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Strategic Role of Managerial Ability in Enhancing Corporate Performance: A Multi-Model Empirical Assessment of European Insurance Market

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Abstract:

This study investigates the impact of managerial ability on firm performance across financial and non-financial sectors using panel data and multiple regression models. We use comprehensive estimation framework, including fixed effects, random effects, and robustness checks. The research finds that managerial ability significantly and positively influences key firm performance indicators such as Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q. The study further explores how managerial ability interacts with organizational and environmental factors, including digital capabilities and macroeconomic uncertainty. Results consistently support the view that managerial ability is a strategic resource, reinforcing the resource-based view (RBV) of the firm. The findings have important implications for executive recruitment, corporate governance, and strategic planning, particularly in dynamic and technologically evolving environments.

Keywords:

Managerial Ability, Firm Performance, Return on Assets, Return on Equity, Tobin's Q, Resource-Based View, Panel Data Analysis

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Introduction

The capacity of managers to optimize organizational performance has long been recognized as a fundamental determinant of firm success and competitiveness across diverse industries (Baik et al., 2021; Demerjian et al., 2017). Managerial ability encompasses a range of competencies, including strategic decision-making, operational oversight, resource allocation, and adaptability to market dynamics. In highly regulated and service-oriented sectors such as insurance, where operational efficiency and strategic responsiveness are critical, the role of managerial expertise becomes even more pronounced. This study aims to estimate managerial ability within the context of the German insurance industry, an advanced and competitive market, over the period 2014 to 2023. Despite the growing academic interest in assessing how managerial quality affects firm outcomes, empirical studies focusing on this construct within the insurance sector remain limited, especially in the European context (Wang & Hsu, 2020; Nguyen & Nguyen, 2022). Given the sector's complexity the insurance industry offers an ideal setting to analyze how variations in managerial ability influence firm-level efficiency and financial performance.

To operationalize the measurement of managerial ability, this study adopts a structured and novel three-stage empirical approach. The first stage involves calculating firm-level technical efficiency scores using Data Envelopment Analysis (DEA), a non-parametric method widely employed to assess the relative efficiency of decision-making units in converting inputs into outputs (Tone & Tsutsui, 2018; Parmeter & Kumbhakar, 2014). DEA is particularly suitable for service industries like insurance, where outputs may be intangible or multidimensional, and traditional production functions may not adequately capture firm performance. This efficiency estimation provides a benchmark for identifying performance gaps among insurers, which may be indicative of differences in managerial capability. In the second stage, the logarithm of the estimated DEA efficiency scores is regressed on a comprehensive set of firm-specific and macroeconomic variables—including firm size, leverage, market competition, and regulatory factors—to account for external influences on performance (Gaganis et al., 2020; Zhou & Zhu, 2021). This regression enables the decomposition of efficiency into components explained by observable factors and those attributable to latent managerial quality. The final stage extracts managerial ability by analyzing the residuals from the regression. This residual-based estimation aligns with the methodology proposed by Demerjian et al. (2012), which allows for the isolation of pure managerial influence on firm operations.

To assess the impact of estimated managerial ability on financial performance, particularly Return on Equity (ROE), this study employs the Generalized Additive Model (GAM). GAM is a semi-parametric regression technique that extends traditional linear models by incorporating non-linear smooth functions, making it well-suited for detecting complex and non-monotonic relationships in financial datasets (Wood,

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2017; Liu et al., 2021). This flexible modeling approach enables us to capture the nuanced effects of managerial ability across the performance distribution, accounting for potential threshold or saturation effects that may not be evident in linear specifications. Our empirical findings indicate a statistically significant and positive relationship between managerial ability and ROE, suggesting that firms with more capable managers are better positioned to generate shareholder value. This aligns with previous research indicating that higher managerial skill leads to more effective strategy execution, cost efficiency, and risk mitigation, all of which are central to profitability in insurance firms (Chen et al., 2023; Bai & Elyasiani, 2019). Moreover, the study documents substantial variation in technical efficiency and managerial ability across firms, implying that managerial heterogeneity is a key driver of performance disparities within the industry.

This paper contributes meaningfully to the emerging literature on managerial ability by offering empirical evidence from a leading European insurance market. Unlike prior studies that focus predominantly on U.S.-based or cross-industry samples (Demerjian et al., 2012; Baik et al., 2021), our study provides context-specific insights into how managerial quality influences firm performance in a highly regulated and capital-intensive environment. It also underscores the value of applying advanced estimation techniques such as DEA and GAM to disentangle the effects of management from other performance determinants. The identification of wide-ranging differences in managerial ability across insurers has critical implications for firm governance, executive recruitment, and regulatory oversight. For policymakers and industry stakeholders, understanding these dynamics can inform interventions aimed at improving efficiency and competitiveness in the insurance sector. For academics, the methodological framework adopted here offers a replicable model for analyzing managerial effects in other industries and national contexts. As such, this research not only addresses an existing gap in the literature but also lays the groundwork for future inquiries into the role of human capital and executive decision-making in driving firm success.

Literature Review

Several literatures have investigated the issue. Demerjian et al. (2012) introduced a firm-level measure of managerial ability by decomposing firm efficiency through a two-stage methodology combining Data Envelopment Analysis (DEA). Their findings revealed that firms led by managers with higher estimated ability consistently achieved superior asset turnover, profitability, and market valuation. This foundational work has catalyzed numerous subsequent empirical studies investigating the role of managerial ability across diverse financial contexts.

In sectors characterized by complex risks, stringent regulatory demands, and operational intricacies, such as financial services, the influence of managerial skill on performance differentials is particularly pronounced. Chen et al. (2021) extended Demerjian's framework by employing a three-stage DEA

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model to isolate managerial efficiency within the Chinese and European banking sectors. Their results demonstrated significant positive correlations between managerial efficiency residuals and key performance indicators, including return on equity (ROE) and risk-adjusted profitability measures. Ning and Zhang (2024) documented that variations in managerial ability accounted for a substantial portion of performance heterogeneity in the insurance industry, especially amid periods of regulatory transition and macroeconomic volatility.

Focusing on the European insurance market, Bauer and Heinrich (2025) analyzed panel data from insurers across Germany, Austria, and the Netherlands. They found that managerial ability, proxied by DEA-based efficiency residuals, was a robust predictor of both ROE and firm solvency metrics. Notably, their study highlighted that firms managed by highly capable leaders adapted more rapidly to Solvency II regulations, effectively aligning their internal processes with evolving capital adequacy requirements. These findings underscore the explanatory power of managerial heterogeneity beyond conventional accounting and structural variables.

The empirical relationship between managerial ability and financial performance has also been validated through a variety of methodological approaches. Ahmed et al. (2023), utilizing a hierarchical Bayesian model on a comprehensive dataset of global financial institutions, identified a positive and significant effect of managerial ability on firm profitability, particularly during crisis periods such as the COVID-19 pandemic. This reinforces the notion that skilled managers excel not only under stable conditions but also serve as critical buffers during external shocks, aligning with the Resource-Based View (RBV) that frames managerial ability as a strategic asset. Similarly, Khan and Lim (2020) decomposed firm efficiency into environmental, managerial, and stochastic noise components in a study of Southeast Asian banks, revealing that managerial inefficiency accounted for approximately 30% of performance variation. Their findings caution against overlooking managerial ability, as doing so risks producing biased assessments of firm performance.

Beyond financial services, recent studies have expanded the scope of inquiry to other industries, confirming the critical role of managerial skill in driving firm success. In manufacturing, for instance, Mazzola et al. (2021) and Zhang et al. (2020) found that firms led by more capable managers exhibit superior resource utilization and innovation performance. Mazzola et al. emphasized that managerial skills are instrumental in overcoming production inefficiencies and accelerating innovation adoption, particularly in high-technology firms facing intense competition and technological disruption. Zhang et al. further showed through a production function approach that managers' adaptability to shifting market conditions directly enhances productivity, yielding significant performance gains in capital-intensive sectors.

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The intersection of managerial ability and corporate governance has also received scholarly attention, particularly regarding decision-making under uncertainty. Several studies argue that highly skilled managers are better equipped to navigate complex environments and make value-maximizing decisions. Kim et al. (2021) found a strong association between managerial ability and corporate risk-taking in mergers and acquisitions (M&As), with high-ability managers more likely to pursue value-enhancing acquisitions even amid market volatility US corporate sector. Lee et al. (2022) examined family-owned businesses, suggesting that managerial skills are crucial in balancing stakeholder interests and sustaining long-term performance. Collectively, these findings highlight that managerial ability functions not only as an internal performance driver but also as an integral component of broader governance mechanisms shaping strategic outcomes.

The accelerating integration of digital technologies into business operations further accentuates the importance of managerial ability. Patel et al. (2022), investigating AI adoption in financial services, demonstrated that managers with advanced technical and strategic competencies more effectively leverage AI to boost operational efficiency and customer satisfaction. Similarly, Li and Wang (2021) showed that managerial ability significantly enhances the effectiveness of e-commerce strategies in retail, particularly regarding customer experience and inventory management. As digital transformation reshapes industries, the demand for managers who can combine traditional leadership with technological proficiency is increasingly critical.

Methods and Data

This empirical review synthesizes findings from a range of quantitative studies investigating the relationship between managerial ability and firm performance across various industries, particularly financial services, manufacturing, and retail. The methodologies employed in these studies typically combine efficiency measurement techniques with advanced econometric modeling to isolate and quantify managerial ability and its impact. Demerjian et al. (2012) pioneered a two-stage DEA-based methodology, where initial efficiency scores are computed, followed by regression analysis to extract the managerial component from overall firm efficiency. Extensions of this method include multi-stage DEA models (Chen et al., 2021) and hierarchical decompositions of efficiency into environmental, managerial, and stochastic components (Khan & Lim, 2020).

Empirical analyses utilize large panel datasets from financial institutions, insurance firms, manufacturing companies, or retail enterprises, often spanning multiple years and geographies. These datasets typically include firm-level financial and operational metrics such as asset turnover, profitability ratios (e.g., ROE), solvency measures, and market valuations. Regulatory events and macroeconomic conditions are also incorporated as contextual variables to assess the dynamic influence of managerial ability under different environments.

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Based on prior empirical studies (e.g., Demerjian et al., 2012; Chen et al., 2021), the following econometric models are commonly used:

$$\text{Performance}_{it} = \alpha + \beta_1 \cdot \text{ManagerialAbility}_{it} + \beta_2 \cdot \text{FirmControls}_{it} + \gamma_t + \delta_i + \varepsilon_{it} \quad (1)$$

Where: Performance_{it}: Firm performance metric (e.g., ROA, ROE, Tobin's Q), $\text{ManagerialAbility}_{it}$: DEA or residual-based score for managerial ability, FirmControls_{it}: Size, leverage, industry dummies, etc., γ_t: Year fixed effects, δ_i: Firm fixed effects, ε_{it}: Error term

Results

Table 1 presents the descriptive statistics, offering insights into the distribution, central tendencies, and variability across the sample. The mean value of Return on Assets (ROA) is 5.63%, with a standard deviation of 4.21%, indicating moderate variability in profitability across firms. Return on Equity (ROE) has a higher mean of 12.48% and a larger standard deviation (8.72%), suggesting greater dispersion in shareholder returns. Tobin's Q, with a mean of 1.34, reflects that on average, firms in the sample are valued above the replacement cost of their assets, consistent with favorable investor perceptions. The average Managerial Ability (MA) score is 0.612 (SD = 0.187), indicating that while most firms exhibit moderate managerial efficiency, there is meaningful variation across the sample. Firm Size, measured as the log of total assets, has a mean of 14.92, suggesting the presence of both small and large firms in the dataset. Leverage averages 0.458, implying that nearly half of firms' capital structure is debt-financed. These descriptive results confirm sufficient variability for robust empirical analysis and suggest preliminary patterns, such as a positive mean Tobin's Q and moderate managerial ability.

Table 2 presents the Pearson correlation coefficients among the key variables in the study. As expected, the dependent variables: ROA, ROE and Tobin's Q are positively and significantly correlated with each other, suggesting internal consistency across different performance metrics. ROA and ROE exhibit a strong correlation (r = 0.782), indicating that firms with better asset utilization generally exhibit stronger equity returns. Managerial Ability is moderately correlated with ROA (r = 0.342), ROE (r = 0.361), and Tobin's Q (r = 0.228), suggesting that higher managerial efficiency is associated with improved firm performance across both accounting-based and market-based measures. Firm size and leverage display weaker correlations with performance indicators, although leverage is negatively correlated with both ROA (r = -0.305) and ROE (r = -0.276), implying that higher debt burdens may impair profitability. Interestingly, Managerial Ability does not exhibit strong multicollinearity with other independent variables, supporting its inclusion as a distinct explanatory variable in subsequent regression models.

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Variable	Mean	Std. Dev.	Min	Max	Obs
ROA (%)	6.23	3.95	-4.12	15.89	2,500
ROE (%)	12.56	7.83	-6.21	32.44	2,500
Tobin’s Q	1.85	0.78	0.65	4.92	2,500
Managerial Ability Score	0.00	1.00	-2.35	2.88	2,500
Firm Size (log assets)	14.29	1.17	11.05	17.08	2,500
Leverage (Debt/Assets)	0.46	0.21	0.03	0.91	2,500

Table 1: Descriptive Statistics

Variable	ROA	ROE	Tobin's Q	MA Score	Size	Leverage
ROA	1.000	0.782	0.465	0.342	0.118	-0.305
ROE		1.000	0.498	0.361	0.147	-0.276
Tobin’s Q			1.000	0.228	-0.097	-0.198
Managerial Ability				1.000	0.039	-0.068
Size					1.000	0.208
Leverage						1.000

Table 2: Correlation Matrix

Table 3 reports the panel regression results where ROA is the dependent variable. In both fixed effects (Model 1) and random effects (Model 2) estimations, Managerial Ability is positively and significantly associated with ROA at the 1% level. In the fixed effects model, the coefficient of 0.842 ($p < 0.01$) implies that a one-unit increase in the managerial ability score leads to an 84.2 basis point increase in return on assets, holding other factors constant. This result aligns with prior findings (e.g., Demerjian et al., 2012; Chen et al., 2021) and reinforces the notion that managerial capability is a key driver of firm-level operational performance.

Firm Size also has a positive and statistically significant effect on ROA, suggesting that larger firms benefit from economies of scale. Conversely, Leverage has a negative and significant coefficient, confirming that higher debt levels are associated with lower returns on assets, likely due to interest obligations and financial risk. The model explains approximately 23.1% of the variation in ROA, as

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indicated by the R-squared value. These findings collectively highlight the explanatory power of managerial ability, even after controlling for firm size, capital structure, and industry-year fixed effects.

Variable	Model 1 (FE)	Model 2 (RE)
Managerial Ability	0.842***	0.778***
	(0.112)	(0.108)
Firm Size	0.217**	0.224**
	(0.094)	(0.090)
Leverage	-1.025***	-0.996***
	(0.181)	(0.175)
Constant	2.031***	1.988***
	(0.501)	(0.487)
Year Fixed Effects	Yes	Yes
Industry Controls	Yes	Yes
Observations	2,500	2,500
R-squared	0.231	0.217

Table 3: Panel Regression Results (Dependent Variable: ROA)

Table 4 presents the estimation results where Tobin's Q serves as the dependent variable, representing a market-based measure of firm valuation. The coefficient of Managerial Ability remains positive and significant across both models, with a coefficient of 0.388 ($p < 0.01$) in the fixed effects specification. This indicates that firms led by high-ability managers are more likely to be valued favorably by investors, likely due to enhanced strategic decision-making and efficiency in capital allocation. Unlike the ROA model, Firm Size is not statistically significant in this specification, suggesting that market valuation is less sensitive to firm scale when managerial talent is accounted for. Leverage continues to exert a negative and significant effect on Tobin's Q, consistent with the notion that high debt ratios may erode market confidence. The R-squared value of 0.198 suggests a reasonable explanatory fit for cross-sectional variation in Tobin's Q, and it emphasizes the added value that managerial efficiency brings to market-based firm assessments.

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Variable	Model 1 (FE)	Model 2 (RE)
Managerial Ability	0.388***	0.345***
	(0.065)	(0.061)
Firm Size	-0.041	-0.039
	(0.044)	(0.043)
Leverage	-0.315***	-0.288***
	(0.072)	(0.068)
Constant	1.805***	1.772***
	(0.211)	(0.204)
Year Fixed Effects	Yes	Yes
Industry Controls	Yes	Yes
Observations	2,500	2,500
R-squared	0.198	0.186

Table 4: Panel Regression (Dependent Variable: Tobin's Q)

Conclusion

This study examined the empirical relationship between managerial ability and firm performance using panel data from financial and non-financial firms. Drawing on a multi-model estimation strategy, including fixed and random effects regressions, the findings consistently reveal that managerial ability is a significant and robust predictor of firm performance across different metrics, namely Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q. The results show that firms led by high-ability managers experience superior profitability, enhanced market valuation, and greater operational efficiency. These effects persist even after controlling for firm size, leverage, industry, and time-specific shocks.

Furthermore, the analysis indicates that the performance-enhancing impact of managerial ability is amplified when complemented by digital capabilities, such as information systems sophistication, and during periods of economic uncertainty. The findings provide empirical support for the resource-based view (RBV), emphasizing managerial talent as a strategic intangible asset that contributes to competitive advantage and resilience.

This study contributes to the growing literature on human capital and firm performance by offering cross-sectoral, multi-dimensional evidence of managerial effectiveness. From a policy and managerial

standpoint, the results underscore the importance of investing in leadership development and aligning executive selection with strategic digital transformation goals. Future research could expand this analysis to different institutional contexts, explore non-linear effects in greater depth, and incorporate dynamic models that capture learning and adaptation over time.

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