotting. It is thus even very likely that superiors promote subordinates because of their abilities - be it to gain a capable supporter or for the greater good of the party. Either way, those promoted are likely to retain a positive attitude toward the discoverer, given the opacity of the selection procedure.

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<sup>17</sup>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.

## 5.2 Summary statistics

The result of the process is a network for each Central Committee, containing the current alternate and full Central Committee members (which includes current Politburo and Politburo Standing Committee members), as well as all former Politburo Standing Committee members. The latter are included because observers agree that such high-ranking CCP members often remain important actors despite their retirement. The results are robust to contracting the set of relevant elites and constructing the network among the current Central Committee only, or expanding it to include all former Politburo members (see tables 7, 9, and 8 in the online appendix).

The size of the networks vary between 293 (13th CC) and 395 (18th CC) nodes (individuals), with 500 and 1117 edges (ties).<sup>18</sup> CC members do get promoted in their simultaneously held regular jobs during their 5 year term, and a handful individuals pass away or get purged from the Party, but the largest changes in the network occur at the end of each term, because of the turnover of up to 60%. I therefore measure the network only every five years at the beginning of a new term.

Figure 4 shows the network in 2007 among current members of the 17th Central Committee members. It is fairly typical for the networks after the 1980s (see figures 9, 10, and 11 in the online appendix): there is one large component that connects the vast majority of CC members, a considerable number of isolates (members disconnected from everyone else) and at best a few smaller components. The layout algorithm employed 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 large component is made up of the civilian cadres (left) and a smaller, densely connected cluster of military cadres to the right. These two clusters become more clearly discernible over time, but the two parts remain connected, with the Secretary General forming part of the bridge between them.

In figure 4, future Politburo (orange) and Politburo Standing Committee members (red) are all located on the main component and tend to occupy central positions: they

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<sup>18</sup>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. I therefore treat the network as binary.

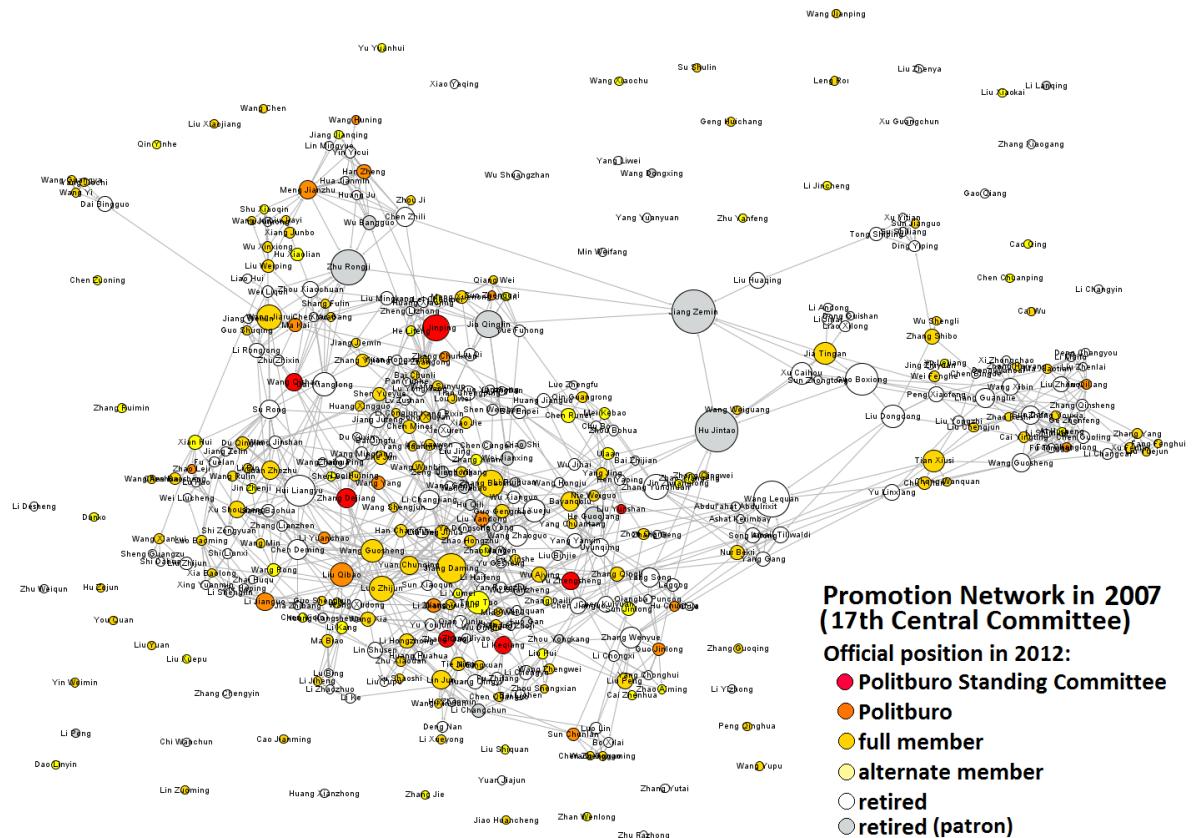


Figure 4: The promotion network among Central Committee members in 2007. Color according to position held five years later: PSC members in red, Politburo in orange, full CC members in yellow, alternate members in pale yellow. White nodes are members that are not part of the Central Committee in 2012 anymore, usually because they have reached retirement age. Size of nodes proportional to betweenness centrality. Layout: Force Atlas as implemented in gephi.

are either located towards the middle of the network (Liu Yunshan, Liu Yandong, Yu Zhengsheng) or occupy strategic positions between parts of the network (Wang Qishan or Meng Jianzhu). The latter is also true for some of the powerful individuals about to retire in white (such as Wang Lequan, or Guo Boxiong) and the future retired patrons (grey), such as Secretary General Hu Jintao. The latter and his predecessor, Jiang Zemin, are the most betweenness central individuals, and thus likely the most powerful patrons.

### 5.3 Mismeasurement, endogeneity, and possible confounders

Any analysis of the effect of informal networks has to address at least two concerns: network mismeasurement and endogeneity. As far as the former is concerned, I have chosen the measurement that is least likely to from suffer systematic bias (see discussion in [Keller \(2015\)](#)). In a section of the online appendix dedicated to validity, I provide additional evidence that the promotion network indeed captures the true network. I show that it displays the sort of characteristics that we would be expected from expert narratives: individuals hailing from the same province, alumni from the same universities, and with similar experience during the civil war, are more likely to be connected. The same is true for members of factions as identified by experts.

Still, there maybe mismeasurement. Some individuals may have been promoted without any help of the superior they are tied to in the network. There are probably also dyads without a tie that nevertheless share a deep connection formed outside workplace.<sup>19</sup> To confirm that this just creates random noise and not bias, I conduct simulations and show that the results hold even if up to 10% of the connections were included or left out by mistake (see figures [13](#) and [14](#) in the online appendix).

The problem of endogeneity is a more complex task. Conducting experiments with authoritarian elites is clearly not feasible. Plausible random treatment assignments for a quasi-experimental setup are also hard to come by.<sup>20</sup> A common concern in SNA is that individuals may attain a powerful position because they are well-connected, or because

<sup>19</sup>Note, however, that career data actually is uniquely suited source to capture a large part of the environment in which this particular set of elites could have formed informal ties. Unlike most other country's political elites, Chinese political elites do indeed spent most of their lives with each other in the government and party institutions documented in those CVs.

<sup>20</sup>The most promising approach would probably involve taking advantage of unexpected, accidental deaths, which are rare among current Chinese elites.

others anticipate their success and therefore try to establish ties with them. Promising candidates for top leadership positions may be known several years in advance, and are often assigned to advantageous or challenging posts to test their mettle (Zhang, 2009). This is thus a valid concern.

The first step I take to address this problem is to limit the scope of the investigation to the final career stage, taking the network as given. The research question is only how top elites, defined as those individuals able to influence the selection of a country's leader (the Central Committee), become part of the winning coalition (the Politburo). Note that tie formation at this final stage is severely restricted. It is true that office-selling scandals have revealed considerable discretion on the part of direct superiors, especially the party secretaries on different levels, in determining promotions in their units (Gong, 2008; Zhu, 2008). But Central Committee members, like all other bureaucrats, cannot simply switch job position to serve under a Politburo Standing Committee member in the hope of gaining him as a patron. They likely do form other kinds of network through exchanges of favors at this stage, but these would not show up in the promotion network. To take into consideration such additional ties formed, I use simulations to show that the results are robust even if the actors form up to 10% additional, unmeasured ties (figure 14).

To further reduce the possibility of 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 more (temporally) distant confounders, such as gender or ethnicity, the time elite's joined the party or their level of education.

An important confounder is age: older officials are more likely to be appointed to the Politburo because of their experience, and could have accumulated connections during their long career even without consciously engaging in patronage. The former effect is not linear, because older officials are also closer to the age limits introduced since the 1980s (Kou and Tsai, 2014). I thus include age, as well as its square and cube, as co-variates in the basic model in table 1. Li and Walder (2001) find that the timing of the decision to enter the party can influence promotion, with an early entry signaling loyalty. But neither length of party membership nor age has a robustly significant effect. However,

the time spent in the Central Committee does, with which both are correlated.

Minorities and women have traditionally been underrepresented in the Party’s more influential bodies. Their status might hinder both their ability to form connections and lower their chances of entering the inner circle. Minorities indeed turn out to be significantly less likely to be elected into the Politburo.

The party leadership has become increasingly educated, and having a bachelor if not master degree has become a prerequisite for many higher-level positions. I include dummies for the educational levels “postgraduate” and “high school and below”, with the most common category “college” left out as the baseline. Both dummies seem to have a negative effect, but only a lack of college education significantly decreases the chance of entering the Politburo.

The latter has sometimes been taken as meritocratic element in the selection process. China scholars have analyzed promotions and appointments in the CCP mainly in the framework of “meritocracy vs patronage” ([Shih et al., 2012](#); [Li and Zhou, 2005](#)). Provincial performance measures like GDP growth, tax collection, or even social development indicators have often been used as a proxy for merit.

This question is not at the center of this study, however, because its setup is not very suitable for providing a definite answer. Firstly, only 134 Central Committee members in the whole dataset serve concurrently in regional positions in which their performance could be reflected in the outcome of their province. It is therefore not surprising that neither GDP growth nor fiscal revenue figures have a significant positive effect on the chance of a Politburo appointment in my analysis. Their inclusion does not change the main results, however.<sup>21</sup> Secondly and more importantly, merit and connectedness cannot be separated conceptually nor in their measurement. Individuals may accumulate ties because they have a talent for networking or pre-existing ties, or because talented individuals make for useful clients. Thus the number of connections a CC member accumulates over the course of their career likely measures both patronage and talent.

But even if it is not the goal of this paper to adjudicate between those two theories, I will include covariates that proxy at least imperfectly for ability. The main goal of these more proximate covariates, however, is to account for the “mechanical” accumulation

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<sup>21</sup>The data are from [Shih et al. \(2012\)](#) with missing values imputed.

of ties in the course of a career. Individuals will have ties simply because of the way a promotion network is constructed from the data. Every promotion creates a tie with superiors, even if they did not intervene in the process. Talented individuals that are promoted often would thus appear to accumulate ties with many superiors. Having risen to high-level positions, these prodigies will mechanically accumulate connections to anyone promoted under them, again increasing their connectedness. Finally, promising young cadres are often rotated quickly, giving them opportunity to gain variegated job experiences, a process that may also mechanically increase their ties. The level of connectedness in a promotion network may thus capture the effect of some unmeasured characteristic which facilitated both their early career and increases their chance of inclusion in the inner circle.

The second set of confounders tested in table 2 thus tries to control for this unmeasured characteristics and the automatic accumulation of ties. At the same time, the covariates also measure formal aspects of the candidate’s career path that are often used to assess his or her chances of receiving a Politburo or Politburo Standing Committee position (Nathan and Gilley, 2003). As it turns out, only one factor seems to have a robustly significant effect on Politburo appointment: work experience in a provincial administration. Including the covariates does reduce the effect of the main results somewhat, but not below conventional levels of significance. That is unsurprising, because budding leaders may have been given the chance to gather such variegated experience exactly because they already had connections.

## 6 Results

### 6.1 The effect of direct ties

This section discusses the results of testing the hypotheses proposed in section 3 by estimating a hazard model: having entered the Central Committee, each member is at “risk” of being appointed to the Politburo (PB) in each of the following five year periods, until he or she is appointed or 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. With two exceptions (Zeng Qinghong and Tan Shaowen), new Politburo members used to be Central Committee members in the previous time period. The pool of eligible candidates are thus all Central Committee members that are not in the Politburo.<sup>22</sup> The main independent variable of interest are the different network positions in the previous Central Committee five years earlier.

The first model includes only the covariates, and is discussed above. The second model in table 1 examines simply if having a connection to a patron<sup>23</sup> increases the chance of joining the Politburo in the future. I also include two other dummies that are available in the data set and capture 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. This status could provide advantages when trying to secure a seat in the Politburo and when forming ties, as supervisors might try to ingratiate themselves with the parents of the princeling or the patron of the secretary.

The model shows that princelings and clients of patrons indeed profit from their connection. But personal secretaries are not significantly more likely to be appointed in most models. With only 42 such *mishu* in the dataset, this may be due to the rather restrictive definition of personal secretary employed by Shih et al. (2012).

As is always the case with in non-linear regressions, the size of the coefficients cannot be interpreted directly, but simulations show that the effect is quite substantial. An average princeling Central Committee member has a 13.6% chance of entering the Politburo, a regular party member only 5.7%. This is similar to the effect of having a patron, which increases the chances by 7.4 percentage points. These effects are thus quite sizeable, and it is unsurprising that observers have spotted this pattern without the help of statistical analysis. It also raises the confidence that our “promotion ties” do indeed measure something meaningful.

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: Figure 5 illustrates the exact effect of different numbers of patrons on the chance

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<sup>22</sup>The patrons, who are either current or past members of a subset of the Politburo (the Politburo Standing Committee, PSC) are therefore also not eligible candidates.

<sup>23</sup>Individuals become valid patrons in the year when they first enter the Politburo Standing Committee and cease to be so only with their death.

| DV: app. to Politburo         | Model 1           | Model 2           | Model 3           | Model 4           | Model 5           | Model 6           |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| (Intercept)                   | -43.96<br>(89.13) | -38.60<br>(91.32) | -36.51<br>(91.14) | -39.63<br>(91.46) | -36.99<br>(90.42) | -49.24<br>(92.18) |
| high school or less           | -1.03<br>(0.69)   | -1.26<br>(0.74)   | -1.25<br>(0.74)   | -1.25<br>(0.74)   | -1.00<br>(0.71)   | -1.20<br>(0.74)   |
| postgraduate                  | -0.25<br>(0.31)   | -0.41<br>(0.32)   | -0.41<br>(0.32)   | -0.43<br>(0.32)   | -0.41<br>(0.32)   | -0.53<br>(0.33)   |
| minority                      | -2.39*<br>(1.02)  | -2.32*<br>(1.02)  | -2.31*<br>(1.02)  | -2.31*<br>(1.02)  | -2.27*<br>(1.02)  | -2.20*<br>(1.03)  |
| male                          | 1.11<br>(0.64)    | 1.09<br>(0.64)    | 1.10<br>(0.64)    | 1.15<br>(0.65)    | 0.83<br>(0.63)    | 1.07<br>(0.67)    |
| has patron                    |                   | 0.94**<br>(0.32)  |                   |                   |                   |                   |
| was mishu                     |                   | 0.37<br>(0.46)    | 0.37<br>(0.46)    | 0.38<br>(0.46)    | 0.32<br>(0.46)    | 0.32<br>(0.47)    |
| (personal secretary)          |                   |                   |                   |                   |                   |                   |
| princeling                    |                   | 0.92*<br>(0.42)   | 0.92*<br>(0.42)   | 0.91*<br>(0.42)   | 0.92*<br>(0.42)   | 0.83*<br>(0.43)   |
| # of patrons                  |                   |                   | 1.11*<br>(0.52)   |                   |                   | 0.71**<br>(0.24)  |
| # of patrons <sup>2</sup>     |                   |                   | -0.26<br>(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 subordinates)          |                   |                   |                   |                   | (0.06)            | (0.06)            |
| out-degree (# of              |                   |                   |                   |                   | -0.06             | -0.12*            |
| former superiors)             |                   |                   |                   |                   | (0.05)            | (0.06)            |
| time in party, <sup>2,3</sup> | ✓                 | ✓                 | ✓                 | ✓                 | ✓                 | ✓                 |
| age, <sup>2,3</sup>           | ✓                 | ✓                 | ✓                 | ✓                 | ✓                 | ✓                 |
| time, <sup>2,3</sup> in CC    | ✓***              | ✓***              | ✓***              | ✓***              | ✓*                | ✓*                |
| Indep. var. lag:              | 1 period          |
| AIC                           | 477.89            | 470.77            | 473.15            | 474.87            | 467.98            | 461.73            |
| BIC                           | 546.03            | 553.51            | 560.75            | 562.47            | 555.58            | 554.20            |
| Log Likelihood                | -224.95           | -218.38           | -218.57           | -219.44           | -215.99           | -211.87           |
| Num. obs.                     | 960               | 960               | 960               | 960               | 960               | 960               |

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , · $p < 0.1$

Table 1: Logistic regression with duration, dependent variable: appointment to Politburo from among the Central Committee members. Standard errors in parentheses.

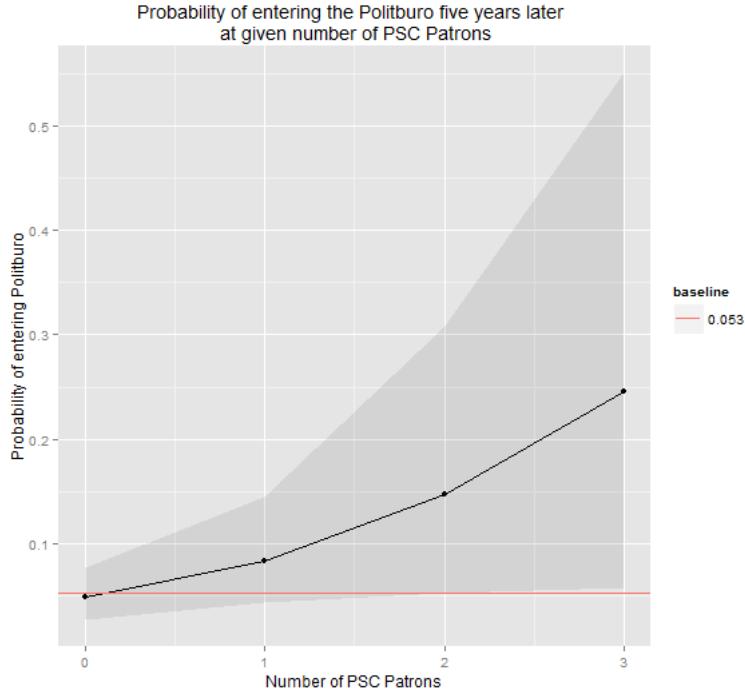


Figure 5: The chance for an otherwise “average” Central Committee member being appointed to the Politburo five years later as a function of the number of ties to current and former Politburo Standing Committee members. The red line indicates the baseline chance of being appointed (5.2%). The model used is that in column 3 of table 1, all other covariates held at mean, 95% confidence interval indicated by shaded area.

of being appointed to the Politburo five years later. The influence of patronage is again considerable: while the chance of an individual without PSC patron is less than the average of about 5%, it more than doubles to almost 8% with one patron, and attains more than 15% with two patrons. The same effect is even stronger if the patron in question is or was the General Secretary.

One can even further differentiate between two forms of ties that a Central Committee member can have with his or her patron. Either the patron used to be the superior who helped to promote him or her, or the patron was a former subordinate. Both kind of ties have a positive effect in model 4, but only the former is significant. This difference may simply be due to the fact that the latter are quite rare.

What about connections to non-patrons, to one’s own “power base”? Column 5 adds the number of former subordinates whose promotion a given member has overseen (in-degree) and the number of former bosses under whom he or she has been promoted

(out-degree) among all other Central Committee members. The combined number of such connections turns out to be a highly significant predictor, but the positive effect is due to the number of promoted subordinates.

But this does not mean that the patronage effect found above masks a broader connection effect, as the results of the combined model in column 6 shows. Both the number of patrons, as well as the number of ties to other elites remain significant, and contribute to an increased likelihood of a Politburo appointment in the next time period. Figure 6 illustrates the effect size for a given size of the power base of former subordinates. An additional such tie does not increase the chance of entering the inner circle as much as an additional tie to a patron. Still, elites who have overseen the promotion of six colleagues roughly double their chance of a Politburo appointment over their average peers with only two such ties. Former superiors, to whom the individual may still owe loyalty, however, do not have any additional benefits.

An example for an individual with a strong network among peers before his appointment to the Politburo in 2002 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, seven former subordinates promoted under him, and eight of his former superiors were among the Central Committee at that time. Most of the latter were members of Shandong's Provincial Standing Committee when Yu was first made Deputy and then Party Secretary of Shandong's capital, Qingdao. This included another future PSC member, He Guoqiang, and future Politburo member Wang Lequan, but also less important elites who retired in the decade afterwards. As the online appendix shows (figure 16), this group of supporters forms a clearly visible cluster or clique. Observers have only noted a "disproportional representation of leaders from the east coast" under Jiang and Hu (Li, 2014), but it looks like this group formed a small faction that was Yu's stepping stone for his eventual rise to the Politburo Standing Committee in 2012.

By the time they enter the Central Committee, elites have experienced a distinguished career, which has allowed them to accumulate connections, but also valuable leadership experience. According to the official account of the CCP, it is the latter that determines an appointment to the Politburo. The models in table 2 therefore try to control for these

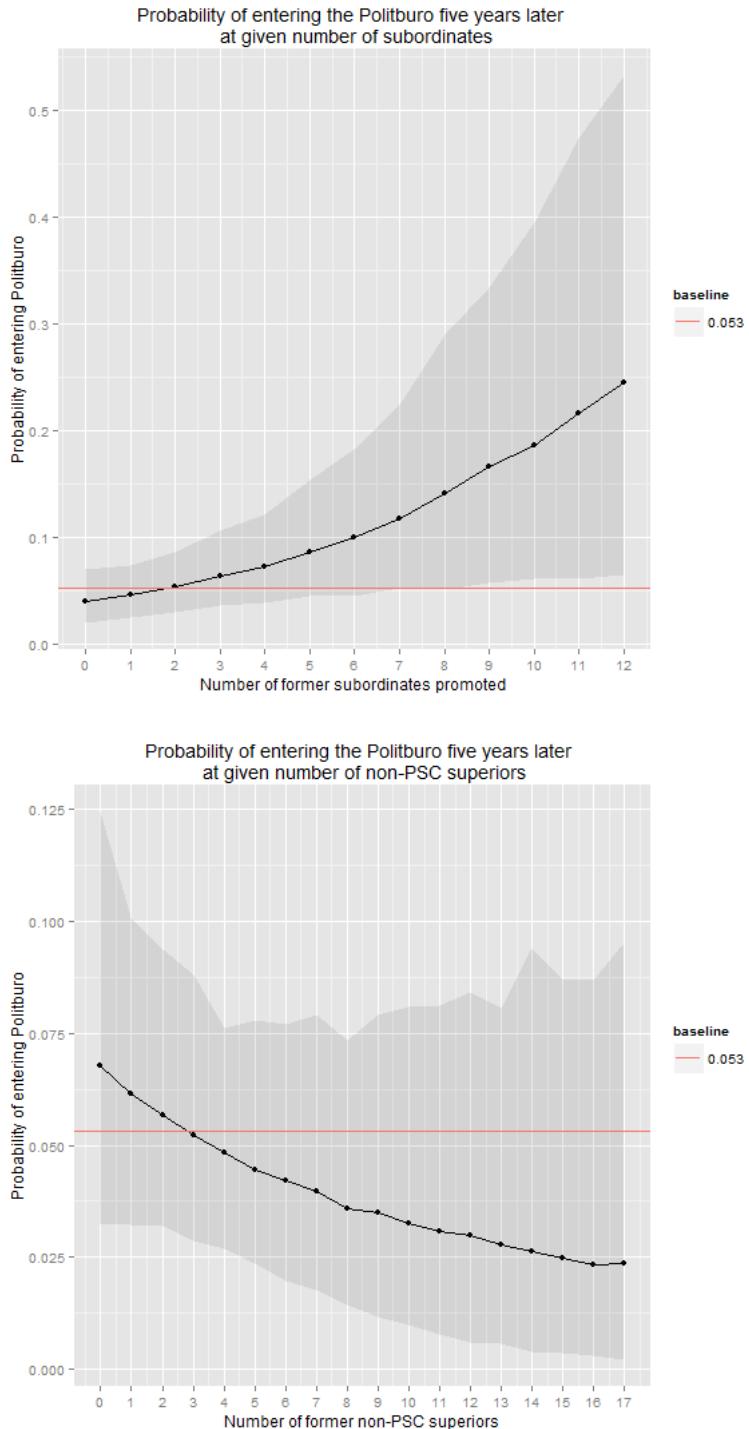


Figure 6: The chance for an “average” Central Committee member being appointed to the Politburo five years later as a function of the number of ties to former subordinates (top) and former bosses (bottom) who were involved in promotions and are currently also members of the Central Committee. The red 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.

formal criteria and attainments.

In the promotion network, ties are created when individuals are promoted within the same unit. Individuals who have experienced many such promotions should therefore be expected to have more ties. If their promotions were mainly due to some unmeasured ability which also helps them enter the inner circle, then this may confound the effect of the informal network. However, I do not find any such effect in model 1 of table 2.

Experience at the very center of power, in the Organization Department responsible for appointments or the Party Secretariat, might grant the candidate specific insights: they may 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. Secretariat experience indeed appears to be helpful, but the coefficient loses significance once other covariates are included, presumably because only more experienced cadres are appointed to work at the Secretariat.

Diverse work experience is clearly an important criteria for appointments to the inner circle, but not one that is easy to measure. The number of different positions an individual has held in their career so far is one possible proxy. It turns out to have a significantly positive effect on the chance of entering the Politburo in model 3, but loses significance once work experience at the center is accounted for.

Experience in one or more provinces, preferably at the helm of the local government or party, is also a desirable qualification. But apparently, experience in one such local unit is enough (model 4). The same is often said about work experience at the center in Beijing, but the coefficient in model 5 is not significant. Finally, holding several positions at the same time may grant the possibility of helping more subordinates advance, and may be a sign of current or promise of future power. The coefficient is not significant either, however.

Including covariates measuring formal criteria and positions reduces the significance of the network variables somewhat - indicating that the right connections may well allow a greater accumulation of “merit” as measured in work experience. This is consistent with the observation that elites with special connections to a patron can expect greater mobility and accumulate a more diverse work experience. But the informal network retains a significant influence on the chance of entering the inner circle. At the same

| DV: app. to Politburo                   | Model 1           | Model 2           | Model 3          | Model 4          | Model 5          | Model 6          |
|---|-------------------|-------------------|------------------|------------------|------------------|------------------|
| high school or less                     | -1.20<br>(0.74)   | -1.26<br>(0.77)   | -1.31<br>(0.78)  | -1.34<br>(0.78)  | -1.32<br>(0.78)  | -1.26<br>(0.78)  |
| postgraduate                            | -0.53<br>(0.33)   | -0.52<br>(0.34)   | -0.53<br>(0.33)  | -0.53<br>(0.34)  | -0.53<br>(0.34)  | -0.53<br>(0.34)  |
| minority                                | -2.20*<br>(1.03)  | -2.11*<br>(1.03)  | -2.08*<br>(1.03) | -2.23*<br>(1.03) | -2.22*<br>(1.03) | -2.20*<br>(1.03) |
| male                                    | 1.05<br>(0.67)    | 1.02<br>(0.66)    | 1.02<br>(0.66)   | 1.20<br>(0.67)   | 1.23<br>(0.67)   | 1.20<br>(0.67)   |
| was mishu<br>(personal secretary)       | 0.32<br>(0.46)    | 0.23<br>(0.47)    | 0.17<br>(0.47)   | 0.19<br>(0.47)   | 0.20<br>(0.47)   | 0.27<br>(0.48)   |
| princeling                              | 0.85<br>(0.44)    | 0.83<br>(0.44)    | 0.70<br>(0.45)   | 0.77<br>(0.46)   | 0.75<br>(0.46)   | 0.75<br>(0.46)   |
| # of Patrons                            | 0.72**<br>(0.24)  | 0.67**<br>(0.24)  | 0.62*<br>(0.24)  | 0.61*<br>(0.24)  | 0.57*<br>(0.24)  | 0.58*<br>(0.24)  |
| in-degree (# of<br>former subordinates) | 0.22***<br>(0.06) | 0.21***<br>(0.06) | 0.18**<br>(0.06) | 0.17*<br>(0.07)  | 0.16*<br>(0.07)  | 0.17*<br>(0.07)  |
| out-degree (# of<br>former superiors)   | -0.14*<br>(0.06)  | -0.12<br>(0.07)   | -0.10<br>(0.06)  | -0.09<br>(0.07)  | -0.09<br>(0.07)  | -0.08<br>(0.07)  |
| # of promotions                         | 0.06<br>(0.16)    | 0.04<br>(0.16)    | -0.12<br>(0.18)  | -0.16<br>(0.18)  | -0.11<br>(0.18)  | -0.09<br>(0.18)  |
| worked in OrgDep                        |                   | -0.50<br>(1.24)   | -0.69<br>(1.21)  | -0.86<br>(1.26)  | -0.89<br>(1.24)  | -0.94<br>(1.23)  |
| worked in Secretariat                   |                   | 1.43**<br>(0.52)  | 0.95<br>(0.57)   | 0.86<br>(0.58)   | 0.85<br>(0.57)   | 0.73<br>(0.58)   |
| # of positions held                     |                   |                   | 0.17*<br>(0.07)  | 0.19*<br>(0.08)  | 0.14<br>(0.09)   | 0.09<br>(0.10)   |
| worked in 1 prov.                       |                   |                   |                  | 0.86<br>(0.49)   | 0.98*<br>(0.50)  | 0.99*<br>(0.50)  |
| worked in 2+ prov.                      |                   |                   |                  | 0.35<br>(0.53)   | 0.56<br>(0.56)   | 0.57<br>(0.56)   |
| worked at center                        |                   |                   |                  |                  | 0.43<br>(0.35)   | 0.46<br>(0.35)   |
| # of current positions                  |                   |                   |                  |                  |                  | 0.25<br>(0.20)   |
| time in party, <sup>2,3</sup>           | ✓                 | ✓                 | ✓                | ✓                | ✓                | ✓                |
| age, <sup>2,3</sup>                     | ✓                 | ✓                 | ✓                | ✓                | ✓                | ✓                |
| time, <sup>2,3</sup> in CC              | ✓***              | ✓***              | ✓***             | ✓***             | ✓*               | ✓*               |
| Indep. var. lag:                        | 1 period          | 1 period          | 1 period         | 1 period         | 1 period         | 1 period         |
| AIC                                     | 463.62            | 460.81            | 457.70           | 456.77           | 457.24           | 457.70           |
| BIC                                     | 560.95            | 567.88            | 569.64           | 578.44           | 583.78           | 589.11           |
| Num. obs.                               | 960               | 960               | 960              | 960              | 960              | 960              |

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , · $p < 0.1$

Table 2: Logistic regression with duration, dependent variable: appointment to Politburo from among the Central Committee members. Standard errors in parentheses. Constant omitted to save space.

time, almost none of the formal criteria appear to have an effect.

To further support the evidence in favor of hypothesis 1 and 2, I conduct a series of robustness checks in the online appendix. Experts on factional politics often claim that common provincial origin or having graduated from the same college or university also create patronage ties. But as I show in table 6, these sort of ties do not increase the chance of a Politburo appointment. I argue in the appendix that this should not surprise us: such commonalities may facilitate the formation of promotion ties early in their career, but are unlikely to sway leaders on their own at a later stage.

Observers have worried that publicly available data is too coarse to measure informal relationship, pointing out that coworkers can also grow to dislike each other. This is why I examine coworker ties that have been “confirmed” by a promotion only. But using simulations, I also show that the coefficients on the number of patrons and on indegree would remain positive even if up to 10% of the ties were not measured correctly, or if elites form a similar percentage of other ties not captured in my promotion network (tables 13 and 14). Finally, one may argue whether the circle of relevant elites should be defined more narrowly - limiting it to current Central Committee members only - or more broadly - including not just former PSC members, but also former Politburo or even all former Central Committee members. None of this changes the basic results, however (table 7).

## 6.2 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 everyone who held an important position once is able to cling to power afterward - see the recent trial of former PSC member Zhou Yongkang. Also, the holder of the highest official title is not necessarily the most influential figure: Deng Xiaoping famously never moved above being official number 3 in the party hierarchy. Is it still possible to predict who might rise in the party hierarchy or become a member of the inner circle if we do not know the identity of the current “powers that be”?

Figure 7 plots the distribution of *closeness centrality* (i.e. “popularity as a coalition partner”) of Central Committee members, grouped according to their position five years later. The future Politburo members are on average more closeness central than peers

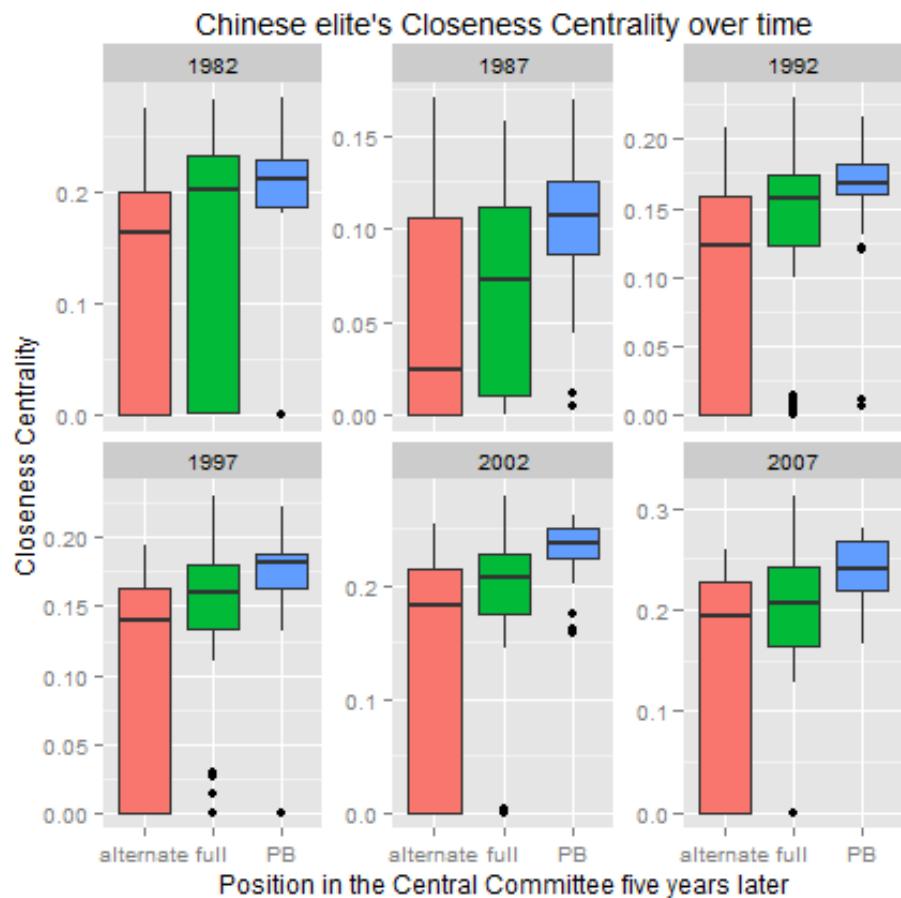


Figure 7: The distribution of CC member's closeness centrality by their position five years later. Future alternate members are less central than full members, which in turn are more peripheral than future Politburo members.

who remain ordinary Central Committee members. This initial assessment is confirmed by results of the hazard model in column 1 of table 3, in which variables that require identifying influential individuals through some other means (i.e. the variables “number of patrons”, “personal secretary” or “princeling”) have been replaced by closeness centrality. Being close to other elites along network ties remains important even after controlling for formal positions held (model 2), and remains a significant predictor for appointment to the Politburo up to 10 years ahead (model 3).<sup>24</sup>

Different measures of network centrality are often highly correlated. Model 4 therefore tests if it is really closeness centrality that matters, or if another, possibly less complex measure, such as indegree (the number of connections) would perform better. Because of multicollinearity, the significance level of the closeness centrality’s coefficient is reduced to 10%. But the other network centrality measures don’t even reach this level. The fact that closeness centrality wins this horse race against indegree (which by itself is also a significant predictor) indicates the importance of a network approach that takes into consideration indirect ties and overall position in the network, and not just the direct connections measured in indegree.

An illustrative example for the importance of indirect connections is Li Keqiang, the current Premier, in 2002, five years before he was directly appointed to the Politburo’s Standing Committee. Li is often thought to be a member of the Youth League Faction headed by Hu Jintao (Bo, 2014). But in the promotion network, he is not directly connected to Hu Jintao. However, they share an indirect connection through Song Defu, under whom Li Keqiang became first Secretary of the Communist Youth League 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” (Li, 2012a) Ling Jihua, who became director of the office of the Youth League Secretariat under him in 1988. The network approaches’ indirect connections therefore allow us to discern Li Keqiang’s closeness to Hu. More importantly, even though Li has only 6 direct connections in 2002 (barely above the average), he is 17th in terms of closeness centrality among those young enough to be eligible for a Politburo

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<sup>24</sup>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 seems to pose a problem for empirical models only if the dependent variable is interdependent, while the same phenomenon in the independent variable is not problematic, if one is willing to make certain assumptions (Butts, 2008).

| Dep. Variable:                                   | PB 1              | PB 2              | PB 3                | PB 4              | Patron 1           | Patron 2           |
|--|-------------------|-------------------|---------------------|-------------------|--------------------|--------------------|
| (Intercept)                                      | -36.15<br>(90.28) | -36.51<br>(95.04) | 207.66<br>(112.50)  | -45.74<br>(96.70) | 79.83<br>(1044.00) | 63.09<br>(1037.51) |
| high school or less                              | -1.10<br>(0.71)   | -1.19<br>(0.76)   | -1.66<br>(1.26)     | -1.11<br>(0.76)   | -1.05*<br>(0.52)   | -1.03*<br>(0.54)   |
| postgraduate                                     | -0.46<br>(0.32)   | -0.50<br>(0.33)   | -0.35<br>(0.43)     | -0.51<br>(0.34)   | -0.16<br>(0.49)    | -0.06<br>(0.51)    |
| minority   | -2.45*<br>(1.02)  | -2.35*<br>(1.03)  | -2.14*<br>(1.05)    | -2.26*<br>(1.03)  | -17.16<br>(890.57) | -17.40<br>(871.56) |
| male   | 1.04<br>(0.63)    | 1.28<br>(0.65)    | 0.78<br>(0.68)      | 1.18<br>(0.65)    | 16.74<br>(1043.43) | 16.59<br>(1036.89) |
| # of promotions                                  |                   | -0.24<br>(0.16)   | -0.30<br>(0.25)     | -0.15<br>(0.18)   | 0.47***<br>(0.13)  | 0.59***<br>(0.15)  |
| worked in OrgDep                                 |                   | -1.07<br>(1.22)   | -18.62<br>(6029.07) | -0.94<br>(1.23)   | 0.78<br>(0.55)     | 0.74<br>(0.55)     |
| worked in Secretariat                            |                   | 0.75<br>(0.57)    | 0.08<br>(1.09)      | 0.75<br>(0.58)    | 0.85*<br>(0.37)    | 0.91*<br>(0.39)    |
| # of positions held                              |                   | 0.11<br>(0.09)    | 0.20<br>(0.15)      | 0.09<br>(0.10)    | 0.14<br>(0.07)     | 0.10<br>(0.07)     |
| worked in 1 prov.                                |                   | 1.00*<br>(0.49)   | 0.83<br>(0.64)      | 0.82<br>(0.50)    | 1.99*<br>(0.82)    | 1.85*<br>(0.80)    |
| worked in 2+ prov.                               |                   | 0.61<br>(0.54)    | 0.37<br>(0.73)      | 0.36<br>(0.56)    | 1.57*<br>(0.82)    | 1.65*<br>(0.82)    |
| worked in center                                 |                   | 0.59<br>(0.35)    | 0.30<br>(0.47)      | 0.53<br>(0.35)    | 1.32*<br>(0.63)    | 1.30*<br>(0.64)    |
| # of current positions                           |                   | 0.25<br>(0.20)    | -0.38<br>(0.33)     | 0.26<br>(0.20)    | 0.08<br>(0.11)     | 0.12<br>(0.12)     |
| closeness centrality<br>("coalition popularity") | 5.73**<br>(1.92)  | 4.79*<br>(2.19)   | 5.68*<br>(2.89)     | 4.76*<br>(2.63)   |                    | -4.59<br>(3.57)    |
| in-degree (# of<br>former subordinates)          |                   |                   |                     | 0.11<br>(0.07)    |                    | 0.05<br>(0.07)     |
| out-degree (# of<br>former superiors)            |                   |                   |                     | -0.07<br>(0.07)   |                    | -0.28*<br>(0.13)   |
| betweenness centrality<br>("strategic position") |                   |                   |                     | 3.98<br>(29.91)   | 35.91*<br>(17.42)  | 46.60*<br>(19.85)  |
| time in party, <sup>2,3</sup>                    | ✓                 | ✓                 | ✓                   | ✓                 | ✓*                 | ✓*                 |
| age, <sup>2,3</sup>                              | ✓                 | ✓                 | ✓                   | ✓                 | ✓                  | ✓                  |
| time, <sup>2,3</sup> in CC                       | ✓**               | ✓**               | ✓                   | ✓*                | ✓***               | ✓***               |
| Indep. var. lag:                                 | 1 period          | 1 period          | 2 periods           | 1 period          | none               | none               |
| AIC  | 469.86            | 458.04            | 269.20              | 460.12            | 344.69             | 339.19             |
| BIC  | 542.86            | 569.98            | 356.43              | 586.66            | 478.06             | 489.96             |
| Num. obs.  | 960               | 960               | 328                 | 960               | 2438               | 2438               |

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , . $p < 0.1$

Table 3: 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.

position five years later. He may owe his advancement less to specific direct ties, but to his central position relatively close to several patrons in the network (as shown in figure 15 in the online appendix).

Li is thus a prime example for the general rule state in hypothesis 3: being central in an informal elite network - in the sense of being the preferred coalition member of many elites - does indeed increase the chances of entering the inner circle. As column 3 has shown, this applies even for someone who is still a decade away from reaching the top.

This is of course not to say that closeness centrality or direct connections can explain all appointments to the Politburo. Four relatively well-known elites with few connections and low centrality five years before entering the Politburo are Jiang Zemin, Li Peng, Zhou Yongkang, and Bo Xilai. In the case of Jiang, who unexpectedly became General Secretary after the Tian'anmen protest - two years after entering the Politburo in 1987 - this may have been intentional. Deng Xiaoping could have (rightfully) suspected that the newly appointed General Secretary Zhao Ziyang would turn out to be just as headstrong as his disgraced predecessor Hu Yaobang, and may have been on the lookout for a less powerful and more pliable backup. The case of Li Peng's appointment can be explained by his status as adopted son of Zhou Enlai, the probably most important historical CCP leader after Mao Zedong. The same could be true for Bo Xilai, whose father Bo Yibo was one of the "Eight Immortals", the eight party elders thought to have wielded power behind the scenes during the 1980s and 1990s. But maybe Bo Xilai's low centrality score reflects exactly the lack of support that led to his downfall five years after his father's death and his appointment in 2007. Zhou Yongkang, finally, had neither promotion ties to patrons nor to peers five years before his appointment in 2002. Even in the following decade he remained barely above average in terms of closeness centrality, and ranked clearly below his fellow patrons in terms of betweenness centrality discussed below. One could thus speculate that his relatively weak position in the informal network presages his eventual downfall.

Model 5 and 6 in table 3, finally, tests hypothesis 4. The dependent variable in this case is patron status, measured as current or former membership in the innermost circle, the Politburo Standing Committee. Betweenness centrality is indeed a significant identifier, and remains so even if other centrality measures are added in model 6. Also

significant, but negatively, is out-degree. This may be due to the patron's age: most of their former superiors have passed away, and have therefore been removed from the network.

The results in column 5 and 6 thus confirm that patrons occupy strategic parts of the network and form the bridges that connect different elite groups. They are individuals surrounded by weaker elites dependent on them, and use those supporters to suppress opposition within the inner circle. Also, as the negative coefficient on out-degree demonstrates, they tend to be at the top of the food chain and not beholden to anyone else. This combination grants them informal power even after their retirement.

In the online appendix, I subject the results of table 3 to similar robustness checks as those for hypothesis 1 and 2. The results hold even if 10% of the ties are added or removed at random (i.e. even if there is some level of mismeasurement of ties) or with alternative definitions of the relevant elites.<sup>25</sup>

One could of course argue that in the model there is only one leader, and therefore betweenness should only matter for the consecutive General Secretaries or whoever else is the paramount leader at the time. Figure 8 plots their betweenness centrality over time. Except for the first two periods under examination, the current Party Secretary is indeed the most or second most powerful individual, and remains a very important figure even after retirement. Jiang Zemin is the second most central figure in 1992, and the most central 5 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 many current or former PSC members (black lines), although there are also some regular Central Committee members (grey lines). The latter are often PLA officers in the Central Military Commission (CMC) who, through their connection with the Party Secretary (who is usually the CMC chairman) also form bridges between the military and the civilian cluster (see the position of Guo Boxiong or Xu Caihou in figure 4).<sup>26</sup>

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<sup>25</sup>The only exception is the result on betweenness centrality in the network that contains all current and former Central Committee members (column 3 in table 9). It is a significant predictor if some covariates that are very strong direct proxies for PSC membership are removed, however.

<sup>26</sup>While betweenness centrality is in a sense an estimate of informal power, there is no standard way of constructing a confidence interval around it. To give some idea how robust these measures are, figures

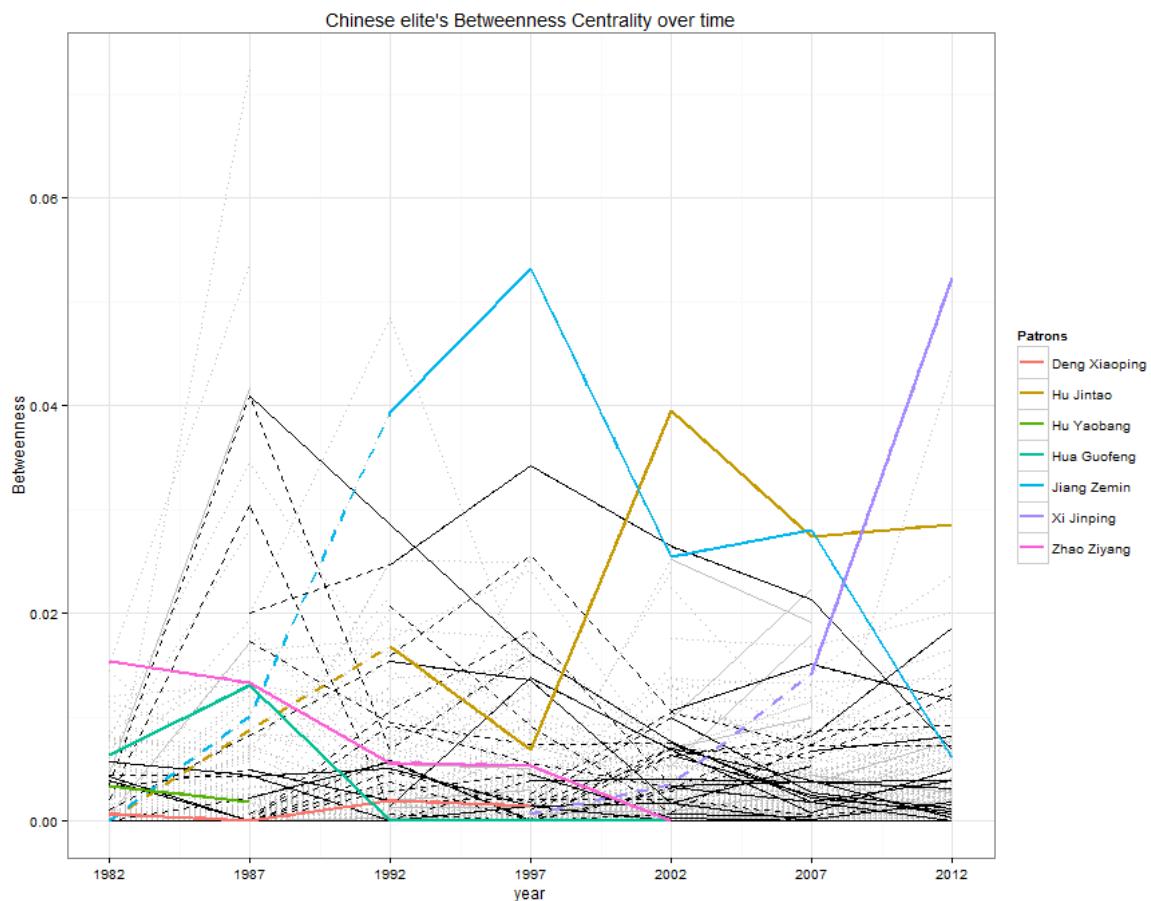


Figure 8: Betweenness centrality of Chinese political elites. Grey lines indicate regular CC and Politburo members. Black lines indicate PSC members, and colored lines indicate current and former Party Secretaries, as well as Deng Xiaoping.

Things are less clear during the unstable 1980s: 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 among the most central figures, but neither is the actual paramount leader, Deng Xiaoping. Maybe the network model suggested in section 3 is not applicable to a period still under the shadow of the tumultuous Cultural Revolution. The more likely explanation is probably that the promotion network does not capture all the relevant ties in that period: many of the elites active during that time had fought together during the civil war. These very powerful connections are not necessarily captured in our network based on their later bureaucratic career.

Finally, note that there is no significant positive association between patron status and the number of former subordinates (indegree) or the combined number of direct connections (indegree + outdegree), neither by itself nor with betweenness centrality added in column 6 in table 3. Only if one does at least differentiate between connections to subordinates and superiors do simple direct connections help to identify patrons. This again points to the weakness of a non-network approach. Studies like Shih et al. (2010)'s attempt at estimating the respective strengths of incumbents and contenders in the Chinese Communist Party could thus potentially profit from the more nuanced network approach.

The results in table 3 finally 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. In other words: it does not just matter who you are connected to, but also who your connections are connected to - and what their overall position in the network is.

## 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

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<sup>17</sup> and <sup>18</sup> display the centrality of the patrons if 10% of ties are removed or added at random.

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 process among the selectorate, determining the composition of a regime's inner circle.

In that process, I have discussed some of the weaknesses and possible biases in the research on patronage in China, which has limited itself to examining the effect of direct ties between clients and patrons. But it is worth examining the relationships between all relevant elites: while being connected to a patron does indeed double the chance of entering the inner circle five years later, being well-connected among one's peers in general (i.e having a "power base") is also beneficial - as long as they are subordinates, and not former bosses outside the inner circle, who might be perceived as competition to the patrons.

I have also shown that more complex network measures are useful when we do not know the identity of the patrons. *Closeness centrality* - a measure of how popular an individual is as a coalition partner - is significantly associated with being appointed to the Politburo as far as ten years ahead. Another network measure, *betweenness centrality*, marks stable leaders, and explains how such patrons may exert influence even if they do not hold high-level official positions anymore.

It would be interesting to explore how these effects vary over different time periods. This would require extending the time period under examination further back in history, however, in order to expand the relatively small sample size (there are only 73 appointments to the Politburo, and 28 patrons). Such an extension may also allow to explore system-wide effects, for example how properties of the network itself affect regime stability. This could then serve as a starting point for exploring the effect of informal networks on more than just elite appointments.

Finally, it should also be noted that the model is limited to examining the effect of informal networks on the appointment to the regime's inner circle from among the selectorate. How informal networks help elites enter the selectorate or how they form those networks is not the focus of this research. It is, however, an aspect that would be worthy of more than a passing examination in the online appendix.

The network model of coalition formation developed in this paper has a broader applicability than the case and time period examined in this study. The network positions singled out as important in the model will likely have a similar effect whenever informal connections play a role in the formation of coalitions. The findings may thus even have some relevance to regimes with stronger formal institutions, such as established Western democracies, or outside the political realm - for example for appointments in board rooms or company leadership. The relevant connections or the appropriate way of measuring them may vary, however. Future comparative studies will thus need to carefully consider their sources in order to conduct appropriate comparisons.

But with this initial study, I hope to have demonstrated that social network analysis can help shed light on important questions that have puzzled researchers of regimes with weak institutionalization. Our interest in informal networks should go beyond asking the question “who is well-connected?” to “...and who are their connections connected to? What kind of connections are we talking about? And how do they matter?”

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# A Online Appendix

## A.1 Summary Statistics

| Variables                     | N   | min | max    | mean    | std.dev |
|-------------------------------|-----|-----|--------|---------|---------|
| appointment to Politburo (DV) | 970 | 0   | 1.000  | 0.0722  | 0.2589  |
| male                          | 970 | 0   | 1.000  | 0.9062  | 0.2917  |
| princeling                    | 970 | 0   | 1.000  | 0.0536  | 0.2254  |
| # of positions held           | 970 | 0   | 17.000 | 4.5608  | 2.2567  |
| experience in Org. Department | 970 | 0   | 1.000  | 0.0144  | 0.1193  |
| experience in Secretariat     | 970 | 0   | 1.000  | 0.0258  | 0.1585  |
| # of previous promotions      | 970 | 0   | 5.000  | 1.3196  | 1.0041  |
| # of current positions held   | 970 | 0   | 5.000  | 1.4031  | 0.6764  |
| # of patrons (subordinates)   | 970 | 0   | 1.000  | 0.0093  | 0.0959  |
| # of patrons (superiors)      | 970 | 0   | 5.000  | 0.1474  | 0.4742  |
| betweenness centrality        | 970 | 0   | 0.048  | 0.0023  | 0.0045  |
| in-degree                     | 970 | 0   | 12.000 | 1.8990  | 2.1593  |
| out-degree                    | 970 | 0   | 18.000 | 2.8237  | 2.9931  |
| closeness centrality          | 970 | 0   | 0.313  | 0.1378  | 0.0875  |
| time in CC                    | 970 | 0   | 7.000  | 0.6041  | 0.9355  |
| # of patrons (province ties)  | 970 | 0   | 3.000  | 0.9093  | 0.8512  |
| # of patrons (school ties)    | 970 | 0   | 6.000  | 1.6134  | 1.6938  |
| # of patrons                  | 970 | 0   | 5.000  | 0.1567  | 0.4810  |
| age                           | 970 | 38  | 71.000 | 53.2742 | 4.9554  |
| time since joining party      | 960 | 7   | 54.000 | 30.4750 | 7.4320  |
| minority                      | 970 | 0   | 1.000  | 0.1216  | 0.3270  |
| highschool                    | 970 | 0   | 1.000  | 0.0784  | 0.2689  |
| postgraduate                  | 970 | 0   | 1.000  | 0.2876  | 0.4529  |
| was mishu (secretary)         | 970 | 0   | 1.000  | 0.0649  | 0.2466  |
| has patron                    | 970 | 0   | 1.000  | 0.1196  | 0.3246  |
| experience in 1 province      | 970 | 0   | 1.000  | 0.4907  | 0.5002  |
| experience in 2+ province     | 970 | 0   | 1.000  | 0.3278  | 0.4697  |
| experience at the center      | 970 | 0   | 1.000  | 0.4938  | 0.5002  |

## A.2 The promotion network in different time periods

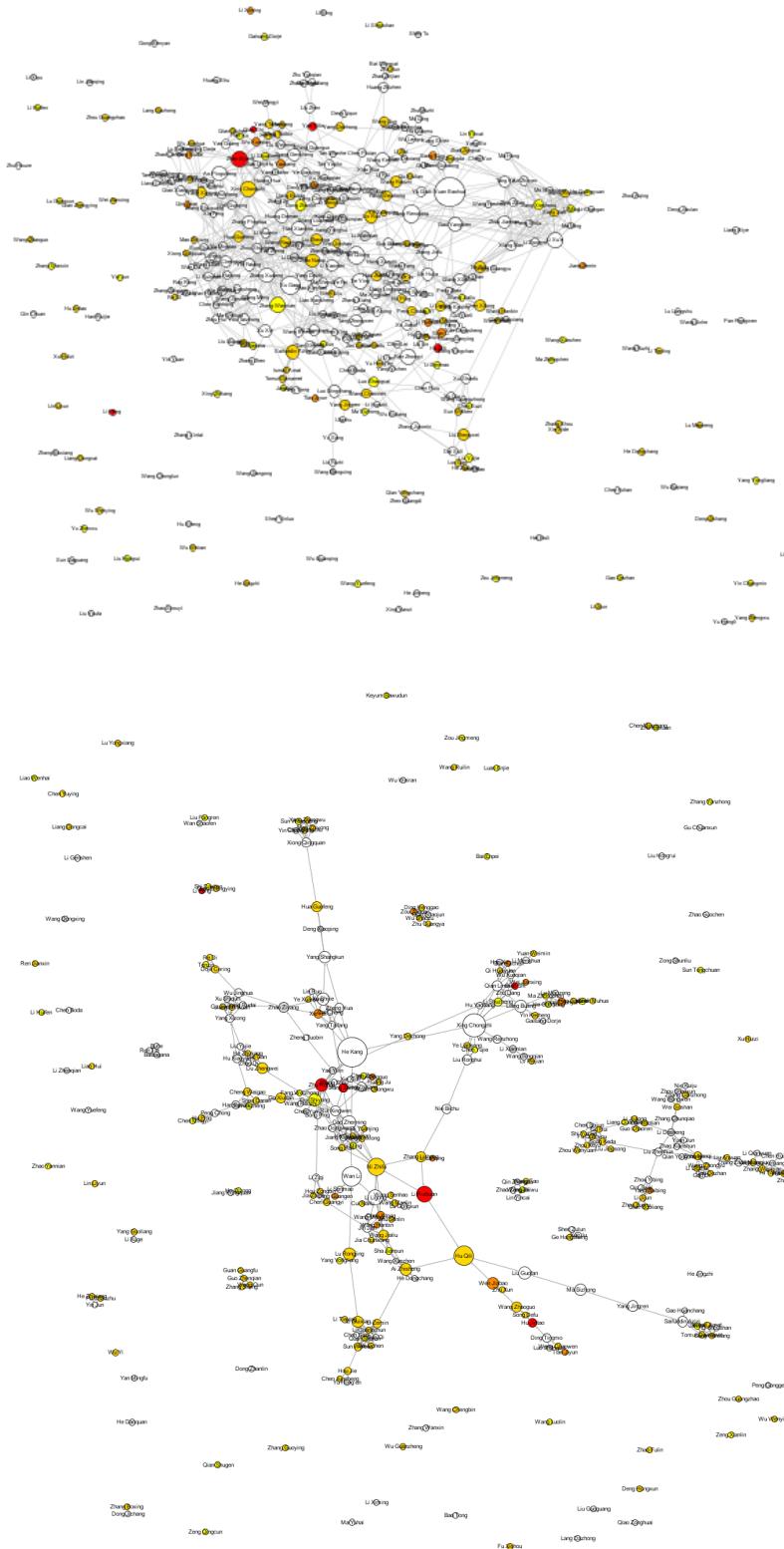


Figure 9: The promotion network among Central Committee members in 1982 (top) and 1987 (bottom). Future PSC members in red, Politburo in orange, full CC members in yellow, alternate members in pale yellow. Future retired members in white, except for those who have held PSC membership (in grey). Size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

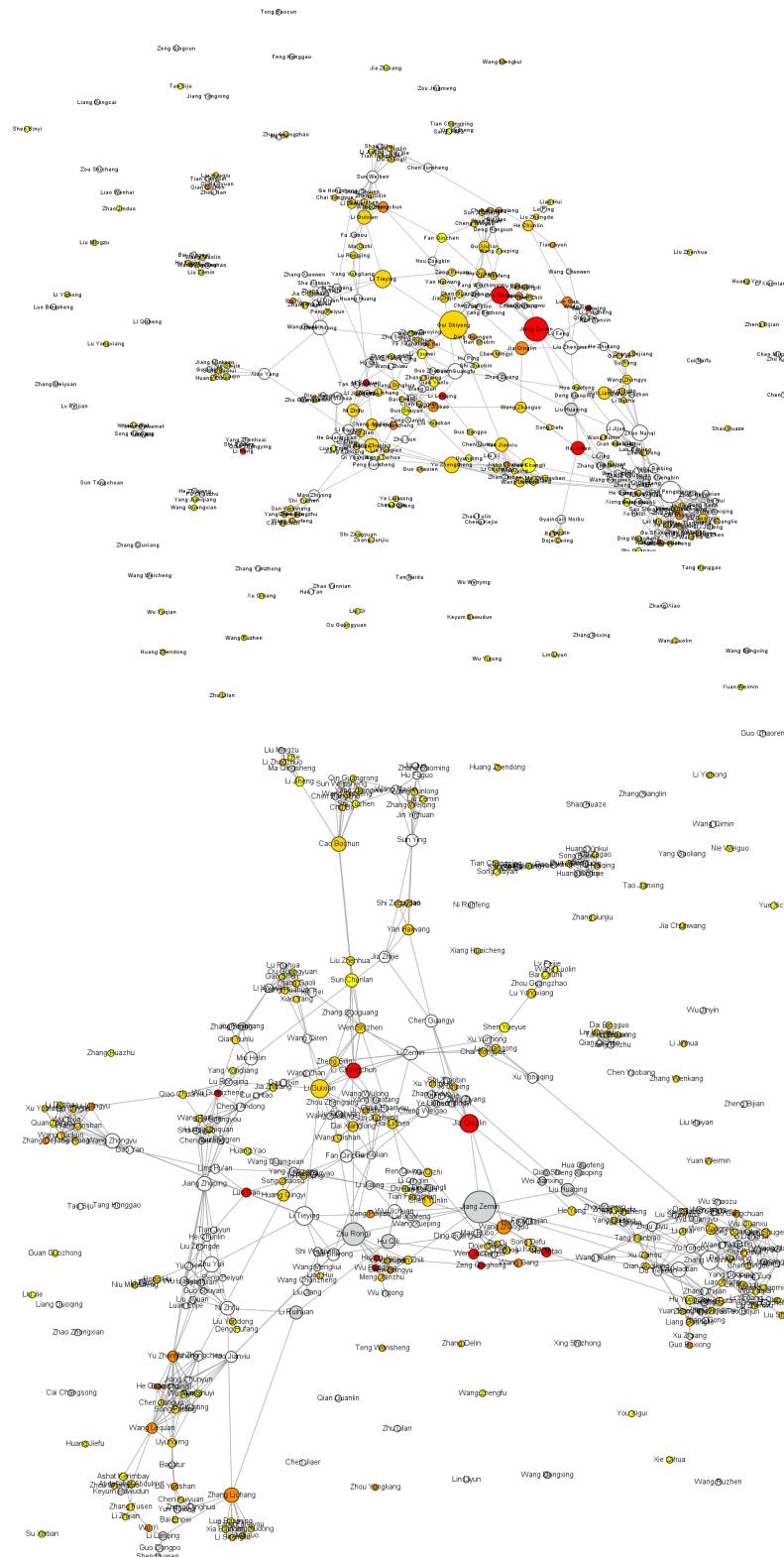


Figure 10: The promotion network among Central Committee members in 1992 (top) and 1997 (bottom). Future PSC members in red, Politburo in orange, full CC members in yellow, alternate members in pale yellow. Future retired members in white, except for those who have held PSC membership (in grey). Size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

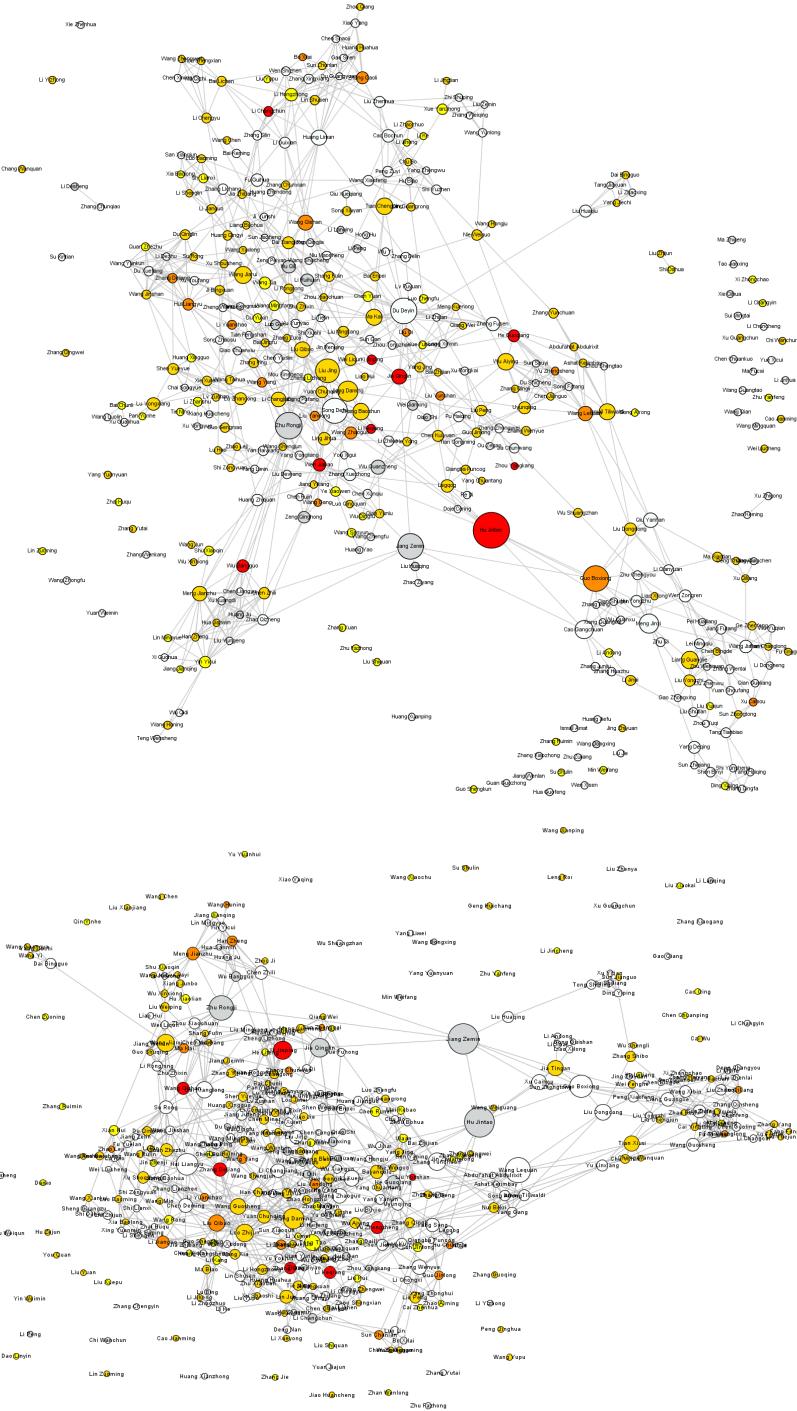


Figure 11: The promotion network among Central Committee members in 2002 (top) and 2007 (bottom). Future PSC members in red, Politburo in orange, full CC members in yellow, alternate members in pale yellow. Future retired members in white, except for those who have held PSC membership (in grey). Size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

### A.3 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, using three different tests: examining if ties in the promotion network appear to get formed in a manner consistent with qualitative accounts (1), examining if ties are more common among factions as identified by outside observers (2), and testing if 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 4 shows.<sup>27</sup> The results thus suggests that officials are more likely to have experienced a promotion when serving under an official hailing from the same province, or one who has served in the same field army or has gone through similar formative experiences during the civil war.

Another validation approach is to compare the network with expert analysis of factions 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

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<sup>27</sup>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 analysis in table 4 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.

|  |             |             |             |
|--|-------------|-------------|-------------|
| 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 4: Exponential random graph model on the promotion network among Central Committee members in 1983. 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 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. The latter could simply be a result of the fact that most minorities are only represented by one or two individuals, and their sample sizes not large enough to detect an effect.

captured in the factional analysis and in the promotion network.

In this case, however, even a simple visual inspection of the network in figure 12 reveals that members of an alleged faction do indeed cluster together: especially prominent are

## Promotion Network in 2002 (16th Central Committee)

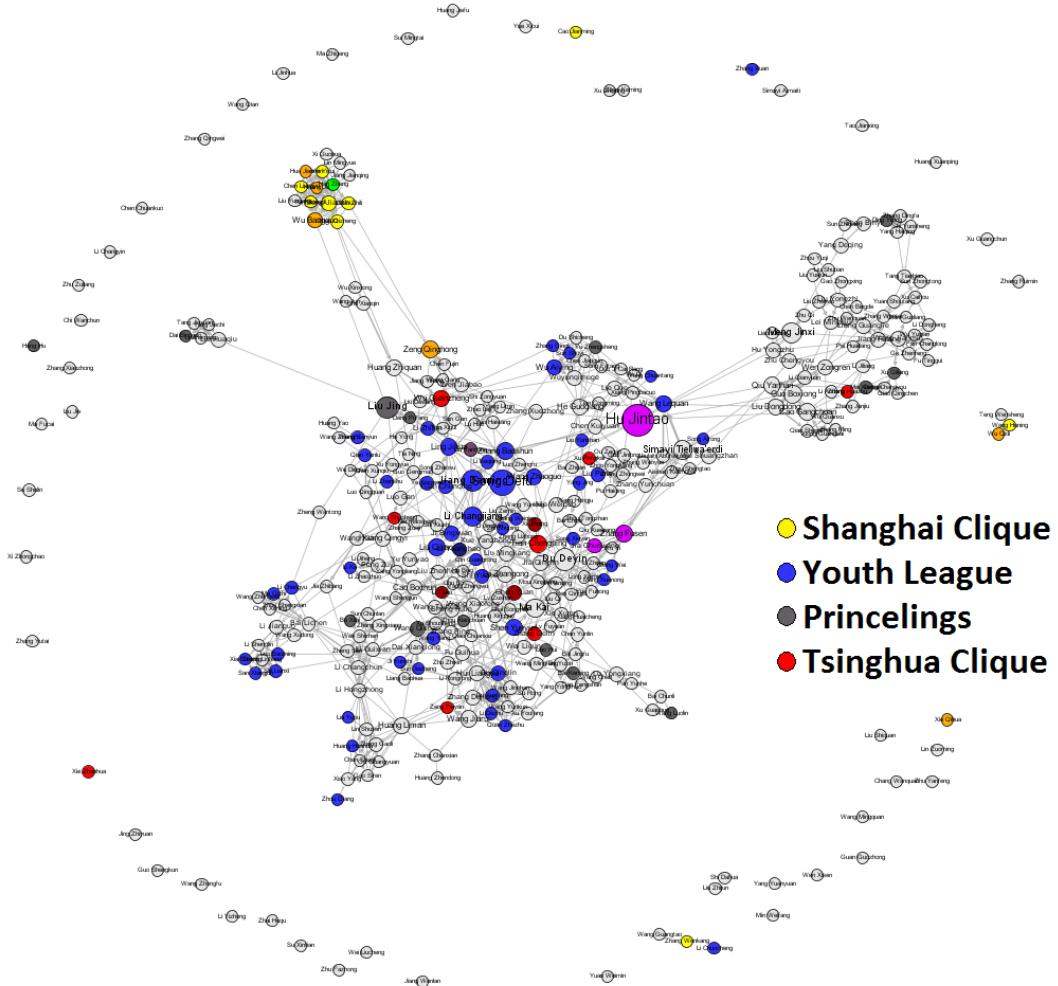


Figure 12: The promotion network among the members of the 16th Central Committee in 2002. Factional affiliation is coded according to Bo (2007) and indicated by the colors yellow (Shanghai Gang - individuals who have made a considerable part of their career in Shanghai), blue (Youth League Faction - individuals who have served in the Party's youth organization), red (Qinghua Clique - alumni of the eponymous university) and black (Princelings - descendants of earlier party leaders). Mixed colors indicate affiliation with more than one faction. Size of node proportional to betweenness centrality. Layout: Force Atlas as implemented by gephi.

the members of the Shanghai Gang at the top (yellow, orange and green), but also the blue, greyish blue and purple Youth League representatives are often connected to each other. The more disputed cliques,<sup>28</sup> the Qinghua Clique (red, dark red, purple and

<sup>28</sup>The Qinghua Clique is a discovery of Li (2001), and is not often referred to by other observers. The princelings are mentioned by many observers, but it is unclear how coherent they really are (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.

orange) and the princelings (black and dark red/blue) are less clearly discernible, but the ERGM analysis in table 5 shows that they, too, have an increased tendency to promote each other.

|                                  | 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 5: Exponential random graph model on the “promotion network” among Central Committee members in 1996, 2001, and 2006. “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. Results are the weakest for the more questionable factions, the princelings and the Qinghua Clique.

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 6.1), 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 6 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 impor-

tant, quickly become rare in the period under examination, and estimation of their effect becomes impossible after the 14th Central Committee. As there are not enough Politburo appointments in those early time periods, it is therefore not possible to test the importance of those ties in this way.

In model 1 and 2, a Central Committee member is connected to a patron (current or 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 2) or allowing for non-linear effect of the number of patrons are similar. Neither the dummy 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. These connections are thus more likely to be captured in a promotion or coworker network.

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           |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|
| (Intercept)                   | -31.57<br>(90.21) | -32.70<br>(90.05) | -33.25<br>(90.15) | -33.44<br>(90.61) |
| has Patron                    | 0.20<br>(0.30)    |                   | -0.03<br>(0.28)   |                   |
| # of Patrons                  |                   | 0.08<br>(0.16)    |                   | -0.07<br>(0.08)   |
| has served as                 | 0.36<br>(0.45)    | 0.36<br>(0.45)    | 0.37<br>(0.45)    | 0.35<br>(0.45)    |
| personal secretary            |                   |                   |                   |                   |
| princeling                    | 0.97*<br>(0.42)   | 0.97*<br>(0.42)   | 0.98*<br>(0.42)   | 1.01*<br>(0.42)   |
| high school or below          | -1.04<br>(0.70)   | -1.06<br>(0.70)   | -1.08<br>(0.72)   | -1.15<br>(0.71)   |
| postgraduate                  | -0.33<br>(0.32)   | -0.34<br>(0.32)   | -0.33<br>(0.31)   | -0.30<br>(0.31)   |
| minority                      | -2.25*<br>(1.03)  | -2.28*<br>(1.03)  | -2.35*<br>(1.02)  | -2.36*<br>(1.02)  |
| male                          | 1.02<br>(0.64)    | 1.03<br>(0.64)    | 1.02<br>(0.64)    | 1.01<br>(0.64)    |
| time in party, <sup>2,3</sup> | ✓                 | ✓                 | ✓                 | ✓                 |
| age, <sup>2,3</sup>           | ✓                 | ✓                 | ✓                 | ✓                 |
| time, <sup>2,3</sup> in CC    | ✓**               | ✓**               | ✓**               | ✓**               |
| Indep. var. lag:              | 1 period          | 1 period          | 1 period          | 1 period          |
| AIC                           | 477.94            | 478.10            | 478.38            | 477.60            |
| BIC                           | 560.68            | 560.84            | 561.12            | 560.34            |
| Num. obs.                     | 960               | 960               | 960               | 960               |

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , · $p < 0.1$

Table 6: 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 or 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 2) or allowing for non-linear effect of the number of patrons are similar.

## A.4 Robustness to connection measurement error

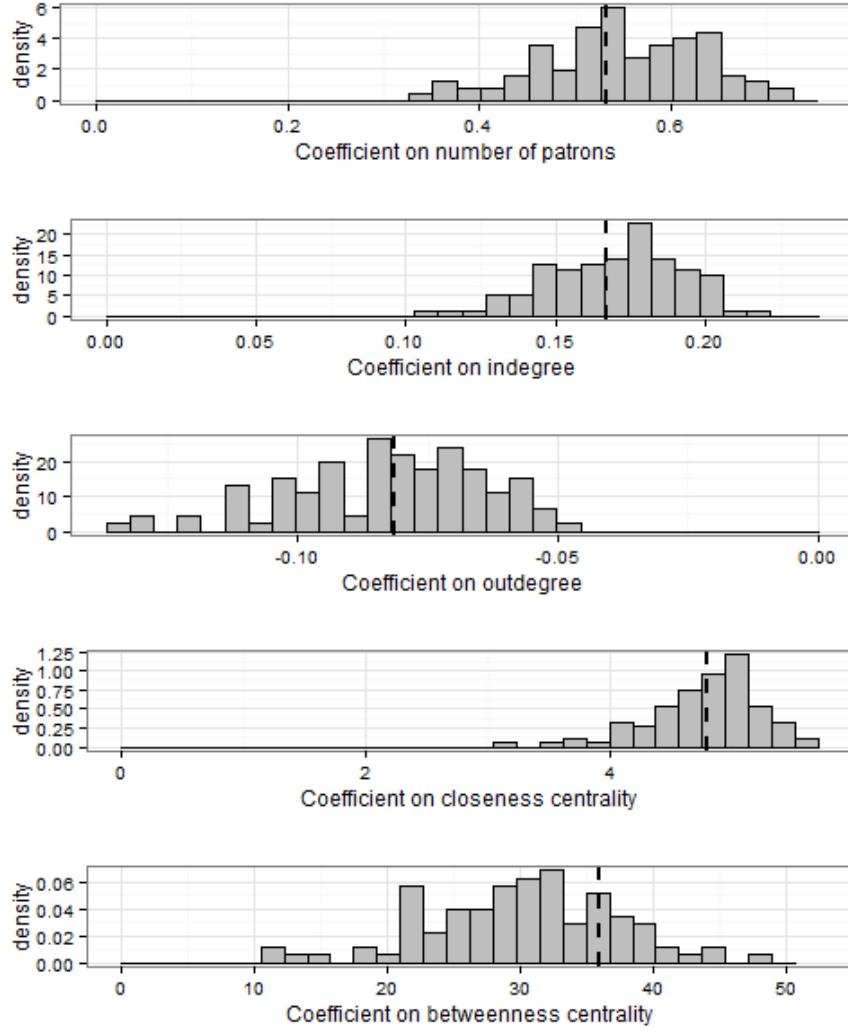


Figure 13: Robustness of main results to mismeasurement of ties. The histogram shows the size of the coefficients on the number of patrons, the number of promoted subordinates (indegree) and supervisors overseeing their promotion (outdegree) in model 6 of table 2, on closeness centrality (“coalition popularity”) in model PB3 and on betweenness centrality (“strategic position”) in model Patron1 in table 3 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.

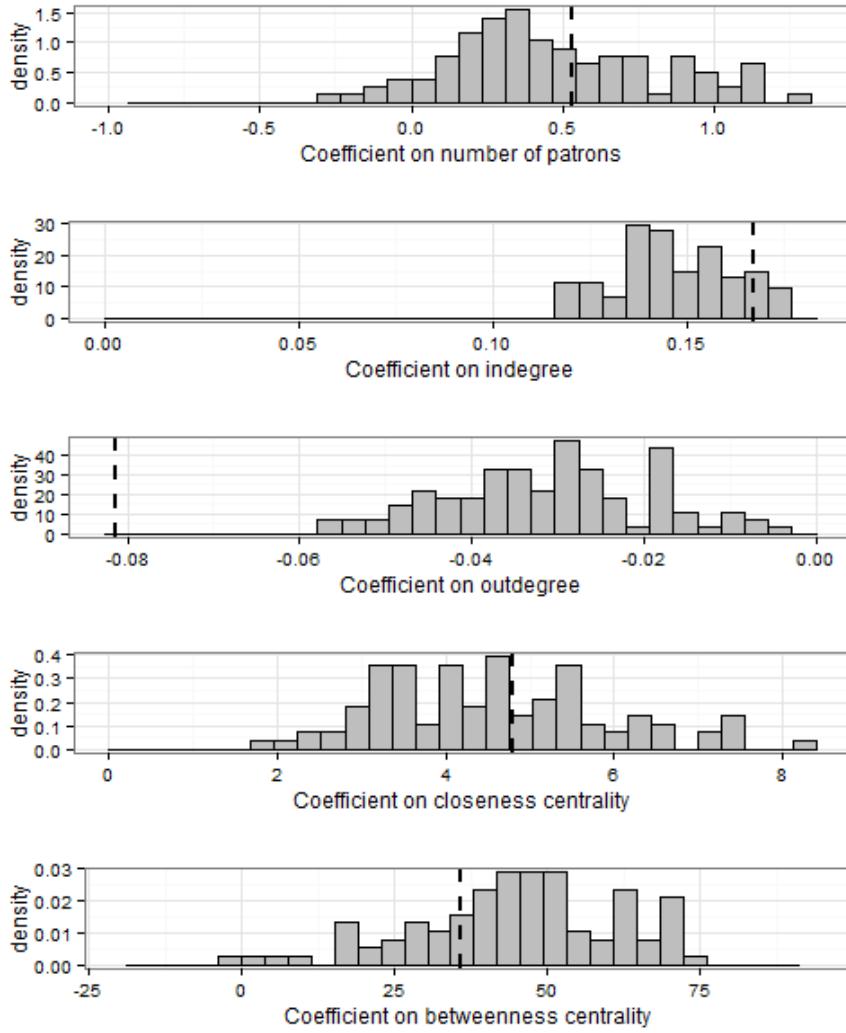


Figure 14: Robustness of main results to mismeasurement of ties. The histogram shows the size of the coefficients on the number of patrons, the number of promoted subordinates (indegree) and supervisors overseeing their promotion (outdegree) in model 6 of table 2, on closeness centrality (“coalition popularity”) in model PB2 and on betweenness centrality (“strategic position”) in model Patron1 in table 3 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.5 Robustness to alternative specification of the relevant elite

| NW with current CC               | + former PSC     | + former PB      | + former CC      | only             |
|----------------------------------|------------------|------------------|------------------|------------------|
| # of Patrons                     | 0.53*<br>(0.24)  | 0.54*<br>(0.24)  | 0.45*<br>(0.23)  | 0.49*<br>(0.23)  |
| # of former subordinates         | 0.17*<br>(0.07)  | 0.17*<br>(0.07)  | 0.12*<br>(0.06)  | 0.16*<br>(0.07)  |
| # of former superiors            | -0.08<br>(0.07)  | -0.09<br>(0.06)  | -0.02<br>(0.03)  | -0.07<br>(0.06)  |
| # of promotions                  | -0.09<br>(0.18)  | -0.08<br>(0.18)  | -0.17<br>(0.20)  | -0.11<br>(0.18)  |
| worked in OrgDep                 | -0.91<br>(1.23)  | -0.95<br>(1.24)  | -0.93<br>(1.23)  | -0.91<br>(1.23)  |
| worked in Secretariat            | 0.74<br>(0.58)   | 0.73<br>(0.58)   | 0.76<br>(0.57)   | 0.75<br>(0.58)   |
| # of positions held              | 0.09<br>(0.10)   | 0.09<br>(0.10)   | 0.10<br>(0.10)   | 0.09<br>(0.10)   |
| worked in 1 prov.                | 0.99*<br>(0.50)  | 1.00*<br>(0.50)  | 1.00*<br>(0.50)  | 0.99*<br>(0.50)  |
| worked in 2+ prov.               | 0.57<br>(0.56)   | 0.57<br>(0.56)   | 0.57<br>(0.56)   | 0.57<br>(0.56)   |
| worked in center                 | 0.46<br>(0.35)   | 0.46<br>(0.35)   | 0.49<br>(0.35)   | 0.47<br>(0.35)   |
| # of current positions           | 0.25<br>(0.20)   | 0.25<br>(0.20)   | 0.25<br>(0.20)   | 0.25<br>(0.20)   |
| has served as personal secretary | 0.25<br>(0.48)   | 0.26<br>(0.48)   | 0.26<br>(0.48)   | 0.25<br>(0.48)   |
| princeling                       | 0.74<br>(0.46)   | 0.77<br>(0.46)   | 0.69<br>(0.46)   | 0.74<br>(0.46)   |
| high school or below             | -1.29<br>(0.79)  | -1.31<br>(0.79)  | -1.49<br>(0.82)  | -1.28<br>(0.79)  |
| postgraduate                     | -0.52<br>(0.34)  | -0.51<br>(0.34)  | -0.54<br>(0.34)  | -0.52<br>(0.34)  |
| minority                         | -2.21*<br>(1.03) | -2.20*<br>(1.03) | -2.18*<br>(1.03) | -2.22*<br>(1.03) |
| male                             | 1.20<br>(0.67)   | 1.21<br>(0.67)   | 1.23<br>(0.66)   | 1.20<br>(0.67)   |
| time in party, <sup>2,3</sup>    | ✓                | ✓                | ✓                | ✓                |
| age, <sup>2,3</sup>              | ✓                | ✓                | ✓                | ✓                |
| time, <sup>2,3</sup> in CC       | ✓**              | ✓**              | ✓**              | ✓**              |
| Indep. var. lag:                 | 1 period         | 1 period         | 1 period         | 1 period         |
| AIC                              | 458.36           | 458.22           | 460.11           | 458.75           |
| BIC                              | 589.77           | 589.63           | 591.52           | 590.16           |
| Num. obs.                        | 960              | 960              | 960              | 960              |

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , · $p < 0.1$

Table 7: Robustness check for 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. Intercept not displayed to preserve space.

| NW with current CC            | + former PSC      | + former PB       | + former CC       | only              |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|
| (Intercept)                   | -36.51<br>(95.04) | -36.13<br>(95.10) | -34.90<br>(96.20) | -37.20<br>(95.28) |
| closeness centrality          | 4.79*<br>(2.19)   | 4.74*<br>(2.37)   | 5.14*<br>(2.84)   | 4.78*<br>(2.19)   |
| # of promotions               | -0.24<br>(0.16)   | -0.24<br>(0.16)   | -0.28*<br>(0.17)  | -0.24<br>(0.16)   |
| worked in OrgDep              | -1.07<br>(1.22)   | -1.01<br>(1.21)   | -1.02<br>(1.20)   | -1.04<br>(1.21)   |
| worked in Secretariat         | 0.75<br>(0.57)    | 0.76<br>(0.57)    | 0.81<br>(0.57)    | 0.75<br>(0.57)    |
| # of positions held           | 0.11<br>(0.09)    | 0.12<br>(0.09)    | 0.12<br>(0.09)    | 0.11<br>(0.09)    |
| worked in 1 prov.             | 1.00*<br>(0.49)   | 1.01*<br>(0.49)   | 1.04*<br>(0.49)   | 1.01*<br>(0.49)   |
| worked in 2+ prov.            | 0.61<br>(0.54)    | 0.62<br>(0.54)    | 0.72<br>(0.53)    | 0.61<br>(0.54)    |
| worked in center              | 0.59*<br>(0.35)   | 0.60*<br>(0.35)   | 0.66*<br>(0.35)   | 0.59*<br>(0.35)   |
| # of current positions        | 0.25<br>(0.20)    | 0.24<br>(0.20)    | 0.25<br>(0.20)    | 0.25<br>(0.20)    |
| high school or below          | -1.19<br>(0.76)   | -1.18<br>(0.76)   | -1.15<br>(0.74)   | -1.20<br>(0.76)   |
| postgraduate                  | -0.50<br>(0.33)   | -0.46<br>(0.33)   | -0.37<br>(0.32)   | -0.50<br>(0.33)   |
| minority                      | -2.35*<br>(1.03)  | -2.34*<br>(1.03)  | -2.34*<br>(1.03)  | -2.36*<br>(1.03)  |
| male                          | 1.28*<br>(0.65)   | 1.27*<br>(0.65)   | 1.20*<br>(0.65)   | 1.29*<br>(0.65)   |
| time in party, <sup>2,3</sup> | ✓                 | ✓                 | ✓                 | ✓                 |
| age, <sup>2,3</sup>           | ✓                 | ✓                 | ✓                 | ✓                 |
| time, <sup>2,3</sup> in CC    | ✓**               | ✓**               | ✓**               | ✓**               |
| Indep. var. lag:              | 1 period          | 1 period          | 1 period          | 1 period          |
| AIC                           | 458.04            | 458.85            | 459.34            | 458.09            |
| BIC                           | 569.98            | 570.79            | 571.28            | 570.03            |
| Num. obs.                     | 960               | 960               | 960               | 960               |

\*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , ·  $p < 0.1$

Table 8: Robustness check for model PB2 table 3. 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*<br>(17.42)  | 34.72*<br>(16.99)  | -2.20<br>(49.91)   | 46.51*<br>(19.61)   |
| high school or below          | -1.05*<br>(0.52)   | -0.99**<br>(0.38)  | -1.51***<br>(0.34) | -2.16*<br>(0.91)    |
| postgraduate                  | -0.16<br>(0.49)    | -0.09<br>(0.48)    | -0.03<br>(0.48)    | 0.01<br>(0.62)      |
| minority                      | -17.16<br>(890.57) | -16.76<br>(889.33) | -17.17<br>(938.31) | -16.85<br>(1404.91) |
| male                          | 16.74<br>(1043.43) | 16.67<br>(1026.32) | 16.59<br>(902.61)  | 16.72<br>(1692.69)  |
| # of promotions               | 0.47***<br>(0.13)  | 0.44***<br>(0.10)  | 0.61***<br>(0.10)  | 0.53**<br>(0.17)    |
| worked in OrgDep              | 0.78<br>(0.55)     | 0.73<br>(0.40)     | 0.90*<br>(0.38)    | 0.46<br>(0.69)      |
| worked in Secretariat         | 0.85*<br>(0.37)    | 0.31<br>(0.28)     | 0.73**<br>(0.28)   | 0.57<br>(0.49)      |
| # of positions held           | 0.14<br>(0.07)     | 0.22***<br>(0.05)  | 0.37***<br>(0.05)  | 0.20*<br>(0.10)     |
| worked in 1 prov.             | 1.99*<br>(0.82)    | 1.96**<br>(0.63)   | 1.98**<br>(0.63)   | 2.34*<br>(1.34)     |
| worked in 2+ prov.            | 1.57<br>(0.82)     | 1.27*<br>(0.62)    | 1.31*<br>(0.62)    | 2.19*<br>(1.32)     |
| worked in center              | 1.32*<br>(0.63)    | 1.15<br>(0.61)     | 1.50**<br>(0.57)   | 2.20*<br>(1.19)     |
| # of current positions        | 0.08<br>(0.11)     | 0.22*<br>(0.10)    | 0.36***<br>(0.09)  | 0.62***<br>(0.18)   |
| time in party, <sup>2,3</sup> | ✓*                 | ✓*                 | ✓*                 | ✓*                  |
| age, <sup>2,3</sup>           | ✓                  | ✓                  | ✓                  | ✓                   |
| time, <sup>2,3</sup> in CC    | ✓***               | ✓***               | ✓***               | ✓***                |
| Indep. var. lag:              | none               | none               | none               | none                |
| AIC                           | 344.69             | 490.20             | 609.40             | 218.63              |
| BIC                           | 478.06             | 625.24             | 767.57             | 351.28              |
| Num. obs.                     | 2438               | 2621               | 7165               | 2362                |

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , · $p < 0.1$

Table 9: Robustness check for model Patron1 table 3. 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.

## A.6 Case Studies

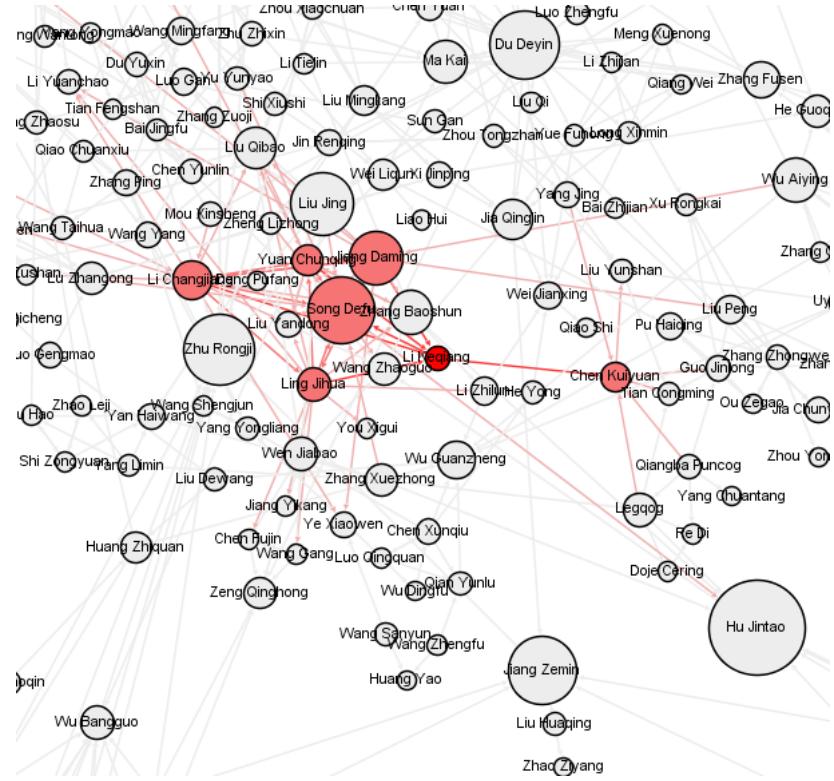


Figure 15: Li Keqiang's position in the 2002 promotion network. Enlarged from figure 11. Li Keqiang is surrounded by, but not directly connected to, several powerful figures, such as outgoing premier Zhu Rongji, incoming premier Wen Jiabao, outgoing General Secretary Jiang Zemin, and incoming General Secretary Hu Jintao.

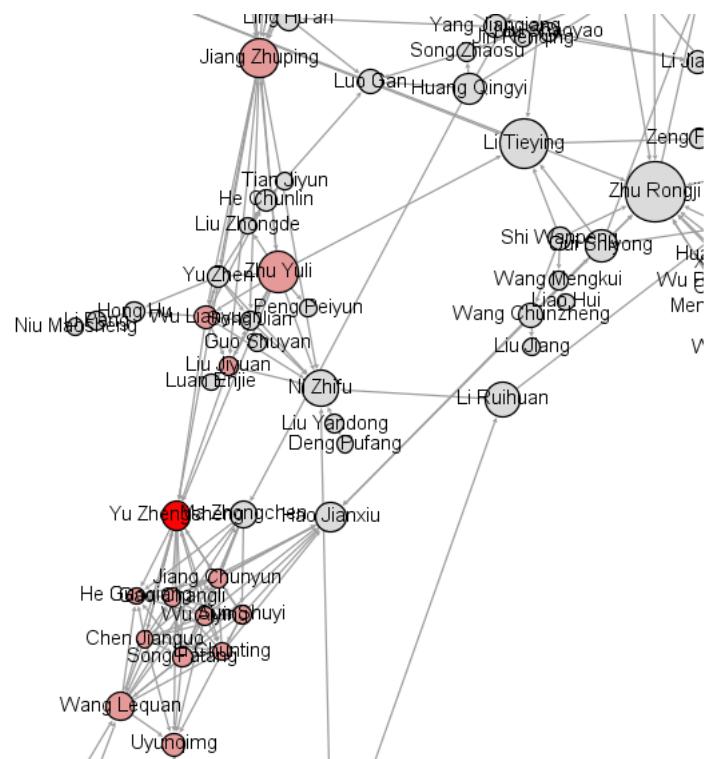


Figure 16: Yu Zhengsheng's position in 1997. Enlarged from figure 10. Note the dense cluster of Shandong officials located just below him.

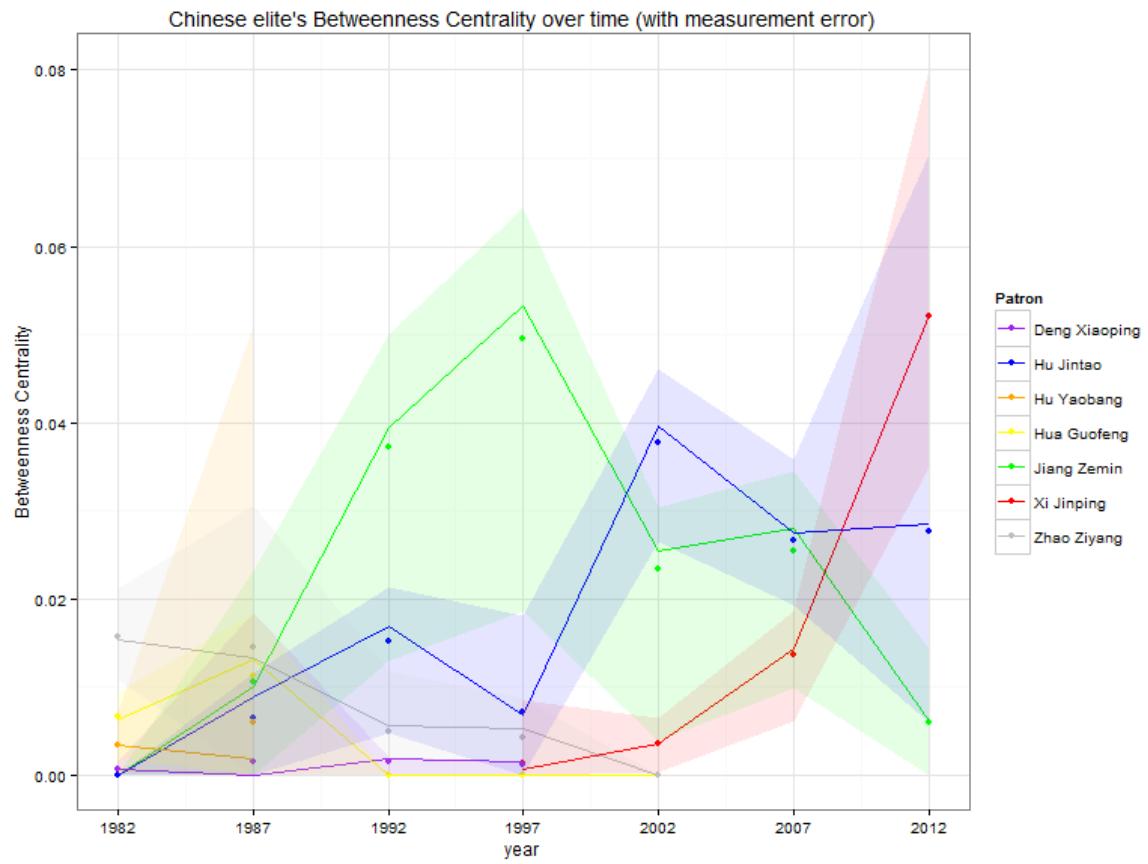


Figure 17: Betweenness centrality of current and former Party Secretaries, as well as Deng Xiaoping, with estimates of certainty. The latter are measured by removing 10% of the ties at random and re-calculating betweenness centrality. The shaded areas are bordered by the lowest and highest measure out of 100 simulations, with the dots indicating the median. The line marks the actual betweenness centrality observed.

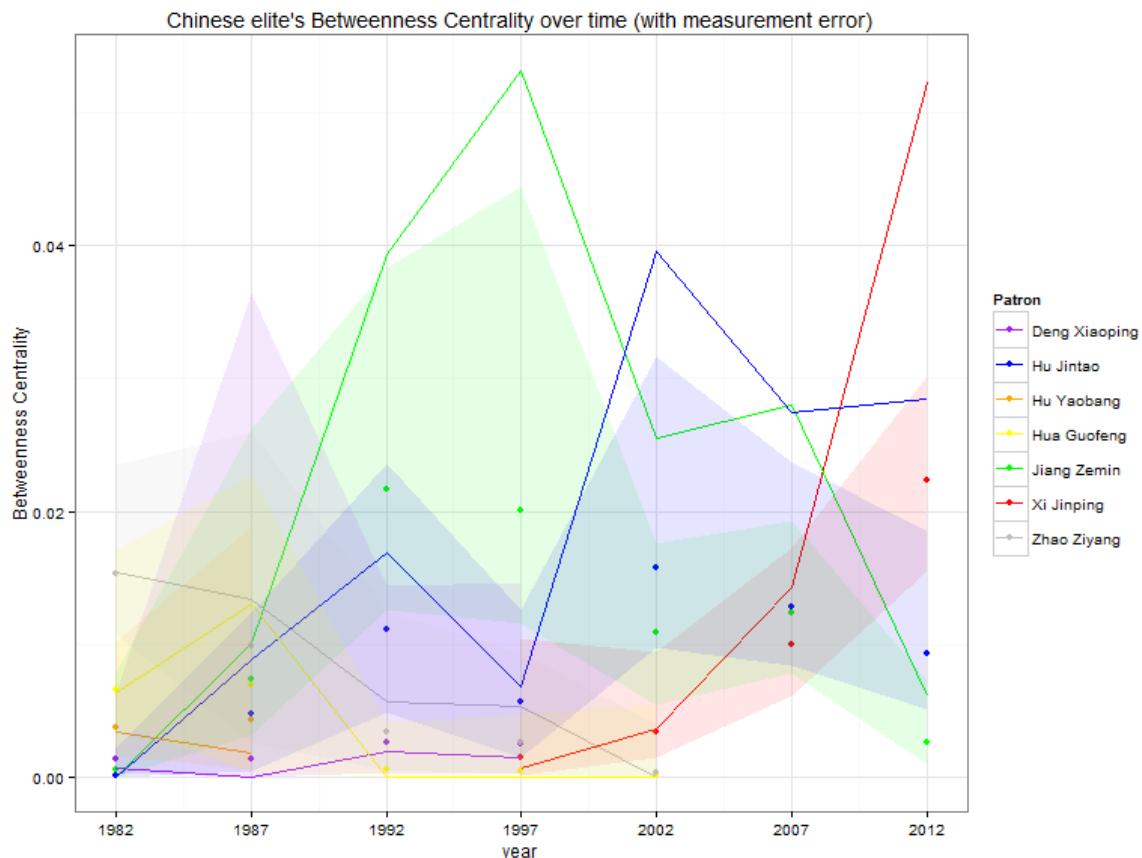


Figure 18: Betweenness centrality of current and former Party Secretaries, as well as Deng Xiaoping, with estimates of certainty. The latter are measured by adding 10% of the ties at random and re-calculating betweenness centrality. The shaded areas are bordered by the lowest and highest measure out of 100 simulations, with the dots indicating the median. The line marks the actual betweenness centrality observed. Unlike the previous simulation in figure 17, the observed value is often higher than the maximum of the simulation. This is likely because each randomly added tie has some chance of connecting two previously “distant” parts of the network, drastically reducing the betweenness of individuals who were the only connectors between those parts (i.e. the patrons).