Corporate Networks and State Power: Russian State-owned Enterprises and Interlocks

Abstract

This study explores state-business networks within the framework of state capitalism, a growing phenomenon in emerging economies. State capitalism involves the state acting as an economic agent, influencing companies and markets through mechanisms that go beyond direct ownership. Using the Orbis database and a unique dataset of Russian state officials, the research applies social network analysis to investigate formal ownership structures and informal board interlocks. The findings reveal that while state-owned enterprises (SOEs) constitute only 2% of firms in Russia, they account for a third of revenue and assets, demonstrating the state's disproportionate economic power. Additionally, interlocking directorates, with shared directors—including former politicians—establish informal control channels, extending state influence beyond SOEs and further integrating state and private sectors. This dual mechanism blurs the boundaries between public and private entities, emphasizing the hybrid nature of state capitalism. The study introduces *Network State Capitalism* as the predominant model in Russia, where formal and informal control mechanisms operate concurrently. These findings contribute to the understanding of state capitalism in autocratic economies and offer broader implications for other emerging markets, enriching academic discussions on the varieties of capitalism and the role of networks in state-business relations.

Keywords: directorates, interlocking, Russia, social networks, state capitalism, state-owned enterprises

Introduction

State capitalism has been increasingly prevalent worldwide (Alami & Dixon, 2023; Wright et al., 2021). This phenomenon signifies the state's direct activity as an overt economic agent, exerting often arbitrary influence over companies and markets through various institutional mechanisms. These mechanisms include formal avenues such as ownership, financial subsidies and loans, administrative support, as well as informal channels such as political ties (Wright et al., 2021). In contrast to mixed economy state intervention, state capitalism entails substantial governmental intervention in business operations via highly individualized channels, predominantly observed within emerging markets (Du & Luo, 2016; Estrin et al., 2016). Companies linked to the state through ownership structures and political connections derive numerous advantages from these associations, such as access to resources and administrative support. However, they also face challenges due to their dependency on the state, including the necessity to adhere to governmental political agendas (Cuervo-Cazurra & Li, 2021; Klishevich & Panibratov, 2024).

State capitalism remains under-explored within the realm of network science; modern discussions highlighting the varieties of capitalism (VoC) thesis. Existing studies predominantly focus on clustering (DuBois & Primo, 2016; Sosnovskikh & Cronin, 2021), strategic alliances (Narula & Dunning, 1998; Takyi et al., 2022), and global production networks (De Marchi & Alford, 2022; Horner, 2017) within international business and economic geography. Our focus, in contrast, is on social networks in state-business relations. While there are notable studies on informal networks (Minbaeva et al., 2022; Vasileva, 2018), clans (Boisot & Child, 1996; Schweitzer, 2018), blat/guanxi (Ledeneva, 2009; McNally, 2011), and crony capitalism (Aslund, 2019), the dynamics and interlocking network structures

between the state and business in state capitalist formations have not received substantial attention.

The forms of governmental influence within these structures can manifest in various ways, surpassing simple asset ownership such as state-owned enterprises (SOEs) (Grosman et al., 2016). Recent research on SOEs underscores the significance of diverse manifestations of state capitalism, which encompass a wide array of state interventions in the economy and specific directorial and ownership connections between state organizations and private companies (Mariotti & Marzano, 2019; Witt et al., 2018; Wright et al., 2021). In the debate over the benefits of state- or market-led economic development, state ownership is seen to fluctuate between reforms and reversals (Alami & Dixon, 2023), with the role of SOEs varying accordingly. We focus on Russian state capitalism as an example of state resurgence. Following a period of market liberalization and deregulation in the 1990s, the state re-emerged as a significant player in the early 2000s (Viktorov & Kryshtanovskaya, 2023). This distinguishes the Russian context from the extensively studied Chinese model, where the state has maintained a more consistent role throughout years of economic liberalization (Remington, 2018).

The Russian state holds a substantial share of the economy, estimates ranging from approximately 25 to 80 per cent of GDP (Abramov et al., 2017; Berezinets et al., 2023; Panibratov & Klishevich, 2023). Despite these varying figures, there is consensus among scholars and policymakers that the state has greatly strengthened its influence on the Russian economy in recent years, increasing ownership of large domestic firms and establishing additional SOEs (Viktorov & Kryshtanovskaya, 2023; Yakovlev, 2021). Concentrations of state ownership are found in infrastructure - encompassing transport, nuclear power generation, and

pipelines - as well as in defense, finance, and media (Sharafutdinova, 2020). Apart from SOEs, which are directly or indirectly controlled by the state, many large Russian companies maintain political connections with government officials at various levels (Sawant et al., 2021), adding a crucial dimension to the understanding of Russian state capitalism. Russia serves as an exemplary and intriguing case of near-omnipresence in state influence on firms' activities.

In this study we seek to extend understanding of Russian state capitalism by examining the reach of the state among businesses through both formal and informal channels. Drawing on the extensive *Orbis* database of company-level data and a unique dataset of state officials compiled from various secondary sources, we use social network analytic (SNA) methods to examine the interaction of formal ownership relationships with informal channels constituted by overlapping board membership. We find that the Russian state's influence in the corporate sector is disproportionately large, with SOEs comprising only 2% of all firms with subsidiaries account for a third of operating revenue and total assets. The concentration is greater again within the largest interconnected component of parent-subsidiary relationships. This direct influence through ownership is potentially extended through associated informal relationship; the interlocking director network links SOEs with non-SOEs through shared directors, including former politicians, creating informal channels for state influence within the core of Russian business relations.

Our study makes three notable contributions. First, it extends the literature on the VoC by broadening the understanding of state ownership in the private sector using SNA approach. The distinctiveness of the Russian context, marked by strong governmental influence in the economy, influences both state-owned and state-connected firms directly and indirectly. Second, our research significantly advances network science by examining ownership,

interlocking directorates and their interaction within the understudied context of Russia. We find that the Russian political regime can be characterized not only as state capitalist but also as structured importantly by formal and informal networks. Finally, this study contributes by proposing *Network State Capitalism* as the predominant form of economic organization in Russia, highlighting how state influence extends beyond ownership structures into corporate governance networks. By employing SNA, it offers a methodological contribution, revealing hidden layers of power and influence within corporate structures, enhancing our understanding of formal and informal state control mechanisms.

The structure of this paper is as follows. First, the literature review discusses the ongoing debate surrounding Russian state capitalism, highlighting the importance of informal networks. This is followed by an examination of studies of interlocking directorates as an important form of informal relationships in business. Next, we outline the empirical strategy and data collection methodology. The subsequent section presents our findings, and finally, we engage in a critical discussion of the results, concluding with recommendations for future research.

Literature

Russian Network Capitalism

The power of informal relationships between organizations is highlighted in Ouchi's (1980) concept of ‘clans,’ which describes the space between market transactions and bureaucratic systems where social embeddedness supports common norms and activity without recourse to market or bureaucratic pressure, which may arise from kin or friendship obligations. These structures are distinguished by their reliance on personal relationships, goal setting through negotiation, and coordination via mutual adjustment - informal processes that occur among a relatively small number of participants within a context of high uncertainty. Such dynamics

align with the cognitive institutional pillar and support the view that firms tend to favor relationship-based strategies during the early stages of a transitioning economy. While a shift towards more formal, market-oriented institutions may be expected (Peng, 2003), personal networking and clan structures within state-business relations have proved remarkably persistent, which Boisot and Child (1996) characterize as a distinct 'network capitalism' institutional form.

In Russia, the capitalist elites emerged from the managers of Soviet state enterprises in the 1980s, many of whom were members of the *Komsomol* (Sakwa, 2008). They amassed private capital by skillfully exploiting the widespread privatization process of the early 1990s, with a few appropriating significant portions of the economy, particularly in natural resources, through varying degrees of ruthlessness, becoming the oligarchs. However, this did not result in Russia becoming an oligarchic state. Instead, the lawlessness and influence of the oligarchs encroached on the activities of the broader emerging capitalist class, forming the social basis for Putin's election and his subsequent assertion of state power to subdue the oligarchs. Additionally, as Western firms' competitiveness left limited space for Russian capitalists in the open market, they increasingly relied on and developed state-organized activities to support their accumulation (Gabdrakhmanov & Safiullin, 2020). In the 2000s, oligarchs were legitimized by the state in exchange for their cooperation, thereby addressing the institutional voids left by the collapse of the communist economy (Grosman et al., 2016). Beyond the oligarchs and their affiliated companies, numerous firms are linked to the state through the presence of government officials on their boards of directors or through the state's ownership of golden shares (Klishevich & Panibratov, 2024).

Ownership rights in Russia are typically exercised through direct control of voting shares (Guriev & Rachinsky, 2005). Consequently, conflicts between majority and minority shareholders, often exacerbated by business groups (Young et al., 2008), may be less pronounced in Russia. The high level of individual control within these groups suggests that their objectives primarily reflect the self-interest of the controlling oligarch, thereby minimizing traditional agency costs associated with diffuse ownership. Partly due to the privatization methods used, Russian elites typically own, control, or are affiliated with banks or investment houses, and their affiliates are often publicly traded (Filatotchev et al., 2001). Thus, Russian elites consist of firms linked by concentrated ownership in the hands of individual oligarchs, sharing commercial, financial, social, and political ties. Russia's strong cultural and educational system has fostered robust social connections and shared values among business and other groups (Estrin et al., 2009).

The Russian capitalist elites also emerged amidst significant institutional changes. Russia has undergone a transition from a centrally planned system, where the historical and ongoing influence of the state over enterprises remains large (Buck, 2003). The country also retained deeply embedded patterns and rules that continue to shape the business environment, reflecting Russian culture and values (Buck et al., 1998). For example, the country inherited Soviet-era networks based on reciprocal favors, known as *blat*, which have evolved into a quasi-market system referred to as *svyazi* (Ledeneva, 2013), benefiting Russian business elites. *Svyazi* (connections) refers to a firm reliance on personal networks for conducting business, with trust typically confined to these networks (Schrader, 2004). These persistence of personal networks leads managers to rank connections and dishonesty as the two most critical factors for business success (Taylor et al., 1997). For Russian entrepreneurs, network connections reduce

uncertainties and risks in financial transactions, facilitated access to resources and loans, and helped increase sales and profits (Batjargal, 2003).

Institutional theory provides insight into why informal networks are so prominent in Russia. The economy primarily operates on a cognitive institutional pillar rather than a formal, rule-based regulative pillar, enabling the proliferation of networks deeply embedded in Russian culture (Chimenson et al., 2021). State agents have traditionally played a central role in these networks. Puffer & McCarthy (2007) conceptualize Russia as encompassing three forms of network —*market, oligarchic*, and *siloviki* capitalism—each interrelated and existing within the overarching influence of the Russian state. The state influences all three forms and their interactions, characterizing the entire system as state-managed network capitalism (Puffer & McCarthy, 2007, 2011). In the interactions among these networks, each party seeks to influence the others to achieve its objectives. Members of the market and oligarchic sectors attempt to exert influence over the *siloviki* and the state. However, the state has consistently prevailed, as demonstrated by some oligarchs' sale of valuable natural resource assets to SOEs.

The Russian state has employed various methods to exert its influence on the economy, including regulating and restricting firm entry, controlling the use of land and real estate occupied by private businesses, manipulating taxation to serve its interests, inspecting and arbitrarily closing firms, taking advantage of public procurement processes, and exercising control over international trade and foreign exchange transactions (Earl & Michailova, 2021; Gans-Morse et al., 2021; Yakovlev, 2021). These methods have also been used to support politically favorable businesspeople and punish those deemed unfriendly. Many of these practices involve networks comprising state officials, administrative operatives, and businesspeople (Yakovlev, 2021).

Despite the wide acknowledgement of the importance of informal networks in constituting Russian state capitalism, there has been little systematic attempt to identify these networks or quantify their impact. Accounts remain episodic, descriptive or abstractly theoretical. Yet analytical tools for the systematic study of informal networks have been widely applied in other contexts, in the business context, most widely in the study of interlocking directorates.

Interlocking directorates

The term 'interlocking directorate' refers to a situation where two or more firms share one or more common directors (Allen, 1974). This phenomenon has been frequently interpreted as evidence of economic elite domination and the extent of interlocking among major corporations has been a critical issue in the ongoing debate between pluralist and elitist views of society (Heemskerk, 2013). A large body of research has applied SNA techniques in systematic empirical study of the phenomenon (see reviews by Mizruchi, 1996; Smith & Sarabi, 2021).

Reviewing system-oriented theories of director interlocking, Sapinski & Carroll (2018), distinguish three broad approaches. Institutional perspectives emphasized the potential of these inter-firm communication channels to reduce environmental uncertainty by securing access to essential resources from other corporations (Pennings, 1980; Thompson & McEwen, 1958; Salzman & Domhoff, 1980). More instrumental system-oriented approaches emphasized the integration of financial and industrial capital, with banks occupying central positions in power structures segmented into 'financial groups' (Menshikov, 1969; Park & Park, 1973). Their dominant role in interlock networks reflects their hegemonic position as mediators of intra-class competition and as meeting points for financial capitalists, while at the individual level, these interlocks help form a cohesive elite network of multiple directors linked by shared

backgrounds, friendships, and economic interests, representing capital as a whole (Mintz & Schwartz, 1985). A third system-oriented perspective elevates the hegemony of the elite network, corporate decision-making is shaped not by organizational networks but by competing networks of individuals within the dominant class (Soref & Zeitlin, 1987).

The potential for elite adoption of cooperative strategies or cooptation of resources through corporate interlocks is constrained by legislative anti-trust restrictions in many countries (Burt, 1980). Yet, anti-trust laws do not extend to non-competitors or indirect interlocks and the prevalence of corporate interlocking suggests the practice serves important corporate functions (Burris, 2005), though perhaps of declining importance in the US case (Chu & Davis, 2016). Although empirical evidence on this topic is limited, the primary function of corporate interlocking is the exchange of information and expertise between corporations, contributing to a firm's 'business scan' (Useem, 1984) and transfer of managerial practices (Mizruchi, 1996). While directors rarely engage in a corporation's internal management, they frequently advise management regarding the corporation's relationship with its external environment (Howard et al., 2017). As the system-centered approaches have highlighted, the embedded nature of corporations and their directors constitute a framework within which elite individuals and firms pursue specific objectives while simultaneously advancing broader elite hegemony, interlocks manifesting as 'traces of power' (Carroll & Shaw, 2001; Sonquist & Koenig, 1984).

In this paper, we utilize insights and SNA methods from the interlocking director literature to consider the 'traces of power' manifest inter-corporate and business-government relationships within Russian state capitalism. This approach provides the basis for a more systematic study of the informal networks found to be central in this environment.

Methodology

The study analyzes data primarily from Moody's firm-level *Orbis* database, supplemented by secondary data on the membership of various Russian government institutions from 2012 to 2024. We conduct SNA of the ownership network of Russian firms, the network of interlocking directorates among these firms, and the positions of Russian government institutions and actors within these networks. Together, this provides the most comprehensive analysis to date of the observable network of Russian business-government relationships.

Data

The ownership network includes all current subsidiaries of Russian-located entities recorded in *Orbis*. The dataset is designed to enable a reasonable comparison between state-owned and non-state-owned enterprises. Since Russian SOEs tend to be larger than non-SOEs, restricting the dataset based on firm size would bias it toward SOEs. However, this restriction excludes SOEs without subsidiaries. Descriptive statistics of any ownership share are included as an ownership relation in the dataset, though various assumptions about the shareholding size constituting a controlling interest are also examined. A directional graph was constructed from an edgelist (owner->owned) drawn from these data. Descriptive statistics constructing graphs at various ownership shares, including conventional assumptions of 10 or 50 percent ownership, are detailed in Appendix A. The number of firms in the dataset split at ≥5 percent through ≥50 percent range from 256,128 to 210,283, with the main component (where there is a path between each pair of firms) accounting for 32 percent to 28 percent of these and its density (the proportion of possible connections actually made) ranging from 0.00005 to 0.00008. In this study we split the data at the conventional level of ≥ 10 percent ownership 252,134 firms, with 80,200 in the main component.

The interlocking directorship network dataset is constructed from the *Orbis* listing of all current directors and managers for each firm in the ownership network. Managers were included as a manager of one firm is frequently appointed to the board of a subsidiary, even when not serving on the board of the owner. *Orbis* provides a unique contact identifier for each director or manager (a DMUCI) and unique firm (BvD ID number) in its database. A bipartite graph was constructed from a non-directional edgelist (BvD ID number – DMUCI) drawn from these data. A one-mode firm-to-firm graph was drawn from the bipartite graph with edges projected where two BvD ID numbers had a DMUCI in common. Data on directors and managers were available for 85,929 Russian firms with subsidiaries, a total of 121,395 current directors. The company-company projected graph comprised 74,842 nodes (firms) and 16,541 edges. 59,581 firms had no interlocks with others leaving a network of 15,261 nodes, with a main component of 1,454.

We distinguished politicians among DMUCIs through a four-step process. First, a list of names members of all Russian Government institutions was constructed from official sources where readily available in English. These included members of Russian Governments (2012-2024), the Federation Council (2014-2024) and various department of the State Council (2023). This was supplemented by a listing of members of Russian Governments (2001-2011) in Turnbull's (2011) study of the *silovki*. Second, names were standardized for spelling inconsistencies, where individuals with small spelling variations held the same office at similar times, wherever possible using the three-name form common in Russia, as in ‘Aleksandr Stalyevich Voloshin’. Names were also standardized to the spelling of matching names in the Orbis list of directors and managers of SOEs, for example using the Orbis form ‘Sergii’ rather than ‘Sergy’ or ‘Sergey’. The comparison with SOE directors and managers provided some confidence in the matching, as many politicians were likely to spend some time on SOE boards by virtue of their

government roles. Third, where an initialized three-name form was listed, as in 'V. V. Abramchenko', and not matched in the *Orbis* SOE list, the existing and *Orbis* SOE lists were searched for instances where the last name and the initials of the first two names matched, as for example with 'Victoria Valerievna Abramchenko', where there were no alternative possibilities in the lists. Fourth, remaining unmatched names were then compared to the complete list of directors and managers in the ownership dataset. Finally, each name matched with *Orbis* was allocated the corresponding DMUCI.

Insert Table 1 about here

Variables

Attributes of firms and directors/managers were compiled from a variety of secondary sources. A firm was identified as an SOE, having SOE status, where *Orbis* listed its 'ultimate owner' as the Government of the Russian Federation. A firm was identified as having a director interlock with an SOE where an alter firm was an SOE, the total comprising the 'SOE degree' of a firm. A firm was identified as having a director interlock involving a politician where a shared director/manager was matched to the list of politicians as described above. The sum of interlocks with politicians comprised the 'Politician degree' of a firm. Variables for 'revenue' and 'total assets', indicators of firm size (thousand USD) were also drawn from *Orbis*, missing data reducing the dataset for regression analysis to 9,526 firms. Descriptive statistics and correlations for all variables are reported in Appendix B.

The SOE status, SOE degree and Politician degree attributes allow us to distinguish different levels of influence among business and government. SOE status in the ownership network represents direct government control of business activity. SOE degree in the director interlock likely reinforces direct government control where a firm is an SOE but is an informal channel

of influence where a firm is non-SOE. Politician degree, links with individuals who at some point served in a formal government role, is the most informal influence channel measured particularly in the case of non-SOEs, less aligned with current government priorities but likely still aligned with general government outlook. Note that while the influence in the ownership channel is predominantly from government to business, the less formal influence channels can operate between government and business both ways.

We calculated a conventional set of metrics measuring the position of each firm in the ownership and director interlock networks (Borgatti et al., 2018). In the director interlock network, this included degree centrality, the number of connections between firms in the respective networks; eigenvector centrality, degree centrality weighted by the degree centrality of each alter; betweenness centrality, the number of times a firm appears on the shortest path between each pair of firms; harmonic closeness centrality, the sum of shortest paths between each pair of firms within each separate component in the network. In the ownership network we distinguished between outdegree, the number of ownership stakes in other firms, and indegree, the number of firms with ownership stakes in a firm. All measures were normalized by the number of firms in the network. Additionally, for each network we created a dummy variable as to whether a firm was in the main component that network. Metrics were calculated using the NetworkX package in Python.

The network variables serve as dependent and independent variables in our modelling. Centrality of a firm in the interlock network may be influenced by ownership relationships as a firm that has a wide range or importance of owners is likely to have a wide range of informal relationships. However, centrality of a firm in the ownership network is unlikely to be

influenced by position in the interlock network as ownership decisions tend to be long-term investments undertaken for competitive and strategic reasons.

Analysis

We calculated various measures of cohesion of the two networks to gain a sense of scale and concentration, supplementing this with visualizations of the main component of each. We added the results of a Louvain analysis of clustering within the main component and the identities of SOEs to the visualizations. We then undertook a series of OLS regression models to explore the relationship between position in the interlock network and attributes of each firm. These models were of the form:

$$C\_interlocks = \beta_0 + \beta_1 SOE\_status + \beta_2 SOE\_degree + \beta_3 Politician\_degree + \beta_4 Main\ component + \beta_5 Log\_revenue + \beta_6 Log\_assets + \beta_7 C\_ownership + \varepsilon, \quad (2)$$

where:

C_interlocks comprises the four measures of network centrality (degree centrality, eigenvector centrality, harmonic closeness centrality and betweenness centrality) in the interlock network;

C_ownership comprises indegree centrality, outdegree centrality and member of the main component in the ownership network;

ε is the error term.

Findings

We examine the direct influence of the Russian state in the Russian corporate sector of Russia by considering the financial capacity of SOEs. Table 2 compares the operating revenue and

total assets of SOEs to all firms with financial data in the dataset. Among firms with subsidiaries, SOEs account for 2 percent of all owned subsidiaries in Russia but 33 percent of revenue and assets. Mean SOE revenue and assets are 15x larger than firms in general with a smaller proportional standard deviation. The largest firm by revenue is an SOE (Publichnoe Aktsionernoe Obschestvo Neftyanaya) but by assets a non-SOE (Profilnaya Innovatsionnaya Kompaniya Garantiya).

Insert Table 2 about here

Modelling ownership relationships among firms with ≥ 10 percent ownership as a graph, as visualized in Figure 1, SOEs (colored blue) are located entirely within the main component, accounting for 13.5 percent of these 80,200 firms. However, financially SOEs account for 78 percent of revenue and 80 percent of assets within the component, greatly concentrating their potential influence among these firms.

Insert Figure 1 about here

Figure 2 visualizes the main component of the interlocking director network among all Russian firms with subsidiaries. Panel A colors nodes by Louvain clusters, indicating commonalities in the pattern of network ties. Panel B highlights SOEs in blue, indicating their centrality within the network but also, by comparing positions with Panel B, that SOEs are clustered in different interaction patterns.

Insert Figure 2 about here

Table 3 presents the results of the first four regression models, considering the relationship between basic firm attributes and the position of firms within the director interlock network. All four models have strong goodness of fit. In Model 1, a firm's degree centrality in the interlock network, that is the number of firms it shares directors with, is positively associated with its location in the main component of the network, the number of interlocks it has with SOEs, or politicians and its size as measured by assets, though not revenue. Degree centrality is negatively associated with a firm being an SOE, however. An example of the impact of the effect can be seen with SOE degree, the number of SOEs a firm is interlocked with; one additional interlock with an SOE is associated with a 0.00001 higher degree centrality of the firm in the whole interlock network; firms interlocking with SOEs are more central.

Insert Table 3 about here

A similar picture is evident in Model 2, which examines firms in terms of their closeness to all other firms in the interlock network. Closeness is significantly and positively associated with all variables, particularly location in the main component, not surprising as this is where almost all connection occurs. Interlocks with politicians and SOEs are strongly associated with network closeness, as is being an SOE; one additional line with a politician is associated with a higher closeness centrality of 7, suggesting politically and SOE-aligned firms are at the core of the interlock network. The association is greatest for larger firms by revenue or assets.

Model 3 considers firms that are more connected to other firms in the interlock network, eigenvector centrality. These positions are generally negatively associated with the variables examined. SOEs and firms with interlocks involving politicians are less likely to be connected to well-connected firms in the network. However, those with interlocks to SOEs and larger

firms by assets, but not by revenue, are more likely to be so. This is distinct from degree centrality and closeness where interlocks involving politicians are more prominent. The negative association with positions in the main component simply indicates most firms do not have high eigenvector centrality as this is concentrated in the main component. Model 4 considers firms that connect otherwise less-connected firms, betweenness centrality. Like degree centrality, this is positively and significantly associated with most variables, including a main component position, interlocks with SOEs and involving politicians and is greater for larger firms by assets, but not revenue and is negatively associated with being an SOE. This suggests that betweenness is associated with degree centrality, albeit weaker, the number of connections providing diversity and reach within the network, while closeness is associated with SOE and political connections.

Table 4 presents the results of the regression models with the addition of the firm's positions within the ownership network. In each case except model 7 there is a small improvement in the Goodness of Fit over the first set of models. In Model 5, degree centrality, the same variables from Model 1 remain significant and in the same direction but additionally there are positive associations between degree centrality in the interlock network and indegree and membership of the main component in the ownership network. Thus, an additional owner (o.indegree) is associated with a 0.068 increase in director interlocks (both in normalized terms). This suggests that diverse owners may seek to increase their influence on a subsidiary by appointing board members or possibly board interlocks help identify investment opportunities. The coefficients from Model 1 are all slightly diminished in Model 5, except for log assets, where there is a large reduction, suggesting ownership effects are concentrated in larger firms.

Insert Table 4 about here

Likewise in Model 6, closeness in the director interlock network is associated with the variables from Model 2 with the same significance and direction, except for log assets, which is no longer significant. Most coefficients are slightly diminished, but SOE increases considerably, and log revenue increases a little. The impact of the additional ownership variables is quite different from Model 5, however. There is no association with membership of the main component of the ownership network, outdegree (owning other firms) is strongly positive while indegree is strongly negative. Owning another firm increases closeness in the director interlock network by 1342, while being owned decreases closeness by 34567 (all in normalized terms). As in Model 2, the central firms tend to be large (in this case, by revenue) SOEs with links to other SOEs and linked by politicians.

Model 7 also retains the significance and direction of the variables from Model 3, with increased coefficients for all but SOEs and log assets. As with Model 6, both indegree and outdegree are significant and membership of the main ownership component not but both are negative. Being owned by another firm reduces eigenvector centrality, links to well-connected firms, by 9 and owning another firm decreases this by 0.6 (all in normalized terms). Lastly, Model 8 retains the direction and significance in the coefficients of the variables from Model 4, with the loss of log assets and slight diminishment of all but SOE. Model 8 adds one significant variable from the ownership network, outdegree. Betweenness in the director interlock network increases 0.0001 with each additional firm owned, suggesting board appointments made to help direct diverse investments.

In summary, Russian director interlocks are related to firm ownership. Firms with more owners have more directors (degree) but are more distant from all other firms (closeness) and less connected to well-connected firms (eigenvector centrality) in the director interlock network.

Firms owning other firms are closer to all other firms (closeness), more frequently connecting less-connected firms (betweenness) but less connected to well-connected firms (eigenvector centrality) in the director interlock network. This suggests that firms with a larger portfolio of subsidiaries deploy directors to supplement arms-length control with direct representation on boards, particularly in firms with strategic positions of closeness (more so by SOEs) or betweenness (less so by SOEs) in the director interlock network. These interlocks tend to connect to SOEs and are constituted by politicians. Firms with higher eigenvector centrality in the director interlock network display a different pattern of interaction. These firms, connected to well-connected firms, tend to be smaller by assets, tend not to be SOEs, not to be owned by or own other firms and not to be in the main component of the interlock network. The firms they interlock with are typically SOEs, but their connections are not via politicians.

Discussion

The direct influence of the Russian state within the Russian corporate sector is much greater that the raw number of SOEs might suggest. While comprising 2 percent of Russian firms with subsidiaries, SOEs account for a third of operating revenue and total assets of such firms. This effect is more pronounced within the largest interconnected component within the network of parent-subsidiary relationships; here they account for around 80 percent of both measures. As ownership ties in Russia are frequently concentrated among elites, often oligarchs, supported by strong social, financial, and political ties (*svyazy*) (Klishevich & Panibratov, 2024), this concentration of financial resources resembles Ouchi's (1980) concept of 'clans' where market transactions are embedded in personal relationships. Clan structures exploit opportunities created by government policies, facilitating flexible economic activities in informal sectors (Schweitzer, 2018). Our findings suggest that the interlocking director network among Russian firms extends the potential corporate influence of the Russian state beyond direct ownership of

SOEs. SOEs are linked by shared directors closely to other firms in the central core of the interlock network. SOEs are also connected to non-SOEs with high betweenness high eigenvector centrality and high degree in the interlock network. More indirectly, many of the connections contributing to central positions of firms in the interlock network involve directors who have served as politicians. This provides an additional informal potential channel of influence for the Russian state into the core of Russian business interrelations.

Our study also suggests that the SOE status, SOE degree and Politician degree attributes allow us to distinguish different levels of influence among business and government. SOE status in the ownership network represents direct government control of business activity. SOE degree in the director interlock likely reinforces direct government control where a firm is an SOE but is an informal channel of influence where a firm is non-SOE. Politician degree, links with individuals who at some point served in a formal government role, is the most informal influence channel measured particularly in the case of non-SOEs, less aligned with current government priorities but likely still aligned with general government outlook. Note that while the influence in the ownership channel is predominantly from government to business, the less formal influence channels can operate between government and business both ways.

These findings clearly illustrate the intricate interconnection between the state and the private sector. As proposed in the institutional approach in the interlocking directorate literature these connections may enable corporations to navigate environmental uncertainties and manage inter-organizational relationships. But the central position of SOEs and politicians in constituting Russian director interlocks also gives support to cohesive elite instrumental perspectives of interlocks. This contrasts with most studies of interlocks in the West which find instrumentalism muted, constrained by anti-trust legislation, and more focused on general

exchange of information and expertise. The embroilment of elite individuals in Russian inter-firm and business-state relationships likely opens the door to more direct engagement with firm internal management and the influence of competing elite networks of individuals over organizational networks (Soref & Zeitlin, 1987).

The state-embeddedness of Russian interlocks also distinguishes these from Western interlocks where studies suggest the private elite networks seek to influence the state (Cardenas, 2015; Heemskerk, 2013). The centrality of SOEs and politicians in the interlock network facilitates the dominance of the Russian state, already economically entrenched via control of critical resources through public institutions, SOEs and the integration of private organizations into state networks through various mechanisms (Grosman et al., 2016; Puffer & McCarthy, 2007). Thus, elite interlock networks and ownership-networks provide additional channels reinforcing state control over resources, capital, and businesses, leading to pervasive state patronage across various sectors of the economy (Viktorov & Kryshtanovskaya, 2023; Yakovlev, 2021). These networks, then, comprise an important component of Russian state capitalism, theorized previously as network capitalism (Puffer & McCarthy, 2007) but not previously identified empirically.

Conclusion

This paper aimed to extend understanding of Russian state capitalism by examining the reach of the state among businesses through the interaction of formal ownership relationships with informal channels constituted by overlapping board membership. Through this analysis, we were able to examine more deeply the connections between various interconnected interest groups within the government and private organizations, providing insights into the evolving dynamics of these relationships over time. Building on this foundation, the study sought to

move beyond the limitations of the VoC approach (Alami & Dixon, 2020; Wright et al., 2021) by analyzing the unique form of state capitalism in Russia. Overall, three contributions emerge from this study.

Our study makes a significant academic contribution to the literature on both state capitalism and interlocking directorates by offering a detailed and nuanced analysis of how state influence permeates the Russian corporate sector. First, this research extends the understanding of state capitalism by showing that the Russian state's influence is disproportionately large relative to the number of SOEs. Although SOEs comprise only 2 percent of firms with subsidiaries, they account for a third of the operating revenue and total assets and 80 percent of both in the main component of the ownership network, underscoring the outsized economic power that the state wields through direct ownership of key enterprises. This observation adds new empirical data to discussions of state capitalism by highlighting how a small number of state-controlled firms can dominate vast portions of the national economy, especially through highly interconnected corporate networks.

Secondly, the study contributes to the literature on interlocking directorates by illustrating how the Russian state extends its influence beyond direct ownership. The presence of interlocking directorates, wherein directors are shared between SOEs and non-SOEs, creates informal channels of state control. Particularly noteworthy is the role of former politicians who serve on the boards of these firms, further intertwining state interests with private-sector operations. By identifying and analyzing the "politician degree" in the director interlock network, this research uncovers how political connections facilitate the flow of influence both ways, from state to business and vice versa. This aspect broadens the conventional understanding of interlocking directorates, adding a layer of political dynamics to the predominantly economic or

organizational interpretations found in earlier studies. Additionally, the SOE degree in the interlock network offers a critical new insight. In the case of Russia, the SOE degree strengthens formal control in state-owned firms but also extends informal control to non-SOEs. This dual mechanism reveals how interlocking directorates not only reinforce the state's direct control of its own enterprises but also create a secondary layer of influence over private entities, thereby blurring the boundaries between the public and private sectors.

Finally, the study also provides a refined theoretical framework for understanding the mechanisms of influence in autocratic economies like Russia's, where the state plays a central role in capital allocation and business decision-making. By using SNA to map these relationships, this research makes a methodological contribution, demonstrating how network-based approaches can reveal hidden layers of power and influence within corporate structures. Therefore, this study proposes the concept of *Network State Capitalism* as the predominant form of economic organization in Russia, by illustrating how state influence is embedded not only in ownership structures but also in corporate governance networks. This extends the understanding of how formal and informal mechanisms of state control operate simultaneously, offering a more comprehensive picture of state-business relations in Russia. These insights have broader implications for the study of state capitalism in other emerging markets, where similar dynamics of state influence over the private sector may be at play.

Direction for future research

Several directions for future research can be suggested. Further exploration of *Network State Capitalism* in other emerging markets would provide valuable comparative insights. Investigating whether similar patterns of state influence through interlocking directorates exist in other state-capitalist economies, such as China or Brazil, could deepen our understanding of

how these dynamics vary across different institutional and political contexts. Additional research could focus on the long-term implications of these interlocking networks on corporate governance and market competition. Studies could examine how these networks influence decision-making processes within firms and whether they enhance or hinder innovation and market efficiency. Future research could explore the role of former politicians in corporate governance more deeply, analyzing the extent to which political connections translate into preferential treatment for firms, such as access to state resources or favorable regulatory conditions. Finally, applying SNA to a broader range of sectors beyond those dominated by SOEs could offer insights into how these networks function across various industries and regions within Russia (and other emerging economies), potentially uncovering sector-specific dynamics of state influence.

Managerial and policy implications

For managers, understanding the extensive influence of interlocking directorates, especially those involving former politicians and SOEs, is crucial for navigating Russia's corporate landscape. Firms should strategically position themselves within these networks to enhance access to key resources and decision-makers, potentially improving their competitive edge. Additionally, private firms can benefit from building strong governance structures that balance state influence with the need for corporate independence, particularly in sectors where state control is pervasive. From a policy perspective, regulators should be mindful of the implications of such interconnected networks for market competition and transparency. The state's influence, reinforced by interlocking directorates, may limit competition and create barriers for new entrants, calling for policies that promote fair competition while maintaining the strategic objectives of SOEs. Furthermore, there is a need for regulatory frameworks that enhance transparency and accountability in corporate governance, ensuring that the extensive

informal influence exerted through political connections does not compromise corporate decision-making or economic efficiency. Policymakers should also consider reforms that promote a clearer separation between public and private sectors, mitigating the risk of over-concentration of state influence in critical industries.

References

Abramov, A., Radygin, A., & Chernova, M. 2017. State-owned enterprises in the Russian market: Ownership structure and their role in the economy. ***Russian Journal of Economics*****,** 3: 1–23.

Alami, I., & Dixon, A. D. 2020. State capitalism(s) redux? Theories, tensions, controversies. ***Competition & Change***, 24: 70–94.

Alami, I., & Dixon, A. D. 2023. Uneven and combined state capitalism. ***Environment and Planning A: Economy and Space*****,** 55: 72–99.

Allen, M. P. 1974. The Structure of interorganizational elite cooptation: Interlocking corporate directorates. ***American Sociological Review***, 39: 393–406.

Aslund, A. 2019. ***Russia's Crony Capitalism: The Path from Market Economy to Kleptocracy***. New Haven: Yale University Press.

Batjargal, B. 2003. Social capital and entrepreneurial performance in Russia: A longitudinal study. ***Organization Studies***, 24: 535–556.

Berezinets, I. V., Ilina, Y. B., Smirnov, M. V., & Ambardnishvili, T. G. 2023. Do board characteristics matter for the dividend policy of state-owned companies? Evidence from Russia. ***International Journal of Business Governance and Ethics***, 17: 196–222.

Boisot, M., & Child, J. 1996. From fiefs to clans and network capitalism: Explaining China's emerging economic order. ***Administrative Science Quarterly***, 41:600–628.

Borgatti, S. P., Everett, M. G., & Johnson, J. C. 2018. ***Analysing Social Networks***, 2nd Edition. Thousand Oaks: Sage Publications.

Breiger, R. L. 1974. The duality of persons and groups. ***Social Forces***, 53: 181–190.

Buck, T. 2003. Modern Russian corporate governance: Convergent forces or product of Russia's history? ***Corporate Governance in Transitioning Economies***, 38: 299–313.

Buck, T., Filatotchev, I., & Wright, M. 1998. Agents, stakeholders and corporate governance in Russian firms. ***Journal of Management Studies***, 35: 81–104.

Burris, V. 2005. Interlocking directorates and political cohesion among corporate elites. ***American Journal of Sociology***, 111: 249–283.

Burt, R. S. 1980. Cooptive corporate actor networks: A reconsideration of interlocking directorates involving American manufacturing. ***Administrative Science Quarterly***, 25: 557–582.

Cardenas, J. 2015. Are Latin America's corporate elites transnationally interconnected? A network analysis of interlocking directorates. ***Global Networks***, 15: 424–445.

Carroll, W. K., & Shaw, M. 2001. Consolidating a neoliberal policy bloc in Canada, 1976 to 1996. ***Canadian Public Policy / Analyse de Politiques***, 27: 195–217.

Chimenson, D., Tung, R. L., Panibratov, A., & Fang, T. 2021. The paradox and change of Russian cultural values. ***International Business Review***, 31: 101944.

Chu, J. S. G., & Davis, G. F. 2016. Who killed the inner circle? The decline of the American corporate interlock network. ***American Journal of Sociology***, 122: 714–754.

Cuervo-Cazurra, A., & Li, C. 2021. State ownership and internationalization: The advantage and disadvantage of stateness. ***Journal of World Business***, 56: 101112.

De Marchi, V., & Alford, M. 2022. State policies and upgrading in global value chains: A systematic literature review. ***Journal of International Business Policy***, 5: 88–111.

Devos, E., Prevost, A., & Puthenpurackal, J. 2009. Are interlocked directors effective monitors? ***Financial Management***, 38: 861–887.

Du, X., & Luo, J. 2016. Political connections, home formal institutions, and internationalization: Evidence from China. ***Management and Organization Review***, 12: 103–133.

DuBois, F. L., & Primo, M. A. M. 2016. State capitalism and clusters: The case of Brazilian shipbuilding. ***International Journal of Emerging Markets***, 11: 214–231.

Earl, A., & Michailova, S. 2021. Home governments and MNEs in Russia: Relationships and MNE external legitimacy. ***Journal of International Management***, 27: 100847.

Estrin, S., Meyer, K. E., Nielsen, B. B., & Nielsen, S. 2016. Home country institutions and the internationalization of state owned enterprises: A cross-country analysis. ***Journal of World Business*****,** 51: 294–307.

Estrin, S., Poukliakova, S., & Shapiro, D. 2009. The performance effects of business groups in Russia. ***Journal of Management Studies***, 46: 393–420.

Filatotchev, I., Kapelyushnikov, R., Dyomina, N., & Aukutsionek, S. 2001. The effects of ownership concentration on investment and performance in privatized firms in Russia. ***Managerial and Decision Economics***, 22: 299–313.

Gabdrakhmanov, N. K., & Safiullin, L. N. 2020. ***Regional Economic Development in Russia***. Berlin: Springer Nature.

Gans-Morse, J., Kalgin, A., Klimenko, A., Vorobyev, D., & Yakovlev, A. 2021. Public service motivation as a predictor of corruption, dishonesty, and altruism. ***Journal of Public Administration Research and Theory***, 32: 287–309.

Grosman, A., Okhmatovskiy, I., & Wright, M. 2016. State control and corporate governance in transition economies: 25 Years on from 1989. ***Corporate Governance: An International Review***, 24: 200–221.

Guriev, S., & Rachinsky, A. 2005. The role of oligarchs in Russian capitalism. ***Journal of Economic Perspectives***, 19: 131–150.

Heemskerk, E. M. 2013. The rise of the European corporate elite: Evidence from the network of interlocking directorates in 2005 and 2010. ***Economy and Society***, 42: 74–101.

Holdo, M. 2019. Cooptation and non-cooptation: Elite strategies in response to social protest. ***Social Movement Studies***, 18: 444–462.

Horner, R. 2017. Beyond facilitator? State roles in global value chains and global production networks. ***Geography Compass***, 11: e12307.

Howard, M. D., Withers, M. C., & Tihanyi, L. 2017. Knowledge dependence and the formation of director interlocks. ***Academy of Management Journal***, 60: 1986–2013.

Johnson, T. 2016. Cooperation, co-optation, competition, conflict: International bureaucracies and non-governmental organizations in an interdependent world. ***Review of International Political Economy*****,** 23: 737–767.

Klishevich, D., & Panibratov, A. 2024. The omnipresence of the state and its effect on the internationalization of companies: The Russian variety of state capitalism. ***Journal of International Management***, 30: 101154.

Koenig, T., & Gogel, R. 1981. Interlocking corporate directorships as a social network. *The **American Journal of Economics and Sociology***, 40: 37–50.

Ledeneva, A. 2009. From Russia with blat: Can informal networks help modernize Russia? ***Social Research: An International Quarterly***, 76: 257–288.

Ledeneva, A. 2013. ***Can Russia Modernise? Sistema, Power Networks and Informal Governance***. New York: Cambridge University Press.

Mariotti, S., & Marzano, R. 2019. Varieties of capitalism and the internationalization of state-owned enterprises. ***Journal of International Business Studies***, 50: 669–691.

McNally, C. A. 2011. China's changing guanxi capitalism: Private entrepreneurs between Leninist control and relentless accumulation. ***Business and Politics***, 13: 1–29.

Menshikov, S. 1969. ***Millionaires and Managers: Structure of the U.S. Financial Oligarchy***. Moscow: Progress Publishers.

Minbaeva, D. B., Ledeneva, A., Muratbekova-Touron, M., & Horak, S. 2022. Explaining the persistence of informal institutions: The role of informal networks. ***Academy of Management Review.*** 48: 556-574.

Mintz, B., & Schwartz, M. 1985. ***The Power Structure of American Business***. Chicago: University of Chicago Press.

Mizruchi, M. S. 1996. What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates. ***Annual Review of Sociology,*** 22: 271–298.

Musacchio, A., Lazzarini, S. G., & Aguilera, R. V. 2015. New varieties of state capitalism: Strategic and governance implications. ***Academy of Management Perspectives***, 29: 115–131.

Narula, R., & Dunning, J. H. 1998. Explaining international R&D alliances and the role of governments. ***International Business Review***, 7: 377–397.

Ouchi, W G. 1980. Markets, bureaucracies, and clans. ***Administrative Science Quarterly***, 25: 129–141.

Panibratov, A., & Klishevich, D. 2023. Emerging market state-owned multinationals: A review and implications for the state capitalism debate. ***Asian Business & Management*****,** 22: 84–117.

Park, L., & Park, F. 1973. ***Anatomy of Big Business***. Toronto: James Lewis & Samuel.

Peng, M. W. 2003. Institutional transitions and strategic choices. ***Academy of Management Review***, 28: 275–296.

Pennings, J. M. 1980. ***Interlocking directorates: Origins and consequences of connections among organizations' Board of Directors***. San Francisco: Jossey-Bass.

Puffer, S. M., & McCarthy, D. J. 2007. Can Russia's state-managed, network capitalism be competitive?: Institutional pull versus institutional push. ***Journal of World Business***, 42: 1–13.

Puffer, S. M., & McCarthy, D. J. 2011. Two decades of Russian Business and management research: An institutional theory perspective. ***Academy of Management Perspectives***, 25: 21–36.

Remington, T. F. 2018. Institutional change in authoritarian regimes: Pension reform in Russia and China. ***Problems of Post-Communism***, 66: 301–314.

Sakwa, R. (2008). ***Russian Politics and Society***. 4th edition. Oxon: Routledge.

Salzman, H., & Domhoff, G. W. 1980. Corporations, the civic sector, and government: Do they interlock? ***Insurgent Sociologist***, 9: 121–135.

Sapinski, J. P., & Carroll, W. K. 2018. Interlocking directorates and corporate networks. In A. Nölke & C. May (Eds.), ***Handbook of the International Political Economy of the Corporation***: 45-60. Cheltenham: Edward Elgar Publishing.

Sawant, R. J., Nachum, L., & Panibratov, A. Yu. 2021. The effect of interpersonal political embeddedness on firm internationalization scope. ***British Journal of Management***, 32: 812–831.

Schrader, H. 2004. Social capital and social transformation in Russia. ***Journal of East European Management Studies***, 9: 391–410.

Schweitzer, J. 2018. Network capitalism and the role of strategy, contracts and performance Expectations for Asia-Pacific innovation partnerships. In T. Clarke & K. Lee (Eds.), ***Innovation in the Asia Pacific: From Manufacturing to the Knowledge Economy***: 181–200. Singapore: Springer.

Sharafutdinova, G. 2020. ***The Red Mirror: Putin's Leadership and Russia's Insecure Identity***. Oxford: Oxford University Press.

Smith, M., & Sarabi, Y. 2021. "What do interlocks do" revisited – a bibliometric analysis. ***Management Research Review***, 44: 642–659.

Sonquist, J. A., & Koenig, T. 1984. Interlocking directorates in the top U.S. Corporations: A graph theory approach. ***Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique***, 2: 41–74.

Soref, M., & Zeitlin, M. 1987. Finance capital and the internal structure of the capitalist class in the United States. In M. Mizruchi & M. Schwartz. (Eds.) ***Intercorporate Relations: The Structural Analysis of Business, Structural analysis in the social sciences***: 56–84. Cambridge: Cambridge University Press.

Sosnovskikh, S., & Cronin, B. 2021. The effects of culture, attitudes and perceptions on industrial cluster policy: The case of Russia. ***Competition & Change***, 25: 350–381.

Stokman, F. N., Van Der Knoop, J., & Wasseur, F. W. 1988. Interlocks in the Netherlands: Stability and careers in the period 1960–1980. ***Social Networks***, 10: 183–208.

Takyi, L. N., Naidoo, V., & Dogbe, C. S. K. 2022. Government support, strategic alliance and internationalization: Evidence from indigenous Ghanaian exporters. ***Journal of International Entrepreneurship*****,** 20: 619–638.

Taylor, T. C., Kazakov, A. Y., & Thompson, C. M. 1997. Business ethics and civil society in Russia. ***International Studies of Management & Organization***, 27: 5–18.

Thompson, J. D. 2003. ***Organizations in Action: Social Science Bases of Administrative Theory***. New Brunswick: Transaction Publishers.

Thompson, J. D., & McEwen, W. J. 1958. Organizational goals and environment: Goal-Setting as an interaction process. ***American Sociological Review***, 23: 23–31.

Turnbull, B. J. 2011. ***The Siloviki and Autocracy in Russia: Are They the Source?*** [M.A. Thesis, Georgetown University]. http://hdl.handle.net/10822/553598. Accessed September 21, 2024.

Useem, M. 1984. **T*he Inner Circle: Large Corporations and the Rise of Business Political Activity in the U.S. and U.K***. New York: Oxford University Press.

Vasileva, A. 2018. Trapped in Informality: The big role of small firms in Russia's statist-patrimonial Capitalism. ***New Political Economy***, 23: 314–330.

Viktorov, I., & Kryshtanovskaya, O. 2023. Presidential succession in Russia: Political cycles and intra-elite conflicts. ***Russian Politics***, 8: 97–121.

Witt, M. A., Kabbach de Castro, L. R., Amaeshi, K., Mahroum, S., Bohle, D., & Saez, L. 2018. Mapping the business systems of 61 major economies: A taxonomy and implications for varieties of capitalism and business systems research. ***Socio-Economic Review***, 16: 5–38.

Wright, M., Wood, G., Musacchio, A., Okhmatovskiy, I., Grosman, A., & Doh, J. P. 2021. State capitalism in international context: Varieties and variations. ***Journal of World Business*****,** 56: 101160.

Yakovlev, A. 2021. Composition of the ruling elite, incentives for productive usage of rents, and prospects for Russia's limited access order. ***Post-Soviet Affairs***, 37: 417–434.

Young, M. N., Peng, M. W., Ahlstrom, D., Bruton, G. D., & Jiang, Y. 2008. Corporate governance in emerging economies: A review of the principal–principal perspective. ***Journal of Management Studies***, 45: 196–220.

TABLE 1

Politician name matching process

Unique politician names	1284
Standardized names	96
Standardized by last name and initials	67
Match SOE list	53
Match non-SOEs	88
Matched with all firms	141

TABLE 2

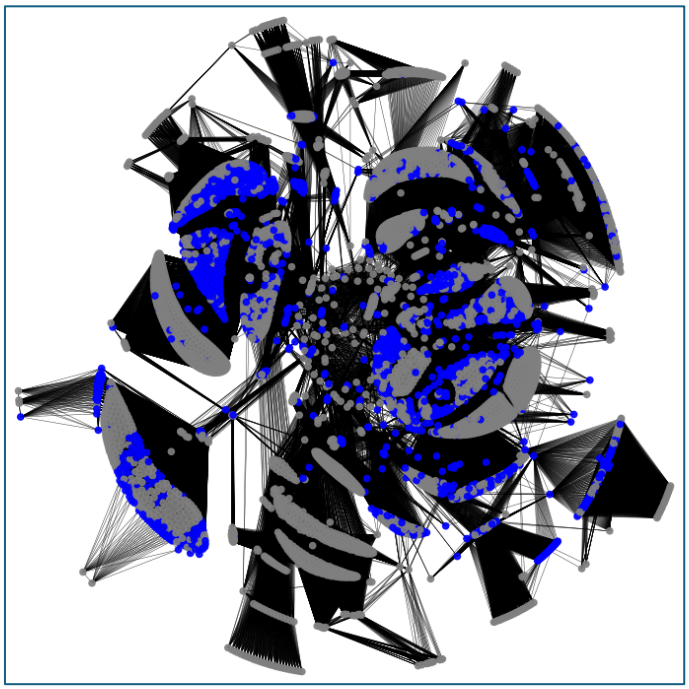
Financial statistics of Russian firms with subsidiaries

	Operating revenue			**Total assets**		
	All	SOE	SOE/All	All	SOE	SOE/All
N	84,283	1,968	2%	84,283	1,968	2%
N with data	72,303	1,581	2%	72,316	1,584	2%
mean	31	483		168	2,542	
std	744	4,065		14,006	26,841	
min	-57	0		0	0	
max	102,164	102,164	100%	2,547,719	685,915	27%
sum	2,228,694	764,861	34%	12,125,428	4,026,538	33%

Note. Million USD Last available Year (2023 ±1)

FIGURE 1

Russian Corporate Ownership Network – main component

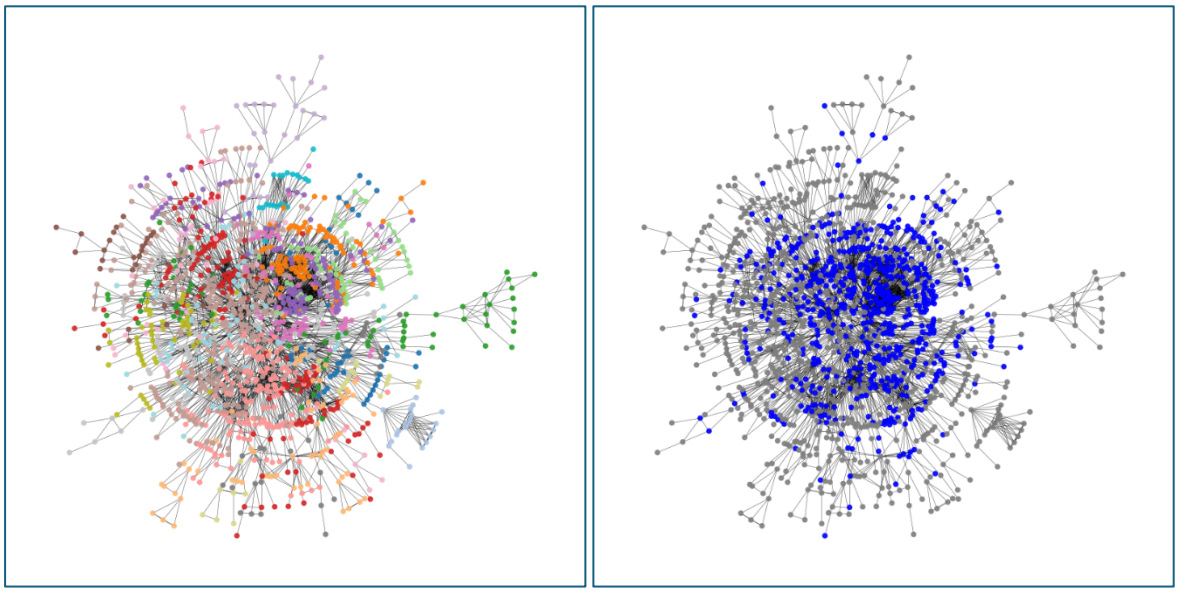


Note: Nodes within the main component with a degree of 20 or more.

Blue circles SOEs; grey circles non-SOEs, black lines ownership.

FIGURE 2

Russian Interlocking Director Network – main component



(A) Louvain clusters

Note: Each color represents a distinct cluster

(B) SOEs

Note: Blue nodes represent SOEs

TABLE 3

Russian director interlock position – OLS regression results, models 1-4

model	(1)		(2)		(3)		(4)	
dependent	**degree**		**closeness**		**eigenvector**		**betweenness**	
main component	0.00001173	***	238.8326850	***	-0.0037245	***	0.000000532	***
SOE	-0.00002147	***	6.5111450	***	-0.0068796	***	-0.000000716	***
SOE degree	0.00001352	***	4.7847702	***	0.0036071	***	0.000000234	***
politician degree	0.00000563	***	7.3324774	***	-0.0026635	***	0.000001163	***
log revenue	-0.00000001		0.1890469	**	0.0000036		0.000000004	
log assets	0.00000107	***	0.2750669	***	-0.0001105	***	0.000000013	*
constant	0.00001450	***	-1.9554104	***	0.0008408	***	-0.000000126	***
Obs.	9526		9526		9526		9526	
R-squared:	0.712		0.975		0.576		0.406	
Adj. R-squared:	0.712		0.975		0.576		0.405	
Prob (F):	0.000	***	0.000	***	0.000	***	0.000	***

Sig. * p< .05; ** p< .01; *** p< .000

TABLE 4

Russian director interlock position – OLS regression results, models 5-8

model	(5)		(6)		(7)		(8)	
dependent	degree		closeness		eigenvector		betweenness	
main comp.	0.00001012	***	238.740	***	-0.003680	***	0.000000511	***
SOE	-0.00002635	***	7.466	***	-0.006594	***	-0.000000757	***
SOE degree	0.00001360	***	4.739	***	0.003608	***	0.000000232	***
politician degree	0.00000565	***	6.539	***	-0.002323	***	0.000001081	***
Log revenue	0.00000004		0.198	***	-0.000004		0.000000006	
Log assets	0.00000076	***	0.239		-0.000092	**	0.000000006	
o.indegree	0.06831601	***	-34567.391	***	-8.871022	*	0.000473911	
o.outdegree	0.00016401		1342.582	***	-0.602376	***	0.000143186	***
o.main comp.	0.00000509	***	0.410		0.000032		0.000000029	
const	0.00001510	***	-1.357	**	0.000493	*	-0.000000061	
Observations:	9526		9526		9526		9526	
R-squared:	0.715		0.975		0.578		0.411	
Adj. R-squared:	0.715		0.975		0.578		0.41	
Prob (F):	0.000	***	0.000	***	0.000	***	0.000	***

Sig. * p< .05; ** p< .01; *** p< .000

APPENDIX A

Descriptive statistics – ownership network split by ownership share of subsidiaries.

	All known	All known ex-exclusions*	>=5%	>=10%	>=20%	>=25%	>=50%	100%
All Nodes								
Nodes	417880	412784	256128	252134	243580	232652	210283	144600
Edges	791182	783826	517377	507358	485521	467917	423539	312803
Average Degree	3.78	3.79	4.04	4.02	3.99	4.02	4.02	4.32
Components	46778	45669	49601	49239	47984	45362	40957	22131
Component size mean	8.93	9.04	5.16	5.12	5.08	5.13	5.13	6.53
Component size std	1096.63	1103.37	371.71	361.50	340.37	338.98	291.11	294.11
Main Component								
Nodes	237182	235794	82769	80200	74541	72177	58879	43701
Edges	626169	621815	353455	345163	324859	315127	273421	206741
Density	1.11E-05	1.12E-05	5.16E-05	5.37E-05	5.85E-05	6.05E-05	7.89E-05	0.0001
Average Degree	5.2800	5.2742	8.5408	8.60756	8.7162	8.732061	9.2875	9.4616
InCentralisation	0.0061	0.0061	0.0174	0.01798	0.0193	0.0199	0.0244	0.0328
OutCentralisation	0.0108	0.0109	0.0310	0.03199	0.0344	0.03554	0.0435	0.0585
Main Component /All								
Nodes	0.57	0.57	0.32	0.32	0.31	0.31	0.28	0.30
Edges	0.79	0.79	0.68	0.68	0.67	0.67	0.65	0.66

Note. * Exclusions comprise Advisor (funds), Fund Management Entity, Negligible (<=0.01%), Sole Trader (100%), Vessel.

APPENDIX B

Descriptive statistics and correlation among independent variables

		mean	std	min	max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	degree	0.0000299	0.000042	0.00001	0.00082												
(2)	betweenness	0.0000002	0.000001	0.00000	0.00006	0.529											
(3)	closeness	31.414146	85.13172	1.00000	453.7166	0.563	0.414										
(4)	eigenvector	0.0007055	0.010200	0.00000	0.20417	0.571	0.135	0.258									
(5)	main comp.	0.1111694	0.314358	0.00000	1.00000	0.455	0.325	0.976	0.195								
(6)	SOE	0.0815662	0.273717	0.00000	1.00000	0.387	0.217	0.551	0.223	0.499							
(7)	SOE degree	0.5069284	2.572192	0.00000	56.00000	0.829	0.494	0.595	0.713	0.481	0.544						
(8)	politician degree	0.0382112	0.495024	0.00000	17.00000	0.289	0.496	0.252	0.050	0.188	0.163	0.260					
(9)	log revenue	6.9468848	3.346374	-4.49634	18.44210	0.232	0.177	0.330	0.070	0.309	0.255	0.215	0.161				
(10)	log assets	8.2473334	3.014268	-4.49634	20.34626	0.284	0.204	0.381	0.076	0.358	0.293	0.249	0.182	0.699			
(11)	ownership indegree	0.0000080	0.000021	0.00000	0.00026	0.178	0.086	0.276	0.036	0.269	0.469	0.201	0.055	0.159	0.222		
(12)	ownership outdegree	0.0001266	0.000801	0.00000	0.02933	0.241	0.318	0.270	0.053	0.226	0.224	0.240	0.408	0.181	0.261	0.160	
(13)	ownership main comp.	0.3232207	0.467731	0.00000	1.00000	0.280	0.154	0.408	0.100	0.396	0.425	0.269	0.106	0.284	0.414	0.363	0.229