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Do agroholdings cope better with the agency problem? Empirical evidence from corporate farms in Russia

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Abstract. The agricultural industry in Russia demonstrated a notable growth since 2010. Russian policymakers strive to further increase agricultural production and set new targets for the industry for the years ahead. While agroholdings are regarded as one of the main driving forces behind the recent success in the agricultural sector, they are also believed to be the main locomotive that will move agriculture towards the set goals. In spite of their growing importance, the literature on agroholdings is still relatively immature and fails to provide clear evidence of their financial efficiency as opposed to non-agroholding farms. The current study utilizes a manually sourced longitudinal dataset of 203 corporate farms in Russia and provides a new empirical evidence on the financial performance of agroholding farms through the prism of an agency problem. Our findings reveal a significant positive relationship between agroholding membership and financial performance, as indicated by two accounting indicators – return on assets (ROA) and return on sales (ROS). We further observe that agroholdings face lower agency costs, which to a certain extent, explain their higher financial performance compared to stand-alone farms. The study offers empirical recommendations for policymakers and corporate executives in the Russian agricultural sector.

Keywords: agroholding, corporate farm, agency cost, farm performance, Russia.
JEL Codes: M14, Q12, Q13.

1. INTRODUCTION

The agri-food industry in Russia has illustrated profound growth over the past few years. Its gross agricultural output jumped more than threefold, from RUB 2.46 trillion in 2010 to RUB 8.56 trillion in 2022 (RosStat, 2022). During the same period, the export of agricultural products skyrocketed by more than five times, from USD 8.1 billion in 2010 to USD 41.6 billion in 2022 (AgroExport, 2023). In the agricultural year of 2021-2022, Russia produced a record amount of almost 150 million tonnes of grain, of which 45

million was exported, maintaining its position as the world's largest grain exporter since 2017 (AgroInvestor, 2023). Substantial progress can also be seen in the production of poultry and pork. Between 2008 and 2017, poultry production increased by over 150%, while pork output nearly doubled (Wegren et al., 2019). Since the dissolution of the Soviet Union, Russia has become one of the world's largest importers of agri-food products. However, over the last decade, the import of agri-food products in Russia has dropped significantly, by around 67%, from USD 43 billion in 2013 (an all-time high since 1990) to nearly USD 30 billion in 2022, thereby narrowing the negative trade balance in agri-food products (WTO, 2023). The substantial fall in the level of agri-food imports was largely caused by the introduction of an import embargo on a list of agri-food products by Russia in August 2014 (Bobojonov et al., 2018). Nowadays, Russia is the largest exporter of wheat and beet pulp and ranks among the top-3 exporters of sunflower oil, peas, oil cake, oil meal, flaxseed, and barley in the world (USDA, 2018a; Uzun et al., 2019). Yet, the Russian government aims to further increase both the volume and variety of exported agri-food products. In 2018, the president of Russia decreed an increase in the export of agri-food products to USD 45 billion and to position Russia among the top exporters of agri-food products globally (Petukhov, 2018). To achieve these ambitious goals, the Russian government introduced a national program for the development of agriculture for 2013-2020, with a total budget of RUB 2.28 trillion (USD 76 billion) (USDA, 2012).

It is commonly believed that agroholdings play a major role in the substantial growth of agri-food production in Russia (Ryzhova & Ivanov, 2023). Agroholdings are also considered the driving force for the realization of the ambitious production and export targets set by the government (Liefert & Liefert, 2015; Wegren & Elvestad, 2018). Russian agroholdings represent a significant concentration of agricultural land, resources, and production (Wegren et al., 2023). In 2016, the top-5 agroholdings operated around 3.2 million hectares of agricultural land, the top-20 companies produced nearly half of the total animal feed, and the top-15 companies accounted for 75% of all grain exports (Wegren, 2018). A similar pattern can be observed in the meat industry, with nearly half of the country's meat being produced by the top-25 companies (Agroinvestor, 2018b), and approximately 60% of all pork and poultry production accounted for by the top-20 and top-10 companies, respectively (Agroinvestor, 2018a; USDA, 2018b). Furthermore, agroholdings wield significant economic power, with less than a quarter of farms accounting for 93% of all profits (Wegren, 2018).

As policymakers primarily rely on agroholdings for the realization of the set targets, they have been the main recipients of financial support from the government (Wegren & Elvestad, 2018). For instance, in 2015, only 248 large agri-food farms (1.2% out of the total number), including agroholdings, received over 40% of all subsidies (Uzun et al., 2019). In addition to substantial state support, agroholdings attract significant financial investments from both local and international investors. From 2012 to 2016 alone, the Russian agri-food industry received over USD 3 billion of overseas and approximately RUB 1 trillion of local investments, with most of these investments going to agroholdings (Wegren, 2018).

Despite the significant growth and increasing role of Russian agroholdings in domestic agri-food production, the existing literature on agroholdings is still in its infancy and has certain gaps to be filled (Matyukha et al., 2015; Visser et al., 2014). First, most of the existing research on agroholdings focuses on their production efficiency (e.g., Hahlbrock & Hockmann, 2011), with studies concentrating on the financial performance of agroholdings being virtually non-existent. It is worth mentioning that corporate farms in Russia are highly vulnerable to financial insolvency, with around 25% of all bankruptcy cases in the country resulting from corporate farms (Yastrebova, 2015). Understanding the financial efficiency of agroholdings is therefore crucial, especially in light of their significant, often "too big to fail," roles in the agri-food sector of Russia. Second, while prior research attempts to identify the production efficiency of agroholdings, it is still not clear which specific attributes and capabilities make agroholdings more efficient compared to other forms of agri-food production. To the best of the authors' knowledge, this study is a pioneering attempt to understand the financial efficiency of agroholdings through the lens of the agency problem. An agency problem is a conflict of interest between the principals (shareholders) and agents (managers) of an enterprise. A situation of agency conflict may arise due to diverging goals between the shareholder and the manager, or because it is difficult and costly for the shareholder to control and monitor the manager's actions (Berle & Means, 1932; Eisenhardt, 1989; Jensen & Meckling, 1976). Consequently, this may result in ineffective and inadequate management of companies, which could then negatively impact the company's financial performance. The remainder of the paper is organized as follows: Section 2 provides a theoretical framework and an overview of the literature on agroholdings and their efficiency. Section 3 describes the methodology and data employed in the study. This is followed by Sec-

tion 4, where the results of our empirical analysis are presented and discussed. Finally, we present our concluding remarks in Section 5.

2. THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

Agroholdings are specific types of business groups in agriculture that are unique to post-communist countries like Kazakhstan, Russia, and Ukraine (KRU). They began to emerge in the KRU countries in the 2000s and have been growing considerably since then (Rada et al., 2017; Ryzhova & Ivanov, 2023; Visser et al., 2014). Although there is no formal definition of agroholdings, there is a consensus in the existing literature that an agroholding is a conglomerate of legally autonomous enterprises, which may include agricultural producers, processors, service providers, and other entities involved in agriculture. The holding company maintains control of the group through ownership of a controlling block of shares (Matyukha et al., 2015; Spoor et al., 2012; Uzun et al., 2021). In this study, we attempt to investigate agroholdings through the lens of an agency problem. An agency problem is a conflict of interest between the shareholders (principals) and managers (agents) of a company, which is regarded as one of the main drawbacks of corporate farms, compared to traditional family farms (Hermans et al., 2017). In a family farm setting, there is no separation of ownership and control, and the farms are operated and managed by their owners. This alignment incentivizes managers to work more efficiently, as they are also the owners and thus the residual claimants of the generated revenue. Conversely, corporate farms are managed by hired managers, who are not the residual claimants of the profits and therefore have less incentive to maximize farm income (Hermans et al., 2017). Such a misalignment of interests between owners and managers can lead to agency conflicts (Chaddad & Valentinov, 2017; Valentinov et al., 2015).

Agency conflicts are common in all corporate farms. However, the extent of the agency problem and related costs might differ from one corporate farm to another. One of the main factors that can enhance a corporate farm's ability to cope with and minimize potential agency conflicts is the use of advanced and complex management and monitoring technologies. These technologies include performance evaluation systems, incentive compensation programs, formal control mechanisms, and digitized accounting and budgeting systems, among others (Chaddad & Valentinov, 2017). In comparison to stand-alone corporate farms, agroholdings have better access to resources, both external and internal within the group, which allows them to afford expensive, modern management and monitoring techniques and to implement the best international practices for enhancing their corporate governance mechanisms. Indeed, Hermans et al. (2017) and Petrick (2017) argue that agroholdings employ stimulating performance evaluation systems and offer incentive-based compensation programs. Agroholdings also utilize contemporary management practices and advanced technology for monitoring and supervising their workforce and production processes (Balmann et al., 2015; Liefert et al., 2013). Furthermore, Gagalyuk & Kovalova (2024) note an increasing adoption of digital technologies by agroholdings, which enhances their production and organizational performance.

Additionally, companies with concentrated ownership structures are believed to have lower agency costs, due to the ability and willingness of large blockholders to more effectively monitor and control the companies' management (Shleifer & Vishny, 1997; Wang & Shailer, 2015). The data used in this study shows considerably higher levels of ownership concentration in agroholding affiliates, with the ownership stake of the largest shareholders averaging 74% as opposed to only 56% in unaffiliated farms.

Therefore, agroholding affiliates may be better at minimizing their agency costs compared to stand-alone farms. If agroholding members do indeed face lower agency-related costs, then it is reasonable to expect them to demonstrate better financial performance.

Nonetheless, prior empirical research indicates both positive and negative impacts of agroholding membership on performance (Lefebvre, 2023; Matyukha et al., 2015; Tleubayev et al., 2022; Visser et al., 2014).

One group of researchers has found that agroholding members have performance advantages over nonmember farms. Examples of these advantages for agroholding members in Russia include higher land and labor productivity (Rylko et al., 2008) and greater scale efficiency (Hahlbrock & Hockmann, 2011), compared to other forms of agri-food production. Furthermore, Hahlbrock and Hockmann (2011) note that agroholding affiliates also demonstrate higher total factor productivity due to better implementation of contemporary technology. Epshtein et al. (2013) report similar findings, revealing that agroholding members achieve better efficiency thanks to their higher use of the latest production technology and strong corporate control mechanisms. Another advantage of agroholdings is the existence of internal trade markets that decrease dependence on external suppliers, lower price uncertainties, and significantly reduce transaction costs (Hockmann et al., 2011). Moreover,

the vertical and/or horizontal integration of agroholdings allows their affiliates to benefit from economies of scope and to gain a significant economic advantage over non-affiliated farms (Davydova & Franks, 2015). Lastly, Tleubayev et al. (2022) observe that agroholding members show higher technical efficiency. They argue that the agroholding model of agri-food production provides better access to essential resources, such as within-group machinery, equipment, and capital markets, making holding farms more technically efficient.

Another group of scholars finds a negative relationship between agroholding membership and performance or does not find any significant relationship. For example, Hockmann et al. (2005) analyzed 100 large-scale farms in the Belgorod region of Russia and observed lower levels of efficiency among agroholdings despite their higher use of up-to-date production technology. Similar findings were reported by Hockmann et al. (2009) in the case of the Oryol and Belgorod regions of Russia. Lower levels of production efficiency were also observed among grain-producing holdings in Russia. Although agroholdings had more investments and technology and used substantially higher levels of fertilizers, the holding farms did not show significantly higher levels of grain yield (Uzun et al., 2012). A subsequent investigation by Matyukha et al. (2015) also failed to find evidence of economic advantages for agroholding members compared to independent farms. Lastly, studies by Gataulina et al. (2014) and Guriev & Rachinsky (2004) also did not find any significant difference in average productivity levels between agroholding affiliates and non-affiliated farms.

3. METHODOLOGY AND DATA

3.1. Models and variables

Baseline regression model:

$$y_{it} = \alpha_{it} + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \beta_6 x_{6it} + \beta_7 x_{7it} + \varepsilon_{it} \quad (1)$$

In this model, $\boldsymbol{y}$ represents the financial performance of farms, measured by return on assets (ROA) and return on sales (ROS). Existing research suggests two broader categories of indicators for measuring enterprise performance: indicators based on market value (e.g., Tobin's Q) and accounting-based indicators (e.g., return on assets). Since the market value-based measures for the farms used in this study are not publicly available, we focus on two widely used accounting-based indicators to measure farm performance: return on assets (ROA) and return on sales (ROS) (Adams & Ferreira, 2009; Ehrhardt et al., 2003; Liu et al., 2014).

$\boldsymbol{x_1}$ is the independent variable representing agroholding membership. Unfortunately, there is still no formally specified definition for agroholdings. However, there is a consensus among researchers that agroholdings are certain types of business groups in the agri-food sector, consisting of several legally autonomous farms, with controlling stakes in the ownership shares of these farms owned by a holding company (Hermans et al., 2017; Visser et al., 2012). In this study, we adhere to the above consensus and consider a farm a member of an agroholding if over 50% of the ownership shares of that farm are owned by a holding enterprise.

In addition to agroholding membership, which is the main explanatory variable in our model, we also control for a number of board ($\boldsymbol{x_2}$...$\boldsymbol{x_4}$) and farm specific variables ($\boldsymbol{x_5}$...$\boldsymbol{x_7}$).

As per board characteristics, we control for the number of directors on the board ($\boldsymbol{x_2}$) (e.g. Yermack, 1996), the share of independent directors on the board ($\boldsymbol{x_3}$) (e.g. Black & Kim, 2012) and gender diversity on the board ($\boldsymbol{x_4}$) (e.g. Terjesen et al., 2016).

As per farm specific characteristics, we control for farm age ($\boldsymbol{x_5}$) (e.g. Reddy et al., 2008), farm size ($\boldsymbol{x_6}$) (e.g. Debrah & Adanu, 2022), and leverage, the ratio of total debts to total assets ($\boldsymbol{x_7}$) (e.g. García-Meca & Sánchez-Ballesta, 2011).

Extended regression model:

$$y_{it} = \alpha_{it} + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \beta_6 x_{6it} + \beta_7 x_{7it} + \beta_8 x_{8it} + \beta_9 x_{9it} + \varepsilon_{it} \quad (2)$$

In the extended model, we consider the possibility that agroholding members might face lower agency costs, which may potentially result to their higher financial performance, compared to non-agroholding farms. In this model, $\boldsymbol{x_8}$ is an agency cost variable and $\boldsymbol{x_9}$ is an interaction term between agroholding affiliation and agency cost. We measure the agency cost, using two widely used proxies for enterprise level agency costs: operating expense ratio *(OER)* and asset turnover ratio *(ATO)* (e.g. Rashid, 2015; Singh & Davidson III, 2003). The other variables are the same as those specified in Model (1).

Table 1 illustrates the farm performance, agroholding affiliation and other control variables employed in this research.

3.2. Robustness tests

We conduct standard tests to come up with the model that is most suitable for the longitudinal data

Table 1. Variables and descriptions.

Variables	Description
Panel A: Dependent variables	
ROA	Net Income / Total Assets
ROS	Net Income / Sales
Panel B: Explanatory variables	
AGRH_MEM	Dummy variable, which is equal to 1 if more than 50% of the farm is owned by a holding company and 0 otherwise
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
Farm characteristics	
FAGE	The number of years since the farm was first registered by the state
FSIZE	Natural logarithm of the farm's total assets
LEVERAGE	Total debt / total assets
Agency cost	
OER	Operating expenses / Sales
ATO	Sales / Assets

Source: compiled by authors.

under study. While the F-test, the Breusch-Pagan Lagrangian multiplier test (Appendices 2 and 3 respectively) illustrate the significance of fixed and random effects, the results of the Hausman test suggest the significance of random effects over the fixed effects (Appendix 4). Hausman test fails to reject the null hypothesis that the random effects model is consistent and more efficient than the fixed effects model. Hence, in this study we employ a random effects model to conduct the regression analyses.

Conducting a regression analysis with longitudinal data where the number of cross-sectional observations (N) are higher that the number of time-periods (T) may lead to a potential issue of cross-sectional dependence in the error terms (De Hoyos & Sarafidis, 2006). To control for such a potential issue, we also run our baseline model using the Driscoll-Kray (DK) robust standard errors, as suggested by (Hoechle, 2007). In addition to cross-sectional dependence in the error terms, the Driscoll-Kray (DK) robust standard errors also control for potential heteroscedasticity and autocorrelation in the model (Hoechle, 2007).

Endogeneity is another problem that may potentially distort the results of the analysis. Based on prior research (Campbell & Mínguez-Vera, 2008; Doan et al., 2023; Marinova et al., 2016), we control for potential endogeneity in the model by employing the 2SLS (two-stage least squares) method. In a 2SLS model, we use the first lag of the explanatory variable as an instrumental variable, as suggested by Caramanis & Lennox (2008) and García-Meca & Sánchez-Ballesta (2011).

3.3. Data

Current research utilizes a manually sourced longitudinal dataset of 203 corporate farms from 27 administrative regions in Russia for the years from 2012 to 2017. The sample was chosen through the convenience sampling method, where availability and accessibility are the criteria for the selection of the research sample (Etikan, 2016; Henry, 1990). Because longitudinal data for the majority of Russia's corporate farms are not publicly accessible, our sample consists of 203 corporate farms for which panel data for the variables of interest was publicly available.

The data on the variables of interest was sourced from the quarterly and annual reports, as well as the financial statements of those farms. The document sources are publicly accessible through the portal of the "Interfax - Corporate Information Disclosure Center (CIDC)[1]", which is the agency authorized to release public information on the Russian securities market.

Descriptive statistics of the main variables utilized in this research are described in Table 2. The average

[1] https://www.e-disclosure.ru/

Table 2. Descriptive statistics of key variables.

Variables	Obs	Mean	Std	Min	Max
ROA	1218	4.7%	0.1	-0.85	0.84
ROS	1218	5.75%	0.27	-2.26	2.93
AGRH_MEM	1218	27.7%	0.45	0	1
BSIZE	1218	6	1.68	3	15
BOD_IND	1218	50.8%	0.38	0	1.8
BOD_DIV	1218	29.27%	0.22	0	1
FAGE	1218	16	6.16	0	25
FSIZE	1218	12.92	1.57	7.25	18.87
LEVERAGE	1218	47.4%	0.31	0.006	1.83

Source: compiled by authors.

agroholding affiliation among the sampled farms is 28%. Board of directors, on average, consists of six members. Furthermore, around half of the boardrooms are composed of independent directors and female directors represent less than a third of the boards. Average farm in this sample is 16 years old and has a size in terms of total assets of around RUB 2.3 billion. The average ratio of total debt to total assets is about 47%. Lastly, performance indicators such as return on assets *(ROA)* and return on sales are *(ROS)* 4.7% and 5.75%, respectively.

4. RESULTS AND DISCUSSIONS

We begin our analysis with the comparison of the average performance variables of agroholding members versus stand-alone farms. Table 3 presents the results of the standard z-test. In terms of both performance measures (*ROA* and *ROS*), agroholding affiliates demostrate better performance, compared to non-member farms. The *ROA* and *ROS* of agroholding members are higher by 1.3% and 4.9% respectively, than those for non-agroholding farms. The differences in both measures are statistically significant at 5% significance level.

We continue our analysis by running the random effects (RE) regression model with *ROA* and *ROS* as dependent variables and a dummy for agroholding affiliation *(AGRH_MEM)* as the main explanatory variable. The first and the second columns of table 4 present the results of the RE model. The results suggest a significant positive effect of agroholding affiliation *(AGRH_MEM)* on farm performance (both *ROA* and *ROS*). Similar with the results of the z-test, agroholding affiliation has a stronger effect on *ROS*, compared to *ROA*. Agroholding affiliates illustrate *ROA* and *ROS* that are by 2.6% and 4% higher compared to stand-alone enterprises, respectively. These results are also robust to potential cross-sectional dependence (Table 4: columns 3 and 4) and potential endogeneity (Table 4: columns 5 and 6).

While the results of z-test and random effects model reveal better financial performance of agroholding affiliated farms, it is also important to explore what exact characteristics of agroholding affiliates make them financially better off. As mentioned earlier in the paper, we expect that the level of agency cost might to a certain degree, explain the performance differences between agroholding and non-agroholding farms. To test this hypothesis, we proceed to the next step of our analysis and compare the average levels of agency costs between agroholding affiliates and independent companies. As suggested by prior studies (Rashid, 2015; Singh & Davidson III, 2003), we employ two most widely used proxies for measuring company level agency costs: operating expense ratio *(OER)* and asset turnover ratio *(ATO)*. Table 5 illustrates the results of this comparison.

The results exhibit a significantly higher agency cost, measured in terms of operating expense ratio *(OER)*, by independent farms (19.23%), as opposed to agroholding members (18.18%). Differences in agency costs, measured in terms of asset turnover *(ATO)*, are found to be statistically insignificant, hence in our further analyses we proceed with only operating expense ratio *(OER)* as a measure for agency cost variable *(AG_COST)*.

Having revealed that agroholding members have lower agency costs, we test for the robustness of this result and extend our baseline regression model by including the interaction term *(AGHR_MEMxAG_COST)* between the agroholding affiliation variable *(AGRH_MEM)* and the agency cost variable *(AG_COST)*. Table 6 presents the results of this extended model (2).

Agency cost *(AG_COST)* appears to have a significant negative impact on both *ROA* and *ROS*. At the same time, the estimates of the interaction term variable *(AGHR_MEMxAG_COST)* are found to be significantly positive, both for *ROA* (0.44) and for *ROS* (0.87). This suggests that the negative effects of the agency cost on farm performance are significantly lower for agroholding members, compared to stand-alone farms. While a point increase in the agency costs of independent farms leads to a decrease in their *ROA* and *ROS* by 0.93 and 2.24 points respectively, a similar increase in the agency costs of agroholding members leads to only 0.49 and 1.37 points decrease in the levels of their *ROA* and *ROS,* respectively. This implies that agroholding members perform better in dealing with the agency conflict, compared to unaffiliated farms. Hence, the agency problem can be regarded as one of the main matters that can to a certain degree, explain the better financial performance

Table 3. Averages of performance variables, agroholding affiliates VS independent farms.

Performance variables	Whole sample	Agroholding affiliates	Independent farms	Difference	Z-score
Return on assets (ROA)	4.7%	5.6%	4.3%	1.3%	2.25**
Return on sales (ROS)	5.7%	9.3%	4.4%	4.9%	3.33***

*** p<0.01, ** p<0.05, * p<0.1.
Z-scores are calculated using the methodology suggested by Paternoster et al. (1998).
Source: compiled by authors.

Table 4. The impact of agroholding affiliation on farm performance (standard errors in parentheses).

Variables	Random Effects (RE)		DK robust standard errors		2SLS	
	(1) ROA	(2) ROS	(3) ROA	(4) ROS	(5) ROA	(6) ROS
AGHR_MEM	0.026*** (0.008)	0.040* (0.023)	0.026* (0.012)	0.040** (0.013)	0.034** (0.016)	0.084** (0.042)
FAGE	-0.001 (0.001)	-0.003** (0.002)	-0.001 (0.001)	-0.003** (0.001)	-0.001 (0.001)	-0.003** (0.002)
FSIZE	0.008*** (0.003)	0.035*** (0.007)	0.008 (0.005)	0.035*** (0.008)	0.008** (0.003)	0.03*** (0.008)
LEVERAGE	-0.143*** (0.013)	-0.234*** (0.033)	-0.143*** (0.011)	-0.234*** (0.029)	-0.143*** (0.013)	-0.232*** (0.033)
BSIZE	-0.002 (0.002)	0.004(0.006)	-0.002 (0.002)	0.004 (0.006)	-0.002 (0.002)	0.005 (0.006)
BOD_IND	0.025** (0.009)	0.073*** (0.026)	0.025 (0.014)	0.073** (0.027)	0.026** (0.009)	0.075*** (0.026)
BOD_DIV	0.053*** (0.016)	0.099** (0.041)	0.053*** (0.012)	0.099*** (0.019)	0.053*** (0.016)	0.104** (0.041)
_cons	-0.000 (0.038)	-0.326*** (0.098)	-0.000 (0.085)	-0.326* (0.128)	0.006 (0.039)	-0.29*** (0.103)
R-squared	0.189	0.125	0.189	0.125	0.186	0.120

*** p<0.01, ** p<0.05, * p<0.1.
Source: compiled by authors.

Table 5. Averages of agency cost variables, agroholding affiliates VS independent farms.

Agency cost variables	Whole sample	Agroholding members	Independent farms	Difference	Z-score
Operating expense ratio (OER)	18.94%	18.18%	19.23%	1.05%	3.46***
Asset turnover (ATO)	113%	116%	112%	4%	0.61

*** p<0.01, ** p<0.05, * p<0.1.
Operating expense ratio (OER) = Operating expenses / Sales.
Asset turnover ratio (ATO) = Sales / Assets.
Source: compiled by authors.

of agroholding affiliates. Several factors might provide potential explanations for this.

To begin with, agroholdings tend to use stimulating performance evaluation systems and offer attractive compensation contracts to their employees, including the top executive management (Hermans et al., 2017; Petrick, 2017) . Knowing that their efforts actually count and that their income depends on the farm performance, managers would be more likely to work hard for the good of the farm. Moreover, when managers receive attractive compensation, they tend to better value their position and try not to risk their top posts in the company. It is therefore less likely that such managers would engage in the expropriation of farm assets for their own benefit, putting personal interests above the interests of the company and its shareholders (Florackis, 2008; Sajid et al., 2012).

In addition, the increasing use of digital technologies by agroholdings enhance their production and organizational performance (Gagalyuk & Kovalova, 2024).

They also tend to implement modern management practices and advanced technology to monitor and supervise their workforce, including the top executive management (Hermans et al., 2017; Liefert et al., 2013). These practices of agroholdings decrease the agency costs related with the supervision of the hired labor and manage-

Table 6. The impact of agroholding affiliationand agency cost on farm performance (standard errors in parentheses).

Variables	Random Effects (RE)	
	(3) ROA	(4) ROS
AG_COST	-0.9314*** (0.1595)	-2.2374*** (0.4099)
AGHR_MEM	0.1036*** (0.0311)	0.1912** (0.0808)
AGHR_MEMxAG_COST	0.4431*** (0.1659)	0.8664** (0.4298)
FAGE	-0.0016*** (0.0006)	-0.0051*** (0.0015)
FSIZE	0.0044* (0.0026)	0.0239*** (0.0063)
LEVERAGE	-0.1248*** (0.0122)	-0.1823*** (0.03)
BSIZE	-0.0018 (0.0022)	0.0044 (0.0053)
BOD_IND	0.026*** (0.0095)	0.075*** (0.0236)
BOD_DIV	0.0531*** (0.0151)	0.1017*** (0.038)
_cons	0.1424*** (0.0393)	0.0704 (0.0961)
R-squared	0.2570	0.2206

*** p<0.01, ** p<0.05, * p<0.1.
Source: compiled by authors.

ment. Finally, yet importantly, agroholdings tend to be the largest shareholders in the ownership structure of their affiliates, holding on average 74% of all shares of their member companies. Such huge ownership shares of agroholdings, give them both power and willingness to control that the managers of their affiliated farms act at the best interest of the company and its shareholders (Shleifer & Vishny, 1997; Wang & Shailer, 2015), thereby minimizing the expropriation risk by managers. All of the above factors decrease the potential conflicts between the principals (shareholders) and agents (managers) of the companies belonging to agroholdings and therefore minimize their agency costs, which in turn leads to a higher financial performance by holding farms.

5. CONCLUSION

Russian agri-food industry exhibited noticeable growth during the last decade. While agroholdings accounted for a major part of this growth, they are also expected to be the driving force for reaching the ambitious future goals set for the industry by the government. Nonetheless, existing literature on agroholdings is still relatively immature and fails to provide clear evidence on financial efficiency of agroholdings as opposed to non-agroholding farms. The current study utilizes unique farm-level data on the Russian corporate agri-food enterprises and provides new empirical evidence on the financial efficiency of agroholding affiliated farms.

Besides its empirical contribution, this research is also one of the first attempts to offer a theoretical explanation for the emergence and growth of agroholdings through the framework of an agency problem. While agency conflicts are common to all corporate farms, this study proposes that agroholdings perform better at minimizing the agency costs, compared to stand-alone farms. This is because agroholdings have better access to both external and internal resources, which allows them to afford modern and advanced management and monitoring techniques, implement best international corporate governance practices, such as performance evaluation systems, incentive compensation programs and other formal control mechanisms. We therefore hypothesize that the lower agency costs faced by agroholdings make them financially better off, as opposed to non-agroholding farms. Indeed, the results of the study indicate that agroholdings have substantially lower agency costs, compared to non-agroholding farms, which translates into to better financial performance (both *ROA* and *ROS*) of the former.

The results of this research could appeal to policy makers, executives and shareholders involved in the agricultural sector in Russia. For policy makers, this study suggests additional evidence that agroholdings may be more suitable for adapting to current institutional and market conditions compared to other types of agricultural producers, and that they could be the main catalyst for pushing the agricultural sector towards its objectives. However, this does not mean that government support should only be focused on agroholdings. Instead, against the backdrop of evidence on agroholdings' financial advantages, policy makers should encourage better access to resources for other forms of agricultural producers. This may include stimulating better access to capital, labor and contemporary management and monitoring techniques, including digital technologies, among others.

For the shareholders and executives of corporate farms, the findings of this research underscore the importance of managerial efficiency and encouragement for farm's financial performance. It is crucial for corporate farms to adopt up-to-date management and monitoring techniques and to introduce stimulating compensation practices that help in aligning management's interests with those of the shareholders, thus minimizing potential agency conflicts.

While this study makes a few contributions to the existing literature, it does have some limitations that should be examined in future research. Firstly, the sample selection in this study was driven by data, including only sample farms with publicly available data. This resulted in the sample consisting of mostly larger-sized corporate farms that the average size of corporate farms in the population. Therefore, it is important to inter-

pret the findings of this research carefully, as they may not apply to a wider population. Future research should focus on a more diverse sample that encompasses the entire population, including relatively smaller corporate farms. Secondly, in this study, we focus only on farm level features for explaining the differences in farm financial performance. Upcoming research may advance by incorporating macro-level factors beyond the influence of individual farms. These may include variables that control for regional differences in weather and climate conditions, as well as differences in agricultural and market infrastructure, among others.

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