

Who is Monitoring the Monitor? The Influence of Ownership Networks and Organizational Transparency on Long-Term Resource Commitment in Russian Listed Firms

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Abstract

This empirical study examines the effects of ownership networks and organizational transparency on the long-term resource commitments of large Russian firms. Building on resource dependence and agency theories, we argue that ownership networks may compensate for lack of institutional structures in emerging economies and provide the necessary resources or accountability to enable firm growth through long-term commitments of capital. We use a unique panel dataset of Russian listed firms complemented by information on firms' transparency and disclosure (TD) practices, major owners, and membership in a leading industry association. These data allow us to analyse the network of ownership and association ties to Russian oligarchs and to the state. We find that a firm's position in an

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ownership network and its corporate governance practices in terms of transparency and disclosure are positively associated with long-term investment. We find also that ownership network position and transparency practices significantly interact: firms in peripheral network positions tend to benefit more from improvements to their TD practices. However, this interaction depends on the type of ownership. To analyse this further, we compare different types of network ties: single or multiple controlling owners, state, conglomerate and industry association ties allow us to distinguish the types of resources or oversight that might be available through the network. We find that firms with a single controlling oligarch owner, conglomerate owner, or industry association tie benefit particularly from transparency practices in committing to long-term investment. We interpret these findings through reference to resource dependence and agency theories.

Keywords: networks, governance, resource dependence theory, agency theory, investment

INTRODUCTION

The Russian economy has a dichotomous structure. On the one hand, it is controlled by the state; on the other, it is controlled by a handful of Russian billionaires or 'oligarchs'. These parties can be immensely powerful and may either provide availability of economic and political resources to firms or extract valuable resources from firms (Okhmatovsky, 2010). In this paper, we investigate the determinants of Russian listed firms' long-term commitments of capital – fixed investments.

Investment is critical for the long-term performance of firms because it boosts productivity, enables growth and, thereby, improves performance and profits. Investment can lead to increases in the firm's share price which subsequently increases shareholder value. Thus, fixed investments reflect the ability of the firm to invest in long-term growth and performance. However, governance arrangements, such as ownership structure and transparency practices, may influence the firm's access to financial, knowledge and political resources, and its vulnerability to the funnelling of resources out of the firm by powerful organizational agents (Faccio, 2006; Frye and Iwasaki, 2011). In this paper, we explore the conditions under which either resource provision or expropriation is likely to happen. We argue that highlighting these organizational strategies in an emerging economy institutional environment is appropriate because of greater variation in organizational practices, and the relevance of the emerging economy context for institutional research per se.

We approach the relationships between governance and long-term resource commitment from two theoretical perspectives. Resource-dependence theory (Pfeffer and Salancik, 1978 and 2003; Boyd, 1990; Hillman et al., 2009) suggests that firms are constrained by their

environmental conditions and tend to act to relax these constraints and obtain access to vital resources such as finance, expertise, advice and inputs (Burt, 1980; Provan et al., 1980; Boyd, 1990; Casciaro et al., 2005). Agency theory is based on the recognition that the separation between ownership of the firm and its control by professional managers leads to a principal-agent problem in which the agent (managers) does not always act in the best interests of the principal (shareholders) due to incomplete monitoring and the discretion managers have to maximize their own private gains (Berle and Mean, 1932; Fama and Jensen, 1983). A vast literature has built on these initial insights, and in much of the 20th century was devoted to trying to figure out, theoretically and empirically, how best to align the incentives of managers with the benefits of shareholders (Fama, 1980; Eisenhardt, 1989; Blair, 1995; Eisenhardt and Schoonhoven, 1996).

A slightly different perspective of agency theory, and one particularly relevant for emerging economies, is the principal-principal agency (PPA) model of corporate governance (Classens et al., 2000; Dharwadkar et al., 2000; Young et al., 2008). Principal-principal conflicts between controlling and minority shareholders result from concentrated ownership, extensive family ownership and control, conglomerate structures and weak legal protection of minority shareholders (Young et al., 2008). In particular, concentrated ownership, the predominant ownership structure in Russia and other emerging economies, combined with weak external governance mechanisms, results in more frequent conflicts between controlling shareholders and other shareholders (Morck et al., 2005). These conflicts are created by the controlling shareholder's access to decisions concerning dividends, investments and appointments or even

sales of assets, and collusion with top management, that generate opportunities for private gains and expropriation of minority shareholders.

In developed economies, concentrated ownership is generally viewed as a possible means of addressing traditional principal-agent conflicts (Grossman and Hart, 1986; Shleifer and Vishny, 1997), but in emerging economies, and in Russia in particular, since concentrated ownership is a root cause of PPA conflicts, increasing the ownership concentration is not a remedy and may exacerbate the situation (Faccio et al., 2001; Young et al., 2008). In this context, PPA conflicts can be resolved by outside monitoring of controlling shareholders or bonding between controlling shareholder and other shareholders. The latter occurs when controlling shareholders provide an implicit guarantee to protect other shareholders against expropriation, either by developing a reputation for treating minority shareholders well (Gomes, 2000) or by cross-listing American Depository Receipts (ADRs) on the US stock exchanges (Doidge et al., 2004) to signal higher standards of governance.

Within the broader institutions-based view of the firm (Ahuja, 2011), we integrate PPA theory with Resource-Dependence Theory (RDT) by building on Hillman's (2003, 2004, 2009) work. In particular, we revive the notion of organizational power (Brass and Burkhardt, 1993) and suggest that owners that are powerful enough to attract resources to a firm may be powerful enough also to redirect resources away from the firm. Thus, although powerful owners may increase decision making efficiency by monitoring top managers, the benefits may be more than offset by the costs of expropriation enabled by the ability to generate private gains or to collude with top managers. However, these tendencies can be countered by the firm's commitment to corporate governance practices such as TD (Patel et al., 2002; Bushman et al.,

2003; Berglöf et al., 2005; Hermalin and Weisbach, 2007; Roohani et al., 2009). If firms institute thorough and transparent reporting practices, this makes it more difficult for powerful managers or owners to draw private benefits. Also, transparent governance facilitates the acquisition of resources from other external investors or lenders. Therefore, transparency mitigates agency costs, including PPA costs and, as a consequence, alleviates resource constraints.

We adopt the novel network perspective of ownership to examine the effects of owners' connectivity to one another and to the state (Guthrie et al., 2012). More connected controlling owners may provide more relevant resources to the firm, such as information about and finance for investment opportunities. On the other hand, more connected owners may be particularly powerful and prone to expropriation. However, powerful owners potentially might be monitored by other large shareholders, thus reducing the potential downsides of ownership networks.

We test these ideas with a unique panel dataset of 90 large Russian listed firms. We combine these firms' accounting data with longitudinal information on their TD practices collected by Standard & Poor's (S&P). These panel data are complemented by cross-sectional information on firms' controlling oligarch ownership, state ownership, conglomerate ownership, stock-market listing and industry association ties, which we use to construct our ownership network measures. We estimate error-correction panel models explaining the fixed investments of firms in the period 2000-2010, focusing on the moderating effects of ownership network position and ownership structure on the impact of TD on investment.

We find that both centrality in oligarch ownership networks and firms' TD practices positively influence long-term resource commitment to fixed investments, but generally are substitutes for determining investments. Peripheral firms – firms with less connected controlling owners – rely more on TD to attract and commit resources for investment than central firms, whereas for central firms, transparency is less critical. However, the interaction between transparency and networks depends on the type of ownership structure underlying the network ties. In particular, resources provided through conglomerate or state ownership, or ownership by a particularly powerful oligarch connected through the major industry association, are found to complement transparency practices. We argue that these types of control of the enterprise create particularly severe expropriation hazards (Henisz and Zelner, 2001), which must be mitigated by transparent governance. TD practices facilitate commitment of the resources to productive investment rather than their being exploited for 'nest feathering' or other private benefits for owners.

In the following section, we introduce the theoretical framework where we integrate PPA theory with RDT and develop a set of novel hypotheses on the roles of business networks and transparent governance in determining long-term resource commitments. The third section introduces the unique panel dataset of Russian listed firms. Regression analyses are presented in the fourth section, and the final section summarizes the key results and discusses their implications.

THEORETICAL FRAMEWORK

Resource-Dependence Theory and Principal–Principal Agency Theory

Firms are embedded in a range of relationships with other organizational actors (Granovetter, 1985). Virtually all organizational outcomes are based on interdependent causes or agents (Pfeffer and Salancik, 1978). This interdependence creates ties among organizations so that they become part of a network. Organizations can be tied to one another through many types of connections such as exchanges of information, materials, financial resources, legal contracts, ownership, control and services. Some network ties provide salient and trusted information that may affect behaviour (Brass et al., 2004) leading to imitation among organizations (DiMaggio and Powell, 1983; Levitt and March, 1988). We consider ownership networks in which firms may be connected to different types of owners, and owners may be connected to each other or to a major industry association.

A firm's reaction to others in the network is determined in part by the extent to which the organization's operations depend on certain types of resource exchanges (Pfeffer and Salancik, 1978). Resource availability strongly influences firms' ability to gain legitimacy and, therefore, facilitates network development. For example, Bazolli et al. (2003) find that the availability of grant funding influences partnership formation and the legitimacy of organizations. The dependence of one organization on another is determined also by the concentration of resource control by one or a few organizations, and the importance of this resource to the focal organization. Russian SOEs, for example, rely on the state for contracts and financing. An SOE will be influenced more by the state the greater is its dependence on the state, i.e., the more critical the state is to the functioning and survival of the firm.

RDT has been used to explain such corporate governance mechanisms as corporate boards, because boards provide organizations with resources (Boyd, 1990; Dalton et al. 1999, Hillman and Dalziel, 2003; Hillman et al., 2004). Gulati (1999) relies on a resource-dependence framework to examine network resources and alliance formation. Other contexts in which RDT has been applied include mergers and acquisitions, joint ventures, alliances, political activity and executive succession.

To the best of our knowledge, the present research is the first to examine how ownership networks impact on investments through corporate governance practices. We focus on investment rather than profitability measures, because such focus allows us to assess whether the controlling owners are re-investing their gains in long-term assets or taking them out as cash or dividends. These two alternatives have drastically different implications for firm growth and for the dynamism of the economy. Since firms in Russia are generally under-invested (Dzarasov, 2009), it is important to understand the impact on investment of better governance. Moreover, in the Russian context, profitability, proxied by accounting profits, can often be arbitrary since firms manipulate accounts to minimize their accounting profits to avoid corporate taxes. Investment is a more reliable measure with higher expected explanatory power. Oligarchs can own relatively unprofitable firms, but still invest in fixed assets to improve the productivity of the firms they own (Gorodnichenko and Grygorenko, 2008).

An Integrated Framework of Ownership Networks, Transparency and Disclosure Practices, and Long-Term Resource Commitments

Conceptually, our study is close to Hillman and Dalziel (2003) which integrates resource dependence and agency perspectives in a study of boards of directors and performance. Our context of ownership networks is aligned with their focus on boards of directors in that both controlling owners and boards can influence the behaviour of top managers through the resources they make available (e.g., finance, managerial advice, political power) or because they affect agency costs. Thus, resource provision and agency costs are likely to be central for understanding the implications of boards and controlling shareholders.

However, our context of controlling owners in an emerging economy differs fundamentally from boards of directors in that the relevant agency costs arise from, and are monitored by, very different parties. In an institutionally weak emerging economy, such as Russia, it is possible that controlling shareholders take a very active role in the firm's strategy and management. For example, the majority shareholder Khodorkovsky, prior to his imprisonment, directly influenced the strategies of Yukos, transforming it from an under-performing collection of assets to one of the largest Russian oil companies at the time (Rigi, 2005). Oligarch shareholders can use the company as a vehicle to pursue their own political or financial interests (Morck et al., 2005) which do not necessarily coincide with the interests of all shareholders. There is considerable evidence that in such conditions, minority shareholders' value is at risk of being expropriated (Black, 2001; Boone and Rodionov, 2002; Dyck, 2003; Guriev and Rachinsky, 2005; Adachi, 2009). Thus, concentrated ownership can lead to inefficiencies caused by principal-principal conflicts of interest (Young et al., 2008).

In weak institutional and governance environments, controlling shareholders have two options. They can provide their firms with valuable resources such as finance or political connections or they can expropriate value from their firms through unproductive or unfair dividend policies, special (wasteful) investments and activities, nest-feathering or empire building. However, the firm's position in the ownership network can enhance, aggravate, or mitigate these resource-dependence and agency issues.

The firm's position in the two-mode firm-owner network has implications for both resource dependence and agency costs. First, well-connected controlling owners can provide more or higher-quality resources. Thus, if the focal firm's controlling owners are connected to a wider network of firms through their other shareholdings, they are likely to be able to act as information and resource conduits to the focal firm. Better informed and resource rich firms are better positioned to make productive long-term resource commitments through fixed investment.

Second, controlling shareholders can attempt to extract value from the company for their own advantage, thus depleting the company of resources that could be committed to productive long-term investments. This argument reflects the PPA cost of powerful individual (oligarch) owners: who will monitor the monitor? Indeed, there is evidence (Pagano and Roëll, 1998; Faccio et al., 2001; Faccio and Lang, 2002; Maury and Pajuste, 2005) that multiple large shareholders can monitor one another's attempts to derive private benefits from their companies. A particular case of effective monitoring is formation of controlling coalitions (Bennedsen and Wolfenzon, 2000). In controlling coalitions, ownership and control are distributed among several large owners and no individual shareholder is large enough to

control the firm. This arrangement creates a credible commitment (a form of bonding) that the shareholders will not undertake unilateral action to expropriate funds. As a result, agency costs can be mitigated by position in the ownership network that affords the company multiple large shareholders (blockholders), reducing value-extraction and enhancing the conditions for long-term resource commitments.

Similarly, conglomerate structures can influence firms' resource dependence and agency issues. Russian oligarchs tend to control firms in different industries and often run them as business groups or conglomerates. For example, Mr Yevtushenkov, who controls most of his companies through the holding company Sistema, has controlling interests in about ten leading listed firms, from energy, oil and gas, to telecommunications and chemicals. Many such conglomerates include banks, which is a remnant of post-privatization times when financing was scarce and best provided 'in-house'.

Studies building on RDT (Buckley and Strange, 2011; Estrin et al., 2009) argue for the importance of business groups, such as oligarchic conglomerates, to internalize market transactions, minimize transaction costs and transfer financial resources between firms so as to alleviate financing constraints on investment. These advantages may be more pronounced in Russia where external markets are less efficient (Wright et al., 2005). The internal markets associated with business groups in emerging markets reduce uncertainty and lower transaction costs. Conglomerate ownership ties, therefore, can improve the availability of financial resources for investment.

In contrast, agency-theory based research takes a more negative view that conglomerates suffer from agency and coordination problems due to their complex organizations, resulting in

inefficiency and even exploitation of minority shareholders (Morck et al., 2005). This perspective suggests that conglomerate ownership reduces financial efficiency and weakens the ability of firms to make long-term investments. Conglomerates have been depicted in the literature as either 'paragons or parasites' (Khanna and Yafeh, 2007).

Firm-state interactions also play a crucial role in many emerging economies in determining corporate behaviour and outcomes (Okhmatovskiy, 2010; Okhmatovskiy and David, 2011; Hillman et al., 2004). Firms in the firm-state network can provide state actors with inside business information, financial resources (corporate taxes, campaign financing, state-backed charity financing), and political support (voting and open support of state policies and regulations). In exchange, the state can help focal firms enhance their rights and competitive positions. State connections provide firms with opportunities to influence regulatory policy (Hillman et al., 2004), enhance the firm's legitimacy (Baum and Oliver, 1991) and facilitate access to valuable resources controlled by the state (Xin and Pearce, 1996). Firms connected to the state may benefit from preferential treatment (Johnson and Mitton, 2003) and receipt of exclusive information regarding state policies (Lester et al., 2008).

Studies employing the resource dependence view hypothesize that, on balance, the benefits of firm-state ties outweigh the costs, and provide evidence that 'performance benefits accrue to firms that create linkages with the political environment' (Hillman et al., 2009). Inter-organizational relationships based on dyadic ties developed between business and government give rise to political resources that can be enjoyed by the focal firms. Therefore, firm-state ties can provide important resources at firm level (Dyer and Singh, 1998; Gulati et al., 2000; Sun, Mellahi and Wright, 2012). Empirical studies provide evidence that ties to the state indeed

enhance performance (Fishan, 2001; Johnson and Mitton, 2003; Siegel, 2007). In a recent study of firm-state ties among Russian banks, Okhmatovskiy (2010) distinguishes between board and ownership ties to SOEs, and board and ownership ties directly to the Russian state. He finds that ties to SOEs are associated with higher profitability, while no significant differences emerge for firms with direct ties to the state.

There are a few reasons why the presence of the state among the firm's shareholders might boost investment. Since management communicates regularly with large shareholders, we can expect benefits associated with information exchange such as being informed about changing policies. The state as a shareholder can boost the legitimacy of a particular business and decrease the perceived risks associated with the business because of expected state support in crisis situations (see banks bail-outs). Finally, if a firm has ties to the state, this firm may be privileged when applying for licences, tax exemptions, government contracts, etc., which, in turn, can result in more valuable investment opportunities.

However, from an agency perspective, being controlled by the state can have negative effects on investment. While the power of individual owners may be mitigated by other owners, reducing the concern of expropriation, the power of the state may be too strong for any individual or group of other owners to counterbalance. Thus, having an overpowering state as the major shareholder may make other owners less inclined to provide resources for the firm for fear of expropriation by the state, with the result that the firm's capability for long-term resource commitments to investment may be limited (Faccio et al., 2001; Faccio, 2006).

Finally, collective organizations and associations allow concentration on a valuable resource (Leiponen, 2008). Unions and trade and professional associations are instances of such

attempts to achieve coordinated action. Recent research shows that membership in a business association is positively related to the firm's propensity to invest in capital assets (Pyle, 2009). We examine the effects of membership in the most developed and influential business association in Russia – the Russian Union of Industrialists and Entrepreneurs (RUIE).

RUIE developed originally as a powerful alliance of Soviet-era enterprise directors, which, in the initial stages of the reform era, lobbied for the retention of many price controls, continued access to state subsidies, and strict limits on foreign investment (McFaul, 1993; Hanson and Teague, 2005). By the mid-1990s, RUIE had begun to adopt a more pro-market orientation and was helping to organize a network of independent affiliates. RUIE aspires to act as a lobby representing the interests of large firms owned by the oligarchs. RUIE and other interest groups seek access to policy makers in order to defend the interests of their members - at the expense of others if necessary. This relationship is mutually beneficial since policy makers need the information that pressure groups, such as influential oligarchs, provide in order to keep in touch with their firms, to know where policy measures are needed, and to determine whether planned policies have sufficient support from those directly involved to ensure that they will be implemented. Hence, industry associations, such as RUIE, may enhance personal ties when lobbying state officials (Frye, 2002) and contribute to political stability (Hanson and Teague, 2005).

Industry associations also provide lobbying members and participating managers or owners with access to people and information. By becoming central actors in such an association, firms may accrue benefits in terms of privileged access to inputs, advice, expertise or other forms of power. These benefits should mitigate resource constraints in the operation of the firm.

Although industry associations are non-profit organizations that are unlikely to become actors that develop powerful relationships over their members; having a major shareholder who is a member of the most powerful lobby may still be associated with PPA costs. That is, owners who are members of RUIE's board are likely to be particularly powerful. Thus, although RUIE membership is likely to generate access to valuable resources, it may also signal the presence of a particularly powerful oligarch.

Following this review of the key types of ownership networks, next we develop two novel hypotheses and consider how firms' other governance practices influence investments and, in particular, interact with ownership and other networks. We are interested in particular in TD practices, because these practices influence the ability of the firm's other stakeholders to monitor managers and owners.

Corporate transparency comprises a set of information, privacy and business policies that improve corporate decision making and render operations open for assessment by employees, stakeholders, shareholders and the general public. It has been defined as 'the system by which business corporations are directed and controlled' (Cadbury Committee Report, 1992). The mechanisms of governance can be assessed on various factors ranging from board and management structures, to shareholder rights to TD of information. Our research focuses on a narrow aspect of governance, i.e. TD. TD practices are integral to corporate governance (Patel et al 2002). They are an important component of corporate governance frameworks (OECD, 1999) and a leading indicator of corporate governance quality (Aksu and Kosedag, 2006). Beeks and Brown (2005) find that firms with higher corporate governance standards make more informative disclosures. Black et al. (2006) analysed the various measures of corporate

governance in Russia and conclude that sophisticated governance indices are not necessarily better predictors than TD scores. Sadka (2004), employing data from 30 countries suggests that publicly shared financial reporting (market transparency) directly increases total factor productivity and GDP growth. TD are particularly important in emerging markets, such as Russia, where external capital is necessary to sustain high growth rates, and the greatest agency problems centre on asymmetric information and expropriation by majority shareholders (Aksu and Kosedag, 2006). TD data have been used in many scholarly cross-country studies that assess the relationship between accounting transparency, legal origin, culture and economic performance (see, e.g., La Porta et al., 1998; Hope, 2003).

Another study (Grosman, 2012) provides evidence that TD practices directly influence investments. I argue that these practices enhance both internal efficiency and the prospects for external finance due to improved accountability. As a consequence, Russian firms that adopted better TD practices increased their long-term fixed investments. In terms of the framework in this study, this argument can be interpreted in the light of agency theory: improved TD practices enhance the ability of stakeholders to monitor and, thus, to reduce agency costs.

The interest in this study is in how ownership networks and TD practices interact in determining investment. We explore how TD practices interact with the firm's position in ownership networks. We expect this to depend on whether networks primarily facilitate acquisition of resources or generate agency costs, including principal–principal conflicts.

When the firm's position in a specific network primarily yields resources, we expect TD practices to substitute for ownership networks in enabling long-term investments. This is

because firms may already have obtained many of the resources needed, and advanced TD is not necessary to acquire the resources for long-term investment.

H1: Connections in networks that primarily provide resources negatively moderate (substitute for) transparency and disclosure practices in their effects on investments.

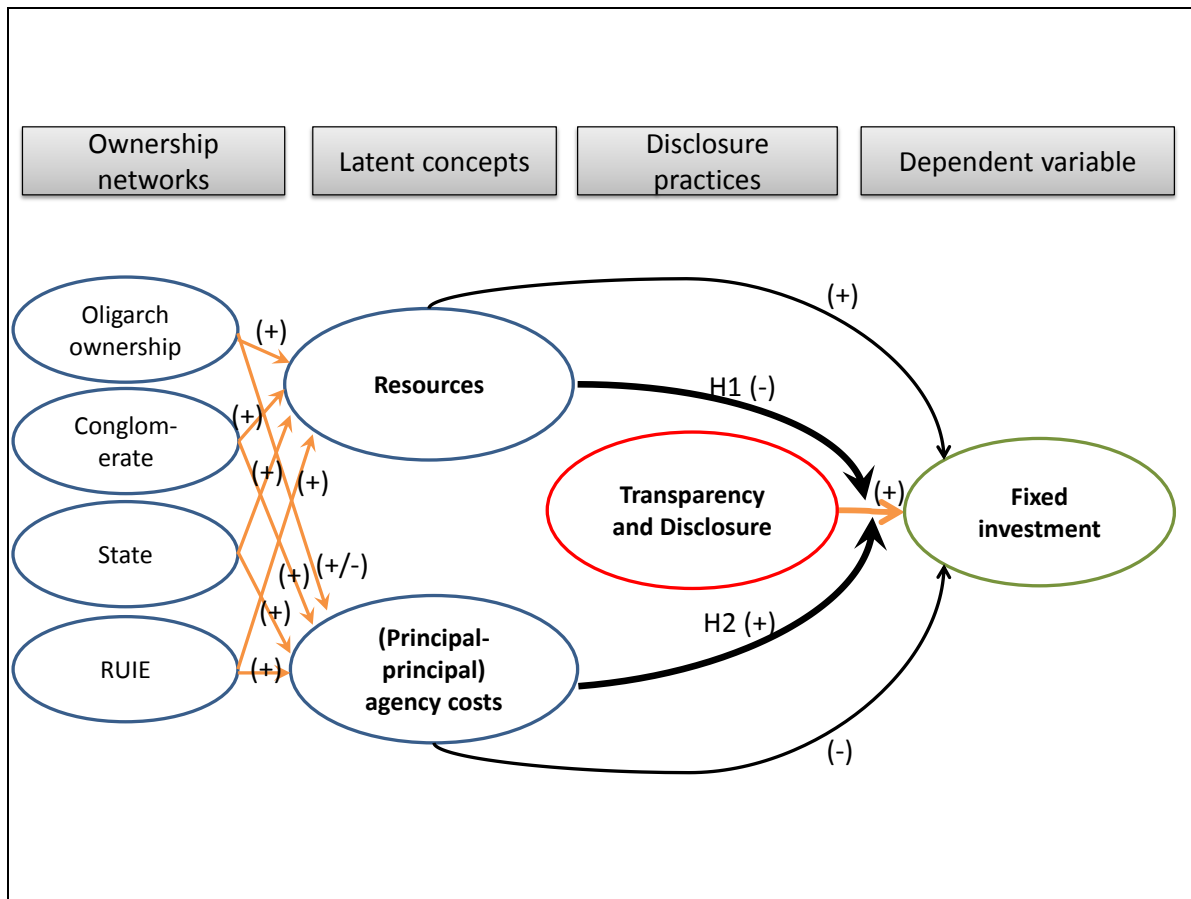
From an agency perspective, when firms' ownership network positions primarily generate agency costs, networks and TD practices are complements. Similar mechanisms are investigated in the literatures on venture capital ownership (Chahine et al., 2007; Fracassi and Tate, 2012; Chahine and Filatotchev, *forthcoming*) and boards (Huse, 2005). In this case, TD practices enhance monitoring that counteracts the agency conflicts created by ownership arrangements.

H2: Connections in networks that primarily generate principal–principal and other agency costs positively moderate (complement) transparency and disclosure practices in their effects on investments.

Conversely, ownership structures that *reduce* agency costs are substitutes for TD practices, because they enhance monitoring and hence accountability.

Our conceptual framework is summarized in Figure 1.

Figure 1 Conceptual framework



In a nutshell, our conceptual framework examines the interactions between ownership networks and TD practices that influence firms' investment performance. Ownership network positions are hypothesized to influence firms' resource dependence and (principal-principal) agency costs. Valuable resources and agency conflicts may have direct (respectively positive and negative) effects on investments, but we focus here on their moderating effects on the impact of TD on investments. As suggested by previous research, TD practices directly and positively influence investments. However, these practices are more valuable to firms that have weaker access to resources or particularly severe agency conflicts.

First, if firms do not get access to information, finance and inputs through their ownership connections, TD become more important for attracting positive attention and improving the company's reputation, thereby enhancing access to these external resources. Second, TD are particularly important for firms suffering principal-principal conflicts and other agency costs. TD of relevant corporate information can substantially reduce the opportunities for expropriation and force powerful owners to commit to productive long-term investments rather than private exploitation of company assets.

We examine four different aspects of ownership networks: connectivity of owners and firms in the two-mode oligarch-firm network; conglomerate ownership structures; state ownership; and major owners' (oligarchs') memberships in the RUIE. Each of these may enhance the firm's resource access or influence its agency costs. Depending on their interaction with TD practices, we determine whether these factors primarily increase resource access (negative moderating effect – substitution) or agency costs (positive moderating effect – complementarity).

DATA AND OPERATIONALIZATION

We use a unique dataset that links Russian publicly-traded firms to oligarchs, indirectly to other firms, to foreign investors, to conglomerate companies, and to state entities, and analyse how these network measures, directly and through their interactions with TD practices, impact on investments. The Russian context is ideal for such a study, because there is great variation across companies and time, in all the variables of interest. Within an industrialized economy, differences in terms of governance practices are more minor and more stable, making it difficult empirically to identify their effects.

Private Russian firms are controlled predominantly by one or two private individuals (oligarchs) or the state, in other words, concentrated rather than dispersed ownership is the norm. In our sample, we include some 100 of the wealthiest Russian private owners, each of whom has a major stake in at least one publicly-listed firm. We collected data on Russian firms publicly listed in Russia or abroad, and for each of these firms identified controlling shareholders, including federal government, regional government, politicians and oligarchs.

Oligarch-owned firms are often structured as pyramids or as part of cross-shareholdings. In these structures, the oligarch achieves control of the constituent firms via a chain of ownership relations. We dissect this relationship to expose the oligarch, i.e. the ultimate owner of the operating assets. Another practice peculiar to such firms is that the oligarch's shares frequently are held on his/her behalf by a nominee shareholder,³ in order to secure the oligarch's corporate and financial anonymity. Therefore, it is the nominee's not the oligarch's name that appears on companies' share registrars and accounts. Our data are unique in that we do not use data on nominee shareholders, but have information on ultimate owners identified through interviews with finance professionals close to the oligarchs' firms, media publications (*Forbes*, *Vedomosti*, *Expert*, *Finance*, and *Kommersant*), and governance-related associations. We utilize S&P's TD scores in our empirical analyses.

Finally, standard financial data on the 90 firms are collected for the period 2000-2010 from Compustat Global. As a result, we have an unbalanced panel of financial and TD information for 90 firms, and cross-sectional information on their ownership networks, stock-market listings,

³ A nominee shareholder is normally a company created for the purpose of holding shares and other securities on behalf of an investor. The nominee is not the legal owner of the shares, and the underlying investor has the 'beneficial interest' in the shares, i.e. s/he is entitled to all income and capital gains on the shares.

and industry association memberships. Unfortunately, it was impossible to obtain longitudinal information on firms' ownership arrangements, because of the unavailability of historical data.

Dependent variable

Investment refers to the firm's annual capital expenditures. Capital expenditure is used by firms to acquire or upgrade physical assets such as equipment, property or industrial buildings. We use the first difference of the natural logarithm of investment as our dependent variable, and include the lagged investment term as an independent variable. The rationale for including the lagged investment term is the presence of adjustment costs of investment (Brown and Pedersen, 2009).

Using investments as a performance measure is justified in the Russian institutional context, because it is reasonable to assume that there is scarce overinvestment. Most Russian firms have old and fully amortized assets as a legacy of the Soviet regime, and resort to heavy use of outsourcing as opposed to reliance on own production. The average life of equipment in Russia is 18-19 years rather than the more desirable 7-8 years (Aganbegyan, 2008). According to Dzarasov (2009), in spite of the prolonged recovery in 1999-2008, capital investment by Russian firms was low and deficient in quality. Political uncertainty and a fluid institutional environment gave oligarchs an incentive structure that induced a preference for asset stripping over long-term investment (Campos and Giovannoni, 2006; Braguinsky and Myerson, 2007; Braguinsky, 2009). Therefore, we argue that it is unlikely that any Russian firms would make systematic frivolous and unnecessary investments, which would reduce the validity of our dependent variable.

Independent Variables

Our key explanatory variables include the *TD* score published by S&P for 90 Russian companies; it consists of three components - (1) ownership structure and shareholder rights, (2) financial and operational information, and (3) board and management structure and process. These three sub-scores are highly positively correlated with one another. The checklist methodology was to search for 110 TD attributes relating to the three components. Each attribute is scored on a binary basis to ensure objectivity, and scores for the three components are developed from the scores for individual attributes. The scoring accounts for information included in the three major sources of public information: annual reports, web-based disclosures and public regulatory reporting (such as publicly available statutory documents filed with the Russian financial markets regulator Federal Financial Market Service, Frankfurt Stock Exchange, UK Financial Services Authority or Listing Authority, and the US Securities Exchange Commission) available on the web sites of companies, stock exchanges and regulatory authorities. According to the weighting system, public disclosure - regardless of its source - yields 80% of the maximum score on each point of the questionnaire. The remaining 20% of points are awarded if this information is present also for the other two sources (10% each).

In our analyses, we explore two-mode inter-firm networks where firms are linked through a major shareholder. For example, if shareholder A owns a controlling stake in company X and a controlling stake in company Y, then companies X and Y are connected to each other. Similarly, if owner B has a stake in firm X, then owners A and B are connected to each other. We consider controlling shareholders that may be individuals (oligarchs) or the Russian state. We examine how the firm's position in this ownership network in 2005 affects its behaviour.

The positioning of each firm within the network influences the information that is conveyed through the network (Lipparini and Lomi, 1999). We focus on simple measures of centrality because they have been found to be associated with performance enhancement and resource acquisition (Ahuja, 2000; Phelps, 2010). In our research, a central firm is the firm with the most connected owners, including the state or regional governments. Russian ownership networks are relatively sparse, and more complex network measures are not very informative in this context (see Figure 1 for the 2005 ownership network).

We project our two-mode network of connected firms and their owners onto a one-mode network of connected firms using UCINET 6 (Borgatti et al., 2002). We dichotomize the matrix to (0,1), where 1 represents the existence of an ownership tie between firms. We calculate the normalized degree centrality of this one-mode binary firm network, denoted here as *connectivity*. Degree centrality is the number of connections to other firms through the controlling owners of the focal firm. Normalized degree is degree divided by the maximum possible degrees expressed as a percentage.

Number of owners represents the number of the firm's controlling owners in 2005. About a quarter of all firms have multiple controlling owners. Most have 2 owners; 11 firms have 3 owners, and 2 firms have more than 3 controlling owners. Twenty-three firms are controlled by the state and one oligarch. We assume that having more than one controlling owner improves monitoring and reduces opportunities for value extraction.

To analyse ownership ties further, we distinguish firms that are controlled by the *state* or through *conglomerate* structures. All ownership data are for 2005. About half of the firms are part of a conglomerate. Firms can be integrated vertically, horizontally or both ways. They can

be part of a portfolio of unrelated firms acquired by an oligarch over time. Examples of vertical integration include mostly oil and natural resources firms, which gives access to the entire value chain; horizontal integration is most common amongst technology and telecom firms wanting to gain market presence.

We determine also whether a firm is owned by a member of the board of the main business association, RUIE.

Our main control variables include Sales and EBIT margin. *Sales* are annual net turnover from firms' financial statements. These data were collected from Compustat Global. We use the variable sales to control for firm size. EBIT or Earnings Before Interest and Taxes is included in financial statements and was collected from Compustat Global. *EBIT margin* is the ratio of EBIT to Sales. We use EBIT margin to control for firms' profitability and efficiency.

EMPIRICAL ANALYSES

Our ownership and business association membership data are cross-sectional and for 2005 only; the accounting and transparency and disclosure data span 2000 to 2010. We utilize these data in a dynamic model of investment to assess the moderating effects of ownership networks. We use an error-correction model estimated in differences (Bond et al., 1997; Mairesse et al., 1999; Bond et al., 2003; Becker and Hall, 2008):

$$(1) \quad \Delta \ln(\text{investment}_{it}) = \beta_0 + \beta_1 * [\ln(\text{investment}_{i,t-1}) - \ln(\text{sales}_{i,t-1})] + \beta_2 * \Delta \ln(\text{sales}_{it}) + \beta_3 * \Delta \ln(\text{investment}_{i,t-1}) + \beta_4 * \Delta \ln(T\&D_{it}) * X_i + \delta_t + \mu_i + \varepsilon_{it}$$

where Δ refers to differences in variables; $\ln(\textit{investment})$ is the natural logarithm of fixed investments; $\ln(\textit{sales})$ is the natural logarithm of sales revenue; $\ln(\textit{T\&D})$ is the natural logarithm of the transparency and disclosure score, δ_t are time dummies, and μ_i are time-invariant unobserved firm-level characteristics (fixed effects). The lagged difference between $\ln(\textit{investments})$ and $\ln(\textit{sales})$ is the error-correction term (*ect*), standard in investment models.

To estimate the moderating effects of the time-invariant ownership variables, we interact the TD variable with a set of dummies \mathbf{X} that represent the different combinations of ownership arrangements and network centrality. This amounts to estimating the interaction between TD and the ownership variables, but because of high correlations between the relevant variables, we operationalize the interactions through their mutually excluding combinations.

We apply fixed effects and dynamic GMM estimators (Arellano and Bond, 1991; Arellano and Bover, 1995; and Blundell and Bond, 1998) to estimate the relationship between TD score, ownership and investment. The dynamic panel GMM estimators incorporate the dynamic nature of the transparency-ownership-investment relationship to provide valid and powerful instruments that control for unobserved heterogeneity and simultaneity (Wintoki et al., 2012).

The use of the GMM estimator is also strictly required if the lagged dependent variable introduces Nickell's bias (Nickell, 1981; Arellano, 2003).

The dynamic modelling approach is used in other areas of finance and economics where the structure of the problem suggests a dynamic relation between the dependent and independent variables. Examples include governance and R&D (Driver and Guides, 2012), external finance constraints and investment (Whited and Wu, 2006), internal finance and investment (Bond and

Meghir, 1994), economic growth convergence (Caselli et al., 1996), labour demand estimation (Blundell and Bond, 1998) and economic growth (Beck et al., 2000).

However, the dynamic panel estimation methodology has some limitations. It relies on using the firm's history (lags of dependent and independent variables) for identification. Thus, there is a potential problem with weak instruments, which becomes greater as the number of lags of the instrumental variables increases. This represents an empirical trade-off. Increasing the instruments' lag length makes them more exogenous, but also may make them weaker. We limit the number of instruments by using the 'collapse' option as in Roodman (2009), which creates one instrument for each variable and lag distance, rather than one for each time period, variable and lag distance. This option effectively constrains all the yearly moment conditions to be the same. Moreover, using the collapse option significantly increases the power of the Hansen test of over-identification.

Table 1 presents the descriptive statistics of all estimation variables and table 2 their pairwise correlations.

Table 1 Descriptive statistics

Variable	Obs	Mean	Median	ST&D. Dev.	Min	Max
Capital investment, EURm	1284	347.4	56.8	1377.3	0.0	27073.3
Sales, EURm	1464	2064.1	485.7	6615.3	0.0	88127.8
EBIT margin, %	1452	-1%	11%	248%	-7330%	99%
TD score	559	49%	51%	17%	0%	85%
Connectivity	1518	22.04	8.19	21.68	0	52.16
Number of owners	1518	1.35	1.00	0.69	0	5
State ownership	1542	0.54	1.00	0.50	0	1
Conglomerate ownership	1531	0.46	0.00	0.50	0	1
RUIE membership	1555	0.35	0.00	0.48	0	1

Table 2 Pairwise correlations

Variable	1	2	3	4	5	6	7	8
1. Investment	1.00							
2. Sales	0.88***	1.00						
3. EBIT Margin	0.02	0.02	1.00					
4. TD score	0.19***	0.22***	0.04	1.00				
5. Connectivity of owners	0.07***	0.02	0.01	-0.02	1.00			
6. Number of owners	0.07***	0.15***	-0.08***	-0.05	0.03	1.00		
7. State ownership	0.12***	0.09***	0.01	-0.01	0.78***	-0.13***	1.00	
8. Conglomerate Ownership	-0.05*	0.02	-0.03	0.03	-0.45***	0.28***	-0.41***	1.00
9. RUIE membership	0.13***	0.20***	-0.04	0.02	-0.24***	0.32***	-0.25***	0.61***

Notes: *p<0.10, **p<0.05, ***p<0.01.

Table 3 Governance, investment and network position

	Fixed effects	GMM differences
	Coeff. (se)	Coeff. (se)
$\Delta Investment_{i,t-1}$	0.296** (0.110)	0.249** (0.080)
$\Delta Sales_{i,t}$	0.946*** (0.160)	1.036*** (0.230)
$\Delta Sales_{i,t-1}$	-0.171 (0.180)	-0.196 (0.180)
<i>ect</i> ($Investment_{i,t-1} - Sales_{i,t-1}$)	-0.772 (0.100)	-1.113*** (0.110)
TD Score*central firms	0.11 (0.100)	0.148 (0.190)
TD Score*peripheral firms	0.262** (0.080)	0.205* (0.090)
constant	-1.750*** (0.210)	
R ²	0.417	
Residual degrees of freedom	79	69
N	298	218
Hansen test		34.3
Hansen (p)		0.2
AR(1)		-1.5
AR(2)		-1.1

Notes: p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

The variable Central firms equals 1 if the firm's 2005 connectivity is greater than the mean and 0 otherwise. Peripheral firms equals 1 if firm's 2005 connectivity is greater than the mean and 0 otherwise. *ect* is error correction term. All variables except dummies and *ect* are logged. All standard errors are White's robust errors controlling for heteroscedasticity and panel-specific autocorrelation. The difference GMM estimator uses a system consisting of first-differenced equations. We use the collapse option of *xtabond2* as in Roodman (2009) to avoid instrument proliferation, and a small sample adjustment to correct for the small number of observations. We assume conservatively that all the variables are endogenous. AR(1) and AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals under the null of no serial correlation. The Hansen test of over-identification is under the null that all instruments are valid.

The results in Table 3 suggest that ownership connections moderate the effects of transparency on investment. We split the connectivity variable at the mean and estimate the effect of TD, separately for highly-connected firms and little-connected firms. TD scores are positive and

statistically significant only for poorly-connected firms. The control variables of lagged investment and lagged sales, and the error-correction term are highly significant.

We conduct a Hansen test of over-identification. Since the dynamic panel GMM estimator uses multiple lags as instruments, our system might be over-identified; therefore, we test for over-identification. The Hansen test yields a J-statistic which is Chi-square distributed under the null hypothesis of validity of our instruments. The results in Table 3 reveal a J-statistic with a p-value of 0.2, meaning we cannot reject the hypothesis that our instruments are valid. Taken together, the specification tests provide empirical verification for the argument that our independent variables are indeed exogenous with respect to investment.

Table 4 examines the interaction of TD scores with mutually excluding combinations of a single vs multiple controlling owners, state ownership and conglomerate ties. We expect agency costs to be the highest for the combination (1,1,1), where all the ownership arrangements, single controlling shareholder, state ownership and conglomerate structure, are present. The combination (1,0,1) implies that there is a single controlling owner, no state ownership, and a conglomerate structure while the combination (0,1,1) refers to the combination of multiple controlling owners, state ownership and conglomerate ties. Combinations (1,0,0), (0,1,0) and (0,0,1) describe organizations with only one of these sources of agency costs present. Preliminary results in Table 4 suggest that the coefficient of TD is positive and significant for firms with more than one of these agency factors present. In other words, TD matters more for firms with agency 'hazards.'

Table 4. Investment, governance, state and ownership interactions

	Fixed effects	GMM differences
	Coeff./ (se)	Coeff./ (se)
$\Delta Investment_{i,t-1}$	0.284* (0.120)	0.249* (0.100)
$\Delta Sales_{i,t}$	0.944*** (0.160)	0.952*** (0.200)
$\Delta Sales_{i,t-1}$	-0.174 (0.190)	-0.218 (0.200)
<i>ect</i> ($Investment_{i,t-1} - Sales_{i,t-1}$)	-0.751*** (0.100)	-1.007*** (0.110)
T&D*(1,1,1)	0.574* (0.260)	0.513+ (0.280)
T&D*(1,1,0)	0.288 (0.180)	0.64 (0.390)
T&D*(1,0,1)	0.160** (0.050)	0.153* (0.070)
T&D*(0,1,1)	0.807+ (0.420)	0.486 (0.620)
T&D*(1,0,0)	-0.376 (1.270)	-0.498 (1.850)
T&D*(0,1,0)	-0.05 (0.100)	0.01 (0.190)
T&D*(0,0,1)	0.288 (0.190)	0.161 (0.130)
T&D*(0,0,0)	0.055 (0.240)	-0.105 (0.250)
constant	-1.696*** (0.220)	
R ²	0.424	
df residual	79	69
N	298	218
Hansen test		52.5
Hansen(p)		0.6
AR(1)		-2.1
AR(2)		-0.8

Notes: p<0.10, * p<0.05, ** p<0.01, *** p<0.001. Central firms equals 1 if the firm's 2005 connectivity is greater than the mean and 0 otherwise. Peripheral firms equals 1 if firm's 2005 connectivity is greater than the mean and 0 otherwise. *ect* is error correction term. All variables except dummies and *ect* are logged. All standard errors are White's robust errors controlling for heteroscedasticity and panel-specific autocorrelation. The difference GMM estimator uses a system consisting of first-differenced equations. We use the collapse option of *xtabond2* as in Roodman (2009) to avoid instrument proliferation, and small sample adjustment to correct for the small number of observations. We assume conservatively that all variables are endogenous. AR(1) and AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. The Hansen test for over-identification is under the null that all instruments are valid.

Table 5. Investment, governance, RUIE association and ownership interactions

	Fixed effects	GMM differences
	Coeff. / (se)	Coeff. / (se)
$\Delta Investment_{i,t-1}$	0.315** (0.110)	0.260** (0.080)
$\Delta Sales_{i,t}$	0.941*** (0.160)	1.057*** (0.220)
$\Delta Sales_{i,t-1}$	-0.197 (0.180)	-0.155 (0.190)
<i>ect</i> ($Investment_{i,t-1} - Sales_{i,t-1}$)	-0.773*** (0.100)	-1.114*** (0.110)
T&D*(1,1,1)	0.226** (0.080)	0.214** (0.070)
T&D*(1,1,0)	1.003*** (0.180)	1.680*** (0.190)
T&D*(1,0,1)	0.069 (0.390)	-0.378 (0.590)
T&D*(0,1,1)	0.453** (0.130)	0.179+ (0.090)
T&D*(1,0,0)	0.233 (0.170)	0.41 (0.370)
T&D*(0,1,0)	-0.119 (0.090)	0.073 (0.220)
T&D*(0,0,1)	-1.277*** (0.090)	-1.282*** (0.090)
T&D*(0,0,0)	0.28 (0.390)	-0.337 (0.490)
constant	-1.747*** (0.220)	
R ²	0.429	
df residual	79	69
N	298	218
Hansen test		50.1
Hansen(p)		0.7
AR(1)		-1.8
AR(2)		-1

Notes: p<0.10, * p<0.05, ** p<0.01, *** p<0.001. Central firms equals 1 if the firm's 2005 connectivity is greater than the mean and 0 otherwise. Peripheral firms equals 1 if the firm's 2005 connectivity is greater than the mean and 0 otherwise. *ect* is error correction term. All variables except dummies and *ect* are logged. All standard errors are White's robust errors controlling for heteroscedasticity and panel-specific autocorrelation. The difference GMM estimator uses a system consisting of first-differenced equations. We use the collapse option of *xtabond2* as in Roodman (2009) to avoid instrument proliferation, and small sample adjustment to correct for the small number of observations. We assume conservatively that all variables are endogenous. AR(1) and AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. The Hansen test for over-identification is under the null that all instruments are valid.

Table 5 explores the interactions between TD and the number of controlling owners, RUIE membership and conglomerate structures. Again, the combination (1,1,1) implies a single controlling owner who is on the RUIE board, and a company associated with a conglomerate structure. We interpret RUIE membership as implying that the controlling oligarch is an exceptionally powerful individual in the Russian economy. Again, we find that the combinations where multiple agency hazards are present tend to interact positively with TD, while combinations where only one or none of the agency cost drivers is present do not significantly interact with TD. We suggest that the results, overall, are aligned with the argument that TD practices are particularly relevant for firms that are associated with other organizational features that generate agency or principal-principal conflicts if the firm wants to be able to commit to productive investments.

In summary, the regression results provide tentative support for our hypotheses. Hypothesis 1 predicted that if the ownership network and other organizational features primarily generate resources for the company to facilitate investment, then there will be a negative interaction with TD because these practices would be redundant for acquiring the resources for investment. We find that ownerships network connectivity may operate primarily in this way. TD matters only for firms that are not well connected through oligarch connections. Hypothesis 2 suggests that organizational features that primarily cause agency costs will positively interact with TD in predicting investments. We find that firms with state ownership, RUIE-connected oligarch owner, conglomerate structure, or a single controlling owner which it would be difficult for minority shareholders to monitor, benefit significantly from TD practices in committing to investments. We argue that these organizational characteristics primarily represent agency

hazards for the firms, and if firms really want to commit to long-term investments, they will benefit from TD practices.

CONCLUSION, IMPLICATIONS, AND FURTHER RESEARCH

Although concentrated ownership is one of the most important governance mechanisms for large firms in emerging economies, these firms are often controlled by the state (e.g. China) or families (e.g. Indonesia, South Korea, Taiwan and Thailand) rather than by oligarchs. The unique oligarchic network structures in Russia may be filling the institutional vacuum left by the collapsed communist economy, ensuring access to the requisite resources for investments and improving assets productivity. Also, states in emerging economies tend to exercise control over the economy through involvement in the governance of firms in 'strategic' industries, and provide political support and preferential treatment. This politically motivated intervention is likely to affect firm performance and long-term investment. Whilst government involvement in corporate governance is an important aspect of business-government relationship, particularly in emerging economies, it has received limited attention in the management literature (Okhmatovskiy, 2010).

We examined the implications of heterogeneity of such ownership network ties that enhance, diminish or compensate for other governance practices in determining investment. Some network connections are substitute mechanisms for governance practices related to TD because they improve accountability and, thus, support investment. Other organizational arrangements might complement these governance practices because they generate agency conflicts. We expect the mechanisms through which ownership networks influence investment

to depend on whether ownership arrangements have implications for resource acquisition or agency costs.

To our knowledge, this is the first study to combine analysis of ownership networks and internal corporate governance and their impact on firms' strategic long-term resource commitments. We viewed ownership and other networks from resource-dependence and agency perspectives and examined how these arrangements interact with governance practices related to TD. We argue that ownership arrangements can reflect either resource benefits or agency costs, depending on type of ownership.

We found that external ownership connections and connections to an industry association moderate the impact of TD practices on investment. We argue that more advanced TD practices support investments because, by improving accountability, they tend to improve firms' internal efficiency and decision-making processes and, as a consequence, make more external resources available to the firm. Ownership networks moderate the impact of TD practices because they can substitute for or complement these practices, depending on whether resource constraints or agency costs are the primary drivers of the connections.

Our preliminary empirical results indicate strongly that ownership and governance practices interact. We find that firms with poorly connected owners benefit significantly from TD, because TD compensates for the lack of resources acquired externally. We find also that firms with a single controlling owner, state ownership or conglomerate structure gain more from TD practices when committing to long-term investments. We suggest that these characteristics reflect high agency costs because, in the weak institutional environment of Russia, the controlling owner, the state or conglomerate arrangement potentially can be used to

expropriate value from the firm, and small shareholders may not be powerful enough to prevent this. As a result, the controlling owner might extract value rather than reinvest in productive assets. However, TD practices can counteract this tendency and commit the firm to credible productive long-term investments.

Finally, we found that oligarch owners' memberships of the board of RUIE complement the effects of TD on commitment to investment. We interpret this effect as due to the power of the individual involved. Being invited to be a board member appears to signal an exceptionally powerful and well-connected individual, which may facilitate resource acquisition for the firms they own, but also poses an unusually strong risk of expropriation. Our results suggest that the risk outweighs the resource benefits.

Our study is based on empirical analyses of a unique, purpose-built firm-level dataset of large Russian firms. Nevertheless, as usually the case in weak institutional environments, data availability and quality present some problems. First, TD scores are longitudinal, but available only for 90 firms. Second, ownership and membership data are extremely costly to retrieve, and older data are not available. As a result, network measures are available only for a cross-section, and our panel analyses which include network measures are limited to interactions specifications.

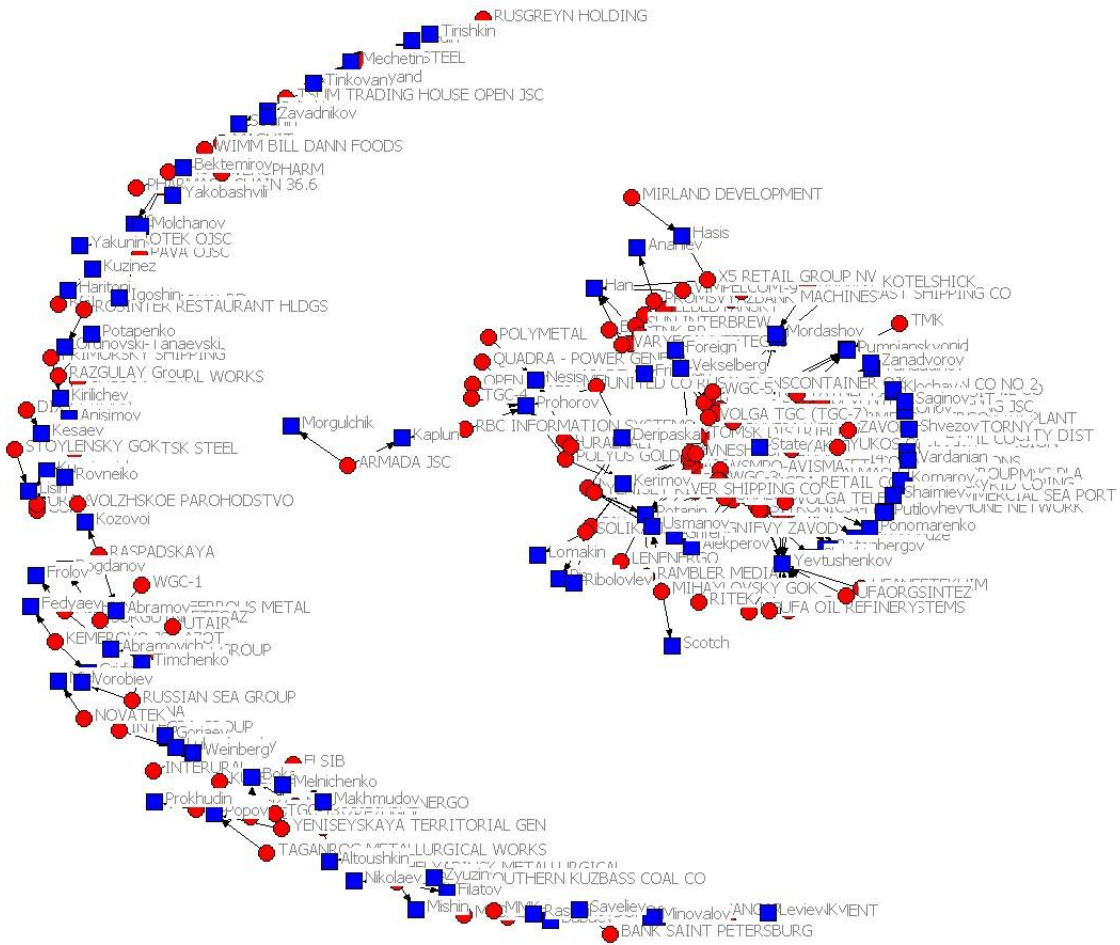
Nevertheless, our analyses generate some robust results that are consistent with our hypotheses. We controlled for unobserved heterogeneity, such as changes in the investment conditions during the period of study that influence ownership networks, governance practices and investment, using a GMM estimator, using difference GMM models. GMM techniques are

used frequently in the investment literature and are being employed increasingly in management studies of the governance-performance relationship.

Our study contributes to the management literatures on resource-dependence theory, agency theory, corporate governance, networks and emerging economies. It has some implications for policymakers and investors choosing which firms to invest in since better-networked and more transparent firms are likely to generate more growth through investments. It also has implications for managers and owners of firms operating in Russia or other emerging economies. For managers and owners of state-owned or conglomerate firms, the strategic focus might be to strengthen corporate governance to be better able to commit to productive investments, whereas for firms controlled by multiple oligarchs, maintaining ties with other 'connected' oligarchs might prove a better tactic to increase investments and subsequent performance.

A natural extension to this study would be to devote more attention to the way business networks impact on the board composition of Russian firms, e.g. by studying whether CEOs or shareholders from these networks are more likely to have membership in one another's boards (board interlocks) and how this particular network-governance interaction influences investment policy. It would be interesting also to explore the interactions between external networks and governance practices by examining the impact of connectivity on the adoption of more stringent practices by the focal firm, through contagion. It is possible that firms learn about corporate governance practices through their network connections. Finally, investigating the effects of ownership networks in other emerging or developed economies would be valuable to assess the generalizability of these results for Russia.

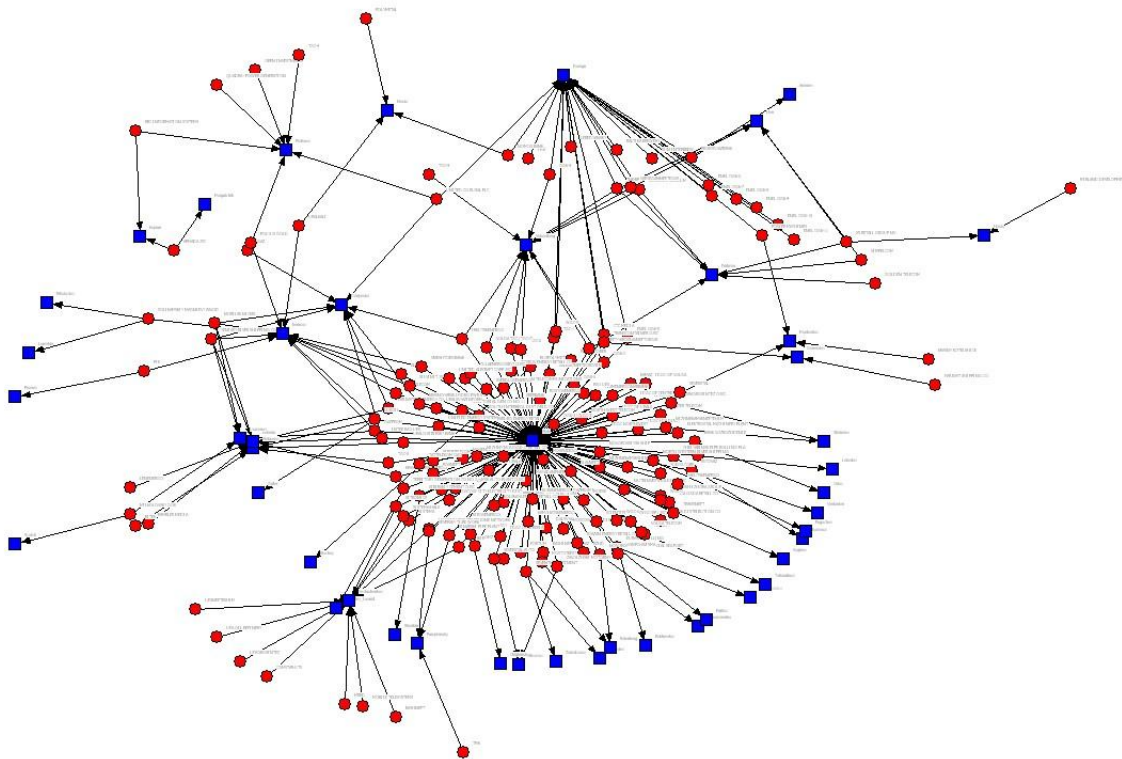
Figure 1. The 2-mode firm-owner matrix⁴



⁴ Owners are represented by (blue) squares, firms by (red) circles

Figure 2. The state cluster (2-mode)⁵ of the whole network

This figure represents the firms connected through ownership ties to the state (the state is at the centre of the cluster with the most connections).



⁵ Owners are represented by (blue) squares, firms by (red) circles

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