Cadre networks and bureaucratic careers in autocracies*

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Abstract

Many autocracies employ classic Weberian bureaucratic structures with formalized recruitment systems for low-level bureaucrats. How successful are these systems in weeding out informal personal ties outside the control of the authoritarian elite? And, if low-level personal networks continue to matter, do they undermine regime interests or do they reflect regime preferences? We undertake the first empirical analysis of such networks, focusing on the case of the former German Democratic Republic. We draw on detailed biographical data on over 180,000 cadres to investigate how workplace-based cadre networks shaped promotion practices. Difference-in-differences models show that cadre networks help individuals' career trajectories. We also demonstrate that network-based promotions mirrored regime preferences, instead of contributing to decentralized cronyism. These findings help us to better understand how the persistence of informal promotion practices can aid autocrats in aligning bureaucratic apparatuses with regime interests.

Keywords: Networks, Autocracy, Bureaucracy

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1 Introduction

A capable state apparatus, loyal to the regime and its leadership, is important for autocrats to survive in office (Svolik, 2012). But dictators cannot feasibly select thousands of lower-level regime agents directly. Cost and efficiency constraints dictate that elites have to delegate the selection of low-level functionaries to mid-level bureaucrats, at least to some degree. Historically, this opened the door for decentralized patronage and personalism in the selection of personnel in state bureaucracies, rather than strictly reflecting the ruling elite's preferences and priorities (Grindle, 2012).

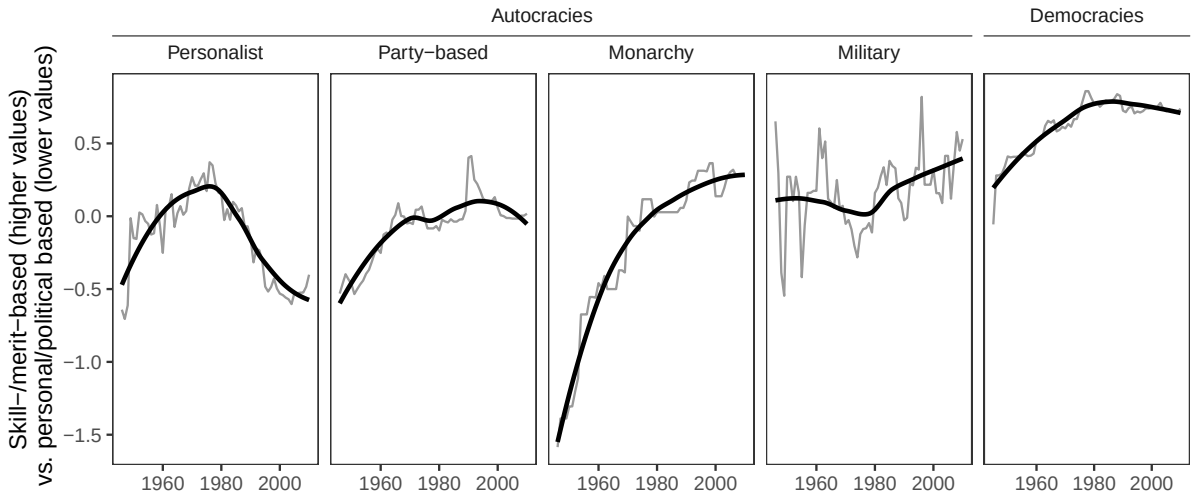
Many modern authoritarian bureaucracies have invested enormous resources to adopt or at least mimic Weberian structures[1] that offer some top-down control and monitoring of selection processes, even if the political incentives that govern the administrative state differ (Chan, 2024). Some autocracies use explicit *cadre policies* to blend elements of Weberian personnel selection with screening for regime loyalty and ideological commitment. The trend toward Weberian personnel selection is especially prevalent in non-personalist autocracies (see Figure 1).

Have modern autocracies been able to weed out informal personal networks in bureaucracies—or do such networks continue to shape careers at lower levels of the state hierarchy? And, if personal networks matter, how do they influence the composition of the bureaucracy in autocracies?

The answers to these questions carry important implications for our understanding of autocratic stability and performance. Nevertheless, our knowledge about the relevance and effects of personal career networks in autocratic states is limited. Several rigorous empirical studies investigate the role of personal networks in high-level political selection (e.g., Jia *et al.* 2015; Shih *et al.* 2012). However, the lack of detailed data on low-level and mid-level functionaries has thus far prevented a systematic analysis of cadre networks within the bureaucracies of autocratic states. Studying low- and mid-level selection is important because it might operate differently from

[1] E.g., merit-based selection and advancement, entry-level exams, minimum qualifications, a predefined hierarchy, and impersonal, rule-based procedures.

Figure 1: Criteria for appointment decisions in the state administration in different types of autocracies and democracies, 1945-2010



Note: The plot displays annual averages of the *v2stcritrecadm* variable from the V-Dem dataset (Coppedge *et al.*, 2022), computed for the four autocracy types from Geddes *et al.* (2014) as well as democracies as a fifth category. The variable captures the extent to which appointment decisions in the state administration are based on personal and political connections (lower values on the y-axis), as opposed to skills and merit (higher values on the y-axis).

high-level selection due to delegation and information problems. While leaders can expend considerable resources to carefully screen candidates for the highest-level positions, resource constraints affect the selection of thousands of lower-level agents, while information problems multiply. Decision-makers can only spend so much time and effort finding the right candidate. Having to delegate these decisions also confers a degree of discretion to mid-level managers, generating opportunities to deviate from the regime's preferred outcome. Under these conditions, how do personal networks shape selection outcomes?

We draw on detailed biographical data on more than 180,000 cadres in the former German Democratic Republic (GDR) to implement such an analysis. We consider the GDR to be a *least likely case* in terms of the effects of informal networks on career advancement: First, the absence of strong ethnic, religious, or regional identities left comparatively little room for group-based factionalism. An unprecedented level of surveillance obstructed the creation of expansive and meaningful *so-*

cial networks (Lichter *et al.*, 2021). Second, the socialist regime established a highly centralized and formalized cadre policy that should have prevented network-based selection. The GDR cadre system combined a plethora of monitoring mechanisms, directives, extrinsic rewards, and punishments to maximize top-down control of the selection process.

We focus on workplace networks, especially joint membership in the so-called "work brigades" to identify networks at the cadre level. The brigades were created by the regime to increase productivity and foster mutual socialization of its citizens. The brigades consisted of small groups of employees (10-20) working together on a daily basis and participating in joint leisure activities and mutual help. Contrary to the expectations of the regime, the brigades developed into niches of autonomous interactions, fostering the creation of strong social networks (Rueschemeyer, 1991; Kott, 2006; Schmidt, 1995). Although specific to the context of the GDR, they are a good example of networks based on shared experiences and mutual help among peers.

We use detailed information on the cadres' careers to reconstruct the composition of brigades. We are interested in the connected career dynamics of cadres belonging to the same work brigade. Our main treatment of interest is the promotion of a fellow network member by at least two ranks in the administrative hierarchy, i.e., the elevation to a position of influence. Our main outcome of interest is a cadre's subsequent career advancement.

To identify the effect of cadre networks on career advancement, we exploit the differential *timing* in the promotion of network members. We construct a sample of cadres from brigades where at least one member has been promoted by at least two ranks between 1985 and 1989. We then compare the career advancement of cadres who experienced such a promotion of fellow network members early (1986 or 1987), to cadres who experienced it late (1988 or 1989). This comparison allows for a stronger counterfactual since both groups are likely to be similar on unobservable characteristics, the only difference being the exact timing of the promotion event

within their network.

We estimate the effects on career advancement with a difference-in-differences model. We find evidence that a promotion within the network has substantively meaningful and positive effects on the subsequent career advancement of a cadre, generating an expected increase in a cadre's rank by 12% of a standard deviation or increasing the relative chance of being elevated to the Nomenklatura by 14%. Additional tests suggest that this effect is less a consequence of considerations of cronyism, but rather reflects the career incentives of the connected higher-level cadres. Work brigades reduce search costs in the presence of widespread preference falsification, allowing higher-level cadres to identify candidates that are both competent *and* loyal to the regime, to improve the performance of their teams, and to prevent the negative effects of "adverse selection" on their careers.

Our findings contribute to research on the role of networks and patron-client relationships in the bureaucracies of autocratic states (e.g. Fisman *et al.* 2020; Shih *et al.* 2012; Jiang 2018). Most of this work has focused on how loyalty to the dictator often trumps competence in agent selection (Egorov & Sonin, 2011; Gläßel & Scharpf, 2026; Zakharov, 2016). Evidence from China, but also from historical episodes such as the Royal British Navy, provides empirical support for the career-advancing function of network ties to the autocratic elite (Fisman *et al.*, 2020; Francois *et al.*, 2016; Jia *et al.*, 2015; Jiang, 2018; Liu & Wang, 2019; Shih *et al.*, 2012; Voth & Xu, 2019).[2]

We add to this literature by demonstrating that networks play an important role beyond the top level of the political elite. We complement recent work by Hassan (2020) and Hassan *et al.* (2024) in this field, who examine the role of *ethnic* and *factional* ties in public sector hiring. Specifically, we show that even in the presence of the most formalized and centralized systems of cadre selection, personal networks continue to influence the selection of low-level and mid-level cadres, thereby shaping the composition of the autocrat's administrative workforce. While this main finding

[2]There is some evidence for situations when personal ties to the top can also have adverse career effects (Shih & Lee, 2020; Fisman *et al.*, 2020; Doyon & Keller, 2020; Li & Manion, 2021).

is not necessarily surprising on its own,[3] our supplementary results suggest, rather than weakening the regime's resilience, these cadre career dynamics may even support autocratic elites by acting as decentralized screening tools across the different levels of the bureaucratic hierarchy.

This finding aligns with existing research on the impact of social networks within bureaucratic structures on regime stability. In the context of Russia, Rosenfeld (2017) suggests that these networks enhance the regime's ability to monitor its administrative staff, thereby helping to prevent dissent among state-sector professionals. In contrast, Parker-Magyar (2024) demonstrates how social networks among public employees can facilitate the mobilization of opposition in Jordan. Beyond the regime's monitoring capabilities and the opposition's mobilization potential, our study identifies a third, more indirect avenue through which networks can influence regime resilience: by aiding in the selection of the most loyal and competent candidates for pivotal roles within the state apparatus.

2 Personal networks and career advancement in bureaucracies of autocratic states

What role do personal networks play in the careers of bureaucrats in autocracies? Many contemporary autocracies have established bureaucratic processes that mimic Weberian ideals. Formal evaluation and selection criteria, proceduralism, standardized selection methodologies, and entry tests, paired with minimum qualification standards are commonplace in many modern authoritarian bureaucracies, even if the political incentives that govern them differ (Chan, 2024). Rejecting historically common forms of decentralized patronage and 'Jobs for the Boys' (Grindle, 2012), the modern authoritarian administrative state, in terms of its formal structures and procedures, resembles bureaucracies in democratic regimes but is often geared toward the goal of top-down control and aligning lower-level recruitment with elite

[3] Although previous research in history and political science has largely dismissed the role of career networks in the GDR, assuming a negligible role for cadre career determination (e.g., Hübner 2008; Bauerkämper 2008).

preferences for the selection of competent *and* loyal (to the regime) candidates.

Comprehensive and formalized personnel screening and evaluation systems that vet candidates for their competence but also regime loyalty, i.e. explicit *cadre systems*, are typically, although not exclusively, found in party-based autocracies. In the 1990s and 2000s, for example, Russia made multiple neo-Weberian reform attempts to improve bureaucracy staffing (Inkina, 2019). China's civil service reforms were initiated in the early 1980s—with the aim of professionalizing the bureaucracy and improving the selection of cadres that reflect the ideal of "virtue and talent" (Jing & Zhu, 2012). Similar reform attempts to formalize the selection of cadres can be observed in Vietnam (Dinh, 2002), Ethiopia (Markos, 2013) or Uzbekistan (Umarova, 2022).

Given this formalization, it is important to ask to what extent personal networks still matter for the mass selection of regime agents in authoritarian systems. We believe the delegation of selection, paired with informational problems common in authoritarian settings, create an interesting environment to consider the role of personal networks among low-level agents. Since ruling elites cannot personally assess the thousands of administrators necessary to run the state, they have to delegate selection to the mid-levels of the hierarchy. No matter how comprehensive and strict formal selection procedures are, standard agency theory suggests that such systems of bureaucratic management are imperfect tools to limit the discretion of mid-level management; informational advantages and incomplete monitoring may still allow agents to pursue their particularistic interests (Miller, 2005). Moreover, in contrast to the selection of top-level positions, the amount of time and resources that can be dedicated to the screening of any individual candidate is inherently limited due to the issue of scale. In the context of mass delegated decision-making in an information-scarce environment, we believe personal networks among low- and mid-level agents play an important role in shaping selection decisions. We consider two ways in which midlevel managers may lean on their own personal networks when it comes to personnel selection.

The first one falls in the category of "patron-client" networks. Mid-level bureau-

crats may use their discretion to sustain practices of personalism and patronage that have shaped bureaucracies historically (Grindle, 2012), despite the presence of formal procedures meant to counteract them. The remaining loopholes of the administrative system allow them to use promotions of individuals within their cadre networks to establish or strengthen patron-client relations and to engage in local-level "empire building" (Roback & Vinzant, 1994) by increasing the willingness of network members to reciprocate in the future. The creation of obligations associated with promotions increases the loyalty of clients to their middle-level patron. From the patron's point of view, these obligations reduce the risk of future betrayal in terms of clients' attempts to take over the patron's position in the hierarchy (Völker & Flap, 2001). Moreover, maximizing the loyalty of subordinate workers ensures that "orders are executed, that mistakes are avoided or covered up discreetly if made, and that subordinates fulfill their responsibilities, even when not directly supervised" (Grindle, 1977). This perspective echoes the theoretical literature on the loyalty-competence trade-off in autocracies (e.g. Egorov & Sonin, 2011; Zakharov, 2016; Shih *et al.*, 2012). Autocratic leaders need competent agents to implement their policy agendas, requiring them to prioritize skills and performance. However, capable agents can also expect to be in high demand by potential alternative rulers or could themselves build independent bases of power. Thus, on the margin, managers might prioritize personal loyalty over competence to secure their grip on power and strongly lean on their personal networks to identify fitting candidates. While mostly developed and applied in the context of high-level selection,[4] potentially, this logic extends to the low and middle levels of the hierarchy, especially in an authoritarian context.

A second set of motivations stems from the use of low-level networks as "information screening devices." Formal systems of top-down control and regulation of the bureaucracy may themselves create new incentives for mid-level managers to favor network members. In highly formalized and centralized bureaucracies, the perfor-

[4]Empirical analyses confirm that this elite strategy bolsters the career prospects of candidates with close connections to members of the inner circle of the regime (Shih *et al.*, 2012; Francois *et al.*, 2016; Jia *et al.*, 2015; Liu & Wang, 2019).

mance of mid-level functionaries often depends directly on the performance of their subordinates. Moreover, mid-level bureaucrats may fear that elites use their promotion decisions to assess their own quality (Doyon & Keller, 2020; Li & Manion, 2021). Under these conditions, it is in the interests of the superiors to select the best-qualified individuals for the units of work under their supervision (Voth & Xu, 2019), aligning selection preferences between the elite and mid-level managers. In particular, if loyalty and competence are complements (Jia *et al.*, 2015), finding candidates of high quality in both dimensions offers substantial rewards to the hiring manager—in terms of strengthening the performance of their work units *and* signaling compliance with elite preferences.

Although such incentives also exist in democratic systems, they are amplified in authoritarian environments. Due to widespread preference falsification, discerning regime loyalty is difficult, and the threat of violence that permeates authoritarian politics raises the stakes of picking the "wrong" candidate; poor decisions by mid-level managers may not simply end with a stalled career but can have consequences for one's well-being. Such pressures were certainly pronounced in the case of the GDR: "[Author translation] Every decision maker–appointed or retained at the next higher level–lived in the constant fear of doing something wrong in the eyes of their "superior" [...]. This constant fear created a pre-emptive obedience and exaggeration in the interpretation of instructions, it provoked pressure on the lower level" (Wagner, 1998, p.17).

These high stakes create strong *motives* for superiors to promote candidates whose profiles align with the expectations of the regime. Personal networks may increase these superiors' *capabilities* to identify these "right" candidates (Flap & Boxman, 2000; Voth & Xu, 2019). Previous research shows how long-term routine interaction among colleagues in the same workplace may generate strong "clustered networks" characterized by high levels of mutual trust and understanding of other network members' interests and preferences (Parker-Magyar, 2024). Information from such personal ties may be more reliable than formal screening procedures in contexts of widespread

preference falsification. For example, candidates may be able to fake certain characteristics in short interviews and tests (e.g., loyalty, diligence, competence on the job); however, signaling these characteristics consistently in daily interactions in social networks is likely to be more difficult. Personal networks may also offer reliable information more quickly, offering shortcuts in a slow-moving bureaucratic process, and lower overall search costs.

Both of these driving forces are likely to create strong incentives for mid-level bureaucrats to hire and promote members of their networks. We therefore expect that even the most rigid top-down bureaucracies will be unable to prevent cadre networks from shaping promotion practices. We investigate this claim in our main empirical analysis.

If personal networks continue to shape selection processes, then what are the implications for the incumbent regime? The two types of motives and dynamics of network promotions sketched above have divergent implications.

If personal networks reflect more the "patron-client" logic of personalized fiefdoms of mid-level cadres they might be indicative of the failure of the elite's attempt at ending traditional practices of patronage and cronyism. From the autocratic elite's perspective, the persistence of patron-client relations on lower levels of the hierarchy may be harmful. The strategic priorities of ruling elites (maximizing the loyalty to and competence of the regime) may not only be less relevant in these career networks of cadres—agents may even be willing to promote individuals who deviate from the priorities of the elites to create a pool of particularly indebted clients.

The second, information-screening dynamic, in contrast, reflects the indirect success of elites' bureaucratic reform attempts. Instead of undermining the ruling elite's objectives, personal networks complement the formal but often cumbersome and slow top-down selection process. Agents use their own networks as a shortcut to reliably identify competent and loyal candidates, to signal their loyalty to the ruling elite, and to avoid risks associated with the promotion of weak candidates. In this case, the career networks of the cadre would serve to implement elite priorities at the

lower levels of the administrative hierarchy.

We investigate the empirical implications of these two alternative dynamics in an exploratory second analysis section.

3 Cadre selection and social networks in the GDR

3.1 The cadre policy of the GDR

Our empirical analyses focus on cadre networks in the empirical context of the former GDR. The ruling Socialist Unity Party (*Sozialistische Einheitspartei Deutschlands*, SED) saw cadre development as a key priority in the advancement of the socialist society. Thus, the selection of cadres was centrally managed according to a policy that covered all individuals who were qualified for or were destined for key roles in state administration and economy (Hornbostel, 1999; Best & Hornbostel, 2003).

The key instrument for the organization and control of the cadre was the Nomenklatura system. The GDR elite organized this system in a hierarchical and centralized way, assigning each relevant position to the responsibility of some higher level, ending in the Politburo of the SED and eventually in the hands of the general secretary (see Glaeßner 1977, for a detailed analysis of GDR cadre policies). The Nomenklatura also clearly defined the concrete administrative levels and specific occupational positions in charge of selecting and promoting candidates to vacant positions or removing individuals who were found unqualified (Glaeßner, 1977). It was a fundamental principle of this pyramid-like system that each level of the hierarchy was in charge of confirming the selection of candidates for positions on the respective next lower level (Wagner, 1998). In addition to centralizing power, the system was intended to create an atmosphere of top-down control and fear, putting pressure on individuals to avoid any (seeming) mistakes and activities contradicting the elite's preferences.

Wagner (1998, p. 100) has characterized the cadre program of the GDR as "planned economy with people." (*Planwirtschaft mit Menschen*). The program was mandatory for the entire bureaucratic apparatus. It was based on five-year planning cycles, mirroring the cycles of the planned economy of the GDR. Formally, promotions were

supposed to follow a certain scheme: individuals were classified as junior/trainee cadres based on their formal qualifications. They were then selected into the cadre reserve with a clear career development plan that would result in promotion into a cadre position after two to three years. Overall, in the eyes of the regime, the centralization and formalization of the cadre policy in the GDR should have left little room for individual career strategies and informal career determinants (Hübner, 2008; Bauerkämper, 2008).

However, a retrospective survey conducted in 1992 and 1993 in the cities of Leipzig and Dresden indicates that almost half of the respondents obtained their jobs through some form of informal channel (Völker & Flap, 1999). More specifically, the study shows that co-workers were the most common intermediaries when candidates secured employment through personal contacts. Findings regarding the association between candidates' informal networks and the *prestige* of their jobs are less clear: informal networks appeared to influence job quality only when they involved individuals with "extensive resources"—i.e., high-level cadres. These descriptive results should be interpreted with caution, as they rely on a small sample of respondents and retrospective self-reported data. Nonetheless, they suggest that the regime's efforts to eliminate informal ties may have been less successful than the elite had anticipated. We aim to systematically scrutinize this finding in our empirical section below.

3.2 Work brigades and the creation of informal networks

The socialist regime of the GDR tried to control all areas of society, formal and informal. State-based organizations penetrated all areas of the private and professional lives of citizens. No other regime in the world maintained a higher number per capita of formal and informal security agents in charge of open and covert surveillance of the population (Gieseke, 2000). Consequently, there was a widespread assumption among the population that any private or professional group or organization had at least one member who was an unofficial informant of the security police (Völker & Flap, 1999). This system left little room for the creation of large and dense social networks in places that have been highlighted in previous studies on networks

in autocracies–schools, universities, mass organizations, or hometowns (see subsection A.1 for a more in-depth discussion).

The workplace was not different from other social contexts in terms of the penetration and control by the regime. The FDGB, the central union of the GDR, was the largest mass organization in the country and covered virtually all employees in all sectors (Dowe *et al.*, 2009). In line with the regime's ideological emphasis on the productive sector and the socialist comradeship of workers, the SED perceived people's workplaces as a crucial arena for socialization and mobilization of regime support. This strategy led to the creation of an institution that eventually evolved into one of the very few contexts of autonomy and mutual support (Hübner, 1995).

In 1950, the FDGB launched the movement of production work groups (*Produktionsbrigaden*) following a Soviet model (Reichel, 2011). Work brigades were small groups of employees (10-20) working together on a daily basis—in the same firm, at the same assembly lines, with the same machines, or on the same administrative processes. Originally focusing only on industrial occupations, the brigade system was later expanded to all areas of the economy. Outside of the industrial sector, the brigades were often called *work collectives*. From the 1960s on, the brigades were often identical to the smallest organizational units of the FDGB (Dowe *et al.*, 2009; Schmidt, 1995).

The regime created the brigades with a dual objective: first, they were meant to increase productivity and innovation by instilling "socialist competition": the regime defined production targets that were broken down into targets of individual brigades. This allowed the regime to evaluate the productivity of the brigades and to hold them accountable for underperformance. At the same time, it promised collective rewards (medals, monetary incentives, funding for group activities) for the "best" brigades (Kott, 2006; Dowe *et al.*, 2009).

Second, brigades served to maximize the regime's holistic control over the citizens. They were meant to constitute real social communities in which individuals would mutually control and socialize with each other. Thus, brigades were assigned

a variety of professional and social functions. Brigades engaged in the protection of employees' rights, served to foster the participation of women, arranged leisure activities for workers and their families, and organized all different kinds of mutual help ranging from children's daycare to support in renovating members' apartments. All social activities were noted in the "brigade diaries" that informed the brigade evaluations and the allocation of collective rewards (Budde, 2008; Dowe *et al.*, 2009).

However, contrary to the expectations of the regime, the brigades soon developed into one of the few niches in the GDR that offered a certain protected space for citizens (Hübner, 1995; Kott, 2006; Bauerkämper, 2008). Rueschemeyer (1991) argues that this unintended development was a natural consequence of the fact that the ruling elite had to offer the participants some genuine influence and autonomy. Otherwise, people would not have been willing to get involved in all of the brigade activities that were meant to serve their members' mutual control and socialization.

The combination of the high relevance of brigades in people's professional and private lives, combined with a certain degree of autonomy and control, fostered the creation of strong social networks outside of direct state control (Soldt, 1998; Bauerkämper, 2008). Brigade members spent a large share of their professional and private lives together (Rueschemeyer, 1982). They got to know each other very closely and learned who they could or could not trust (Dowe *et al.*, 2009). Many brigades evolved into centers of "personal commitment, friendship, and mutual help" (Rueschemeyer, 1991). People came to see them as genuine social communities using the term "work collective" commonly for "colleagues with whom one works and is friendly" (Rueschemeyer, 1991; Schmidt, 1995).

Thus, we consider the brigades to be the most likely area for the development of strong cadre networks in the GDR. Members of the same brigades were in close contact with each other and often developed trusting relationships and strong feelings of mutual obligation and support. We assess the career effects of these cadre social networks in the following empirical sections.

4 Data and Research Design

To investigate the effects of cadre networks on career advancement, we draw on the GDR's Central Cadre Database (CCDB). The GDR regime developed the CCDB as a socialist planning tool to facilitate cadre selection in key state institutions and state-run companies. The CCDB contains detailed information on cadres' biographies, employment history, and membership in voluntary organizations. The CCDB contains information from most state-owned enterprises, ministries, and local-level administrations. The CCDB does not contain data from the security services, such as the NVA, the state security ("Stasi") or the police forces, all of whom kept separate cadre information systems.

The CCDB was located and managed in the Ministry for Science and Engineering's computational center, directed by the cadre office of the GDR minister council (Remy, 2003). Data collection was the responsibility of individual employers. They collected personnel information and submitted this information to the ministry every quarter. The federal archives subsequently cleaned and transformed the data from magnetic tapes into separate machine-readable representations of the original database files.

There exist two separate types of source files: the *Allgemeiner Kaderdatenspeicher*, or AKDS, and the *Zentraler Kaderdatenspeicher*, the ZKDS. There exist AKDS and ZKDS files for each year between 1985 and 1989.[5] Although the precise historical difference between the two file types is unclear, our analysis shows that they are not subsets of each other. We therefore combine both file types for each year into what we subsequently refer to as the Central Cadre Database, the CCDB and use the 1985 and 1989 files to construct our main data set.

[5]For the ZKDS file type there also exists a 1980 version of the data. But since there is no equivalent AKDS file for 1980 we lack the bulk of cadre files for 1980 (the AKDS contributes over 75% of the individual cadre observation to the CCDB, so approximately 140,000 individuals). Moreover, historical research suggests data entry error rates of up to 80% in the early 1980s, as more systematic quality control only started in 1985, making 1985 the logical starting point of our analysis (Best & Hornbostel, 2003, 120).

4.1 Constructing work brigade networks

Each combined CCDB file contains detailed information on the current employment organization of a cadre, the geographic location of the employer, the precise function of a cadre within that work unit, and the rank of the cadre in the system. While the CCDB does not directly record membership in specific work brigades, we can use the detailed employment information in the database to construct an empirical approximation of work network membership (see subsection B.1 in the Appendix for details of the exact procedure and validation exercises).

In the next step, we link each record in the 1985 file to a record in the 1989 file to measure each cadre's career progress between 1985 and 1989, using the `fastLink` R package (Enamorado *et al.*, 2019). Details on the procedure and a comparison of matched and unmatched records are discussed in Appendix B.2. We also implement a simulation of the potential bias due to imperfect record linkage in Appendix B.3. These matched records form the basis of our main dataset, a two-period panel data set in which we observe each cadre at two points in time, 1985 and 1989. This data set comprises 363,596 observations for 181,798 cadres, mostly from the core state bureaucracy of the GDR.

4.2 Outcome variables

Our main outcome of interest is the advancement of the career of a cadre between 1985 and 1989. We used two variables from the CCDB to capture career advancement. *Nomenklatura* rank and *Nomenklatura* membership. Nomenklatura rank is based on a coding scheme of individual work functions as recorded in the CCDB, such as secretary, shift leader, professor, judge, and minister, developed by Salheiser (2009) and Gebauer (2006). This ordinal variable ranges from zero to four, with zero reflecting the lowest rank in the bureaucracy and four representing the highest level. The rank variable is our preferred measure as it captures nuanced movemements within the GDR's bureaucratic apparatues.

We complement the rank variable with a second outcome variable, a dummy that

captures whether or not cadres were a member of the Nomenklatura or not. This variable serves several purposes. First, it is measured independently of the rank variable and does not rely on external coding but is directly taken from the CCDB data itself. This allows us to mitigate any potential measurement problems in the rank variable. Second, it alleviates concerns that results might be driven by advancement to certain ranks. The downside is that it includes positions in the Nomenklatura that were, de facto, not very important–potentially reducing the role of career and selection dynamics that we intend to capture. See Appendix C.2 for a visualization of the empirical distribution for our outcome variables.

4.3 Research design

To identify a causal effect of work brigade networks on career advancement, we exploit the differential timing in the promotion of network members. For each cadre in our sample, treatment status is assigned to cadre i if one of the cadre's network members j is promoted to at least two ranks above cadre i.[6] This is meant to capture the potential advantages to cadre i's own career progression for having a close network member in an influential position. Crucially, treatment status is only assigned if the network member's promotion took place in the years 1986 or 1987, a condition we label "early promotion." The control group status is assigned based on the same criteria but differs in terms of the timing of the promotion: members of the control group experienced a "late promotion" of a co-network member j that took place in the years 1988 or 1989. Consequently, treatment and control group status share the fact of having a network member j promoted to an influential position, but differ in the timing of these promotions. We then compare network members' career progression across treated and control group status via a difference-in-differences comparison of 1985 and 1989.

Early promotions in a cadre's network are more likely to have benefited their career advancement because those who had only late promotions in their network

[6]This means we exclude any cadre i that has already attained rank 3 or 4 in 1985 because, definitionally, nobody in their network can be promoted two ranks above cadre's i current rank.

were at a disadvantage: network members who were promoted in 1988 or 1989 had too little time to "pull up" their network members with them. This argument is based on the observation that any career-advancing effects of promotions in one's network take time to unfold: Unless a person is promoted to very high levels in the hierarchy, it is unlikely that they can create new positions that they can then fill with their former network peers. Instead, promoted cadres need time to lobby for their network peers in selection or promotion committees, or need to wait for new positions to become available. We illustrate our research design together with example data in Figure 2.

This research design has several benefits. First, it generates a hard test for our theoretical argument. On average, the cadres in our network are promoted very slowly. The average time to the first promotion in our data set is 16.2 years. It is unlikely that any network effect can completely overcome such a pattern. Thus, basing our treatment/control definition on the difference between two to four years is likely to bias the results downward, creating a hard test for our theory.

Second, our assignment rule to the treatment and control groups makes both groups comparable with respect to the unobservable characteristics of cadres and their network members that determine advancement in general. Both assignment to treatment and control group status is based on having a network member promoted—the ultimate decision whether a cadre is assigned to treatment or control is simply based on the additional condition of *when* this promotion happened. This ensures that we implicitly control for unobservable variables that might bias our results if we only compared the "network-treated" cadres with all other cadres. E.g., networks in which a network member is promoted might differ in terms of legacy network effects: those promotions that assign treatment status might themselves have been the result of a network effect earlier in time. This could indicate that career-promoting networks are more prevalent in some types of organizations and are not directly comparable to regular networks that do not feature high-level promotions. By constructing our control group based on cadres from networks that receive treatment, but only later in time, we account for unobserved differences that differentiate career promotion

from other types of networks.[7] Moreover, the sudden and unexpected nature of the regime's collapse in 1989/1990 (Kuran, 1991; Lohmann, 1994) is helpful for our design in two ways. First, it is reasonable to expect that cadre networks with promotion events in 1988/89 would have behaved the same as networks with earlier promotion events in 1986/87 in the absence of the regime's downfall, making them good counterfactual comparison groups for each other. Second, the fact that the regime did not see the end coming means we can interpret cadre promotion patterns as representative of "business as usual" and not reflective of changing threat perceptions or attempts to prepare for a post-transition future.

Several pieces of evidence support the idea that creating a treatment/control group through differential timing in promotions creates more comparable groups. First, Figure C.1 in the appendix, shows substantive balance increases across a number of relevant covariates by restricting the control group to cadres who received a late promotion. Second, Figure 3 shows that baseline differences in Nomenklatura rank shrink dramatically when we focus on comparing 'treated' cadres to their counterparts who received treatment later. It also shows that the data meet the parallel trends assumption required for a causal interpretation of the difference-in-differences estimation much better with the restricted control group. Note that the figure also shows descriptive patterns in line with our theoretical expectation of career-boosting effects of network promotions.

[7] For example, different sectors and work units in the economy may have had differential Stasi penetration that informed promotion decisions. Using only the differential timing of promotions, we increase the chance of comparing cases with similar exposure to covert surveillance.

Figure 2: Illustration of data structure and research design

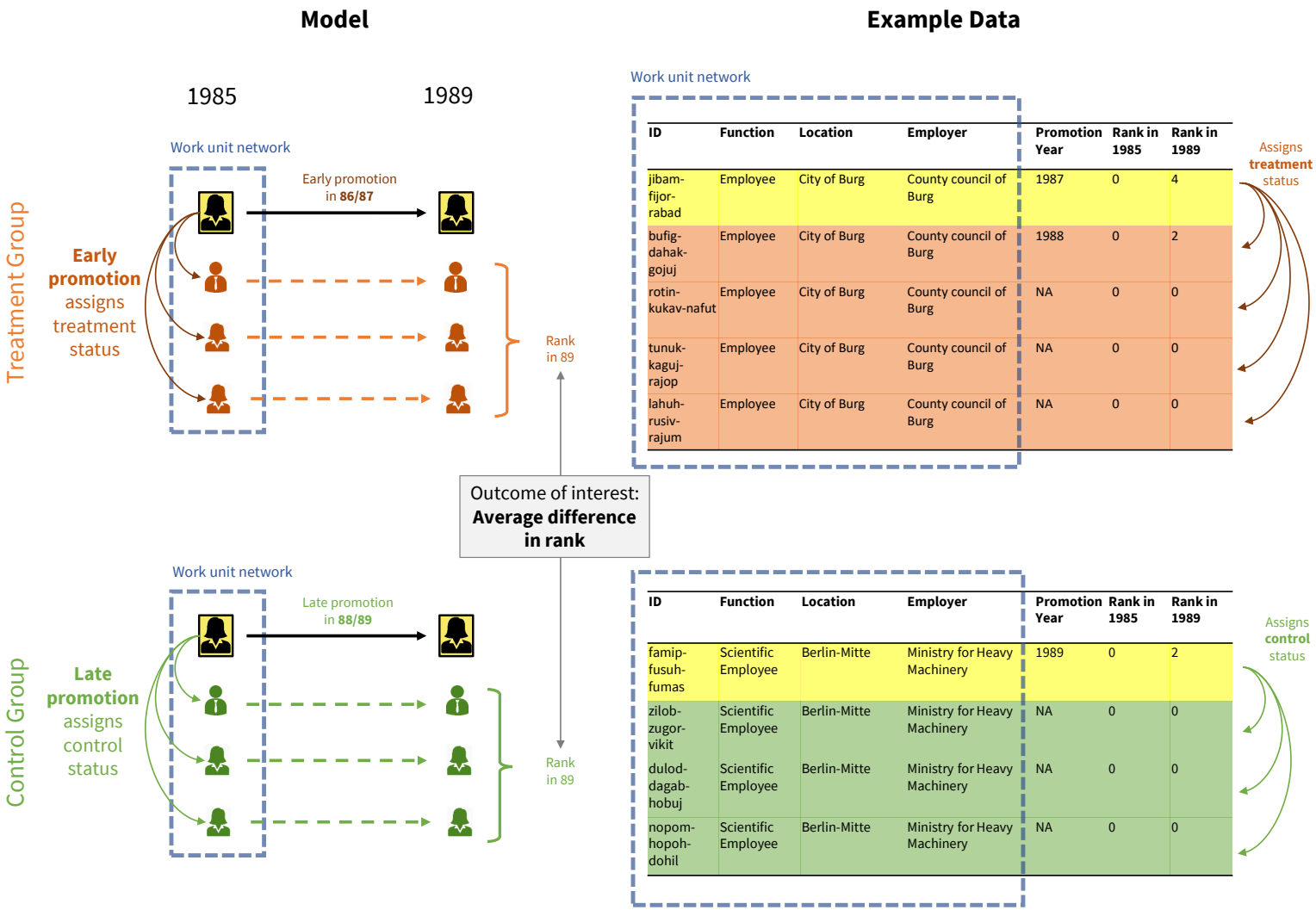
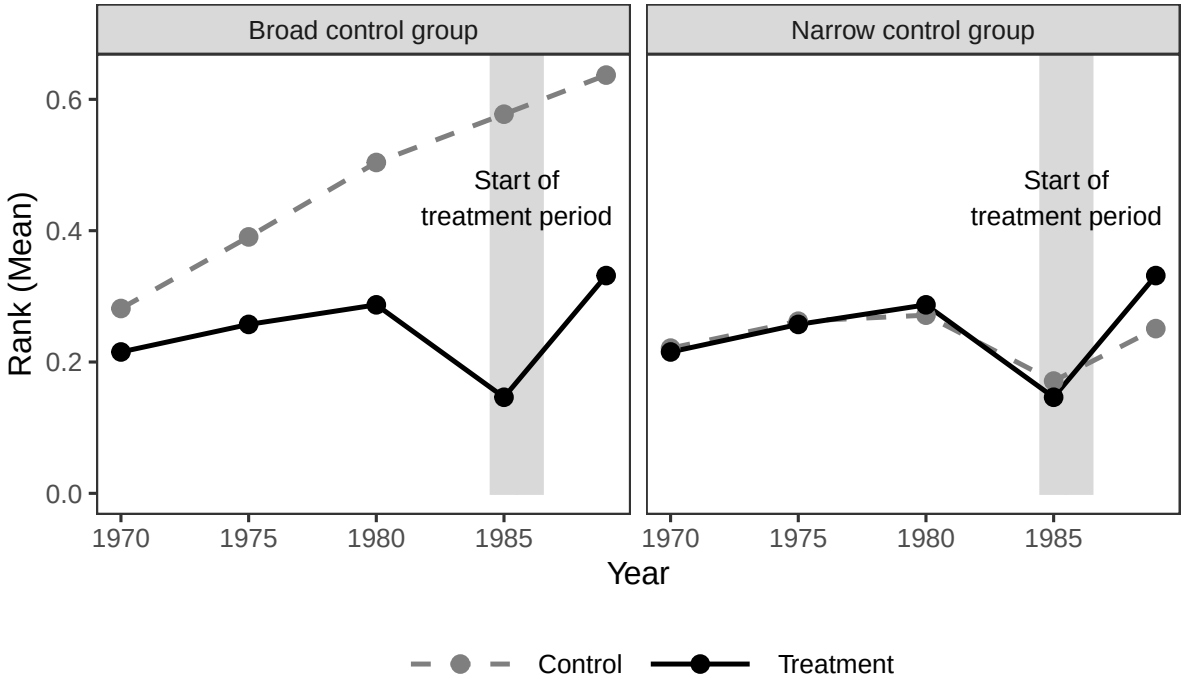


Figure 3: Parallel trends



Note: The plot shows coefficients from separate regressions of the labelled outcome variable on the treatment group dummy. Regressions include employer fixed effects. 95% confidence intervals based on standard errors clustered by network ID shown. Broad control group includes all cadres. Narrow control group only includes cadres in which a network member was promoted at least two ranks above the others in the network, but only in 1988 or 1989.

4.4 Difference-in-Differences Specification

We estimate a standard difference-in-differences model, comparing the change in rank (or Nomenklatura membership) for the group of cadres with early within-network promotions to cadres with late within-network promotions:

$$y_{it} = \alpha + \gamma \cdot \text{Post}_t + \beta \cdot \text{Early Promotion}_i + \delta \cdot \text{Post}_t \cdot \text{Early Promotion}_i + \epsilon_{it} \quad (1)$$

where y_{it} is the Nomenklatura rank or the binary Nomenklatura dummy of individual i in year t (1985 or 1989), γ is the coefficient for the binary indicator for the year 1989 (the 'Post' indicator), β the coefficient for the treated group status (= *Early Promotion*), and δ the difference-in-differences estimate of experiencing an early pro-

motion within one's network. We cluster standard errors ϵ_{it} by network ID.[8]

5 Results

Table 1 reports estimates for the main difference-in-differences specification. The baseline difference between treated and control groups ('Early Network Promotion') is small and negative but not statistically significant at conventional levels. This indicates comparable starting levels in rank in 1985. The difference-in-differences estimate for the treated group is 0.099, statistically significant at the 1% level. The corresponding estimate for the Nomenklatura membership dependent variable is 0.016 (significant at the 5% level). These effects are substantively meaningful: the implied increase in rank as a consequence of a within-network promotion is 12% of one standard deviation of the rank variable; for the Nomenklatura variable, the estimate indicates an increase in the probability of being elevated by 1.6 percentage points. The unconditional probability of belonging to the Nomenklatura is 12.4% in the sample, implying a relative increase in the probability of 14%. These findings support the idea that work brigade networks had substantial career implications for cadres and networks played an important role in shaping career advancement in the GDR.

5.1 Additional implications and placebo tests

To probe the plausibility of the results, we explore a series of additional observable implications of our theory as well as several placebo tests. The results are summarized in Figure 4.

In panel a), we vary the definition of treatment status to allow for a more fine-grained differentiation of the treatment. Our main models rely on a binary indicator that tracks if there was any member j in cadre i's network that was promoted to a high rank. Although this captures the core idea of network effects, some cadres were lucky enough to have several network members j promoted to high status. If network effects matter for one's own promotion, then presumably having more high-

[8]This two-group, two-period difference-in-differences specification is the simplest, most straightforward approach for estimating the effects of a within-network promotion. E.g., adding individual-level fixed effects does not change the estimates due to the two-group, two-period nature of the data set.

Table 1: Main DiD results: early network promotions boost individual career trajectories

	(1)	(2)
DV	*Rank*	*Nomenklatura*
Post	0.087***	0.014***
	(0.012)	(0.004)
Early Network Promotion	−0.018	−0.007
	(0.040)	(0.019)
Diff-in-Diff Estimate	0.099**	0.016*
	(0.037)	(0.008)
Num.Obs.	19 126	19 126
R2	0.020	0.003

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Note:
The table shows OLS estimates with robust standard errors clustered by network in parentheses. Unit of observation is the individual cadre in 1985 and 1989 (two-period panel).

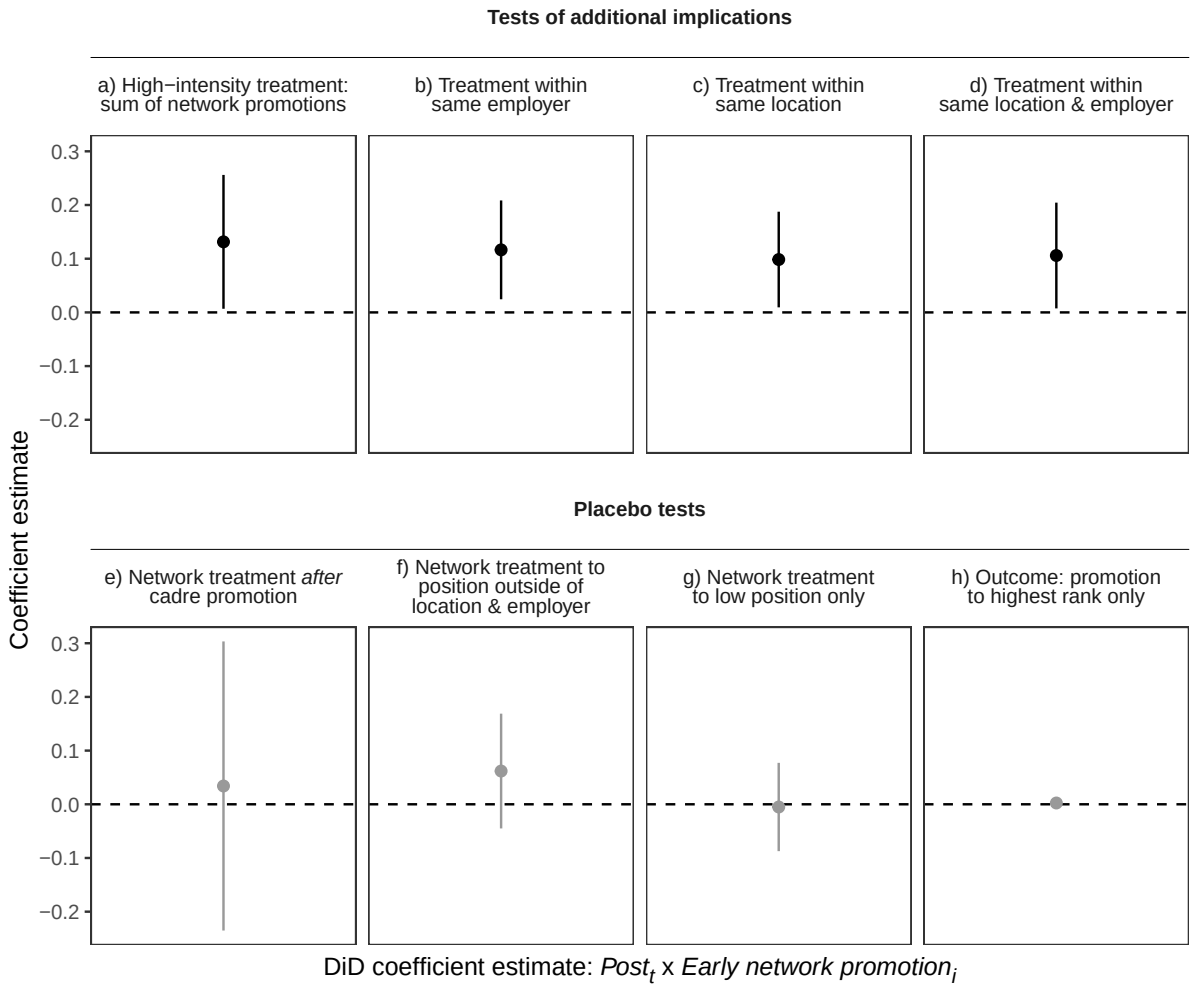
ranking ties should matter as well. We construct a new variable which is the sum of early promotions within one's network and use it as a new treatment indicator.[9] The resulting DiD coefficient is consistent with this expectation and positive and statistically significant.

Moreover, we should be particularly likely to see early network promotions to have an effect when the "treatment-assigning" network member was promoted early to a position within the same employer or to a different employer, but within the same location. The organizational and geographic proximity of those influential positions should better enable the promoted network member to influence the career paths of their network peers. We formally test this expectation in panels b) to d) in Figure 4 and find that the network effect is particularly visible following same employer/location promotions.

We also implement a series of placebo tests to strengthen our findings. In panel e) in Figure 4, we estimate a placebo model in which we assign 'fake' treatment and control status before the promotion events happened in reality. This time-jiggered approach does not reveal evidence of the positive career effects of network promo-

[9]Due to the right-skew of the variable, we use a hyperbolic sine transformation.

Figure 4: Testing additional implications and placebo tests



Note: The figure displays δ coefficients from estimating Equation 1 using different outcomes, treatment specifications or samples with 95% confidence intervals based on robust standard errors clustered by network ID. Outcome is the five-point cadre rank variable. Panel a): We replace the *Early promotion* dummy with the (sine-transformed) sum of early-promoted network members. Panels b)-d): we recode *Early promotions* $= 1$ only for early promotions within the same employer in 1985 and 1989 (panel b); only for early promotions that occur within the same location (using the AKDS municipality codes) (panel c); only for early promotions within the same employer *and* the same location (some employers had offices in different locations) (panel d). Panel e) assigns the network treatment to a year *before* the cadre's promotion. Panel f): We recode *Early promotions* $= 1$ if the network promotion happened to a different employer in a different municipality. Panel g): We redefine network promotions as one-rank promotions only. Panel h): We investigate promotions to managerial positions only.

tions. Switching around the logic of the within-employer/location tests in panels b-c, we investigate network promotions to positions outside of a cadre's current employment organization and workplace in panel f). Here, we should not see a treatment effect, as early-promoted cadres were unlikely to be in positions that easily allowed for influencing network members' careers, which is what we find. Another placebo test investigates the effect of network promotions to lower ranks: if early-promoted network members were only elevated to marginally influential positions, their clout over their network members' careers should have been similarly limited. We test this null expectation by redefining the treatment dummy to capture only early network promotions by one rank (recall that our standard definition of early network promotion is defined by a two-rank increase). Consistent with this expectation Panel g) shows a null estimate.[10] Finally, we recode the rank outcome variable to reflect only promotions to rank 4—the highest rank in the CCDB dataset, limited to combine directors, party executives, or mayors. While we expect network connections to have a career-boosting effect, this effect should be mostly limited to mid-level career jumps. Promotions to top positions are unlikely to be influenced by workplace networks. Consistent with that idea, panel h) reports a precisely estimated null result for this outcome.

5.2 Robustness tests and alternative explanations

We implement a set of additional robustness checks in Appendix D, further refining the sample, allowing for time-varying effects of our control variables, and splitting the sample by employment sector–none of which substantially modify our findings.

One potential alternative explanation is that our findings reflect the effects of good management of the cadres that assign the treatment to their work brigade. While we cannot fully rule out management effects, we find it unlikely they solely drive our results for three reasons. First, our narrow analysis period (1985–1989) makes it implausible for management effects to materialize quickly enough following

[10] We show results from fully disaggregating the treatment variable by all rank differences in Appendix Figure E.10. As expected, the effect is most pronounced if early network promotions were elevated to executive leadership positions.

early promotions in 1986–1987. Second, our treatment variable is defined as early promotions of *two* ranks above peers. However, in the GDR's nomenklatura system line manager responsibilities usually lay with the person in the next rank, i.e. *one* rank above; indeed, we find a negative effect for such one-rank increases in Figure 4 g), suggesting management effects are not at play. Third, if management effects were the primary driver, we would expect uniform impacts rather than stronger effects tied to personal relationships. However, in Appendix Table E.3, we observe significantly stronger effects for promotions based on shared personal characteristics, reinforcing the role of close ties rather than pure management effects.

6 Helping or hindering the regime?

Our findings show that workplace networks boost careers, even within the highly formalized cadre system of the GDR. This raises an important question: What role do these networks play in an autocratic bureaucracy?

We outline two possible functions in the theory section. First, networks may serve mid-level cadres building personal patron-client ties, advancing allies who might not align with regime preferences. These candidates, being less likely to rise through formal channels, would owe more to their patrons. If this is the case, we should see network-promoted cadres diverge from regime ideals.

Second, networks may help cadres identify and promote loyal, capable individuals who serve regime goals. If mid-level cadres are rewarded for selecting the "right" people, and networks improve their selection ability, then network-promoted cadres should align closely with regime expectations of loyalty and competence.

To investigate which of these two observable implications is most consistent with the data, we probe the qualification profiles of promoted cadres compared to all non-promoted cadres. Specifically, we compare two profiles of promoted cadres: (1) cadres that were in a "treated" network (we label this group "network promotions"); and (2) cadres that were promoted for reasons unrelated to a network connection (we label this group "regular, non-network promotions").

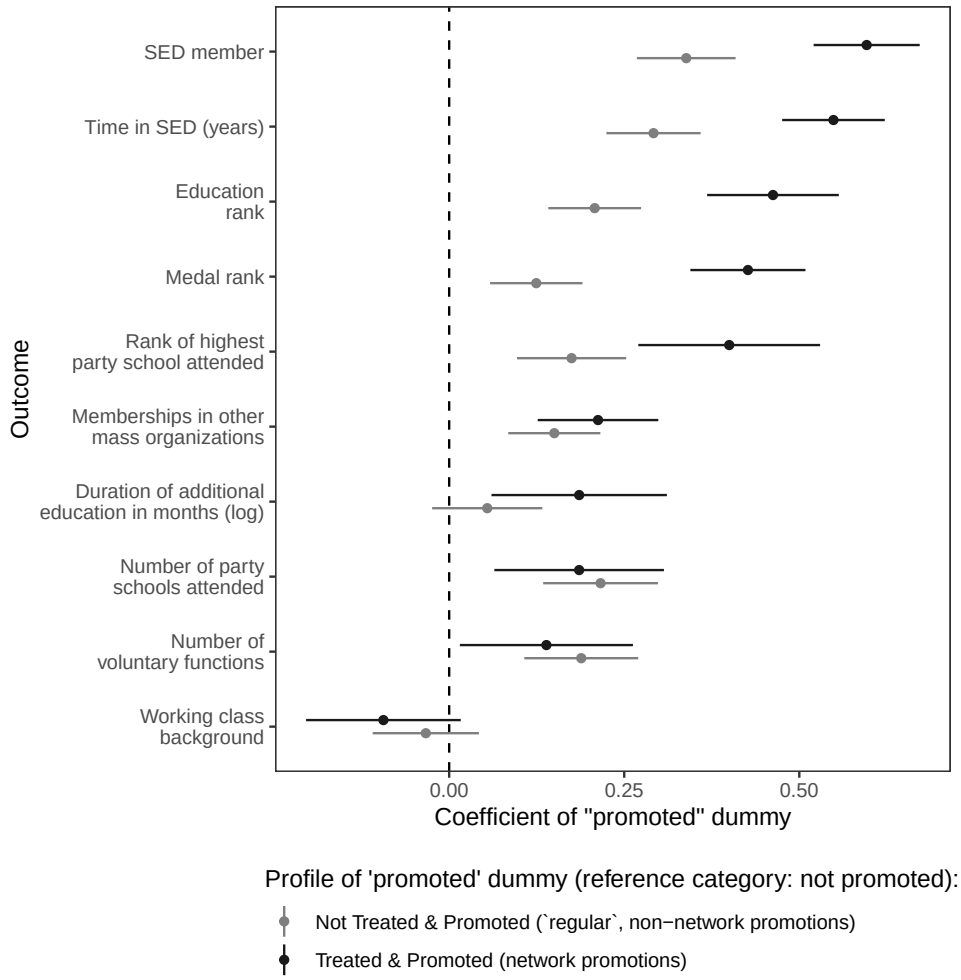
If the “private-fiefdom" explanation is correct, we should observe that the network-promoted cadres score worse than regularly promoted cadres on several indicators that the SED regime considered as highly relevant for promotions, such as membership (duration) in the socialist regime party SED, completion of specialized political training in party schools, medals received, or working class background (Hornbostel, 2002; Salheiser, 2009). If the strategic incentives and screening-tool explanation is more consistent with the data, however, we should observe network-promoted cadres to score as high or higher on regime loyalty indicators than regularly promoted cadres.

Many of these indicators are directly captured in the CCDB database, indicating their relevance to the regime. We provide a detailed list of the indicators in Appendix E.1. To compare network-promoted cadres to regularly-promoted cadres, we regress each of the loyalty indicators in separate OLS models on two dummies, one indicating that a promoted cadre can be linked to a network promotion, another dummy indicating a promoted cadre could not be linked to a network promotion (regular promotion). The reference category is a cadre without a promotion between 1985 and 1989. We control for age, age squared, and sector, and subset the sample to employers with above-average employer size to account for potential differences in employers with and without work networks. We report 95% confidence intervals based on robust standard errors.

We show the results of this comparison in Figure 5 and report three relevant findings. First, we see that regular non-network-promoted cadres score better in terms of loyalty indicators compared to non-promoted cadres, as indicated by the gray coefficients in Figure 5. As expected, regular promotions mirrored the objectives of the GDR cadre policy.

Second, and more interestingly, we see similar patterns for network-promoted cadres (i.e., cadres who had an early-promotion network connection). The black coefficients show that these cadres were also loyal and competent, compared to non-promoted cadres. This finding casts doubt on the argument that the networks served

Figure 5: Loyalty profiles of network promotions match regime preferences better than non-network promotions



Note: The plot shows coefficients from separate OLS regressions of the standardized outcome variable (as labeled on the y-axis) on two dummies that indicate different types of promotions: gray-colored coefficients indicate not treated & promoted cadres (i.e. "regular", non-network promotions), black-colored coefficients indicate network promotions. The reference category captures all non-promoted cadres. Regressions include controls for age, age squared, gender, and employment sectors. The sample is a cross-section of cadres in the last period in our difference-in-difference dataset, restricted to larger-than-average firms to account for differences between firms with and without networks. 95% confidence intervals based on robust standard errors shown.

as a tool of personal patronage. It seems more consistent with the idea that the networks served as a information-gathering device. High-level cadres faced career pressures and recurring evaluations from the top–they had to carefully consider how to staff their own units. Thus, playing poorly qualified favorites may have been sub-optimal. Instead, promoted cadres drew on their workplace connections to identify subordinates that seemed most likely to foster the cadre's own career goals–e.g., by

contributing to productivity targets and loyalty signals of the cadre's work unit.

Third, network promotions also generally score better than non-network promotions with regard to many loyalty indicators. Moreover, when we compare promoted to non-promoted members of the same work brigade, we find the former to score better on these indicators of loyalty and competence (see Figure E.9 in the Appendix). This suggests that the networks were particularly effective in identifying high-quality candidates. This, in turn, raises the question *why* networks worked so well as screening devices. The indicators we observe in Figure 5 are, after all, also visible to the regime itself, and not only to the network members.

We can only speculate about potential reasons. One plausible explanation is that the results reflect unobservable differences between network and non-network promoted candidates that are visible to close network ties but are more difficult to gauge in regular selection procedures. One example is the medal rank indicator. Although the number and quality of medals would be observable to a selection committee, the underlying motivation that went into receiving these medals is plausibly better observable by a close member of a cadre's network. Another example is competence indicators. Matching a cadre's formal qualifications to their job requirements is easier with intimate information about the skills a degree contains, precisely the kind of knowledge a close network tie can provide.

Another potential explanation is that superiors' access to information on potential candidates was less comprehensive than expected. Although relevant candidate information was *theoretically* accessible to superiors, past research suggests limited actual access. The regime's establishment of the computer-based CCDB was a response to realizing that the existing paper-based system was inadequate for maintaining comprehensive and current data on the administrative workforce. Even after introducing the CCDB, many work units did not utilize the system as intended (Hornbostel, 1999). Therefore, informal networks might have effectively bridged these informational gaps for promoting superiors.

Cadre networks may have also compensated for weaknesses in the GDR's rigid

cadre program. Administrative careers were meticulously planned, with centralized decision-making dictating advancement years in advance. Historical studies suggest these processes often resulted in placing individuals in roles that poorly matched their qualifications, interests, or aspirations. Networks could have mitigated these shortcomings by allowing promoters with detailed knowledge of candidates' competencies and preferences to select more suitable candidates.

All three reasons also complement the strategic interests of mid-level cadres to use promotions as a way of signaling loyalty to their superiors–by promoting candidates that appear to be of particularly high quality.

Although these three post hoc explanations would be in line with the strategic interest and screening-argument, we caution against a strong interpretation of the purely descriptive comparison of promotion outcomes.

7 Conclusion

We use the case of the former German Democratic Republic to assess how personal cadre networks matter for careers within authoritarian power structures. The socialist regime of the GDR tried to use highly formalized procedures to centralize the recruitment and promotion of cadres under the control of the top leadership and limit the discretion of mid-level managers. These attempts at bureaucratic control were, at best, imperfect. We explore whether the promotions of low- and mid-level cadres were affected by personal networks.

Within the context of the GDR, we use the example of work brigades to proxy for cadre networks. Given the general paucity of social ties in the former GDR, work brigades are one of the few clear historical examples of meaningful cadre networks that mattered in people's daily lives. Work brigades, initially created by the regime to increase productivity and foster social control, developed into niches of partial autonomy from the state that fostered social connections in the workplace.

We rely on the information from the Central Cadre Database to empirically estimate the effect of personal networks in the form of work brigades on cadre promotion

in East Germany. We rely on a difference-in-differences approach to isolate the effects of a within-network promotion on an individual's subsequent career advancement. We find that the promotion of a member of the work brigade to a higher rank has positive returns for the remaining members. We provide indirect evidence that personal connections through work brigades are unlikely to be the consequence of a patronage mechanism but are used to identify competent and loyal individuals. In effect, personal networks effectively screen for desirable candidates and do not elevate personal cronies.

Our findings are noteworthy in several ways. First, they demonstrate the relevance of social networks at the low- and mid-tiers of an authoritarian hierarchy. Second, we document them for an understudied case, the former GDR, which we consider to be a 'least likely' case due to its heavy reliance on formalized rules and centralized structure. Third, our findings suggest that personal networks do not have to serve narrow patronage goals but can be effective technologies to manage principal-agent problems in an information-poor environment. Combined with the recent work of Hassan *et al.* (2024), our findings contribute to a better understanding of how social and political contexts shape processes of selection in bureaucracies.

To what extent are our findings specific to the GDR and the peculiar nature of the work brigades? Future work will have to explore how social networks shape promotion practices in other settings, but there are a few ways in which we may speculate based on our findings. Work brigades are a suitable stand-in for venues that build dense social ties between peers through shared experiences and mutual help. Similar ties might develop in the context of shared school or university experiences or serving together in a military unit. Importantly, such ties can be utilized as a screening mechanism in authoritarian settings when reliable information is scarce and network members have shared career backgrounds and ambitions. In contrast, other non-hierarchical social networks that foster mutual trust, but include individuals with varied careers, e.g., sports and hobby clubs or neighborhood associations, might be less suitable as screening tools in that regard.

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Cadre networks and bureaucratic careers in autocracies

Online Appendix

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Contents

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A Additional case background

A.1 State regulation of social interactions

Like other autocratic states, the GDR established a dense network of mass organizations related to all different kinds of social activities and interests–ranging from culture and arts to sports and any other kinds of hobbies. Private initiatives without central party control were not allowed (Rueschemeyer, 1991). The youth organization of the ruling party Free German Youth (*Freie Deutsche Jugend*, FDJ), penetrated all areas of the educational sector, from primary schools to universities. Parents taught their children early how important it was not to talk about private matters in school (Grafe 2010, p. 24). Weary of the dissidence that may evolve in universities, the regime ensured a particularly dense Stasi surveillance of higher-education institutions. The seminar groups overlapped with the FDJ groups; their composition was controlled by the secret police. Local neighborhoods did not leave more room for the development of trustful relations and strong social ties either. While the regime succeeded in collectivizing social life and creating ample opportunities to meet, research suggests that strong ties in the neighborhood barely existed because neighbors were mistrustful of each other (Völker & Flap, 1997).

This dense system of control forced citizens to keep their personal networks very small and homogeneous (Völker & Flap, 1999). The awareness of constant surveillance and the resulting fear of relative strangers worked against the development of trust-based networks in schools, universities, neighborhoods, and mass organizations (Lichter *et al.*, 2021). We therefore focus our analysis on networks that emerged in a specific work context: the so-called work brigades.

B Dataset construction

B.1 Identifying Brigade Networks

We use the detailed work information in the 1985 file to identify the smallest work unit in which each cadre was placed in the year 1985. This approach tries to explicitly capture the importance of the small work unit in the employment system of the GDR. Specifically, a work unit network is defined by all cadres who:

1. Have the same employer, as given by the CCDB's unique employer ID (*Betriebsnummer*)

2. Are based at the same location, as given by the CCDB's unique municipality number (*Gemeindenummer*). Several of the larger state-owned companies (*Volkseigene Betriebe*, VEB) in the GDR had sites in different locations. By combining the employer ID and the location ID, we make sure to capture networks in the same employing organization in the same location.

3. Have the same general area of tasks (*Arbeitsbereich*). The CCDB provides an ID number for "area of task" that denotes each cadre's general line of work, such as "bookkeeping", "human resources", "heavy machinery" or "market research". For smaller employers, this criterion often does not vary within an employer. But for larger employers that are active in a range of different fields, this criterion ensures that we capture cadres in the same line of work.

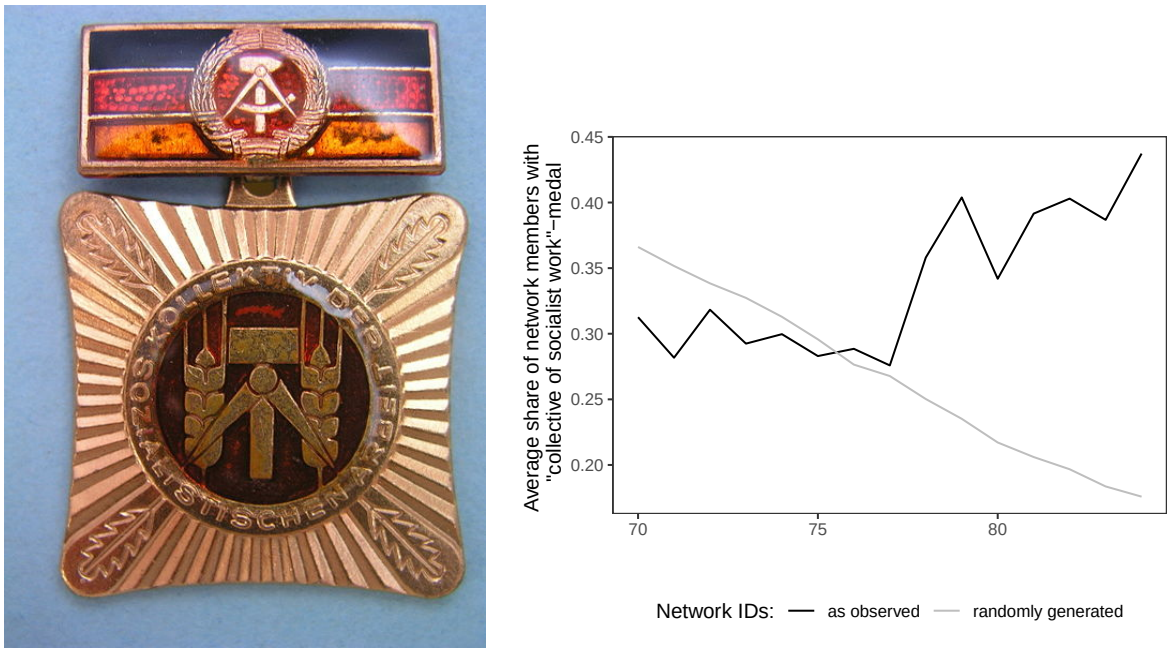
4. Have the same work function (*Funktion / Stellung*). The CCDB assigns every cadre an ID that captures their specific work function, such as "judge", "secretary", or just "employee".

These criteria give us a full account of all work unit networks in the CCDB in 1985. The 1985 file contains 421,595 cadres. Among those, we identify 187,309 unique networks, of which 47,433 networks have two or more members.

How well does our procedure capture work networks through actual work brigades? To assess this question, we exploit a unique feature of work brigades: the possibility of a work brigade earning a dedicated award for the work unit's performance, the so-called "Collective of Socialist Work" medal (*Kollektiv der sozialistischen Arbeit*, KdsA). The medal was awarded to a company's or administration's work brigade that demonstrated "excellent performance in the socialist competition, completion of political and cultural standards, as well as the adherence to socialist morals and ethics" (Dowe *et al.*, 2009, n.p.). To document their efforts towards fulfilling these goals, and thus the overarching five-year plan, work brigades kept a detailed journal not only of their work-related activities, but also extracurricular activities, such as joint movie or theater visits, or hiking excursions. If a work brigade won this prize, the medal was awarded to all members of the work brigade. The left panel of Figure B.1 shows an example of the actual medal.

The CCDB provides detailed information on cadres' awards, including the number of medals received, the year in which the medal was received, as well as the precise type of medal, including the KdsA medal. We use the information on the timing of KdsA medal receptionto validate our measurement of work brigades in the following way: We identify all years in which at least one member of a network received a

Figure B.1: Validating the measurement of work brigades



(a) "Collective of socialist work" medal

(b) Share of "Collective of socialist work" medals in random vs. observed network-years with at least one medal

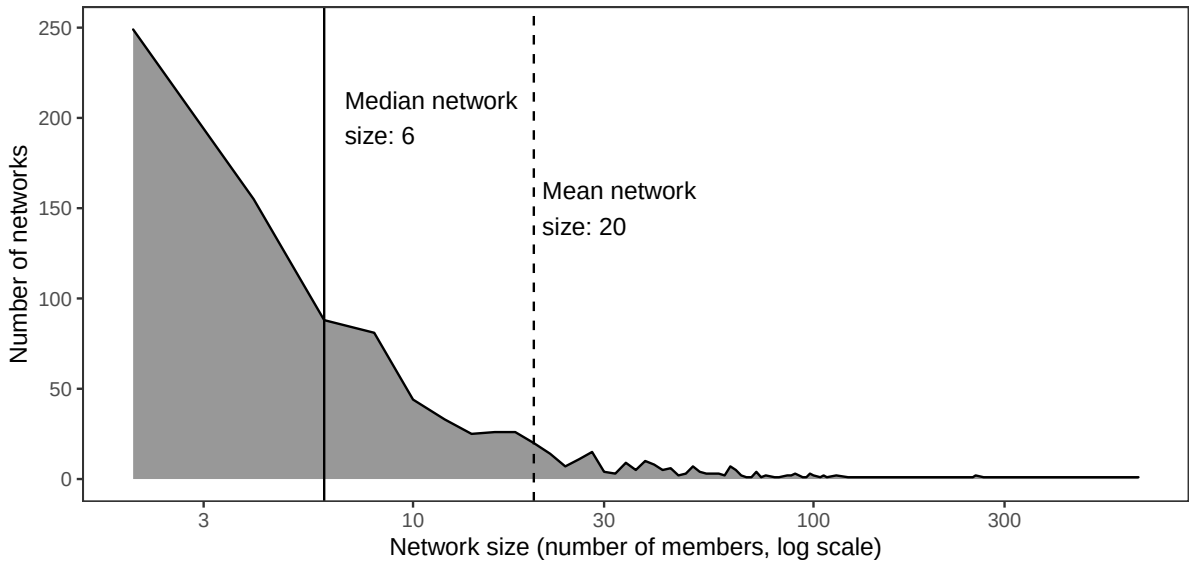
Note: Panel (a) displays the collective of socialist work medal. Image source: https://commons.wikimedia.org/wiki/File:Medalla_RDA.jpg (last accessed: May 18, 2026). Panel (b) displays that observed networks received the medal, on average, in the same year compared to randomly generated networks.

KdsA-medal using information on cadre's time they were in their current function as well as information on the years they received KdsA medals. If our measure correctly captures work brigades at least to some extent, then we should observe a high share of any given network receiving the KdsA medal: since the medals were awarded collectively other members of the network should also have received the same medal in the same year.

We plot the results in panel b) of Figure B.1. The figure shows that particularly as we come closer to the year of our pre-treatment observation of networks, 1985, our measure is successful in capturing a large share of actually observed work brigades—especially compared to randomly generated network IDs.

Another way to validate the data is to compare our observed network sizes to the historical record. We visualize the distribution of network sizes in Figure B.2. The plot demonstrates that network sizes are extremely right-skewed, with the vast majority of networks having less than 30 members and a median network size of 6 members. These statistics are comparable to historical estimates of work collective sizes. (Reichel, 2011, p.350) documents the number of work collectives for fifteen employers together with the total number of employees for the year 1973. We estimate a mean work collective size of about 25 for this historical sample by Reichel, which is close to the average in our sample of about 20, improving the face validity of our data. Both exercises improve our confidence that our measurement strategy captures a meaningful proportion of work brigades

Figure B.2: Distribution of network sizes



Note: The plot shows the distribution of network sizes in our sample. The sample is comprised of cadres that fall under the narrow treatment and control group conditions, based on early vs. late promotions.

B.2 Record Linkage Procedure

Linking records across the 1985 and 1989 files is no trivial task. Privacy laws forced the German federal archive to anonymize each personnel record before handing the data over to us. Therefore, the GDR's personal ID number, (the *Personenkennziffer*, or PKZ) the exact birthday (but not birth year and -month), as well as each cadre's name were removed from the original data files that are accessible for research.

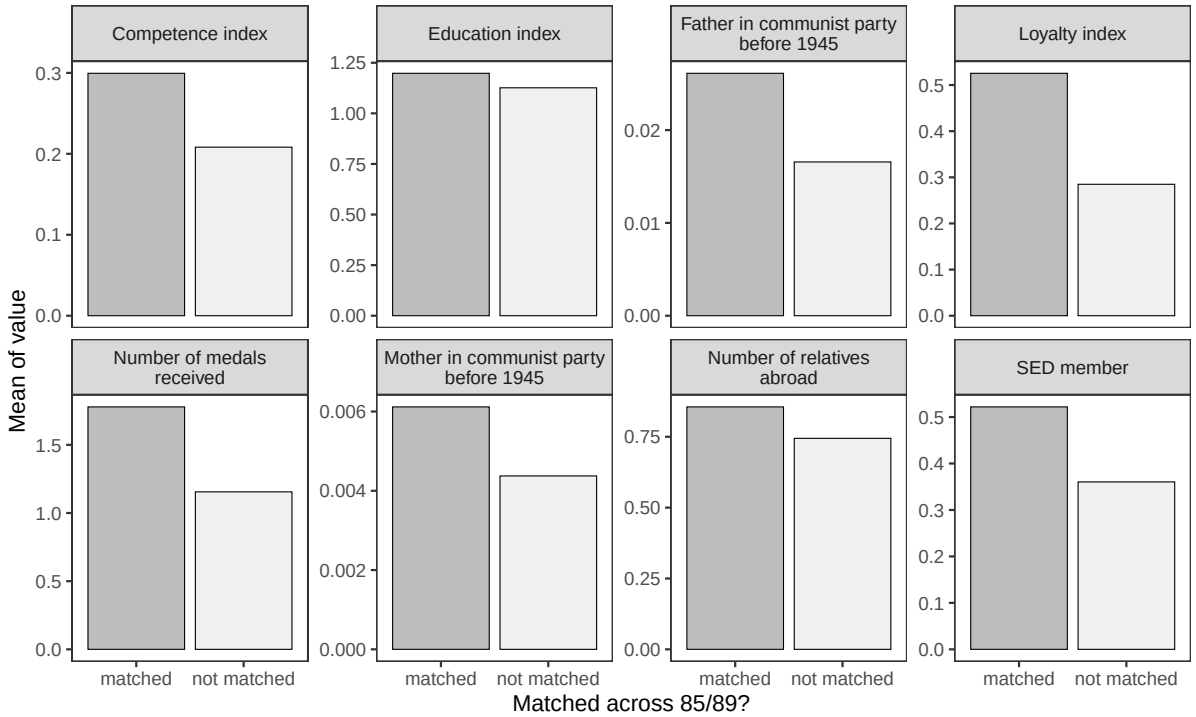
To overcome this challenge, we use the `fastLink` R package that was explicitly developed to probabilistically link large-scale administrative records (Enamorado *et al.*, 2019). Probabilistically means that we rely on features of each record that are the same or extremely similar across both files to assign an ID that links persons across files.[4] To improve computational efficiency, we reduce the number of potential comparisons by blocking the data by gender and birth month. This means we only consider a person to be a candidate for a match if they are similar across covariates and if they share the same birth month and gender. We consider a record as "matched" if the probability of a match is greater or equal to 99%.

Out of the 421,595 cadres in the original 1985 file, we can identify 182,065 matches in the 1989 file. This means we can trace about 48% of the original cadres across both years. This difference in composition can, in part, be explained by retirements from and new additions to the workforce. Moreover, some employers had difficulties to

[4]We match records based on similarity in the following features: the first year a person joined an organization, such as the FDJ, FDGB, or DSF; the first year in which a person received an educational degree; the first year a person received an award; the string of their employer in 1985; the birth year; the social origin (a CCDB feature that captures a cadre's social background, e.g. whether they belonged to the working class or the *Intelligentsia*); political origin (a cadre's background during the Nazi regime 1933-1945) and their basic school attainment.

complete the data submission in time. There is anecdotal evidence that data entry was a laborious task and was more formalized in some organizations than others (Remy, 2003, p.94).

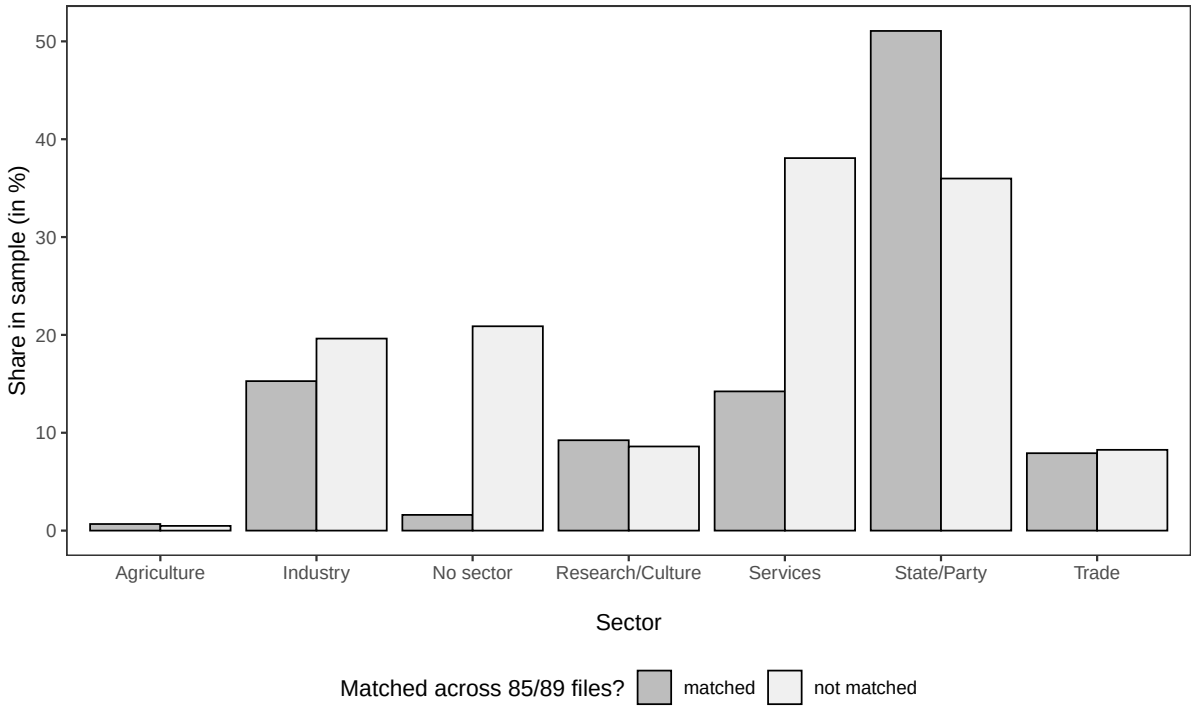
Figure B.3: Comparing covariate composition of matched vs. non-matched records across 85 & 89 files



Note: The plot shows average values of the labeled covariates of cadre records that were matched/non-matched across the 1985 and 1989 CCDB files. "Loyalty index" is a weighted index that captures latent loyalty. It combines information on membership time in the SED; number of core organizations in which the cadre is a member (such as FDJ, DSF, etc.); military service in the NVA; and the total number of medals earned. "Competence index" is a weighted index that captures latent competence. It combines information on education, work experience, additional education, specialized knowledge, and language proficiency.

What are the systematic differences between cadres that we are able to match across both files? Figures B.3 and B.4 we show differences in covariates and sector composition across matched and non-matched cadres. The figures demonstrate that, on average, cadres that we can match across files are more loyal, more competent, and correspond in general more strongly to regime expectations than non-matched cadres. Figure B.4 helps to explain this difference. The plot shows that we are able to match systematically more cadres from within state/party organizations than from the service sector. Since employment in state/party organizations relied more heavily on conformity to regime expectations in terms of loyalty signals (e.g. membership in the SED or other socialist organizations), we would expect cadres from those organizations to also display these traits—which is what we observe in Figure B.3. Thus, our final data set focuses primarily on the core state bureaucracy of the former GDR.

Figure B.4: Comparing sector composition of matched vs. non-matched records across 85 & 89 files



B.3 Simulating potential bias due to imperfect record linkage

Imperfect matching across 1985 and 1989 raises the concern of differential attrition and bias due to compositional changes. It is important to note that we believe this to be unlikely. Missing records emerge for various reasons: cadre retirement or demotion, data entry errors, delayed reporting, and errors in the matching procedure. For this to explain our main finding and supplementary results, all forms of attrition would have to follow the same unusual pattern. We would have to assume that the unobserved and more unqualified cadres would have been promoted in the presence of a network promotion (but not otherwise) and would have experienced their promotion early rather than late. While the former might be plausible, it seems unlikely to correlate simultaneously with the timing of the promotion. More likely, the different attrition processes work at cross purposes and introduce attrition bias in our analysis, biasing against finding any results.

To provide a more systematic evaluation of the degree to which imperfect matching could bias our result, we conduct a simulation exercise. We implement the following procedure:

1. We identify all cadres in an *observed* 1985 network that are *not* observed in 1989. From this dataset we build our two period difference-in-differences dataset. Note that in this dataset we don't observe the rank outcome in 1989 for the unobserved cadres, but we know their treatment status as this is assigned by the observed cadres.

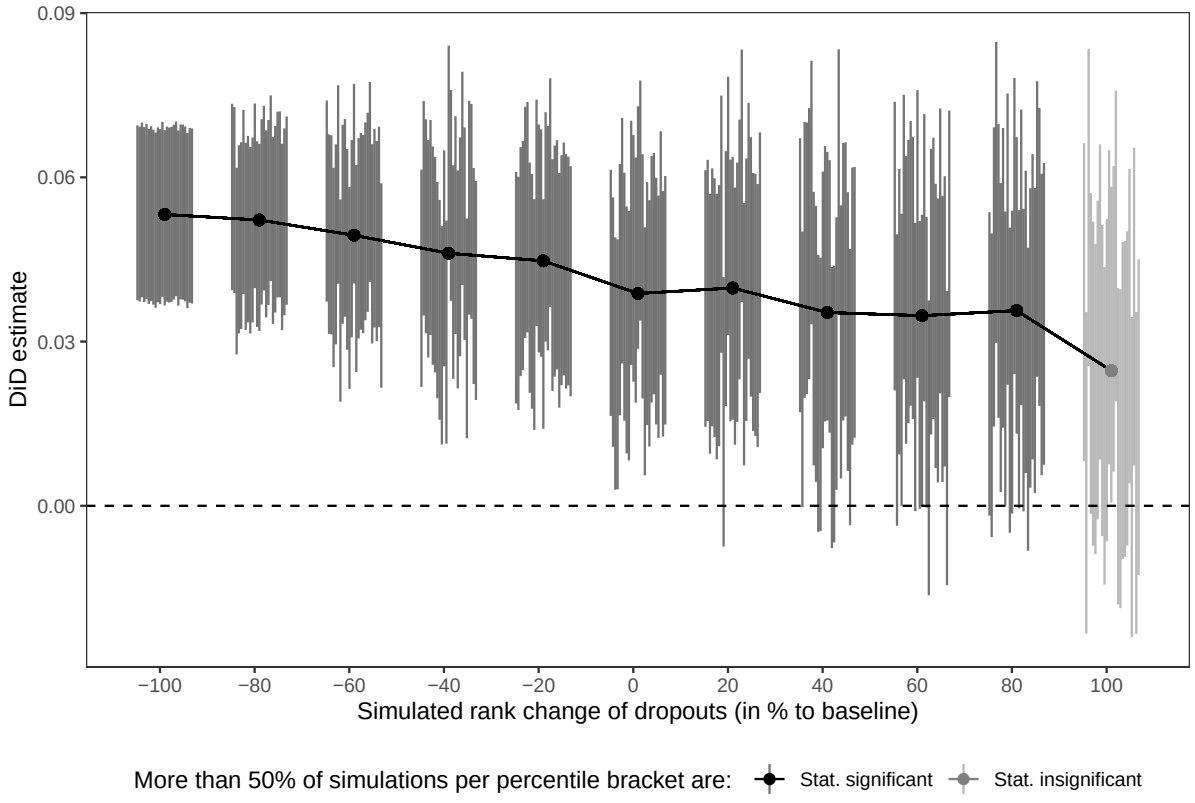
2. We then simulate a 1989 outcome rank for each of the unobserved cadres. In our baseline estimation, we set the mean of the simulated rank distribution to the mean of the rank distribution of the *observed* cadre ranks in 1989. This simulates the scenario in which all unmatched cadres would be promoted at a similar rate as the observed cadres.[5]

3. We then repeat step (2) shifting the mean of the simulated outcome distribution as a percentage of the observed baseline 1989 rank up to +/- 100% in brackets of 20 percentage points. For each bracket we simulate 25 outcomes. This simulates lower/higher promotion rates in the unobserved, non-matched cadres compared to the observed cadres.

Figure B.5 presents the results of the exercise. The figure shows that the DiD estimate turns statistically insignificant in more than 50% of the simulations only in the 100% bracket. This means that the the unobserved cadres would have needed to be promoted to ranks that were, on average, 100% higher than the observed and matched cadres. We deem this scenario to be very unlikely, especially given that the unmatched cadres are relatively less competent and loyal than the matched cadres (see Figure B.3).

[5] We use exponential tilting to simulate the new outcomes.

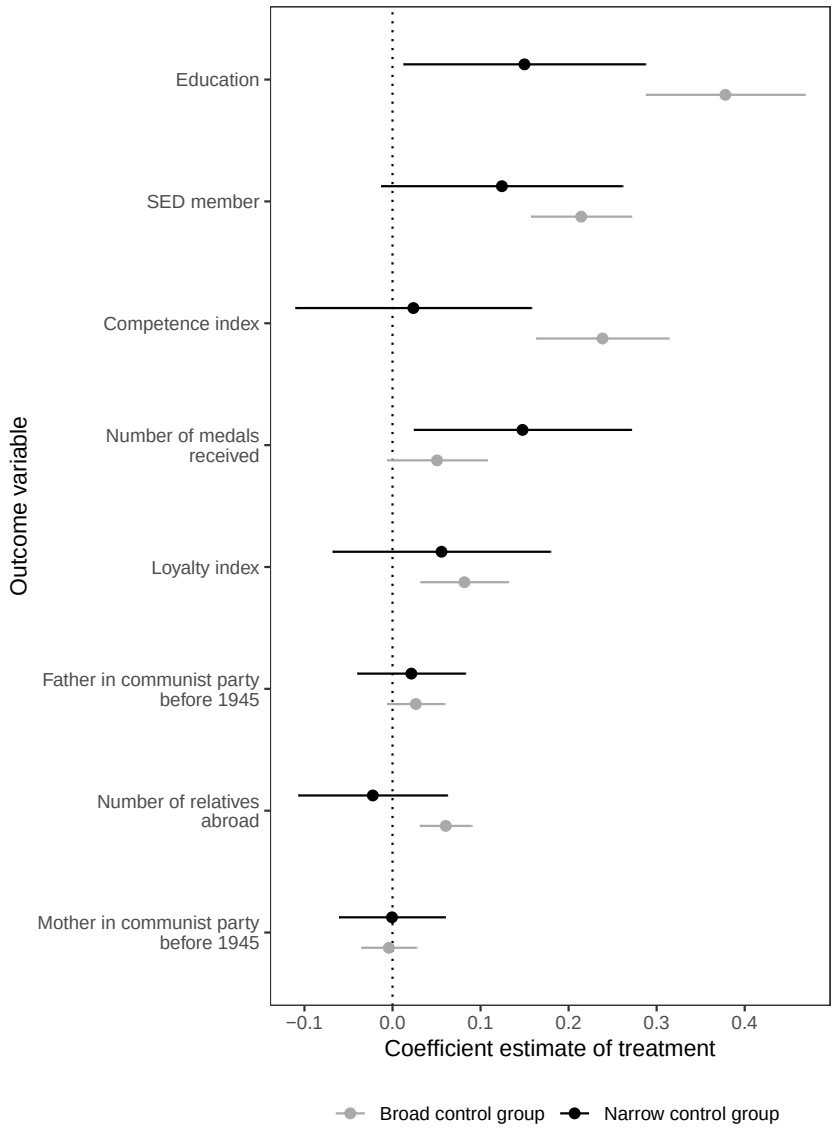
Figure B.5: Simulating bias due to different promotion rates of unmatched cadres



C Descriptive statistics and research design

C.1 Constructing treatment/control groups, balance

Figure C.6: Balance across treatment/control groups on covariates

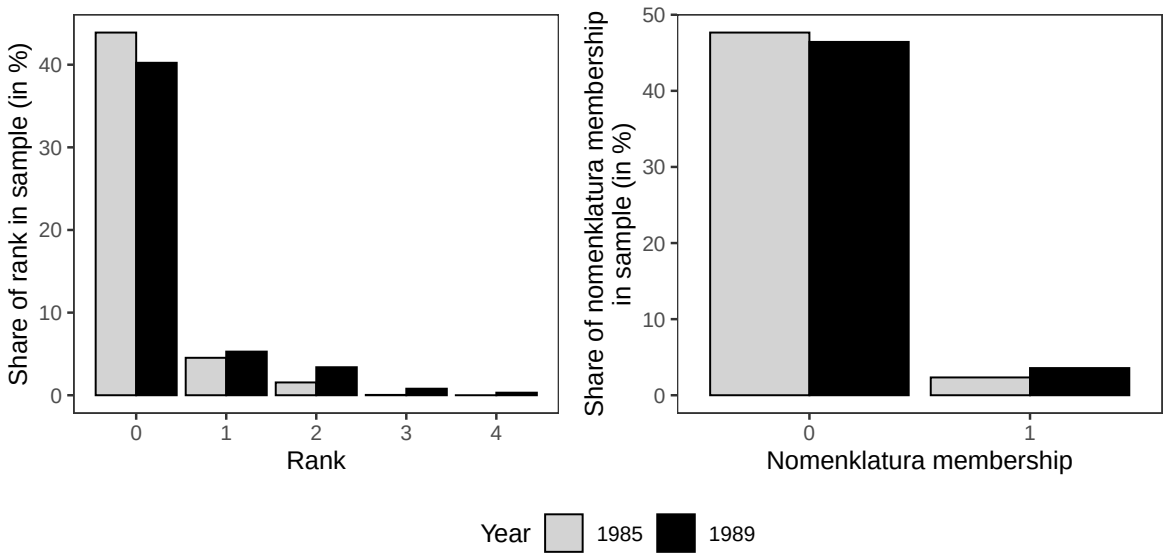


Note: The plot shows coefficients from separate OLS regressions of the labelled outcome variable on the treatment group dummy. Regressions include employer fixed effects. 95% confidence intervals based on standard errors clustered by network ID shown. Broad control group includes all cadres. The "Narrow control group" sample restricts the control group cadres in which a network member was promoted at least two ranks above the others in the network, but only in 1988 or 1989.

C.2 Empirical Distribution of the Outcome Variables

Figure C.7 visualizes the distribution of the two outcome variables for the two years in our sample, 1985 and 1989. We display the ranks for the narrow treatment/control group sample (see below) which we use in all our estimations. The plot shows that we observe some movement up the ranks between 1985 and 1989. The left panel shows that the share of cadres in the bottom rank decreases slightly between 85 and 89 and increases in the other ranks. A similar pattern is observable when we look at the Nomenklatura membership binary variable.

Figure C.7: Outcome variables



Note: The plot shows the distribution of the two outcome variables between 1985 and 1989. The sample is comprised of cadres that fall under the narrow treatment and control group conditions, based on early vs. late promotions, see below.

D Robustness tests

D.1 Individuals at Rank 0

Our first robustness check involves further refining the sample to just individuals who were at rank 0 in 1985. By excluding individuals of rank 1 or 2, we exclude possible cases that were already on a fast career track at the beginning of our analysis period. This has no bearing on our main results.

Table D.1: Individuals at Rank 0

	Rank	Nomenklatura
	(1)	(2)
Post	0.104***	0.014***
	(0.012)	(0.004)
Early Network Promotion	0.000	0.004
	(0.000)	(0.018)
Diff-in-Diff Estimate	0.109**	0.014+
	(0.041)	(0.008)
Num.Obs.	16810	16810
R2	0.050	0.004

Note: The table reports OLS estimates clustered by network in parentheses. Unit of observation is the individual cadre in 1985 and 1989 (two-period panel). Significance levels: + p <0.1, * p <0.05, ** p <0.01, *** p <0.001

D.2 Controls for Trends in Covariates

Second, although our basic difference-in-differences design exploits a comparison in changes, a violation of the underlying parallel trends assumption could occur if there are other time-varying confounding variables that correlate with network promotions and the outcome variables. One way of strengthening our basic model is to include control variables interacted with the 'Post' variable, to model unobserved trends in these covariates. We add a binary indicator for the gender of a cadre, a numerical measure of age, and composite indices of cadre competence and loyalty, all interacted with the 'Post' variable, confirming our initial results, even though the coefficient for nomenclature promotions becomes more noisily estimated.

Table D.2: Trends in covaraites

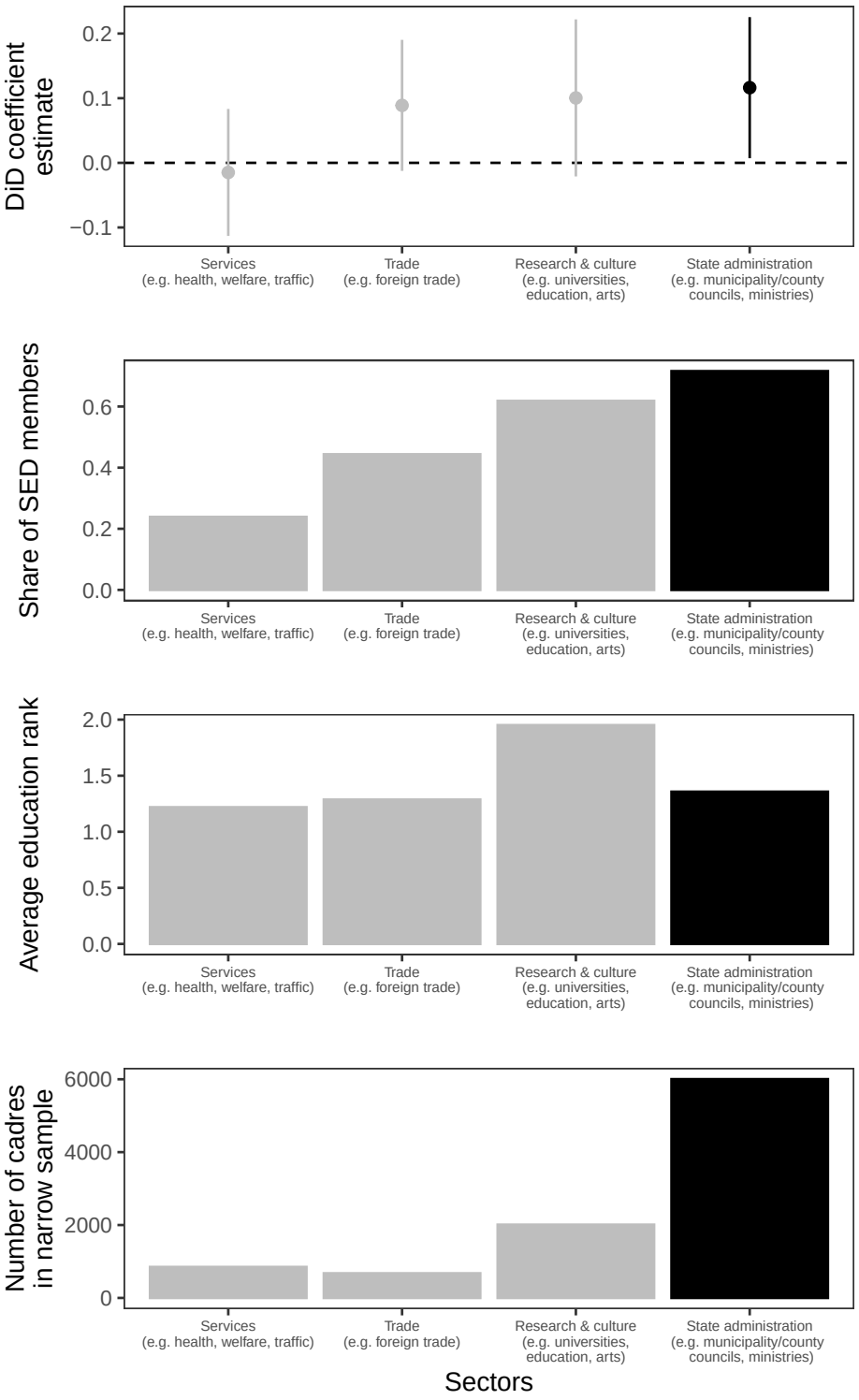
	Rank	Nomenklatura
	(1)	(2)
Post	0.372***	0.048***
	(0.053)	(0.012)
Early Network Promotion	-0.037	-0.016
	(0.039)	(0.019)
Diff-in-Diff Estimate	0.073*	0.010
	(0.030)	(0.007)
Num.Obs.	19126	19126
R2	0.066	0.030

Note: The table reports OLS estimates clustered by network in parentheses. Unit of observation is the individual cadre in 1985 and 1989 (two-period panel). Significance levels: + p <0.1, * p <0.05, ** p <0.01, *** p <0.001

D.3 Results by sector

We split our sample by employment sector. We find that our results are particularly driven by employees in the state administration—precisely those sectors with already high loyalty and lower competence levels than other sectors (see Appendix Figure D.8).

Figure D.8: Results by sector



Note: Outcome in the upper panel is cadre rank.

E Additional tests

E.1 Observable indicators of regime loyalty

All loyalty indicators are measured before the network promotion treatment, using available information in the Central Cadre Database.

SED membership. We construct a dummy variable of party membership. Party membership was an important public commitment to the regime that brought many benefits but was also costly in terms of increased time commitment or possible social sanctioning by regime-critical members of one's social network. Membership in the SED was a key prerequisite for a career in the GDR, especially when it came to higher-ranking positions in the state bureaucracy (Malycha & Winters, 2009; Christian *et al.*, 2019).

Time in SED (years). We construct a variable that measures the duration of SED membership in years before the cadre's promotion, using the party entry year variable from the CCDB.

Education rank. We construct an ordinal variable for an individual's educational attainment in 1984, based on the highest degree obtained as recorded in the CCDB. Educational attainment is a standard proxy of ability and competence in labor economics (Card, 1999) and has been used in the literature on political candidate quality (Besley & Reynal-Querol, 2011).

Medal rank. We count the cumulative value of each medal's *rank* as recorded by (Salheiser, 2009). (Salheiser, 2009) hand-coded each medal in the CCDB according to its reputation in the GDR. This medal rank represents the important symbolic and financial reward to individual GDR citizens, where medals provided the regime with a tool that allowed the targeting of benefits and social recognition to members of society the regime deemed worthy.

Highest party school attended. The CCDB includes a measure of the highest party school attended by an individual cadre at the moment of data collection. Party schools existed, in increasing importance (and with increasing signal in loyalty), at the county- (*Kreis*), district- (*Bezirk*), and national level, with the party school "Karl-Marx" at the national level being the one that was supposed to "educate" the highest ranking cadres. A number of smaller, specialized party schools also existed (Schmeitzner, 2001). We use a slightly simplified rank of these schools as captured in the CCDB.

Number of party schools attended. In addition to the single rank of the highest party school attended by a cadre we also include a simple count of *all* schools a cadre attended as an alternative measure of party school attendance.

Membership in other mass organizations. We count the number of voluntary memberships in core auxiliary organizations, specifically the *Free German Youth* (FDJ), *Society for German-Soviet Friendship* (DSF), and the *Free German Trade Union Federation* (FDGB).

Duration of additional education in months. We include a cumulative count of months spent on additional qualifications by an individual over time. Additional degrees, so-called "*Weiterbildungen*" in German, represent voluntary additional education, completed in public adult education centers ("*Volkshochschulen*") or additional professional certificates. Additional education was a popular way for adults to obtain qualifications beyond their primary education channels in later stages of life (Bramer, 1991; Jacob, 1990)

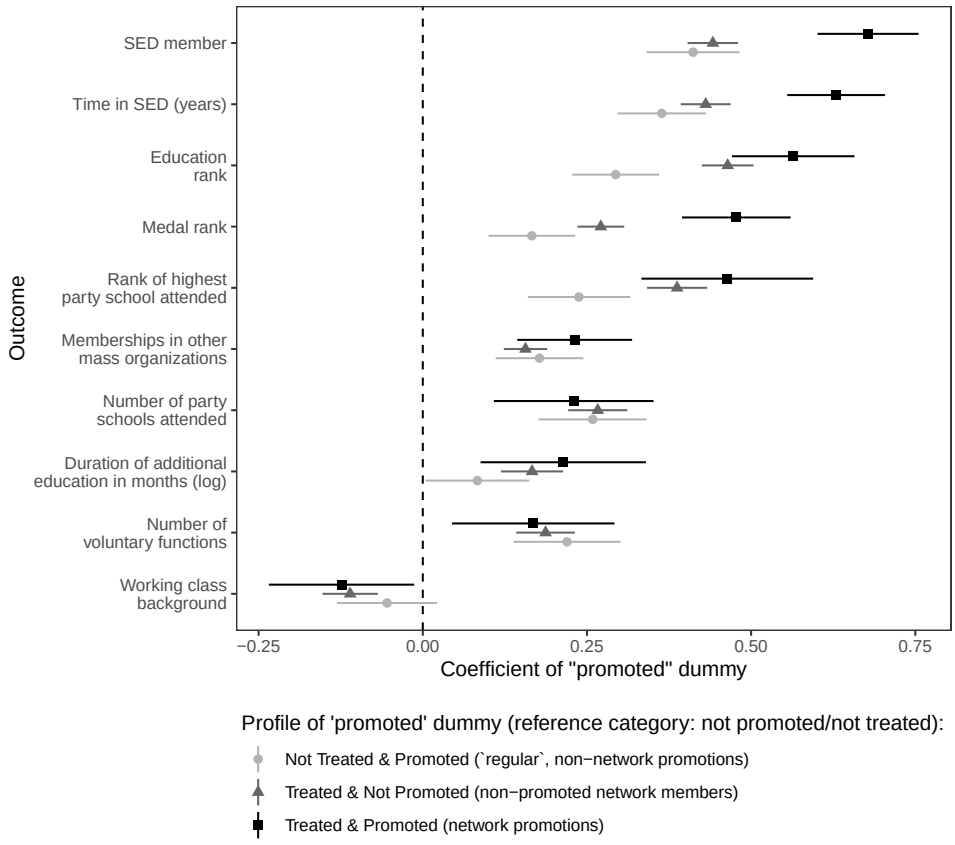
Number of voluntary functions. We also count the number of active voluntary

functions performed by the individual (*Voluntary functions*). Committed members of the central party were expected to invest parts of their free time into voluntary engagement in various state-based and party-based institutions (for example, in party committees). Consequently, the number of voluntary functions can be interpreted as a costly signal of regime loyalty.

Working class background. The working class was central to the GDR's official socialist ideology due to its foundation in Marxist-Leninist principles, which viewed the proletariat as the key revolutionary force for building socialism. Accordingly, "loyalty to the working class," signified through a formal working class background, was an important indicator of regime loyalty. The use a simplified version of the CCDB's own measure of the cadre's social background (*soziale Herkunft*).

E.2 Further disaggregating loyalty profiles

Figure E.9: Disaggregating loyalty profiles of network and non-network promotions



Note: The plot shows coefficients from separate OLS regressions of the standardized outcome variable (as labeled on the y-axis) on two dummies that indicate different types of promotions: gray-colored coefficients indicate not treated & promoted cadres (i.e. "regular", non-network promotions), black-colored coefficients indicate network promotions. The reference category captures only non-promoted, non-treated cadres. Regressions include controls for age, age squared, gender, and employment sectors. The sample is a cross-section of cadres in the last period in our difference-in-difference dataset, restricted to larger-than-average firms to account for differences between firms with and without networks. 95% confidence intervals based on robust standard errors shown.

E.3 "Buddy promotions"

Buddy promotions are a refined treatment of an early two-rank promotion in one's network, with the additional condition that the promoted, and thus treatment-assigning cadre, also has the following ties to the individual cadre:

- Same birthplace (we only have birthplace information for a subset of the sample)
- Same birth year
- Both are male
- Both have spent at least one year together in the same work function (workplace history)
- Both were members in the same mass organizations of the GDR (non-workplace history)

These criteria are supposed to capture close personal ties that arise from long-term workplace interactions and likely outside-of-work connections.

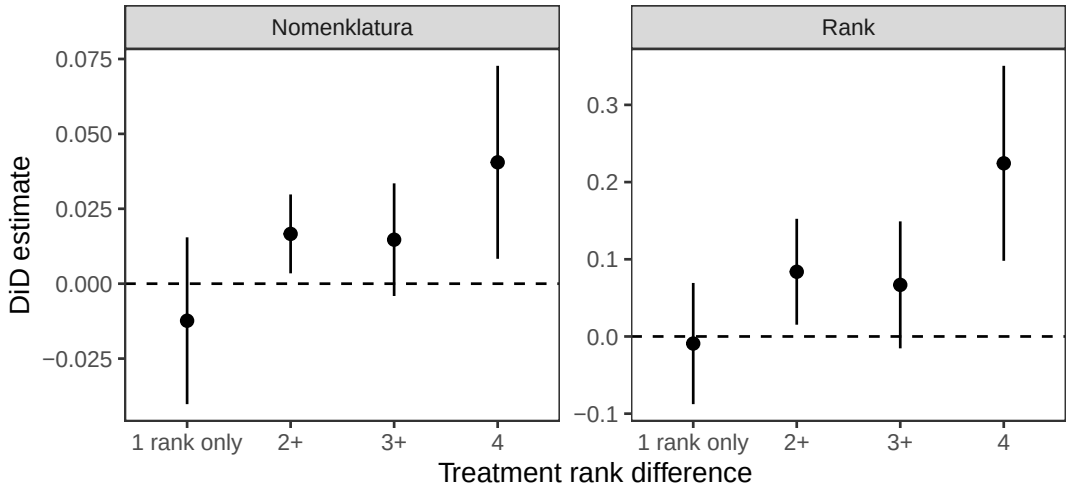
Table E.3: Buddy promotions

	Rank	Nomenklatura
	1	2
Post	0.125***	0.019***
	(0.012)	(0.003)
Early network promotion ("buddy" ties)	-0.073	0.027
	(0.054)	(0.054)
Diff-in-Diff Estimate	2.180***	0.385***
	(0.108)	(0.063)
Num.Obs.	19126	19126
R2	0.114	0.027

Note: The table reports OLS estimates clustered by network in parentheses. Unit of observation is the individual cadre in 1985 and 1989 (two-period panel). Significance levels: + p <0.1, * p <0.05, ** p <0.01, *** p <0.001

E.4 Varying treatment intensity

Figure E.10: Varying treatment intensity



Note: The plot shows the DiD estimate of Equation 1, but with varying treatment definitions. The main treatment is defined as early network promotions to two ranks or higher. Here, we relax this operationalization to illustrate varying treatment "intensities," denoted by the x-axis label. Control group treatment definitions are specified in the same way, i.e. we only compare early 1-level promotions to late 1-level promotions, early/late 2-level promotions, etc.

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