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Corporate governance and firm performance within the Russian agri-food sector: does ownership structure matter?

RESEARCH ARTICLE

Alisher Tleubayev[ⓘa], Ihtiyor Bobojonov[b], Taras Gagalyuk[c], Emma García Meca[d] and Thomas Glauben[e]

[a]Research Associate, [b]Senior Researcher, [e]Professor, Department of Agricultural Markets, Marketing and World Agricultural Trade, Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Theodor-Lieser-Strasse 2, 06120 Halle (Saale), Germany

[c]Senior Researcher, Department of Structural Development of Farms and Rural Areas, Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Theodor-Lieser-Strasse 2, 06120 Halle (Saale), Germany

[d]Professor, Accounting and Finance Department, Technical University of Cartagena (UPCT), La Milagrosa, Cartagena, 30202 Murcia, Spain

Abstract

This article provides pioneering empirical evidence on the ownership structure and firm performance relationship for the case of corporate agri-food companies in Russia. While Russia plays a vital role in the global agri-food system, its domestic agri-food production is evidently dominated by a small number of corporate enterprises, which are in turn characterized by high ownership concentration. We employ unique panel data obtained from 203 companies for the years between 2012 and 2017. A random effects model was used to analyze the impacts of ownership concentration and ownership identity on the firms' financial performance, measured by return on assets and return on sales. Our results indicate an inverse U-shaped association between ownership concentration and firm performance, with average level of ownership concentration found to be on the descending range of the inverse U-shaped curve. Moreover, we observe a similar quadratic relationship between ownership concentration by government and directors and firm performance. On average, ownership by directors was found to be on the ascending range and below the peak point, suggesting a potential for further performance improvement, while the impact of agroholding ownership was found to be linear and positive.

Keywords: corporate governance, ownership structure, agri-food enterprises, firm performance, Russia
JEL code: M14, Q12, Q13

ⓘCorresponding author: tleubayev@iamo.de

1. Introduction

Russia is one of the world's primary agricultural producers and plays a crucial role in global food security. It is one of the largest global producers of agricultural commodities, such as wheat, barley, sunflower seeds, potatoes, milk, eggs and poultry. Russia is also one of the largest exporters of crops like sunflower seeds, wheat and barley worldwide (USDA, 2018a; Uzun *et al.*, 2019). Moreover, Russia still has enormous potential to boost its agricultural production further and increase the volume and diversity of its exported products. It possesses a huge area of agricultural land of more than 200 million ha and has a supportive climate for agriculture, with its high levels of rainfall and abundance of chernozem (black earth) soil (FAO, 2001, 2017). In addition to its favorable natural conditions, the Russian government is increasingly supporting its domestic agri-food production, with an ultimate aim of expanding the list of exported agri-food products (Wegren *et al.*, 2019). On the one hand, the government has been supporting local production through extensive agricultural subsidization programs. On the other hand, they have been protecting local producers from international competition by restricting agricultural imports through various instruments like import taxes, non-tariff barriers and even an import ban, which was introduced in August 2014 against a number of western countries (Bobojonov *et al.*, 2016; Liefert *et al.*, 2019).

Nowadays, agricultural production in Russia is evidently dominated by large-scale corporate farms (Davydova and Franks, 2015). While the share of corporate farms in the structure of gross agricultural production decreased during the first decade after the collapse of the Soviet Union, this trend has reversed since the end of 1990s (Wegren, 2018). As a result, the share of corporate farms in total agricultural production has increased by around 36%, from 40.4% in 1998 to 55.1% in 2018 (Supplementary Figure S1).

Russian agriculture can be characterized not only by the dominance of corporate farms, but also by a high level of concentration of agri-food production in the hands of a small number of large-scale corporate farms. For instance, 12.6 million ha of land, or 10.5% of all cultivated land in Russia, is operated by 55 of the largest agri-food companies (BEFL Agency, 2018). A similar situation is observed in the meat and dairy sectors. While the top 25 companies account for almost half (46%) of the total meat production in the country (Agroinvestor, 2018b), around 60% of all pork (62%) and poultry (58%) are produced by the top 20 and the top 10 largest companies, respectively (Agroinvestor, 2018a; USDA, 2018b). In the dairy industry, the top 20 companies produce almost 10% of all raw milk, whereas around 55% of milk is processed by the top 50 companies (Dairynews, 2018a,b).

Moreover, the Russian corporate system in general is represented by high levels of ownership concentration. According to Iwasaki *et al.* (2018), in 2015, for approximately 60% of the corporate companies in Russia, the ownership stakes of the largest shareholders exceeded 50%. Russian agri-food production is therefore dominated by a small number of large-scale corporate farms, which in turn are controlled by very few shareholders. The sustainability of such a model, whereby the agri-food production is dominated by relatively small number of large-scale corporate farms, which in turn are characterized by highly concentrated ownership, is under question (Deininger and Byerlee, 2012; Hermans *et al.*, 2017). Financial insolvencies by such key players might put the national as well as the global food security at risk. In fact, around 22% of all bankruptcy cases in Russian agriculture are accounted for by corporate farms (Yastrebova, 2005). It is therefore vital to understand the extent to which the level of ownership concentration in corporate farms affects their financial performance. Moreover, it is also vital to identify whether the ownership identity of the largest shareholders also matters or not, i.e. whether certain types of shareholders are more efficient in taking control of their companies or not. Identifying how ownership structure could contribute to the success of Russian agri-food enterprises is also important for state policy, private investments and other important decisions that might potentially impact the development of the sector. In this study, we focus primarily on three types of ownership identities[1] that seem to be most relevant in the Russian context (Davydova and

[1] The ownership structure of Russian agri-food enterprises is not limited to these three ownership types. There are also agri-food firms owned by other types of shareholders, such as individuals, financial companies and other private entities. However, in this study we specifically focus on state, managerial and agroholding owned companies.

Franks, 2015; Iwasaki *et al.*, 2018): managerial ownership, state ownership and business group (agroholding) ownership, each one representing an ownership identity and ownership share of the largest shareholder.

Indeed there are studies in the corporate governance literature that investigate the relationship between ownership structure and firm performance (e.g. Balsmeier and Czarnitzki, 2017; García-Meca and Sánchez-Ballesta, 2011b). However, these works focus mainly on developed economies with well-functioning corporate governance systems (Kumar and Zattoni, 2019). In the case of a transition country like Russia, such studies are scarce (e.g. Filatotchev *et al.*, 2001). In addition, almost all of the previous research use data from publicly listed companies, making the results of their analyses representative of only a certain share of firms that are active on the stock markets (Balsmeier and Czarnitzki, 2017). Moreover, to the best of our knowledge, studies that focus primarily on agri-food companies are non-existent. Even in the case of non-agri-food enterprises, the corporate governance literature on the relationship between ownership structure and performance is not conclusive. Previous research provides contradicting results, especially in the case of ownership concentration.

While some researchers observe a positive linear relation between ownership concentration and firm performance (Lee, 2008; Nguyen *et al.*, 2015), others find a negative linear connection (Lepore *et al*., 2017; Setia-Atmaja, 2009), and yet others reveal a non-linear relationship (Balsmeier and Czarnitzki, 2017; García-Meca and Sánchez-Ballesta, 2011b). In any of the cases, the nature of the relationship cannot be *a priori* theoretically predicted (Sánchez-Ballesta and García-Meca, 2007) and is dependent on a particular empirical context. Therefore, one should probably consider the ownership structure-performance nexus as a matter of empirical research.

This article aims to fill several gaps in the literature: first of all, we provide new empirical evidence to rather ambiguous literature on the relationship between ownership structure and firm performance. Secondly, we expand the literature beyond developed countries with well-settled corporate governance systems and concentrate on a former communist transition country, Russia, which has a short history of a market economy and comparatively less developed corporate governance (Li *et al.*, 2012). In addition, Russia is one of the largest agri-food producers in the world, and plays a vital role in the global food security, which makes this research even more relevant. Lastly, we provide a pioneering study in the context of large-scale corporate agri-food production, which plays an important role in the domestic food security of Russia.

The remainder of the paper is organized as follows: Section 2 provides a conceptual framework and reviews the literature on the ownership structure and firm performance relationship. Methodology and data employed in this study are then described in Section 3, which is followed by the description and discussion of the empirical results in Section 4. Finally, the concluding remarks are presented in Section 5.

2. Review of literature and hypothesis development

The subject of ownership structure and its impact on firm performance has been widely debated among scholars for decades and remains an important research agenda today (Iwasaki and Mizobata, 2019). There is a general consensus among researchers that ownership structure, in the form of ownership concentration and ownership identity, might have a significant effect on firm performance. Nevertheless, the nature of this relationship remains unclear, with prior literature suggesting rather mixed results on the matter. While some scholars reveal the link between ownership structure and performance as positive, others find a negative association and yet others observe a more complex, non-linear relationship (Table 1).

Agency theory is the main underlying theory that is widely used in the existing literature for explaining the nexus between ownership concentration and firm performance (Paniagua *et al.*, 2018). According to this theory, low ownership concentration is associated with the principal-agent problem, a conflict between the shareholders (principals) and managers (agents) of the company (Berle and Means, 1932; Jensen and Meckling, 1976). Agency conflict arises when managers pursue desires and goals different from the

shareholders' (i.e. profit maximization) and therefore do not represent their best interests, as it is difficult and burdensome for the shareholders to verify what the managers are actually doing (Eisenhardt, 1989). The smaller the ownership shares of the largest shareholders, the less capable they are of having proper control over management (Balsmeier and Czarnitzki, 2017).

In contrast, if the ownership shares of the largest shareholders are big enough, they would have both sufficient incentives and the ability to monitor and discipline management, thereby minimizing the agency costs (Shleifer and Vishny, 1986, 1997). Based on the argument that higher ownership shares lead to better monitoring of the managers and lower the agency related costs, one might expect a positive link between ownership concentration and performance. Indeed, such a positive relationship is observed in a number of empirical studies (Alimehmeti and Paletta, 2012; Lee, 2008). However, whilst alleviating the agency conflict between shareholders and managers, concentrated ownership may lead to the principal-principal problem, a conflict between the controlling and minority shareholders. In companies with concentrated ownership, controlling shareholders may act on their own benefits at the cost of the minority shareholders (expropriation hypothesis) (Barclay and Holderness, 1989; Claessens *et al.*, 2000) or take part in potentially inefficient activities (Morck *et al.*, 1988), thereby hindering the overall performance of the firm. Such risks might be even more exacerbated in transition countries with less developed institutions and relatively weak external control mechanisms (La Porta *et al.*, 1999). Companies with concentrated ownership are also less capable in raising new capital, since they have to rely only on the resources of the controlling shareholder (Wang and Shailer, 2015) and hence these companies may miss important investment opportunities (Balsmeier and Czarnitzki, 2017). They may also face higher costs of capital for raising external finance, due to high risk premiums resulting from the potentially high risk of expropriation by controlling shareholders (Carney and Gedajlovic, 2002). These negative effects of concentrated ownership may as well hinder firm performance. A number of empirical studies (Lepore *et al.*, 2017; Setia-Atmaja, 2009) reveal a negative impact of ownership concentration on firm performance. The literature therefore suggests two opposing theoretical predictions on the relationship between ownership concentration and firm performance.

Nevertheless, recent literature has frequently observed a non-linear relation between ownership concentration and performance (Balsmeier and Czarnitzki, 2017; García-Meca and Sánchez-Ballesta, 2011b). The studies argue that the impact of concentrated ownership on firm performance might not be straightforwardly positive or negative, but rather a combination of both, with a true nature of the effect being dependent on the actual level of ownership concentration. Up to a certain critical point, increased ownership concentration might positively impact firm performance due to a better monitoring of management and the resulting reduction in agency costs (Berle and Means, 1932; Jensen and Meckling, 1976). However, after this critical point, the benefits of improved monitoring might be offset by the negative effects of concentrated ownership (i.e. expropriation of minority shareholders, missed investment opportunities, etc.), thereby hindering the overall firm performance (Machek and Kubíček, 2018). This concept is supported by a number of empirical studies. Thomsen and Pedersen (2000) analyzed the data of 435 of the largest European companies and observed a bell-shape link between ownership concentration and financial performance. Another study by Balsmeier and Czarnitzki (2017) revealed an inverted U-shaped relationship between ownership concentration and performance in the case of the firms from a number of Central and Eastern European transition countries. Similar quadratic relationships were observed in the case of Korean (Lee, 2008), Chinese (Gul *et al.*, 2010), Spanish (García-Meca and Sánchez-Ballesta, 2011b) and Czech (Machek and Kubíček, 2018) listed companies. Taking into account the above-mentioned findings, we expect to observe a similar non-linear relationship between ownership concentration and performance in the case of this sample of Russian agri-food enterprises. We therefore propose the following hypothesis:

H1: There is an inverted U-shaped association between ownership concentration and firm performance.

Another important component of ownership structure that could potentially impact firm performance is ownership identity (Kumar and Zattoni, 2019). In the context of the agency problem, it is not only important how much equity a controlling shareholder owns, but also who the controlling shareholder is – an individual,

Table 1. Overview of the literature on the relationship between ownership structure and firm performance.

Reference	Ownership structure	Performance[1]	Data (No. of firms, country, year)	Observed relationship
Machek and Kubíček (2018)	ownership concentration	ROA, ROE	3,810 non-agri-food firms, Czech Republic (2007-2015)	inverted U-shape
Lepore *et al.* (2017)	ownership concentration	Tobin's Q, ROA, ROS	565 non-agri-food firms, France, Germany (2013)	negative
Nakano and Nguyen (2013)	ownership identity (foreign own)	Tobin's Q, ROA	198, non-agri-food firms, Japan (1998-2011)	positive
Alfaraih *et al.* (2012)	ownership identity (state own)	Tobin's Q, ROA	134 non-agri-food firms, Kuweit (2010)	negative
Alimehmeti and Paletta (2012)	ownership concentration	ROA	200 non-agri-food firms, Italy (2006-2009)	positive
Fauzi and Locke (2012)	ownership identity (managerial own)	ROA	79 non-agri-food firms, New Zealand (2007-2011)	positive
García-Meca and Sánchez-Ballesta (2011b)	ownership concentration	Tobin's Q	76 non-agri-food firms, Spain (1999-2002)	inverted U-shape
Hahlbrock and Hockmann (2011)	ownership identity (agroholding own)	total factor productivity	76 agri-food firms, Russia (2001-2007)	positive
Le and Chizema (2011)	ownership identity (state own.)	Tobin's Q, ROA, ROS	1,205 non-agri-food firms, China (2004-2005)	positive
Hockmann *et al.* (2009)	ownership identity (agroholding own.)	labor productivity	268 agri-food firms, Russia (2001-2003)	no relation
Setia-Atmaja (2009)	ownership concentration	Tobin's Q	316 non-agri-food firms, Australia (2000-2005)	negative
Lee (2008)	ownership concentration	Tobin's Q, ROA	579 non-agri-food firms, South Korea (2000-2006)	inverted U-shape
Bonardo *et al.* (2007)	ownership identity (managerial own.)	ROA, ROE	66 non-agri-food firms, Italy (1995-1999)	inverted U-shape
Hockmann *et al.* (2005)	ownership identity (agroholding own.)	economic efficiency	100 agri-food firms, Russia (2001-2003)	negative
Anderson and Reeb (2003)	ownership identity (family own.)	Tobin's Q, ROA	500, non-agri-food firms, USA (1992)	positive
Lins (2003)	ownership identity (managerial own.)	Tobin's Q	1,433 non-agri-food firms, 18 emerging countries	negative
Sun *et al.* (2002)	ownership identity (state own.)	Tobin's Q, ROE	472 non-agri-food firms, China (1994-1997)	negative

[1] ROA = return on assets; ROE = return on equity; ROS = return on sales.

manager, financial institution, government, business group, etc. Different types of shareholders may have different abilities and incentives to properly monitor management decisions and thereby reduce agency costs (Lee, 2008).

Managerial ownership seems to be the most controversial among different ownership types, since it has contradictory impacts on firm performance. On the one hand, managerial ownership aligns the interests of managers with those of shareholders. Since managers become one of the residual claimants of the income, they have a financial motivation to maximize the profits of the company and thus improve its performance (Jensen and Meckling, 1976). On the other hand, managerial ownership may engender entrenchment of managers, a situation when managers might use their ownership control to extract the corporate resources

for their private benefits (Lins, 2003; Morck *et al.*, 1988). Moreover, manager-owned companies may face financing constraints, since they cannot take advantage of equity financing and have to rely on debt only as a source of finances (Thomsen and Pedersen, 2000). The overall impact of managerial ownership on performance therefore depends on which of the two effects interest alignment versus managerial entrenchment prevails. Up to a certain level of managerial ownership, an interest alignment effect may endure, which may significantly improve firm performance. However, if managerial ownership exceeds this level, managerial entrenchment may result, thereby offsetting the positive effects of interest alignment and hindering firm performance. Based on these arguments, we propose that, in the case of this sample of Russian agri-food firms, performance might be a non-linear function of managerial ownership. This leads us to the following hypothesis:

H2a: There is an inverted U-shaped association between managerial ownership and performance.

There is much more unanimity among researchers about the impact of state ownership on firm performance. Government ownership is generally regarded as inefficient, mainly because bureaucrats responsible for the governance of state-owned companies face a lack of financial incentives, since they do not have any claims in residual income (Vickers and Yarrow, 1991). State firms also have high levels of bureaucracy, which are viewed as significantly slowing down the decision making process and hindering the overall performance of a company (Sun *et al.*, 2002). In addition, politicians may interfere in the governance of state firms (Shleifer and Vishny, 1994) and may dictate their own conditions regarding key issues like price policies, human resources policies, etc. (Krueger, 1990; Shapiro and Willig, 1990). Moreover, government enterprises are more prone to the so-called 'soft budget constraint' syndrome, introduced by Kornai (1986). State companies may not be motivated enough to generate profit, since there is always a third party in the face of the government who can provide financial support in the case of company losses. This is especially true in the case of the Russian agri-food sector, where some of the large enterprises might play significant roles for the national food security – and therefore they're considered 'too big to fail'. On the other hand, since governments are generally relatively wealthy, state-owned companies have relative advantages in issues such as access to credit, liquidity and cost of capital (Thomsen and Pedersen, 2000). Previous literature predominantly suggests that there is a negative relationship between state ownership and firm performance. Nevertheless, we expect that this might not be true in the case of Russian agri-food companies and propose that certain levels of state ownership may actually improve performance. The Russian agri-food sector is highly subsidized, and under current institutional settings in the country, one could expect that, due to their political connections, state-owned firms may have better access to government subsidies. They may also have better chances of obtaining different types of government support, such as winning public tenders, obtaining various permissions, certificates, etc. Based on the pervious literature and above arguments, we therefore hypothesize that:

H2b: There is an inverted U-shaped association between state ownership and performance.

Business groups are another type of shareholders that can potentially affect firm performance. In the context of Russian agri-food industry, such business groups are known as agroholdings and they generally hold considerable ownership shares in member companies (Matyukha, 2017). They are also typically connected with their member firms through business ties, e.g. via vertical and/or horizontal integration (Davydova and Franks, 2015). Business groups therefore have both incentives and the potential to take an active role in the corporate governance of their affiliates (Iwasaki *et al.*, 2018). Furthermore, members of the business groups can benefit from the intra-group transfer of technology and have access to internal capital, labor and trade markets (Belenzon *et al.*, 2013; Wan, 2005). These benefits are even more pronounced in transition economies with relatively under-developed factor markets and institutions (Toulan, 2002). Matyukha *et al.* (2015) name the deficiencies in the institutional settings and market infrastructures as one of the key reasons for the existence and further evolution of agroholdings in Russia. Moreover, with the help of modern technologies, agroholdings are able to minimize the monitoring costs of the hired labor and sustain increasing returns to scale (Gagalyuk, 2017). One of the main drawbacks of business groups are the difficulties in coordination,

potential for unfair intra-group distribution of resources and manipulation of transfer prices in favor of the controlling shareholders (Holmes *et al.*, 2018). Existing literature on agroholdings is still immature, with empirical studies providing rather mixed results on the effects of agroholding affiliation on firm performance. Hahlbrock and Hockmann (2011) have studied the effects of agroholding membership on farm efficiency in the Belgorod region of Russia, and revealed that, on average, affiliated farms perform better in terms of efficiency compared to non-affiliated farms. On the other hand, a similar study by Hockmann *et al.* (2005) revealed that agroholding members have lower economic efficiency compared to independent farms. Based on the contradicting empirical evidence, we propose that agroholding ownership, similar to managerial and state ownership, might have a non-linear impact on the performances of this sample of Russian agri-food firms. We therefore hypothesize that:

H2c: There is an inverted U-shaped association between agroholding ownership and performance.

3. Methods and data

3.1 Model

Our baseline regression model is expressed as follows:

$$Firm\ performance = \alpha_0 + \alpha_1\ Ownership\ structure + \alpha_2\ Control\ variables + \varepsilon \quad (1)$$

Fixed effects and random effects are the two models that are most widely used in the context of panel data analysis. Using random effects models is relevant when the data represents a sub-sample of the population (Greene, 2012) and if there is a low variation in the explanatory variables over time (Wooldridge, 2002), as is the case with ownership variables. Therefore, the nature of the data used in this study suggests that a random effects model is more suitable for our analysis. In order to use a random effects model, the assumption of no correlation between the individual effects and explanatory variables should be held (Wooldridge, 2002). We used the Hausman test to check the validity of this assumption. The Hausman test could not reject the null hypothesis of 'no significant correlation between individual effects and regressors', even at the 10% significance level, pointing to the appropriateness of the random effects model for our data.

De Hoyos and Sarafidis (2006) argue that panel-data models are likely to encounter an issue of cross-sectional dependence in the error terms. Such likelihood is especially high for panels where the number of time periods is smaller than the number of cross-sectional observations. To overcome this issue, we re-ran our model using Driscoll-Kraay robust standard errors suggested by Hoechle (2007). In addition to the cross-sectional dependence, Driscoll-Kraay standard errors are also robust to heteroscedasticity and autocorrelation (Hoechle, 2007).

One of the potential issues that can arise when studying the relationship between ownership structure and performance is the presence of endogeneity, in which case the OLS regression might lead to biased results. To account for potential endogeneity, we follow the studies of Carter *et al.* (2003), Campbell and Mínguez-Vera (2008), and Marinova *et al.* (2016) and employ a two-stage least squares (2SLS) method. Running a 2SLS model requires an instrumental variable that is correlated with ownership structure but does not correlate with an error term. However, most variables that correlate with ownership structure are other governance factors that are already included in the model. This makes the finding of a valid instrument, especially in the framework of corporate governance, a very difficult task (Adams and Ferreira, 2009). Faced with such an issue, we follow the studies by Caramanis and Lennox (2008) and García-Meca and Sánchez-Ballesta (2011a) and treat the first lags of the ownership structure variables as instrumental variables. Firm performance, ownership structure and control variables used in this study are described in Table 2 and explained in detail in the following sub-section.

Table 2. Variables and descriptions.

Variables	Description
Panel A: dependent variables	
Return on assets (ROA)	net income / total assets
Return on sales (ROS)	net income / sales
Panel B: explanatory variables	
CR1	percentage of shares held by the largest shareholder
CR3	percentage of shares held by largest three shareholders
SHARE_DIR	percentage of shares held by the largest shareholder, if the largest shareholder is an executive director
SHARE_GOV	percentage of shares held by the largest shareholder, if the largest shareholder is the state
SHARE_AGHL	percentage of shares held by the largest shareholder, if the largest shareholder is an agroholding
Panel C: control variables	
Board characteristics	
BSIZE	the total number of directors in the boardroom
BOD_IND	percentage of independent directors in the boardroom
BOD_DIV	percentage of female directors in the boardroom
Firm characteristics	
FAGE	the number of years since the firm was first registered by the state
FSIZE	natural logarithm of the firm's total assets
LEVERAGE	total debt / total assets

3.2 Variables

■ *Firm performance*

The literature suggests two main measures of firm performance: market-value-based indicators (e.g. Tobin's Q) and accounting-based-indicators (e.g. return on assets, return on sales). Due to the unavailability of market-based variables for our sample, this study focuses only on accounting-based ratios. For the robustness of regression results, we employ two measures of performance: return on assets (ROA) and return on sales (ROS). Both measures are widely used in the corporate governance literature as a proxy for firm performance (Adams and Ferreira, 2009; Liu *et al.*, 2014).

■ *Ownership structure*

Ownership structure is composed of two different components: ownership concentration and ownership identity. In line with the previous studies (Lee, 2008; Nguyen *et al.*, 2015), we define the ownership concentration as the percentage of shares owned by the largest shareholder (CR1) and the percentage of shares owned by the three largest shareholders (CR3).

Ownership identity is represented by three different shareholder types that seem to be most relevant in the Russian context (Davydova and Franks, 2015; Iwasaki *et al.*, 2018), namely: managerial ownership (SHARE_DIR), state ownership (SHARE_GOV) and agroholding ownership (SHARE_AGHL).

■ *Control variables*

Besides ownership structure, firm performance can also be explained by other factors. We control for such factors and include board- and firm-level characteristics in our regression model.

At the board level, we control for the board size (Yermack, 1996), measured as a total number of directors (BSIZE); board independence (Black and Kim, 2012), measured by the percentage of independent directors (BOD_IND); and board diversity (Liu *et al.*, 2014), indicated by the percentage of female directors (BOD_DIV) in the boardroom.

With respect to firm-level characteristics, we control for firm size (FSIZE), measured by the natural logarithm of the total assets (Marinova *et al.*, 2016); firm age (FAGE), measured by the number of years since the company was first officially registered by the state (Reddy *et al.*, 2008); and leverage (LEVERAGE), measured as a ratio of total debts to total assets (Schorr and Lips, 2019).

3.3 Data

The empirical analysis in this study is based on a unique panel data of 203 corporate agri-food companies in Russia for the years between 2012 and 2017. All the enterprises in the sample are involved in the production and/or processing of agri-food products and represent a sub-sample of the entire agri-food production of Russia. The sample was selected using the convenience sample technique, which implies the research sample to be selected based on its ease of availability and accessibility (Etikan *et al.*, 2016; Henry, 1990). Due to the unavailability of publicly accessible data for most of Russia's corporate agri-food enterprises, our sample therefore includes only those companies for which the data on the variables of interest were publicly available.

The main sources of data are the quarterly and annual reports as well as the financial statements of the companies that were obtained from the publicly accessible database of the 'Interfax-Corporate Information Disclosure Center (CIDC)'[2] agency. Interfax-CIDC is one of the five Russian agencies that are authorized to disclose information on the country's securities market. Using these reports and statements, we manually collected a large array of variables, including the ownership stakes and identities of the largest shareholders, the size and composition of the corporate boardrooms and the companies' financial figures, among others.

Descriptive statistics of the key variables used in the study are reported in Table 3. On average, companies in the sample have a high ownership concentration, with the top-1 (CR1) and the top-3 (CR3) largest shareholders possessing approximately 61 and 77% of all ownership stakes, respectively. Among the top-1 largest shareholders are agroholdings (SHARE_AGHL), executive directors (SHARE_DIR) and the state (SHARE_GOV), with the ownership stakes on average being around 23, 19 and 4%, respectively. In addition to already high levels, ownership concentration has been steadily growing since 2012. From 2012 to 2017, both CR1 and CR3 have increased by nearly 8 and 4%, respectively (Figure 1).

Among the top-1 shareholders, the ownership stakes of the agroholdings also increased substantially from 2012 to 2017, by nearly 14%, whereas the ownership stake of the government dropped by almost 37% within the same time period (Figure 2).

On average, a boardroom in our sample consists of six directors, of which about 51 and 29% are independent directors and female directors, respectively (Table 3). Furthermore, on average, a firm in the sample is 16 years old, has total assets of 2.3 billion Rubles (approximately 35.7 million US$), and a debt-to-asset ratio of around 47% (Table 3). The average values of the return on assets and return on sales are 4.7 and 5.8% respectively (Table 3). Both indicators have experienced a substantial growth from 2012 to 2015, with ROA and ROS rising by around 133 and 94%, respectively. However, since 2015, those figures have been sharply decreasing and in just two years they returned back to the levels of 2012 (Figure 3).

Another thing to mention is that the companies' sizes, both in terms of average total assets and total sales, have skyrocketed from 2012 to 2017. While total assets of the companies grew by nearly 68%, total sales rose by about 80% during the mentioned time period (Figure 4).

[2] Available at: https://www.e-disclosure.ru/ (in Russian)

Table 3. Descriptive statistics of key variables.

Variables[1]	Obs	Mean (%)	Std.[2]	Min.	Max.
ROA	1,218	4.7	0.1	-0.85	0.84
ROS	1,218	5.75	0.27	-2.26	2.93
CR1	1,218	61	0.27	0.06	1
CR3	1,218	76.8	0.21	0.06	1
SHARE_DIR	1,218	18.38	0.28	0	1
SHARE_GOV	1,218	3.84	0.18	0	1
SHARE_AGHL	1,218	23.45	0.36	0	1
BSIZE	1,218	6	1.68	3	15
BOD_IND	1,218	50.8	0.38	0	1.8
BOD_DIV	1,218	29.27	0.22	0	1
FAGE	1,218	16	6.16	0	25
FSIZE	1,218	12.92	1.57	7.25	18.87
LEVERAGE	1,218	47.4	0.31	0.006	1.83

[1] A description of the variables can be found in Table 2.

[2] Std. = standard deviation.

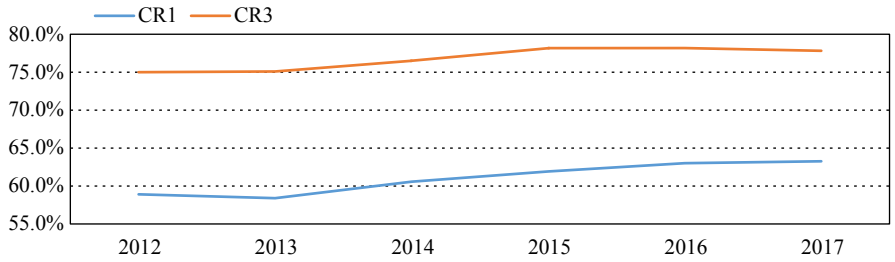

Figure 1. Ownership stakes of the largest (CR1) and three largest (CR3) shareholders.

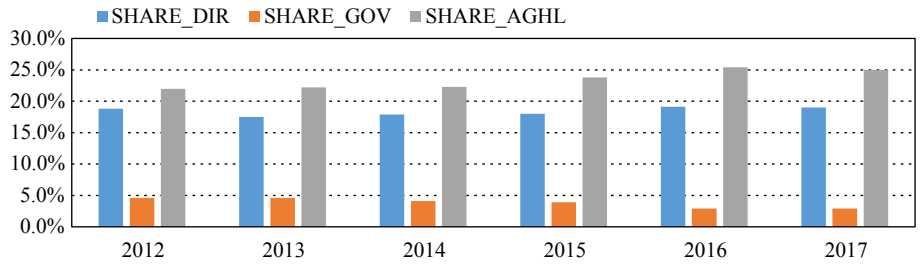

Figure 2. Ownership stakes and identities of the largest shareholders.

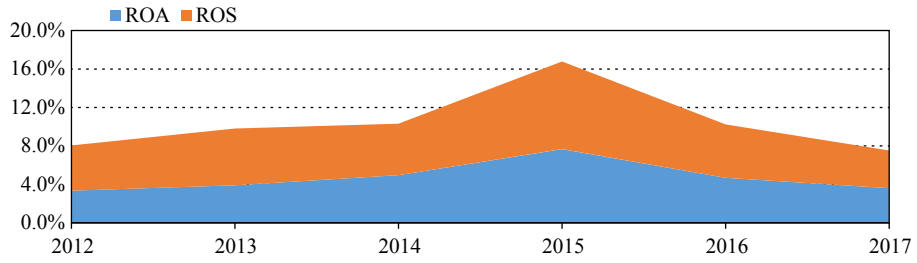

Figure 3. Return on assets (ROA) and return on sales (ROS) dynamics.

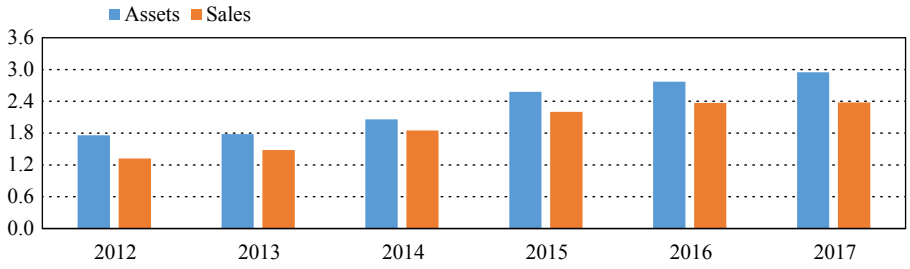

Figure 4. Total assets and total sales dynamics (billion Rubles).

To test for the potential presence of multicollinearity in the model, we estimated the correlations among all independent variables (Supplementary Table S1). The rule of thumb suggests a multicollinearity problem if variables, in their absolute terms, are correlated with a coefficient of 0.7 or above (Liu *et al.*, 2014). The highest correlation (0.74) within our correlation matrix is observed between CR1 and CR3. However, this high correlation level is not an issue, since CR1 and CR3 are two alternative measures for ownership concentration and therefore are not simultaneously used in the model.

4. Results and discussion

Table 4 illustrates the results of the random effects (RE) regression with ROA and ROS as dependent variables. We observe a significant quadratic (inverse U-shaped) relationship between ownership concentration (CR1) and both the ROA and ROS, with the turning points being around 50%. Below this turning point, a 1% growth in the ownership concentration (CR1) increases the ROA and ROS by 0.13 and 0.35% respectively. However, after the peak point of about 50%[3], ownership concentration has an opposite effect, with a 1% increase in CR1 leading to a decrease in ROA and ROS by 0.13 and 0.35% respectively. The results are robust and similar for CR3, an alternative measure of the ownership concentration, which also exhibits an inverse U-shaped relationship with a turning point of almost 59%. This result may be interpreted as

[3] The turning points of the quadratic relationship are identified using the 'utest' STATA command suggested by Lind and Mehlum (2019). The same test also supported the statistical significance of a non-linear relationship between ownership concentration and performance variables at a 5% confidence level.

Table 4. The impact of ownership concentration on firm performance, random effects model.[1]

Variables[2]	ROA model 1	ROA model 2	ROS model 3	ROS model 4
CR1	0.1325* (0.0694)		0.3544* (0.1833)	
CR1_sqr	-0.1331** (0.0562)		-0.3485** (0.1482)	
CR3		0.1725** (0.0859)		0.3876* (0.2280)
CR3_sqr		-0.1474** (0.0643)		-0.3382** (0.1706)
BSIZE	-0.0043* (0.0023)	-0.0034 (0.0023)	-0.0012 (0.0061)	0.0007 (0.0060)
BOD_IND	0.0239** (0.0097)	0.0231** (0.0098)	0.0713*** (0.0256)	0.0686*** (0.0258)
BOD_DIV	0.0479*** (0.0153)	0.0482*** (0.0154)	0.0897** (0.0407)	0.0911** (0.0409)
FAGE	-0.0009 (0.0006)	-0.0008 (0.0006)	-0.0031** (0.0016)	-0.003* (0.0016)
FSIZE	0.0122*** (0.0025)	0.0115*** (0.0025)	0.0420*** (0.0066)	0.0407*** (0.0066)
LEVERAGE	-0.1409*** (0.0123)	-0.1401*** (0.0124)	-0.2301*** (0.0323)	-0.2276*** (0.0326)
_cons	-0.0516 (0.0416)	-0.0674 (0.0464)	-0.4428*** (0.1085)	-0.4618*** (0.1218)
R-squared	0.2008	0.1962	0.1333	0.1292
Extreme points	0.4975	0.585	0.5085	0.5731

[1] *** = $P<0.01$; ** = $P<0.05$; * = $P<0.1$; ROA = return on assets; ROS = return on sales; standard errors in parentheses.

[2] A description of the variables can be found in Table 2.

evidence for a classical principal-agent problem. The ability and willingness of controlling shareholders to monitor and discipline the company management increases together with increased ownership share in the company. This reduces the agency conflict and related costs and has a positive impact on firm performance. However, an inverse U-shaped relationship suggests that firm performance is worsened when ownership concentration becomes too high. Balsmeier and Czarnitzki (2017) argue that low firm performance at high levels of ownership concentration illustrates high private benefits of control and weak investor protection systems, which may lead to an exploitation of minority shareholders. In this respect, on the one hand, it might be the case that controlling shareholders face high private benefits of control and do not want to share these benefits with potential investors. As a result, firms loose potential sources of external capital and therefore miss important investment opportunities, which reflects negatively on their performance. On the other hand, poor legal systems in general and weak investor protection rights in particular might result in an exploitation of the minority shareholders, which may in turn have a negative influence on overall firm performance. The average level of CR1 in our sample is nearly 61%, which is higher than the turning point and lays on the descending range of the inverted U-shape. Moreover, we observe an increasing trend in the levels of ownership concentration from 2012 onwards (Figure 1). This means that, on average, corporate agri-food companies in Russia are performing below their potential. As argued above, this might be the result of forgone investment opportunities and exploitation of the minority shareholders. In this regard, corporate management and ownership of Russian agri-food enterprises should consider bringing the ownership concentration levels to the optimum range of around 50%. This would allow firms to raise new investments, which they could use to finance new projects or modernize their existing activities. It might also considerably reduce the exploitation of minority shareholders. Taken together, these factors may have a positive impact on performance and substantially improve the production potential of the Russian agri-food industry. This concerns not only domestic but global food security as well, since Russia plays a crucial role in the world's agri-food market. Moreover, the results of this study might be interesting for Russian policy makers. In particular, they may want to consider developing programs that could incentivize the reduction of ownership concentration levels among the agri-food companies. In this regard, it would be extremely important that the government undertakes measures for improving the investor protection system in the country.

To overcome the issue of cross-sectional dependence in the error terms, we re-ran our model using the Driscoll-Kraay robust standard errors suggested by Hoechle (2007) (Supplementary Table S2). The results suggest that statistical significance of an inverse U-shaped relationship between ownership concentration (both CR1 and CR3) and performance (both ROA and ROS) is robust to the cross-sectional dependence.

Supplementary Table S2 also presents the results of a 2SLS regression, which accounts for the potential endogeneity in the model. Overall, the results of the 2SLS analysis are similar to those of the RE model, with an exception that the relationship between CR3 and ROS is not significant in the former case.

With regard to control variables, we detect a strong positive link between board independence (BOD_IND), board diversity (BOD_DIV) and firm performance (both ROA and ROS) (Table 4). The positive impact of board independence on performance is generally recognized within the corporate governance literature (Black and Kim, 2012; Dahya and McConnell, 2007). Furthermore, many countries, through their corporate governance codes, recommend that a certain portion of the corporate boards be composed of independent directors. In the case of Russia, the national corporate governance code advises that at least one-third of the corporate boards should be represented by independent directors (EBRD, 2014). The mean value of almost 51% of the BOD_IND suggests that, on average, Russian agri-food companies follow the recommendations advised by their national corporate governance code.

While there is less unanimity among researchers on the nature of the relationship between board gender diversity and performance, a growing body of literature emphasizes the importance of gender diverse boardrooms on overall firm performance (Liu *et al.*, 2014; Tleubayev *et al.*, 2019). Many European countries are encouraging greater female representation in the corporate boardrooms, with some countries like Norway,

Belgium and the Netherlands even imposing affirmative action, like certain quotas for female directors (Marinova *et al.*, 2016).

The ratio of total debt to total assets (LEVERAGE) has a strong negative impact on both ROA and ROS (Table 4). Additional monitoring provided by the debt issuers might be a substitute for poor corporate governance, which in turn might positively impact firm performance (Lopez-Valeiras *et al.*, 2016). On the other hand, González (2013) suggests that if the cost of debt is too high, it might outweigh the positive effects of any additional monitoring by debt issuers, therefore having an overall negative impact on performance. Relatively high costs of debt in Russia, compared to developed economies, might be one of the possible reasons why we observed a negative effect of leverage on performance.

Apart from ownership concentration, the identities of the largest shareholders might also impact a firm's performance. Indeed, we observe statistically significant relationships between ownership concentration distinguished by different types of shareholders (executive directors, government and agroholdings) and performance variables (Table 5).

The results of the RE model illustrated in Table 5 suggest a significant non-linear association between ownership concentration in the hands of the SHARE_DIR and firm performance (both ROA and ROS). Ownership by SHARE_DIR first increases the firm performance, with each additional percentage owned by this type of shareholders leading to an increase in the levels of ROA and ROS by 0.08 and 0.29%, respectively. This effect can be explained by the interest alignment hypothesis, which suggests that managerial ownership improves the financial incentives of managers to maximize firm performance, since managers become the residual claimants of the company income (Jensen and Meckling, 1976). However, after the certain extreme point, managers might abuse their ownership control and extract the corporate resources for their personal benefits, which could ultimately outweigh the benefits of the interest alignment effect (Lins, 2003; Morck *et al.*, 1988). In our case, the extreme point was found to be around 34 and 38% for ROA and ROS, respectively (Table 5). After this turning point, the previous positive relationship reverses, with each 1% increase in the SHARE_DIR leading to a 0.11 and 0.38% decrease in ROA and ROS, respectively. These results are also robust to the cross-sectional dependence and endogeneity (Supplementary Table S3 and S4). An average SHARE_DIR in our sample is around 18%, which is significantly below the turning point of 34%. This suggests that, on average, Russian agri-food companies can still benefit from the interest alignment effect of managerial ownership. Company owners can therefore consider allocating certain shares of their stocks for their management, in the framework of various bonus or compensation options. This could potentially improve the financial performance of the firms and increase the shareholder values.

Concentrated ownership in the hands of the government has a similar, non-linear impact on one of the performance variables, ROA, with the turning point being around 39% (Table 5). Below this peak point, a 1% increase in government ownership (SHARE_GOV) increases the ROA by 0.22%. However, after the extreme point of 39%, each additional percentage increase in the SHARE_GOV decreases the ROA by 0.28%. The relationship is not significant in the case of the ROS, another indicator of the firm performance. Supplementary Table S3 and S4 indicate that the earlier mentioned results are also robust to the cross-sectional dependence and endogeneity. In spite of a general unanimity among academics on the negative impact of state ownership on firm performance (e.g. Sun *et al.*, 2002), our results suggest that, at least up to a certain extreme point, government ownership might actually improve firm performance. At this point, it is worth remembering that the Russian agri-food sector is massively supported by the government (Wegren *et al.*, 2019). Taking into account high levels of corruption in Russia (Weill, 2011), one could assume that firms connected to the state have higher chances of receiving government subsidies and other types of government support (i.e. winning public tenders, obtaining various permissions, certificates, etc. This could partially explain the positive effect of up to 39% of government ownership on the performance of the agri-food companies in our sample. An average state ownership (around 4%) is substantially below the observed peak point.

Table 5. The impact of ownership identity on firm performance, random effects model.[1]

Variables[2]	Quadratic			Linear
	model 1	model 2	model 3	model 4
ROA				
SHARE_DIR	0.08* (0.04)			
SHARE_DIR_sqr	-0.11** (0.05)			
SHARE_GOV		0.22** (0.10)		
SHARE_GOV_sqr		-0.28** (0.11)		
SHARE_AGHL			0.05 (0.05)	0.02** (0.01)
SHARE_AGHL_sqr			-0.02 (0.05)	
FAGE	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)
FSIZE	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.00*** (0.00)
LEVERAGE	-0.14*** (0.01)	-0.14*** (0.01)	-0.14*** (0.01)	-0.15*** (0.01)
BSIZE	-0.00* (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)
BOD_IND	0.02** (0.01)	0.02** (0.01)	0.03*** (0.01)	0.03*** (0.01)
BOD_DIV	0.05*** (0.01)	0.05*** (0.01)	0.05*** (0.02)	0.05*** (0.02)
_cons	-0.02 (0.04)	-0.01 (0.04)	0.01 (0.04)	-0.01 (0.04)
R-squared	0.2	0.20	0.19	0.19
Extreme point	0.34	0.39		
ROS				
SHARE_DIR	0.29** (0.11)			
SHARE_DIR_sqr	-0.38*** (0.14)			
SHARE_GOV		0.03 (0.27)		
SHARE_GOV_sqr		-0.18 (0.29)		
SHARE_AGHL			0.03 (0.13)	0.06** (0.03)
SHARE_AGHL_sqr			0.03 (0.14)	
FAGE	-.00** (0.00)	-0.00** (0.00)	-0.00** (0.00)	-0.00** (0.00)
FSIZE	0.04*** (0.00)	0.04*** (0.00)	0.03*** (0.00)	0.03*** (0.01)
LEVERAGE	-0.23*** (0.03)	-0.24*** (0.03)	-0.23*** (0.03)	-0.23*** (0.03)
BSIZE	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
BOD_IND	0.07** (0.03)	0.06** (0.03)	0.07*** (0.02)	0.07*** (0.02)
BOD_DIV	0.09** (0.04)	0.10** (0.04)	0.10** (0.04)	0.10** (0.04)
_cons	-0.36*** (0.09)	-0.33*** (0.09)	-0.31*** (0.10)	-0.31*** (0.10)
R-squared	0.13	0.13	0.13	0.13
Extreme point	0.38			

[1] *** = $P<0.01$; ** = $P<0.05$; * = $P<0.1$; ROA = return on assets; ROS = return on sales; standard errors in parentheses.

[2] A description of the variables can be found in Table 2.

Coming to our last ownership identity variable, ownership concentration by agroholdings (SHARE_AGHL), we could not observe any significant quadratic relationship between the SHARE_AGHL and performance (Table 5). Instead, the results of the regression analysis illustrate a statistically significant and positive linear impact of the SHARE_AGHL on both the ROA and ROS. Agroholdings seem to be more efficient owners, with a 1% increase in the SHARE_AGHL leading to 0.02 and 0.06% increase in the levels of the ROA and ROS, respectively. The results are robust to the cross-sectional dependence and endogeneity (Supplementary Table S3 and S4).

Financial efficiency of agroholding affiliates over stand-alone firms might be explained by the following factors: agroholdings are well equipped with storage facilities (Gagalyuk *et al.*, 2018); have better access to outside capital (Matyukha *et al.*, 2015); can benefit from the within-group transfer of technology and have an access to intra-group capital, labor and trade markets (Belenzon *et al.*, 2013; Wan, 2005). In addition, most

of the agroholdings are vertically integrated, thereby having an access to raw commodities supply at lower transaction costs (Hermans *et al.*, 2017). Indeed, an empirical study by Hahlbrock and Hockmann (2011) suggests that agroholding affiliated farms in Russia have higher adoption of new technologies and therefore are more efficient compared to independent farms. Moreover, Russian agroholdings operate in the most favorable regions in terms of both agro-climatic and logistics conditions (FAO, 2009; Rada *et al.*, 2017), which gives them comparative advantages over stand-alone firms. They are also mainly export-oriented companies (Liefert *et al.*, 2013), which enables them to get higher commodity prices. Furthermore, Matyukha *et al.* (2015) argue that the opportunity of connecting individual production units provides Russian agroholdings with a strong positioning in local and regional markets. Discussions on the efficiency of agroholdings and whether agroholdings would remain as a model for the organization of agricultural production are still ongoing (Gagalyuk and Valentinov, 2019; Hermans *et al.*, 2017; Matyukha *et al.*, 2015). Nevertheless, the results of this study illustrate that, at least among the large-scale corporate farms of Russia, agroholding affiliated farms perform better in terms of financial performance compared to stand-alone farms. We therefore support the findings of Matyukha *et al.* (2015), and also assume that agroholdings will probably remain as one of the dominant business forms for agricultural production in Russia.

Although this work provides a number of contributions to the literature, it certainly has several limitations which should be addressed by future studies. Firstly, our sample selection was data-driven, meaning that the sample includes only those companies for which the necessary data was available. Moreover, the sample size of 203 companies is relatively low and may not fully reflect the corporate agri-food sector of the country. These factors may lead to a potential selectivity bias, so future studies should focus on a larger sample. Secondly, in this study we analyze the effects of ownership structure on financial performance. Future research should also consider this relationship in terms of production performance (i.e. productivity and technical efficiency) and firm market value (Tobin's Q).

5. Conclusions

This study contributes to the literature on corporate governance and agribusiness by providing novel empirical evidence on the impact of ownership structure on firm performance in the case of the Russian agri-food sector. We put into question the sustainability of the current structure of agri-food production in Russia, a country which plays an important role in agri-food production worldwide. Today, the bulk of Russia's agri-food production is evidently dominated by a relatively small number of corporate enterprises, which in turn are controlled by very few shareholders. Financial insolvencies by such key producers might put the food security at risk, not only at the national, but also at the global level.

The results of this study suggest an inversed U-shaped relationship between ownership concentration and performance, with a turning point being at around 50%. This provides evidence for a classical agency problem and suggests that both monitoring and expropriation effects of concentrated ownership are present in the Russian agri-food context. Whichever of these two effects prevail depends on the level of ownership concentration. An average ownership concentration value of 61% among our sample suggests that the Russian agri-food sector is located in the non-optimum ownership concentration region, meaning that these firms are performing below their potential. We propose that a reduction of ownership concentration to an optimum range of around 50% could provide investment opportunities and reduce the exploitation of minority shareholders within Russian agri-food firms, which in turn may have a significant positive impact on their performance. Considering the increasingly important role of Russia in global food security, the results of this study could be of high importance for decision makers, not only at the corporate, but also the government level. Corporate management and ownership should therefore acknowledge the importance of bringing ownership concentration levels to an optimum range. At this point, they could perhaps consider attracting new investors by opening up the sale of certain shares of company stocks. They could thereby reduce ownership concentration levels and introduce new investment opportunities to their firms. In addition to the corporate sector, policy makers at the government level may also want to consider developing measures that could potentially stimulate the reduction of ownership concentration levels in agri-food companies. In

this respect, undertaking actions for the improvement of the investor protection system should perhaps be an inalienable part of these measures.

We also observe similar, non-linear relationships between the ownership concentrations in the hands of the executive directors and the government and firm performance. In both cases, the average values of the ownership concentration are far below the peak points. This suggests that Russian agri-food companies can benefit from the distribution of a certain number of their stocks to the executive directors.

Lastly, the ownership concentration by agroholdings has a strong positive, linear impact on performance. Agroholdings are relatively new and rapidly emerging models for the organization of agri-food production in Russia, particularly because of their role as a substitute for the poor institutional setting and market infrastructure in the country. Discussions on the superiority of agroholdings as a model for the organization of agri-food production and on the future existence of agroholdings in Russia are still ongoing. Nevertheless, based on the current evidence, agroholding affiliates seem to have better performance compared to independent companies. In this regard, further, more in-depth research is needed to allow us to understand which particular attributes of agroholding affiliated firms make them better performers compared to stand-alone firms.

Supplementary material

Supplementary material can be found online at https://doi.org/10.22434/IFAMR2019.0184

Figure S1. The share of corporate farms in the structure of the gross agricultural production in Russia from 1990 to 2018.
Table S1. Correlation matrix of independent variables.
Table S2. The impact of ownership concent ration on firm performance.
Table S3. The impact of ownership identity on firm performance, random effects model with Driscoll-Kraay robust standard errors.
Table S4. The impact of ownership identity on firm performance, two-stage least squares model.

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