OWNERSHIP STRUCTURES AS MODERATORS: HOW THEY AFFECT MANAGEMENT PRACTICES AND FIRM OUTCOMES

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Abstract

This study examines how different management practices affect firm performance, with a particular focus on the moderating role of ownership structures. Utilizing secondary data from the World Management Survey, we analyze the management practices of 2,927 firms across 18 countries over seven years. Our findings suggest that ownership structure significantly moderates the relationship between management practices and firm performance, as measured by return on capital employed (ROCE). Specifically, dispersed shareholder firms benefit the most from good management practices, while state-owned enterprises (SOEs) and private equity firms do not fully capitalize on effective management practices. These results contribute to the ongoing debate on the impact of ownership structures on firm performance and offer insights for both academic research and managerial practice.

Keywords: Ownership Structures, Management Practices, Firm Performance, Corporate Governance, Return on Capital Employed (ROCE), Moderating Effects

Authors' individual contribution: Conceptualization — R.R.; Methodology — R.R. and P.U.; Formal Analysis — R.R.; Writing — R.R. and P.U.

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1. INTRODUCTION

The relationship between management practices and firm performance has been extensively studied, especially since management quality is a critical determinant of firm success. Effective management practices can lead to enhanced productivity, better resource allocation, and improved operational efficiency. However, the role of ownership structure in moderating this relationship remains less understood. Ownership structures can range from dispersed shareholders to family ownership, private equity, and government ownership, each potentially influencing how management practices impact performance. For instance, dispersed ownership might lead to better monitoring and incentivization of management compared to more concentrated forms of ownership such as family ownership or state ownership.

Recent studies have provided new insights into this complex relationship. Boshnak (2023) examined the impact of ownership structures on the performance of Saudi listed firms and found that government, institutional, insider, and foreign ownership positively affect firm performance, while family ownership has a negative impact. Similarly, Alodat et al. (2022) found that in Jordan, foreign and institutional ownerships positively correlate with firm performance, suggesting that these types of ownership bring in better governance practices and resources. These findings are consistent with resource dependence theory and agency theory, which argue that external ownership can provide valuable resources and reduce agency costs.

This study aims to fill the gap by investigating how ownership structures moderate the relationship between management practices and firm performance. We use data from the World Management Survey[1], which provides a robust and comprehensive dataset on management practices across a diverse set of firms and countries.

Our analysis reveals that the impact of management practices on firm performance is significantly moderated by ownership structures. Dispersed shareholder firms exhibit the highest return on capital employed (ROCE) in response to improved management practices, while state-owned and private equity firms show a lesser impact. The interaction effects suggest that the efficacy of management practices is contingent upon the ownership type, highlighting the need for tailored management strategies.

This study contributes to the literature by providing empirical evidence on the moderating role of ownership structures in the relationship between management practices and firm performance. It extends previous research by incorporating a diverse set of ownership types and using panel data analysis to capture temporal dynamics. Additionally, it underscores the importance of considering ownership structures when implementing management strategies.

This study is particularly relevant as it bridges an existing gap in the literature on the interplay between ownership structures and management practices, both of which are crucial in shaping firm performance. Previous research has underscored the importance of governance models in enhancing management efficiency, yet few studies have specifically examined ownership structures as moderators in this relationship (Alodat et al., 2022). Ownership type — whether dispersed shareholders, state ownership, or private equity — can fundamentally impact managerial autonomy, monitoring intensity, and strategic direction, which in turn influence firm outcomes (Bloom et al., 2012). For instance, Alodat et al. (2022) identified that institutional and foreign ownership was associated with better governance and higher firm performance, whereas Bertrand and Schoar (2006) found that family ownership could lead to stronger control but also potential challenges, such as resistance to change. By investigating how these different ownership types affect the relationship between management practices and performance, this research contributes valuable insights for scholars in corporate governance and management, with practical implications for investors and policymakers.

The paper is structured as follows: Section 2 reviews the relevant literature and theoretical framework, Section 3 describes the data and methodology, Section 4 presents the descriptive results, Section 5 discusses the regression analyses, and Section 6 concludes with implications for research and practice.

2. MANAGEMENT PRACTICE, OWNERSHIP, AND FIRM PERFORMANCE

2.1. Literature review

Management practices are widely recognized as critical determinants of firm performance. Effective management can lead to enhanced productivity, better resource allocation, and improved operational efficiency. However, the impact of these practices can vary depending on the ownership structure of the firm. Different ownership types may prioritize distinct goals, resources, and strategies, influencing how management practices are implemented and their subsequent effect on performance. For instance, institutional investors often drive better governance and performance through active monitoring and strategic input, while family-owned firms might struggle with succession issues and resistance to change (Alodat et al., 2022; Boshnak, 2023).

Existing studies have shown mixed results regarding the relationship between ownership structure and firm performance. For example, Bloom et al. (2012) found that firms with professional management practices tend to perform better. However, the influence of ownership structures, such as family-owned versus publicly traded firms, remains contentious. Some studies suggest that family-owned firms benefit from strong managerial control, while others argue that dispersed ownership leads to better managerial incentives and monitoring (Bertrand & Schoar, 2006; La Porta et al., 1999). Additionally, studies on emerging markets, such as those by Sulehri and Ali (2022) in Pakistan, highlight the unique dynamics in different economic contexts, emphasizing the variability in how ownership structures affect firm performance.

Recent research continues to explore these dynamics in diverse contexts. For example, a study on firms listed in Oman's Muscat Securities Market (Queiri et al., 2021) found that institutional ownership positively influences firm performance, while state and concentrated individual ownership has a negative impact. This is consistent with findings from other emerging markets, underscoring the importance of corporate governance and ownership structures in shaping firm outcomes.

Despite the extensive research on management practices and firm performance, the moderating role of ownership structures is not well understood. Specifically, there is a lack of empirical studies that systematically examine how different ownership types influence the effectiveness of management practices on firm performance. This gap is particularly pronounced in the context of emerging markets, where ownership structures and corporate governance mechanisms can differ significantly from those in developed economies.

2.2. Hypotheses development

Dispersed shareholder firms, characterized by a broad base of shareholders with small individual stakes, often exhibit better governance and monitoring practices. This structure tends to reduce agency problems, as the diverse shareholder base

[1] https://worldmanagementsurvey.org/survey-data/download-data/

demands transparency and accountability from management (La Porta et al., 1999). The dispersed ownership allows for a higher level of scrutiny and pressure on management to implement effective practices that enhance firm performance. Empirical studies have shown that firms with dispersed ownership often achieve higher ROCE due to improved management efficiency and strategic decision-making (Bloom et al., 2012). Moreover, dispersed shareholders are less likely to interfere in day-to-day operations, allowing managers to focus on long-term performance goals rather than short-term gains. This aligns with the findings of Alodat et al. (2022), who noted that firms with dispersed ownership structures benefit significantly from professional management practices. Therefore, the first hypothesis is formulated as follows:

H1: Dispersed shareholder firms will exhibit a stronger positive relationship between management practices and ROCE compared to other ownership types.

State-owned enterprises (SOEs) are often subject to political influences and bureaucratic constraints that can hinder their operational efficiency. These entities typically face challenges such as less stringent performance pressures, which can lead to inefficiencies and lower responsiveness to effective management practices (Boshnak, 2023). The dual objectives of SOEs, which include both commercial and social goals, can dilute the focus on profitability and efficient management (Queiri et al., 2021). Furthermore, SOEs often have less flexibility in implementing innovative management practices due to rigid regulatory frameworks. As a result, the positive relationship between management practices and ROCE is generally weaker in SOEs compared to private firms, where market-driven incentives and competitive pressures are more pronounced. This is supported by empirical evidence showing that SOEs struggle to fully capitalize on good management practices, often resulting in suboptimal performance outcomes (Ahn et al., 2013). Therefore, the second hypothesis is developed as follows:

H2: State-owned enterprises will show a weaker positive relationship between management practices and ROCE compared to other ownership types.

Ownership structures play a crucial role in shaping the effectiveness of management practices on firm performance. Different ownership types, such as family-owned, privately held, institutional, and foreign-owned firms, have varying impacts on how management practices influence ROCE (Sulehri & Ali, 2022). Family-owned businesses, for instance, may benefit from strong leadership and long-term orientation but might suffer from nepotism and resistance to change. On the other hand, institutional investors often push for high governance standards and operational efficiency, enhancing the positive impact of management practices on ROCE (Bloom et al., 2014). Foreign-owned firms bring in global best practices and higher managerial expertise, which can significantly improve performance metrics. However, cultural differences and integration challenges might mitigate these benefits (Boshnak, 2023). Therefore, the relationship between management practices and ROCE is not uniform across ownership structures, highlighting the need for a nuanced understanding of how ownership dynamics influence management efficacy (Alodat et al., 2022). This variability underscores the importance of tailoring management strategies to the specific ownership context to maximize firm performance. Therefore, the second hypothesis is presented as follows:

H3: The impact of management practices on ROCE will vary significantly among different ownership structures.

3. DATA AND METHOD

3.1. Source of data

We use secondary data published by the World Management Survey. This has several benefits: a) due to their sampling procedure the data are highly reliable and valid, also exemplified through several highly-ranked publications (Bloom et al., 2012; Bloom et al., 2014; Bloom & van Reenen, 2010); b) the data consist of a large set of firms in 18 countries on various continents and over up to seven years. Creating a dataset comparable in size and depth would not only be very time-consuming but is almost non-researchable.

3.2. Data structure

The original information was collected by applying an interview-based survey method, explained in detail in Bloom and van Reenen (2007). For evaluating management practices, a blind technique was applied, that means that telephone interviews were conducted with senior managers where information about management practices was obtained without informing the interviewee about the evaluation procedure. To ensure the neutrality of the evaluation, a neutral listener additionally evaluated the manager's responses. Responses were coded on a scale with 1 as "worst practice" and up to 5 as "best practice". The management practices are structured into five groups: 1) operations management, 2) performance monitoring, 3) target setting, 4) leadership management and 5) talent management (World Management Survey, n.d.).

Among other information, the dataset includes data on the company's industry (SIC code), country of residence, number of employees, annual turnover and ROCE. Furthermore, the intensity of competition in the business environment was asked for, as well as documented whenever an enterprise of the sample went bankrupt during the observation period. Regarding the interviewed manager, his nationality and academic degree are collected.

In total, the data set contains observations of 2,927 enterprises over up to seven years between 2002 and 2010. In total 7,094 firm-years are available meaning that each enterprise was observed for an average of 2.42 years. The observed entities have ownership structures of dispersed shareholders, family ownership with or without an external chief executive officer (CEO), private equity and government entities.

We utilize *ROCE* as a dependent variable. *ROCE* is calculated from earnings *before interest and tax* (*EBIT*) divided by *capital employed*. As a performance indicator, *ROCE* measures how profitable a company works with the capital it has invested. The *ROCE* ratio is particularly suitable since it is related to another parameter and thus increases comparability and is free of tax and interest effects (Bausch et al., 2011).

Table 1. Coding the data

Coding	*Ownership*	*Firm-years*
DISPERSED	Dispersed shareholders	2.347
OWNER_EXTCEO	Family owned, external CEO	265
OWNER	Family owned, family CEO	1.090
OWNER	Founder	749
GOV	Government	225
OWNER	Managers	267
OTHER	Other	534
PE	Private Equity	285
OWNER	Private Individuals	1.061
OTHER	(Empty)	271
Overall		7.094
Results of re-coding		***Firm-years***
DISPERSED		2.347
OWNER		3.167
OWNER_EXTCEO		265
PE		285
GOV		225
OTHER		805
Overall		7.094

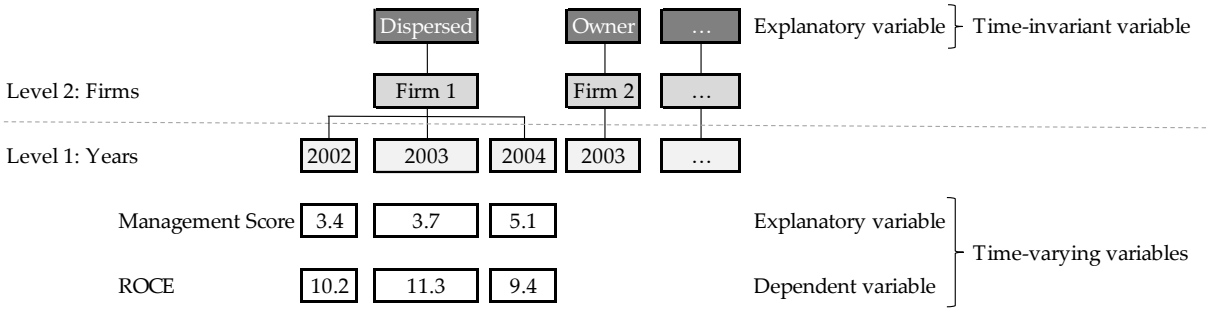
As explanatory variables, we adopt *ownership structure* and *management score*. To ensure adequate processing, the original types of ownership, presented in the second column in Table 1, are aggregated according to the first column (see Table 1). The new variable "*ownership*" is then coded by type as 1) dispersed (*DISPERSED*), 2) owner (*OWNER*), 3) owner external CEO (*OWNER_EXTCEO*), 4) private equity (*PE*), 5) government (*GOV*) and 0) others or NA (*OTHER*).

The explanatory variable "*management score*" represents the result of an explorative factor analysis. The factor analysis aims to aggregate a large number of correlating variables to a small set of latent factors, where each factor explains as much of the variance of the original variable as possible (Bandalos & Finney, 2018).

3.3. Panel data analysis

While the original authors analyzed the data cross-sectionally we decided to exploit the panel structure of the dataset. This allows us to analyze effects over time and firm-specific effects on firm performance. The data structure is schematically depicted in Figure 1.

Figure 1. Schematic data structure



There is a two-level hierarchical data structure with observations (years) at level 1 clustered into level 2 (firms). The dataset has a panel structure where individuals are observed over a certain period (years) and a cross-sectional structure depicting variation between firms This complex data structure has to be considered in the model. The application of a standard linear regression model would not be sufficient as it assumes that there is an independent and identical distribution of the residuals. In other words: The uniqueness of individuals within a group would not be considered. This assumption would be flawed with regard to the temporal hierarchical structure of the data, as these usually show a pronounced dependency over time (Bell & Jones, 2015).

Therefore, a panel model seems more appropriate. Specifically, the data set forms an unbalanced panel, i.e., a partial incompleteness of the values with respect to years and firms. In addition, a panel model is highly efficient in investigating a causal cause-effect relationship including the time component in the sense of before-and-after observations while controlling for unobserved heterogeneity of individuals (Ahn et al., 2013). The effects between or within individuals or groups are referred to as "within" or "between" variations. In this case, "within variation" is related to the variability of management score over time per firm. "Between variation" relates to variation between firms, i.e., related to ownership.

If the influence of an explanatory variable is considered identical for each of the N cross-sectional units, this is called a fixed effects (FE) model. In this case, the coefficient of the explanatory variable is formulated as non-stochastic and identical for all cross-sectional units. If there are random, unsystematic differences between the cross-sectional units in the influence of an explanatory variable, it is called a random effects (RE) model. While the FE modeling is used more frequently in economics and political science and is referred to as the "gold standard" (Schurer & Yong 2012), the RE model increases continually in popularity in various fields of science (Bell & Jones, 2015).

We employ several regressions to analyze the data, where $i = 1, \ldots, N$ individuals (cross-sectional units, i.e., firms) are observed over $t = 1, \ldots, T$ times (time-series, i.e., years).

Regression 1: Ordinary least squares (OLS) with pooled data

$$ROCE_{it} = \beta_0 + \beta_1 Score_{it} + \beta_2 OWNER_i + \beta_3 OWNER\_EXTCEO_i + \beta_4 PE_i + \beta_5 GOV_i + \beta_6 OTHER_i + \varepsilon_i \quad (1)$$

Regression 2: Fixed effects model

$$ROCE_{it} = \beta_1 Score_{it} + a_i + u_{it} \quad (2)$$

where, β_1 signifies the coefficients the coefficient of the explanatory variable $Score_{it}$; α_i signifies the unknown entity-specific and time-invariant error term; u_{it} signifies the error term which is assumed to be uncorrelated with X_{it} (here *Score*). The advantage of FE modelling is that it controls for all time-invariant entity-specific variations.

The difference is the estimation of firm-specific intercepts β_i and given that ownership types are constant over time (fixed) and thus, are excluded from the regression.

Regression 3: Random-effects model

$$ROCE_{it} = \beta_0 + \beta_1 Score_{1it} + \beta_2 OWNER_{2i} + \beta_3 OWNER\_EXTCEO_{3i} + \beta_4 PE_{4i} + \beta_5 GOV_{5i} + \beta_6 OTHER_{6i} + \alpha_i + u_{it} \quad (3)$$

where, β_0 signifies the *y*-intercept; $\beta_1 \ldots \beta_6$ represents the coefficients for each explanatory variable; α_i signifies unknown entity-specific time-invariant error term; u_{it} signifies the error term which varies over the entities and time; both are assumed to be uncorrelated with X_{it}. The advantage of RE modelling is that it estimates the effects of time-invariant variables.

4. DESCRIPTIVE RESULTS

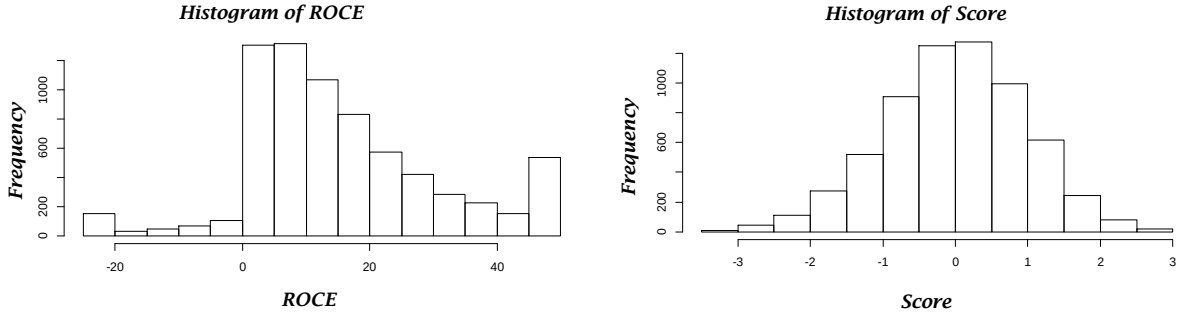
Table 2 presents descriptive statistics for ownership and ROCE.

The average ROCE is 15.50% with a standard deviation of 15.50%. The wide spread of values can be explained by the different industries that the data set combines. However, the majority of values range between 0 and 20% as shown in Figure 2. The sharp dividing line between frequencies below and above zero is striking, but the reasons for that are unknown to the authors. There is a difference of 2.68% between the mean (15.50%) and the median (12.32%), which can be explained by outliers, especially in the upper range as shown in the histogram below (Figure 2). The ROCE's minimum and maximum were artificially set during the original survey as "less than -25%" and "greater than 50%", resulting in a minimum of -25%, maximum of 50% and range of 75%. When comparing the average ROCE by taking the ownership structure into account, dispersed and private equity firms outperform by approximately 17.5% ROCE, indicating a higher profitability than comparison groups. Owner-managed firms and family businesses with an external CEO show only slight differences in profitability, while SOEs perform at the lowest profitability level. These descriptive results are similar to the results of the original authors (Bloom et al., 2012).

Table 2. Descriptive statistics for *ownership* and *ROCE*

Type of ownership	*Mean ROCE*	*Firm-years*	*in %*		*ROCE*	
no entry or "other"	15.83	790	11.14%		Min	-25
1 = *DISPERSED*	17.57	2,325	32.77%		1st quartile	5
2 = *OWNER*	14.14	3,199	45.09%		Median	12
3 = *OWNER_EXTCEO*	13.89	278	3.92%		Mean	16
4 = *PE*	17.66	289	4.07%		3rd quartil	23
5 = *GOV*	11.38	213	3.00%		Max	50
Overall		7,094	100%		Std. dev.	15

Figure 2. Histograms for *ROCE* and *Score*



To illustrate the ownership-specific ROCE development over time as well as the ROCE development in combination with the management score, the data is grouped by ownership over management practice score and time respectively, as shown in Figure 4 and Figure 5. These results seem consistent with the findings of Bloom et al. (2012).

Figure 3a. Scatterplot for *Score* conditional on ownership type

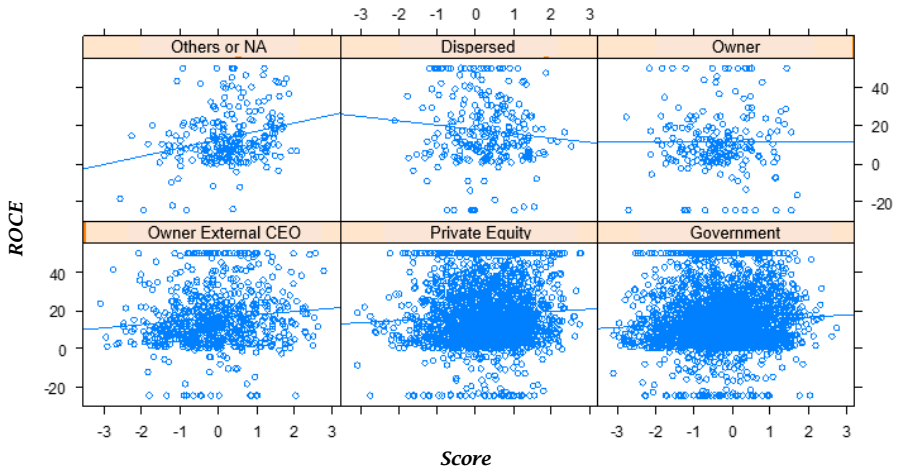
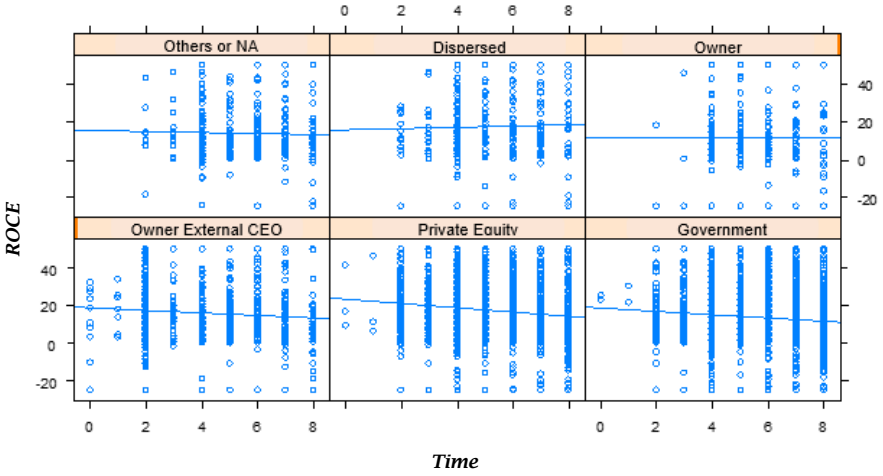


Figure 3b. Scatterplot for *ROCE* conditional on ownership type



In both figures, a wide dispersion of ROCE exists in all plots. The reasons are probably the wide variation of firms in size, stages of development and industry. Furthermore, the ROCE curve appears to be downward sloping for most ownership types (owner external CEO (3), private equity (4) and government (5)). Exceptions are owner-managed companies (4), where the ROCE level remains consistently low over time, and dispersed shareholder companies (2), which demonstrates a slight upward trend. What is also apparent is, that firms show different trajectories over time. This supports the use of panel data analysis to avoid an ecological fallacy, i.e., inferencing from all firms to individual firms or subgroups.

Table 3 depicts correlations of all variables, most of them showing small values so we do not expect problems with collinearity.

Table 3. Correlations of variables

Variables	*ROCE*	*Score*	*Time*	*DISPERSED*	*OWNER*	*OWNER_EXTCEO*	*PE*	*GOV*	*OTHER*
ROCE	1.0000	0.0941	-0.0994	0.0793	-0.0683	-0.0194	0.0245	-0.0407	0.0084
Score		1.0000	-0.0178	0.1882	-0.1798	0.0527	0.0462	-0.0581	-0.0265
Time			1.0000	-0.0392	0.1010	0.0172	-0.0113	0.0338	-0.1231
DISPERSED				1.0000	-0.6328	-0.1410	-0.1439	-0.1228	-0.2472
OWNER					1.0000	-0.1830	-0.1868	-0.1594	-0.3208
OWNER_EXTCEO						1.0000	-0.0416	-0.0355	-0.0715
PE							1.0000	-0.0363	-0.0730
GOV								1.0000	-0.0623

5. RESULTS OF REGRESSION ANALYSIS

5.1. Regression 1: Pooled regression

Regression 1 estimates a pooled regression, i.e., combining all data without recognizing the panel data structure (see Table 4). We find a positive effect of management practice (*Score*) of +1.19% on *ROCE*. Compared to *DISPERSED* as a reference group, *OWNER*, *OWNER_EXTCEO* and *GOV* show a clear negative effect while the effects of *PE* and *OTHER* are not precisely estimated given that their 95% confidence interval includes positive and negative values.

Table 4. Results of pooled OLS regression

Variables	*Coefficient*	*LL*	*UL*
Intercept	17.0998	16.0928	18.1067
Score	1.1858	0.6417	1.7300
OWNER	-2.6036	-3.9034	-1.3039
OWNER_EXTCEO	-3.6608	-6.1879	-1.1338
PE	-0.0532	-3.3535	3.2471
GOV	-5.3429	-8.1152	-2.5707
OTHER	-1.0400	-2.8453	0.7652

Mean ROCE	15.5170
Sum squared resid.	1,504,591
Adj. R²	0.0160
F(6, 2752)	9.7348
Log-likelihood	-26,330.4100
Rho	0.5261
SD	15.5395
SE regression	15.4148
P-value	< 0.001
Durbin-Watson	0.5354

5.2. Regression 2: Fixed effects model

The FE analysis assumes that all differences between firms are fixed parameters. Therefore, the FE model eliminates all firm-specific but time-invariant variables (i.e., ownership type) and analyzes only the effect of time-varying management practices (i.e., score) over time.

Table 5. Results of FE model

Variables	*Coefficient*	*LL*	*UL*
Intercept	15.5170	15.5170	15.5170
Score	0.6035	-0.4606	1.6676

Mean ROCE	15.5170
Sum squared resid.	479373.1000
LSDV R²	0.6868
F(1, 2752)	1.2366
Log-likelihood	-22705.1400
Rho	-0.1750
SD	15.5395
SE regression	11.5636
Within R²	0.0004
P-value	0.2662
Durbin-Watson	1.6649

The results in Table 5 illustrate a positive *Score* coefficient of 0.60. Consequently, a higher management score is associated with higher corporate profitability in terms of *ROCE*. However, the 95% confidence interval includes both negative and positive values. Thus, this model results in poor estimates. The R² value within the statistic also indicates a poor model fit. This gives additional arguments to employ a RE model.

5.3. Regression 3: Random effects model

The RE model treats unobserved differences as random variables with an underlying probability distribution. Therefore, the RE model allows to analyze effects of time-invariant variables (i.e., ownership types).

Table 6. Results of RE model

Variables	*Coefficient*	*LL*	*UL*
Intercept	17.1327	16.1710	18.0942
Score	0.9581	0.4520	1.4643
OWNER	-2.4319	-3.6673	-1.1965
OWNER_EXTCEO	-3.2112	-5.9552	-0.4672
PE	0.1630	-2.8783	3.2043
GOV	-4.8562	-7.6277	-2.0847
OTHER	-0.5862	-2.3091	1.1368

Mean ROCE	15.5170
Sum squared resid.	1,504,591.00
Chi²	49.8150
Log-likelihood	-26,330.0500
Rho	-1.7494
SD	15.5395
SE regression	15.4148
P-value	< 0.001
Durbin-Watson	1.6649

Mean theta	0.3758
Betw een variance	116.9620
Within variance	133.7160

Breusch-Pagan test	Null hypothesis: Variance of the unit-specific error = 0. Asymptotic test statistic: Chi-square(1) = 1192.54 with p-value = 2.55478e-261
Hausman test	Null hypothesis: GLS estimates are consistent. Asymptotic test statistic: Chi-square(1) = 0.619267 with p-value = 0.43132
Pesaran CD test for cross-sectional dependence	Test statistic: z = 32.161830, with p-value = P(|z| > 32.1618) = 6.04e-227. Average absolute correlation = 0.638

The results show a clear positive effect of *Score*, even larger than in the FE model. The same holds for *OWNER*, *OWNER_EXTCEO* and *GOV* while the other ownership types have positive and negative values within their confidence intervals.

Table 6 illustrates further test statistics. The Hausman test verifies if FE or RE are to be used as a model, where the underlying hypothesis (p-value 0.43 > 0.05) indicates RE. The Breusch-Pagan Lagrange multiplier test verifies whether the RE model or pooled model is superior. It is based on the residuals of the OLS estimate and tests the null hypothesis that the variance of the unit-specific error is zero. Here, the Breusch-Pagan test is significant, indicating that the RE model is superior to the pooled regression.

5.4. Interaction effects

As hypothesized, the effect of ownership structure on firm performance, i.e., ROCE, differs by management practice. Estimating multiple panel regressions with specific interaction terms shows

results that are not apparent from the simple regression alone. The following figures illustrate the effects of the different forms of ownership on the slope of the *Score* on *ROCE*. The reference group is always *DISPERSED*, referred to as 0. Interactions change the marginal effects of one variable (i.e., *Score*) depending on another variable (i.e., types of ownership). Table 7 summarizes the marginal effects of *Score* on *ROCE* for different ownership types.

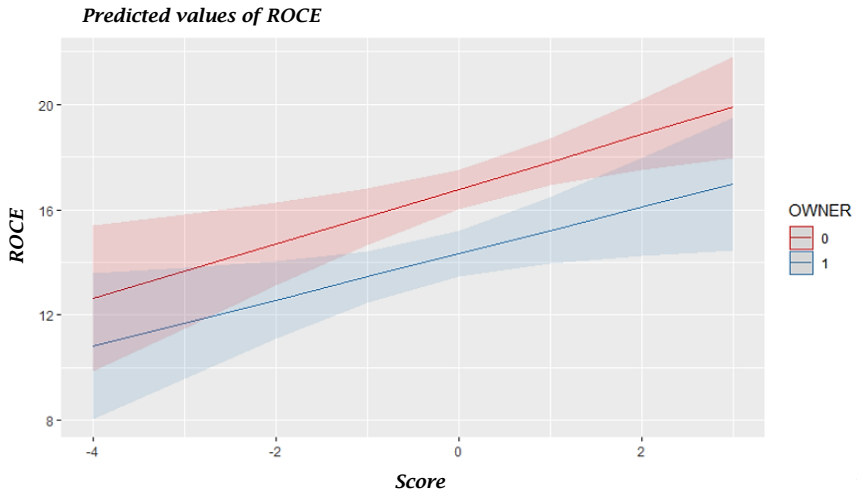
Table 7. Marginal effects of ownership type on the slope of *Score*

	OWNER	*OWNER_EXTCEO*	*PE*	*GOV*
0	1.0373	0.8840	1.0493	1.0377
1	0.8811	3.7350	-1.5566	-1.2447

5.4.1. Interaction effect of OWNER with Score and time

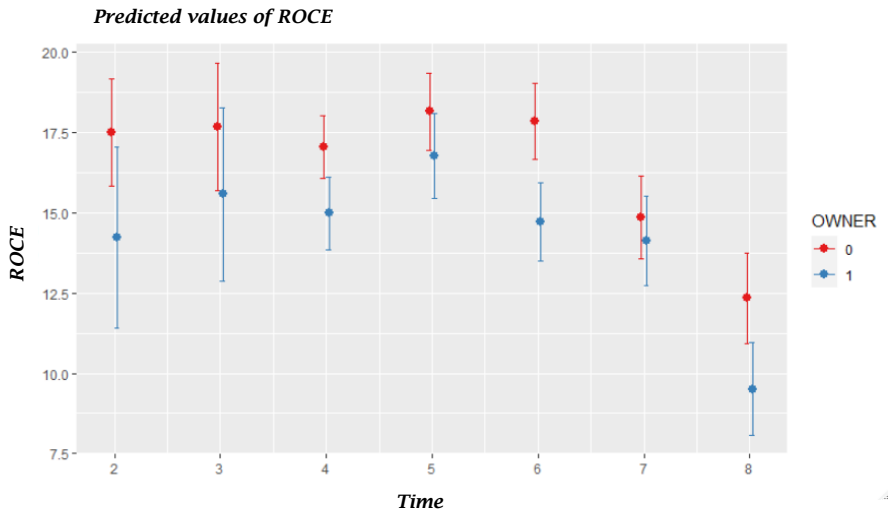
When comparing the development of *OWNER*-managed companies' ROCE to *DISPERSED* shareholders managed companies' ROCE as illustrated in Figure 4, a consistently increasing firm performance with increasing *Score* is recognizable for both comparison groups. However, the interaction effect is consistently lower for the ownership type *OWNER* than for the reference group *DISPERSED*. That demonstrates that regardless of how professionally and efficiently an *OWNER*-managed enterprise works on implementing management practices, the effect is always marginally lower than for the comparison group *DISPERSED*.

Figure 4. Interaction effect of *OWNER* and *Score*



Comparing the interaction effect of the ownership types *OWNER* and *DISPERSED* on *ROCE* over time, a comparable picture is revealed. Figure 5 proves for each year that the interaction effect of the *OWNER*-managed group is permanently lower than that of the comparison group *DISPERSED*.

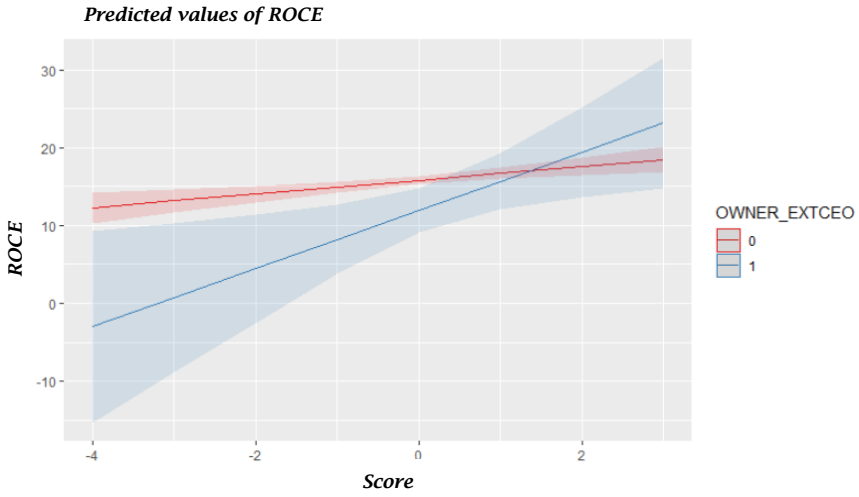
Figure 5. Interaction effect of *OWNER* and *Time*



5.4.2. Interaction effects of OWNER_EXTCEO with Score and Time

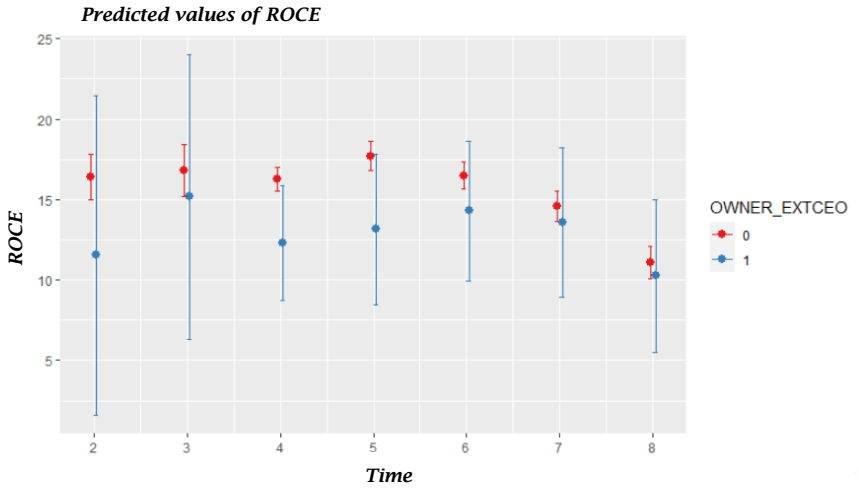
As illustrated in Figure 6, the interaction shows a steeper upward sloping effect of the employment of an external manager combined with management practices. The effect increases exponentially the better the management practice is executed. At the same time, mismanagement in *OWNER_EXTCEO* companies leads to a significant decline in firm performance. In the worst case, the profitability of the business becomes even more negative and gets markedly below the performance of *DISPERSED* or *OWNER*-managed firms.

Figure 6. Interaction effect of *OWNER_EXTCEO* and *Score*



Comparing the interaction effect of the ownership types *OWNER_EXTCEO* and *DISPERSED* on *ROCE* over time as illustrated in Figure 7, it proves that *OWNER_EXTCEO* shows lower *ROCE* over time, albeit this effect comes with a large 95% confidence interval. Thus, this effect can vary significantly from individual to individual.

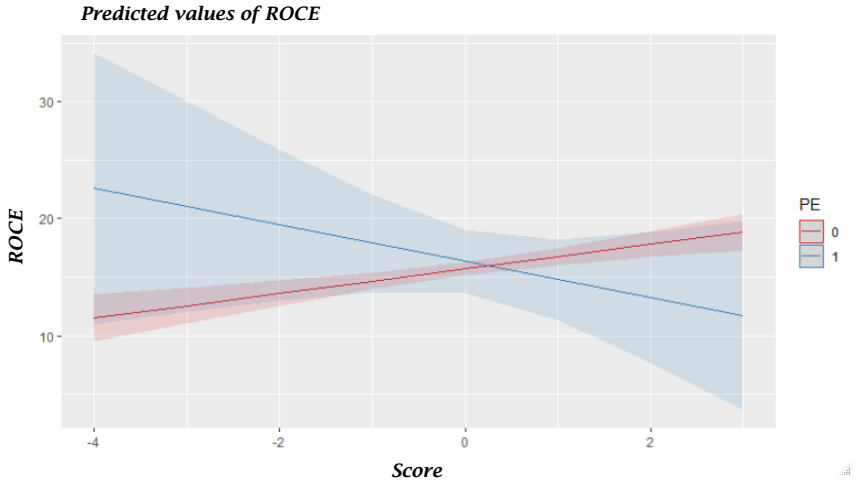
Figure 7. Interaction effect of *OWNER_EXTCEO* and *Time*



5.4.3. Interaction effects of PE with Score and Time

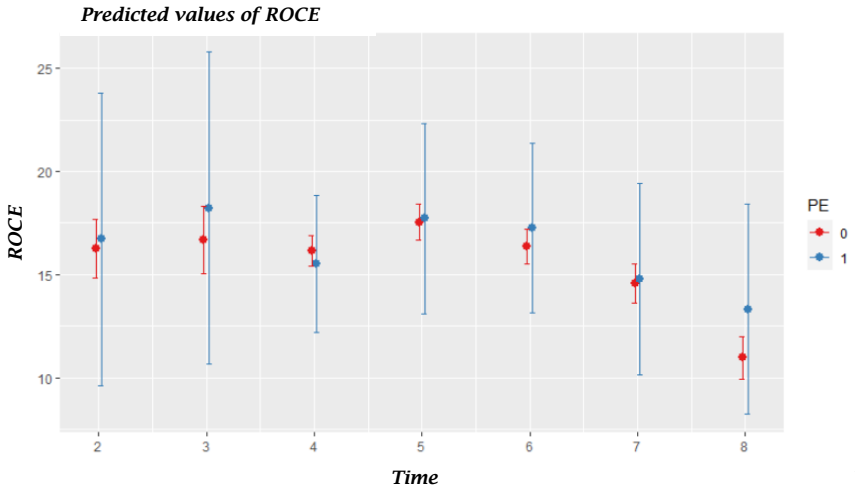
Figure 8 indicates considerably higher profitability of PE enterprises compared to other peer groups although management performance is at a worst-case level. However, if management improves, *ROCE* consistently deteriorates. This is quite surprising, considering the positive performance of *PE* enterprises in previous analyses and the mean positive effect. Nevertheless, this trend is associated with a wide confidence interval, indicating that this effect may be very firm-specific.

Figure 8. Interaction effect of *PE* and *Score*



The above-mentioned observation is confirmed by the following Figure 9. *PE* companies repeatedly exhibit broad confidence intervals. Moreover, *PE* companies even perform better than the reference group *DISPERSED*. If we now compare the averages of both groups, the initially positive *PE* effect is explained but revealed to be an ecological fallacy by closer examination.

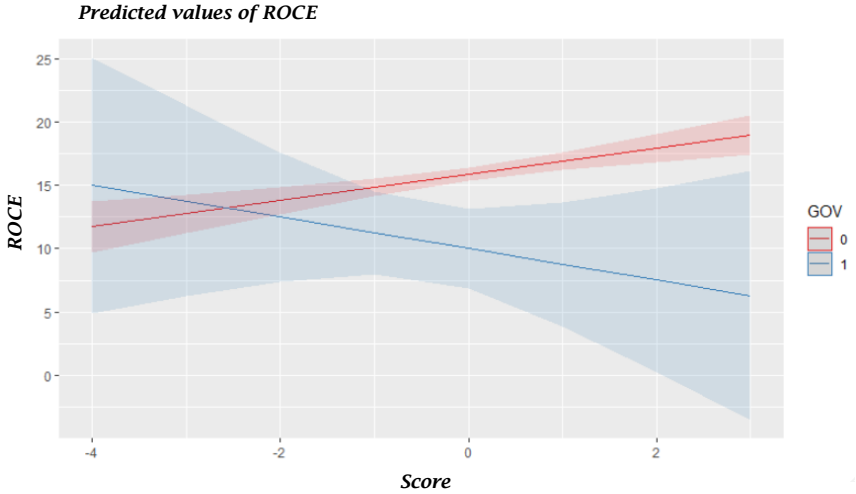
Figure 9. Interaction effect of *PE* and *Time*



5.4.4. Interaction effect of GOV with Score and Time

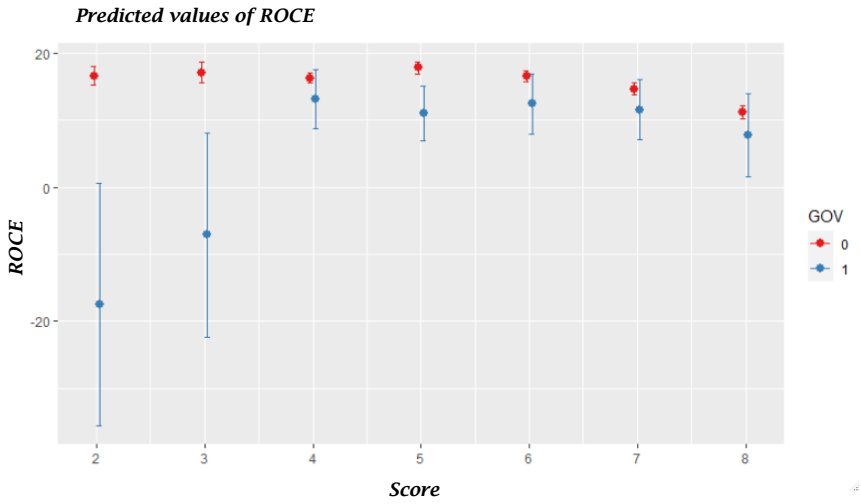
Figure 10 illustrates that SOEs cannot reap the potential benefits of improving management. On the contrary, as the quality of management increases, the profitability of SOEs decreases significantly.

Figure 10. Interaction effect of *GOV* and *Score*



The finding of weak firm performance of *GOV*-enterprises compared to the reference group is also illustrated in Figure 11. Furthermore, *GOV*-companies show consistently weaker profitability, especially in the first two years. While profitability is almost consistently negative in the first year, it is less negative or even slightly positive in the second year. One reason for this could be that unprofitable *GOV*-companies are only present in the first two years or that firm performance improves significantly in the following years.

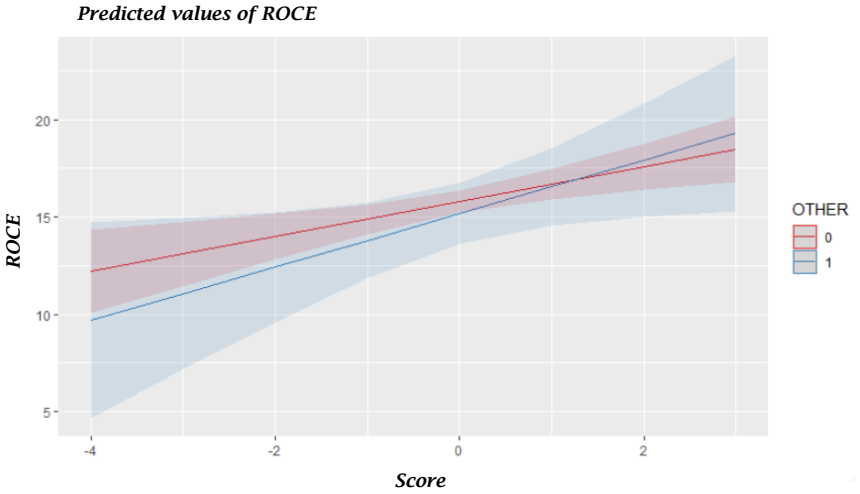
Figure 11. Interaction effect of *GOV* and *Time*



5.4.5. Interaction effect of OTHER with Score and Time

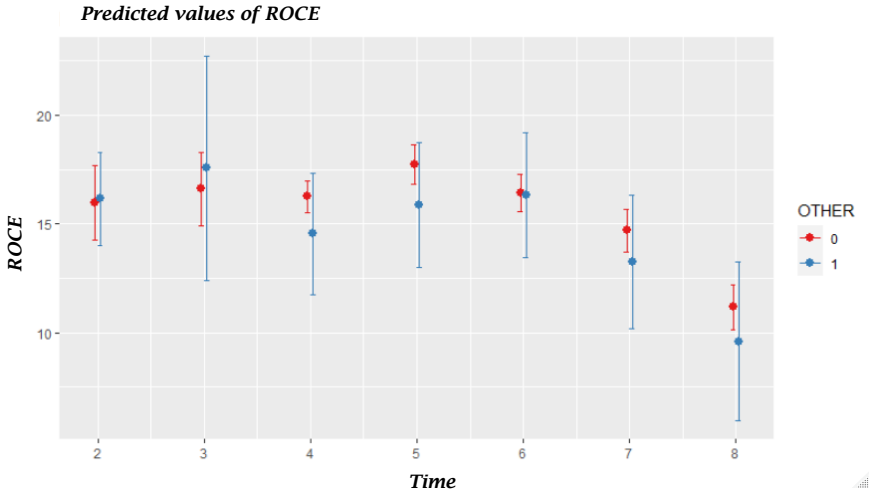
The comparison group "*OTHER*" indicates a similar trend as the reference group *DISPERSED*, although the company performance increases less with increasing management score. Moreover, this result comes along with a wide confidence interval.

Figure 12. Interaction effect of *OTHER* and *Score*



A closer look over the given time horizon exhibits that there is a wide spread of values especially in the second year. However, more detailed conclusions cannot be drawn from this, as the exact constellation of the *OTHER* group is unknown to the authors.

Figure 13. Interaction effect of *OTHER* and *Time*



The results presented indicate that the management practice score (*Score*) has a pronounced and statistically significant positive effect on firm performance (as measured by *ROCE*), which is even more apparent in the RE model compared to the FE model. This suggests that, when accounting for both time-invariant and time-variant factors across different firms, the positive influence of good management practices on firm profitability is stronger than initially observed in the FE model, where only within-firm variations are considered. This enhanced effect in the RE model may indicate that the *Score* variable's impact on performance benefits from additional variability captured across ownership types, which is not isolated in the FE model. The RE model's ability to account for both inter- and intra-firm variation provides a fuller picture, highlighting how the systematic differences between firms — such as ownership structure — can modulate the relationship between management practices and firm performance.

In the case of specific ownership structures, the *OWNER* and *OWNER_EXTCEO* categories show a positive effect on performance, which is also larger in the RE model than in the FE model, though these estimates are accompanied by variability. For *OWNER*-managed firms, this positive relationship may reflect the alignment between ownership and control, where owner-managers are directly incentivized to implement effective management practices that enhance firm profitability. However, since ownership and control are combined, these firms might also be more susceptible to risks associated with limited governance oversight. On the other hand, *OWNER_EXTCEO* firms, where family or individual owners employ external CEOs, display a similar positive effect, potentially because these CEOs bring professional management practices that contribute to firm performance while maintaining accountability to owners. This structure benefits from the alignment of ownership incentives and professional management expertise, allowing firms to harness effective practices while avoiding some of the biases or constraints that might occur in purely owner-managed setups. However, the variability within this group's confidence intervals suggests that the effectiveness of this structure could be influenced by factors such as CEO tenure or the level of control owners exert over strategic decisions.

The *GOV* (SOEs) category also shows a positive effect of management practices on firm performance in the RE model, though this effect is notably weaker than for *OWNER* and *OWNER_EXTCEO* firms. This more muted response to management improvements is consistent with previous research suggesting that government-owned enterprises often face bureaucratic constraints and political pressures that can impede the optimal implementation of management practices. As a result, while *GOV* firms may benefit from improved practices, their overall impact on ROCE is less pronounced due to structural inefficiencies and competing policy objectives that limit responsiveness to traditional management strategies.

Finally, for the remaining ownership types not specified in detail, the estimates in the RE model show a broader range of positive and negative values within their confidence intervals, which indicates a lack of statistical significance. This variability suggests that these ownership structures — possibly including family-owned businesses without external CEOs and certain private equity firms — do not exhibit a consistent pattern of management practice influence on performance. The wide confidence intervals imply that these types of firms might face unique challenges or lack the consistent governance frameworks that enable the positive impact of management practices seen in other groups. Therefore, the heterogeneity within these categories likely contributes to the mixed results, as factors such as succession planning in family firms or short-term performance pressures in some private equity firms may dilute the expected benefits of high management scores on ROCE.

6. CONCLUSION

The question of ownership and firm performance is part of an ongoing debate on understanding the impact of different types of ownership on various outcomes. It seems plausible that certain factors interact with each other and we postulate that this is the case with ownership type and

management practice score. In the present paper, we re-analyzed archival data in order to test the postulated relationships. To sum up, the results are as follows:

- As previous studies have also shown, there is a positive correlation between good management (*Score*) and increased firm performance (*ROCE*). Our study goes beyond and reveals that the effect of ownership structure influences the extent to which favorable management actually results in a beneficial effect on firm performance. This is due to the fact that better management does not necessarily go hand in hand with higher firm performance; rather it depends on the ownership structure whether this effect can be harvested or not.
- While the ownership type of dispersed shareholders (*DISPERSED*) has on average the most favorable effect on firm performance, this effect can be surpassed for the owner type of the individual or family businesses with external management (*OWNER_EXTCEO*) if management is carried out above average. If the management quality is inferior, this effect turns into the opposite, and in the worst case results in a negative firm performance. On the other hand, private equity companies (*PE*) and SOEs (*GOV*) cannot reap the effect of good management. On the contrary, as the quality of management increases, firm performance successively decreases.

Further research should examine the theoretical framework of ownership type and its effect on the actions and decisions of managers. Questions arising from this are, why in some cases private equity companies and state-run companies cannot use the effect of good management for themselves. Furthermore, the country- and culture-specific influence in this context would also be interesting to examine.

Managers should tailor their strategies based on the ownership structure of their firms to maximize the benefits of good management practices. Policymakers should also consider ownership-specific policies to enhance firm performance. For instance, government policies aimed at improving corporate governance in SOEs could help these firms better capitalize on effective management practices. Additionally, investors should consider ownership structures when making investment decisions, as these structures can significantly impact firm performance.

Several limitations are worth noting: first, we analyzed secondary data. This circumstance limits a more specific interpretation of the comparison group *OTHER*, as the authors are not familiar with the exact composition of this group. Second, the data depends on the statements of interviewed managers. Therefore, the data could be biased under the assumption that managers who are under regular observation in the form of interviews will pay more attention to the quality of their management practice and improve it accordingly, without the influence of the ownership structure. It should also be emphasized that there are countless factors that affect the success and profitability of an enterprise. In this study, only the interaction effects of a few of them are examined.

Nevertheless, we argue that this study sheds light on the role ownership plays in moderating the effects of management practices on performance.

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