GLOBAL BUSINESS & FINANCE REVIEW, Volume. 31 Issue. 4 (APRIL 2026), 143-155
pISSN 1088-6931 / eISSN 2384-1648 | Https://doi.org/10.17549/gbfr.2026.31.4.143

GLOBAL BUSINESS & FINANCE REVIEW

www.gbfrjournal.org
for financial sustainability and people-centered global business

# Rethinking CEO Educational Background: A Nonlinear Analysis of Its Impact on Firm Performance in Vietnam

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A B S T R A C T

**Purpose:** This study investigates the impact of the Chief Executive Officer's (CEO) educational background on firm performance in the context of an emerging market, aiming to clarify the nature—linear or nonlinear—of this relationship.
**Design/methodology/approach:** The study uses panel data from 203 non-financial firms listed on the Hanoi Stock Exchange (HNX) between 2013 and 2022. CEO education is quantified by the number of formal schooling years, based on the Vietnamese national education framework. To address endogeneity and dynamic panel issues, the study employs the system Generalized Method of Moments (GMM). Both linear and quadratic specifications are tested to capture possible nonlinearities.
**Findings:** The results reveal a U-shaped nonlinear relationship between CEO education and firm performance. Initially, increases in education levels may reduce short-term performance, possibly due to a focus on long-term strategies. However, beyond a threshold (around postgraduate level), higher educational attainment significantly improves both accounting-based (ROA) and market-based (MVBV) performance.
**Research limitations/implications:** While the one-step GMM approach helps mitigate endogeneity, future research could adopt the two-step GMM for increased efficiency. Additionally, examining other CEO traits (e.g., leadership style or experience) and industry-specific effects could enrich the understanding of the CEO-performance nexus.
**Originality/value:** This study contributes to corporate governance literature by quantifying CEO education based on years of schooling within the national context and identifying a nonlinear impact on performance. The findings highlight the importance of aligning educational attainment with practical experience, offering insights for board-level executive selection in emerging economies like Vietnam.

*Keywords: CEO education, firm performance, nonlinear relationship, corporate governance*

## I. Introduction

The relationship between the educational background of Chief Executive Officers (CEOs) and firm performance has garnered considerable attention in corporate governance research. A CEO with a solid educational foundation not only possesses in-depth knowledge of business but also exhibits strategic thinking abilities that can guide a firm's long-term development. According to Hambrick and Mason (1984), education reflects a leader's cognitive ability

Received: Jun. 11, 2025; Revised(1st): Oct. 17, 2025; Revised(2nd): Oct. 31, 2025; Revised(3rd): Nov. 12, 2025; Accepted: Apr. 10, 2026

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and decision-making competence. Bantel and Jackson (1989) similarly argue that highly educated CEOs are more likely to make innovative and creative decisions. Moreover, the networks established during one's academic journey can offer significant benefits to the firm by connecting with potential partners and opening up new business opportunities (Bhagat et al., 2010). It can be seen that key CEO traits and psychological orientation interact with firm context to shape major strategic decisions (Lee & Park, 2024) and educational background is one of the traits. In practice, the crucial role of education in the success of top executives is well recognized. Leaders such as Tim Cook (Apple), Satya Nadella (Microsoft), and Jeff Bezos (Amazon) all possess outstanding educational qualifications that have contributed to their ability to lead firms to remarkable achievements. Conclusions from researches of Nguyen and Nghiem (2023) or Dwaikat et al. (2023) state that human capital efficiency or CEO and management decisions on asset deployment significantly improve firm ROA and can drive firm valuation. In Vietnam, many CEOs have also made a strong impact thanks to their solid educational backgrounds. For instance, Mr. Tran Tuan Anh (Shopee Vietnam), Mr. Dinh Viet Phuong (Vietjet Air), Ms. Mai Kieu Lien (Vinamilk), and Mr. Nguyen Viet Quang (Vingroup) are exemplary cases of how high educational attainment can influence effective leadership and firm performance.

While numerous studies have found a positive association between CEO education and firm performance, empirical findings remain inconsistent. Some studies suggest that CEOs with higher education levels make better strategic decisions, thereby enhancing firm performance (Kallias et al., 2023; King et al., 2016; Saidu, 2019; Slater & Dixon-Fowler, 2010). However, others find no clear link between CEO education and firm performance (Bhagat et al., 2010; Gottesman & Morey, 2006). These differences may be partly due to the diverse ways in which CEO education is measured. Some studies classify education based on academic degrees such as bachelor's, master's, or doctoral (Kallias et al., 2023; King et al., 2016; Urquhart & Zhang, 2022). Others compare CEOs with or without postgraduate degrees (Kaur & Singh, 2019; Lin et al., 2011) or examine educational fields such as MBA, law, or engineering (Andreou et al., 2017; Frydman, 2019; Ghardallou, 2022; Gottesman & Morey, 2006; Saidu, 2019). Some research evaluates the number of degrees held by a CEO (Gounopoulos et al., 2021), while others emphasize economic expertise (Jaggia & Thosar, 2021; Lindorff & Prior Jonson, 2013; Manner, 2010). Additionally, the quality of the educational institution is considered important. Morresi (2017) argues that CEOs graduating from prestigious universities tend to be better trained and possess superior management skills, which can enhance firm performance. This suggests that not only the level of education but also the quality of training may influence corporate outcomes.

In Vietnam, the relationship between CEO education and firm performance continues to attract attention. In an emerging and globally integrating economy, CEOs are expected to have strong educational backgrounds to lead effectively. The unique ownership structure in Vietnam—encompassing state-owned enterprises, family businesses, and equitized firms—poses governance challenges that require CEOs to have both strategic vision and adaptability. Additionally, Vietnam's corporate governance framework is gradually aligning with international standards, necessitating CEOs with appropriate knowledge to meet increasingly complex requirements. Domestic studies have explored this topic from various angles, including educational level, field of study, and quality of educational institutions (Nguyen & Hoang, 2023; Tran & Pham, 2020).

This study uses data from non-financial firms listed on the Hanoi Stock Exchange (HNX) from 2013 to 2022 and makes several important contributions. First, it expands the measurement of CEO education by quantifying years of formal schooling, based on Vietnam's national education framework as defined in Decision 1981/QD-TTg by the Prime Minister. Second, the study applies the Generalized Method of Moments (GMM) approach to address endogeneity

issues in the relationship between CEO education and firm performance. Furthermore, it explores the nonlinear nature of this relationship, providing a more comprehensive perspective on the impact of CEO education in the context of an emerging market like Vietnam.

The remainder of the paper is structured as follows: Section 2 presents the theoretical framework; Section 3 outlines the research methodology; Section 4 discusses empirical results; and Section 5 provides conclusions and policy implications.

## II. Theoretical Framework

### A. Underlying Theories

The Upper Echelons Theory, developed by Hambrick and Mason, posits that executives' characteristics significantly influence organizational outcomes. According to this theory, the values, cognitive biases, and experiences of CEOs shape their strategic decisions and ultimately affect firm performance (Hambrick & Mason, 1984). It emphasizes the importance of understanding CEO attributes—such as educational background—in predicting organizational behavior and outcomes.

Cognitive Theory complements Upper Echelons Theory by highlighting the role of CEO characteristics in determining firm performance. Among these characteristics, educational background is considered a crucial factor, as it reflects the cognitive abilities and decision-making processes of leaders. CEOs with higher educational attainment often develop stronger logical reasoning and analytical skills, thereby enhancing firm performance (Wang, Holmes Jr, et al., 2016). Orens and Reheul (2013) also emphasize that a CEO's subjective cognition significantly influences strategic decision-making, with education playing a key role in shaping economic perceptions and risk tolerance. This suggests a close relationship between education, cognition, and strategic orientation, as CEOs with different educational backgrounds may make varying managerial and strategic decisions, which in turn affect firm outcomes.

According to signaling theory (Spence, 1978), education serves as a costly signal that helps differentiate between high and low-ability individuals in markets characterized by information asymmetry. This notion is based on the idea that education reflects cognitive ability, problem-solving skills, and strategic thinking —essential components for effective leadership. Therefore, CEO certification involves a degree of information asymmetry between the executive and external investors. Consequently, the stock market's reaction to such accreditation depends on the level of credibility investors attribute to the CEO (Zhang & Wiersema, 2009).

### B. Hypothesis Development

#### *1. The Relationship Between CEO Education and Financial Performance*

Previous studies have indicated that CEO education may influence corporate financial performance. Hambrick and Mason (1984) argue that education reflects an individual's knowledge and skills, which in turn affect how they make decisions and manage companies. However, empirical findings on this relationship are inconsistent—some studies support a positive link, while others find no significant or even negative effects.

Several studies provide evidence that highly educated CEOs positively influence financial performance. According to Upper Echelons Theory, a leader's knowledge and experience shape their strategic thinking and decision-making, thereby enhancing firm outcomes (Wang, et al., 2016). Cheng et al. (2010), analyzing Chinese listed firms between 1999-2005, found that CEOs with university degrees were positively associated with key financial indicators such as EPS, ROA, cumulative abnormal returns, EPS growth, ROA growth, and market-to-book ratios. Hazzaa et al. (2024), conducting on 43 listed private banks in Iraq from 2018 to 2022,

found that CEO education has a positive and statistically significant impact on the financial performance of the banks. Similarly, Darmadi (2013) found that in developing economies, CEOs with higher education levels often implemented investment-attracting strategies that improved financial performance, as measured by ROA and Tobin's Q. In contrast, Cash (2024), examining 509 hospitals across nine U.S. states, found that those led by CEOs holding PhDs had, on average, a 0.40% lower profit margin compared to hospitals led by CEOs without PhDs.

However, not all studies reach the same conclusion. Cheng et al. (2020), in their analysis of U.S. firms from 1992-2014, observed that while higher CEO education was positively related to ROE, it also increased firm risk, suggesting that more capable CEOs might make bolder decisions, leading to higher financial volatility. Elsharkawy et al. (2018), studying UK-listed banks from 2005-2015, found that business-specialized education had a positive effect on Tobin's Q and net interest margins but no significant impact on ROA or ROE. Lu and Zhang (2015), examining Chinese firms from 2003-2012, concluded that highly educated CEOs enhanced market valuation but had no substantial impact on accounting profits or growth. These results imply that investors may view education as a positive signal, but it doesn't necessarily translate into real financial improvements. Saidu (2019), using data from Nigerian listed firms (2011-2016), found a positive association between CEO education and ROA, but no significant effect on stock prices or ROE. Ghardallou (2022) also concluded that CEOs with postgraduate degrees (MBA, Master's, PhD) did not significantly affect accounting-based performance (ROA, ROE) but did improve firm value measured by Tobin's Q. Morresi (2017), analyzing 612 listed firms in the UK, France, Italy, Spain, Germany, and the Netherlands (2006-2015), found similar results: highly educated CEOs did not significantly affect accounting performance but had a positive relationship with market value.

Conversely, some studies argue that CEO education has no significant impact on financial performance. Gottesman and Morey (2006) found that firms led by CEOs with MBAs or law degrees did not outperform those led by CEOs without postgraduate education. Bhagat et al. (2010) also found no significant association between CEO education and long-term firm performance, suggesting that academic qualifications may not reliably indicate managerial competence. Ofe (2012), analyzing 100 firms listed on the Stockholm Stock Exchange (2008-2010), also found no statistically significant relationship between CEO education and ROA. El Abiad et al. (2024), examining 71 family businesses listed on Euronext between 2021 and 2022, found that a CEO with a postgraduate degree or not has no significant effect on financial performance, as indicated by ROA and ROE.

In sum, the relationship between CEO education and firm financial performance remains contentious and inconclusive. While some studies support the positive role of higher education, others highlight inconsistent results depending on performance metrics and contextual factors. Some evidence even suggests that education may influence market perception more than actual firm outcomes. Based on these mixed findings, this study proposes the following hypothesis:

**Hypothesis 1:** Higher CEO educational attainment is associated with improved firm financial performance.

### *2. The Nonlinear Relationship Between CEO Education and Financial Performance*

Previous research has also highlighted the complex, potentially nonlinear nature of the relationship between CEO education and firm performance. When education is categorized by degree levels—bachelor's, master's, and doctorate—their impacts appear to differ. King et al. (2016) developed a CEO education index classifying education into three types: undergraduate education provides a basic foundation and general skills; MBA programs emphasize management and advanced business knowledge; doctoral programs reflect deep technical expertise.

Their findings suggest that CEOs with MBAs positively influence ROA, while bachelor's and doctoral degrees do not significantly improve performance.

Urquhart and Zhang (2022) analyzed CEO education in 350 FTSE-listed companies (1999-2017) and found no significant effects for bachelor's, master's, or MBA degrees on ROA, but CEOs with doctoral degrees significantly enhanced firm performance. Similarly, Jalbert et al. (2010) examined large U.S. companies (1997-2006) using ROA, ROE, and ROI, concluding that postgraduate degrees improved firm performance, whereas bachelor's degrees offered limited support in corporate management. However, they also noted that postgraduate degrees had no significant impact on ROA and ROI, and were negatively associated with ROE. This may reflect Mintzberg and Lampel's (2001) critique that many MBA-led firms fail due to overemphasis on theory over practice.

Altuwaijri and Kalyanaraman (2020) argued that CEOs with undergraduate degrees could improve firm performance (ROA, ROE), while MBAs showed no significant financial benefit. These findings suggest that higher education does not always translate into better corporate leadership.

In conclusion, the relationship between CEO education and financial performance is complex and nonlinear. Although higher education is generally expected to enhance performance, its actual effect depends on factors such as managerial experience, industry context, and the ability to apply knowledge in practice. Thus, to assess the true role of education, it is essential to consider complementary factors. Based on the above discussion, this study proposes the following hypothesis:

**Hypothesis 2:** The relationship between CEO educational attainment and firm financial performance is nonlinear.

# III. Research Methodology

## A. Research Model

This study employs multivariate regression analysis, as multiple explanatory variables are involved. To establish a linear relationship between CEO education and firm financial performance, CEO education is quantified in terms of years of schooling, while firm performance is assessed using both accounting and market-based indicators. The general regression equation is:

$$PER_{i,t} = \beta_0 + \beta_1 EDU_{i,t} + \sum \theta_j (Control)_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where PER represents the dependent variable (firm performance), EDU denotes CEO educational background, and Control includes board size, duality, CEO age, leverage, firm size, and operating cash flow.

The study also examines whether the relationship between CEO education and firm performance is nonlinear. Following Plassmann and Khanna (2007), a quadratic regression model is used, which is a common approach to estimate non-monotonic relationships. The model is as follows:

$$PER_{i,t} = \beta_0 + \beta_1 EDU^2_{i,t} + \sum \theta_j (Control)_{i,t} + \varepsilon_{i,t} \quad (2)$$

## B. Variable Measurement

The study uses both dependent and independent variables. The dependent variables reflect firm financial performance, while the main independent variable captures the CEO's educational background. Control variables are included to assess the effects of other factors on firm performance. Both continuous and dummy variables are used to ensure a comprehensive analysis.

### *1. Dependent Variable: Firm Performance*

The study uses both accounting-based and market-based measures to assess firm performance.

The accounting measure is return on assets (ROA), calculated as net income divided by total assets (Saidu, 2019). ROA captures short-term operational efficiency but does not reflect market perceptions. To address this limitation, the study also includes a market-based measure: the market-to-book value ratio (MVBV), which represents the firm's market value relative to its book value. Market value, reflected in stock prices, signals investor interest and market reactions to firm performance (Saidu, 2019). Compared to accounting measures, market-based measures are considered more reliable as they are less influenced by managerial discretion (Roy, 2016; Siddiqui, 2015).

*2. Independent Variable: CEO Educational Background*

Following studies by Amore et al. (2019), Hamori and Koyuncu (2015), and Zhou et al. (2021), CEO education is categorized into bachelor's, postgraduate, master's, and doctoral levels and measured by years of formal schooling. According to Decision No. 1981/QD-TTg (October 18th, 2016) of the Prime Minister on the national education framework, an individual typically requires 12 years to graduate from high school or vocational school, and 16-17 years to complete a bachelor's degree. Bachelor's programs usually last four years, while specialized programs such as engineering, pharmacy, or medicine may require five years. A traditional master's degree requires two additional years. A doctoral degree, the highest level of education, requires at least 22 years of schooling. The study focuses on the total number of years a CEO has spent in formal education from primary school through the highest level attained.

*3. Control Variables*

To accurately estimate the impact of CEO education on firm performance, the study controls for several governance and firm-specific characteristics. Governance variables include: board size (BS), CEO-chair duality (duality), and CEO age (AGE). Firm-specific characteristics include financial leverage (LEV), operating cash flow (CFO), and firm size (FS). Variables are measured as shown in Table 1.

## C. Data Collection

This study collects data using two methods: manual collection and extraction from the FinPro software. Corporate governance information, including board composition and CEO characteristics such as educational background and age, is manually collected from annual reports and corporate governance reports of publicly listed firms on company websites and reputable financial platforms such as cafef.vn and finance.vietstock.vn. Financial data, meanwhile, is extracted from FinPro. According to the State Securities Commission of Vietnam, as of 2022, there were 400 firms listed on HOSE, 341 on HNX, 857 on UPCoM, and 10 ETFs. After excluding firms

**Table 1.** Variable measurement

| Variable | Measurement | Source |
|---|---|---|
| ROA | Net income / Total assets | Saidu (2019) |
| MVBV | Market value / Book value of equity | Roy (2016) |
| EDU | Years of schooling: 12 (secondary), 16-17 (bachelor's), 18-19 (master's), 22-23 (PhD) | Zhou et al. (2021); Amore et al. (2019) |
| BS | Number of board members | Tang et al. (2020) |
| LEV | Total debt / Total assets | Zhou et al. (2021) |
| Duality | Dummy variable: 1 if CEO is also board chair, 0 otherwise | Tang and Chen (2020) |
| AGE | CEO's age in years | Yim (2013) |
| FS | Natural logarithm of total assets | Mashayekhi and Bazaz (2008) |
| CFO | Operating cash flow value | Liman and Mohammed (2018) |

in the finance, insurance, and banking sectors, as well as firms established after 2013 or lacking data, the final sample comprises 203 non-financial firms listed on the HNX during the period 2013-2022, yielding a total of 2,030 firm-year observations. Regarding CEO education, data is categorized into four levels: below university, university, master's, and doctorate. The results show that most CEOs have at least a university degree, with a relatively high proportion holding master's degrees. Although few CEOs hold doctoral degrees, this reflects a growing trend of appointing top executives with strong academic qualifications.

### D. Research Approach and Data Analysis Techniques

The dataset is first screened for validity, and outliers are treated using the winsorization method (5%-95% for ROA and CFO; 1%-99% for MVBV). After adjustments, the data are suitable for regression analysis. Hypothesis testing is conducted using panel data regressions, including OLS, Fixed Effects Model (FEM), and Random Effects Model (REM). However, endogeneity issues may still exist due to reverse causality, measurement errors, or time-invariant omitted variables (Wintoki et al., 2012), potentially making OLS, FE, and RE estimates inconsistent (Akhtar et al., 2022; Baltagi, 2008). To address these concerns, the study adopts the System GMM approach (Arellano & Bover, 1995; Blundell & Bond, 1998). Prior to this, the 2SLS method (ivregress 2sls) is applied to test for endogeneity using first differences as instruments, along with Durbin-Wu-Hausman and Wald tests.

The GMM technique accommodates lagged dependent and endogenous variables and controls for first-order (AR(1)) and second-order (AR(2)) autocorrelation (Arellano & Bond, 1991). The validity of GMM estimates is ensured if there is no significant AR(2) autocorrelation (Akhtar et al., 2022). The study applies system GMM on dynamic panel data of 203 non-financial firms. Equation (1) estimates the linear effect of CEO education on performance, while Equation (2) tests for nonlinearity by including the squared term of CEO education. Lagged dependent variables are included to capture dynamic effects over time.

## IV. Research Results and Discussion

### A. Descriptive Statistics

Table 2 shows that the average MVBV is 0.82 (ranging from 0.09 to 4.30), while the average ROA is 5%, with a range from -0.01 to 0.19. The average board size is 5.19 members (ranging from 3 to 9), reflecting variations in governance structures. Only 17% of CEOs simultaneously serve as board

**Table 2.** Descriptive statistics

| Variable | N | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| MVBV | 2,030 | 0.82 | 0.73 | 0.09 | 4.30 |
| ROA | 2,030 | 0.05 | 0.05 | -0.01 | 0.19 |
| EDU | 2,030 | 17.19 | 1.29 | 12 | 23 |
| BS | 2,030 | 5.19 | 0.92 | 3 | 9 |
| FS | 2,030 | 26.46 | 1.38 | 23.33 | 30.92 |
| Age | 2,024 | 48.83 | 8.40 | 24 | 73 |
| Duality | 2,030 | 0.17 | 0.38 | 0 | 1 |
| LEV | 2,030 | 0.49 | 0.24 | 0.01 | 1.38 |
| CFO (in billions) | 2,030 | 30 | 81.8 | -101 | 273 |

chairpersons, indicating a relatively high level of power separation. The average CEO age is 48.83 (ranging from 24 to 73), reflecting generational diversity. Operating cash flow (CFO) shows high variability, while the average firm size is 26.46 (ranging from 23.33 to 30.92), indicating operational scale differences. Average financial leverage is 0.49 (ranging from 0.01 to 1.38), reflecting differences in capital structure. The average CEO education level is 17.19 years, corresponding to at least a university degree.

Moreover, the average number of schooling years for CEOs is 17.19 (standard deviation = 1.29), reflecting relatively low dispersion. Percentile statistics reveal that 25% of CEOs have fewer than 16 years of education, while the median is 17 years, indicating that most CEOs have postgraduate education. Notably, 75% have 18 years or more, suggesting that many hold master's degrees or higher. The range spans from 12 to 23 years, illustrating substantial variation in education, from high school to doctoral or postdoctoral levels. The distribution of EDU is right-skewed (Skewness = 1.66), indicating that most CEOs have below-average education years, although a few have exceptionally high levels. Kurtosis is 7.36, exceeding the normal distribution threshold, suggesting a high concentration of CEOs with similar education levels, along with a few outliers.

Table 3 presents the correlation matrix. CEO education (EDU) is negatively correlated with MVBV (-0.04) and ROA (-0.09). No correlation exceeds 0.8, indicating no sign of multicollinearity (Tabachnick & Fidell, 2019). To further confirm, variance inflation factors (VIFs) were calculated for all explanatory variables. All VIFs are below 10, within acceptable thresholds, confirming the absence of multicollinearity (Gujarati, 2002).

## B. Regression Results

### *1. Linear Effects of CEO Education on Firm Performance*

The study initially performs OLS, FEM, and REM regressions using two performance measures: ROA and MVBV. The Breusch-Pagan test is used to choose between OLS and REM, while the Hausman test determines the choice between FEM and REM. F-tests suggest FEM is preferable to OLS. Overall, FEM is selected as the optimal model.

To address model validity, the Wooldridge test is used to detect autocorrelation, and the Wald test assesses heteroskedasticity. Results confirm the presence of both issues. To mitigate potential endogeneity, the 2SLS (ivregress 2sls) method is employed, using first-differenced values of suspected endogenous variables as instruments. The Durbin-Wu-Hausman test identifies firm size (FS) as endogenous in both the ROA and MVBV models. Therefore, the study applies the System GMM approach using lagged values (1-3 years) of FS as

**Table 3.** Correlation matrix

| Variable | MVBV | ROA | EDU | BS | FS | Age | Duality | LEV | CFO |
|---|---|---|---|---|---|---|---|---|---|
| MVBV | 1 | | | | | | | | |
| ROA | 0.27 | 1 | | | | | | | |
| EDU | -0.04 | -0.09 | 1 | | | | | | |
| BS | 0.07 | 0.10 | 0.02 | 1 | | | | | |
| FS | -0.04 | -0.20 | 0.19 | 0.15 | 1 | | | | |
| Age | 0.04 | 0.30 | -0.10 | 0.06 | -0.16 | 1 | | | |
| Duality | -0.09 | 0.07 | -0.01 | 0.00 | -0.13 | 0.20 | 1 | | |
| LEV | -0.13 | -0.46 | 0.13 | -0.01 | 0.52 | -0.15 | -0.05 | 1 | |
| CFO | -0.01 | 0.12 | 0.12 | 0.15 | 0.38 | 0.02 | -0.07 | 0.09 | 1 |

instruments. Table 4 presents the regression results for equations (1a) and (1b), corresponding to ROA and MVBV.

To validate the GMM models, the Arellano-Bond test is used. Results show first-order autocorrelation (AR(1)) with p-values = 0.000, which is expected in first-differenced equations. The AR(2) test shows no significant autocorrelation for MVBV (p = 0.976) and ROA (p = 0.342), confirming the absence of second-order autocorrelation. The Sargan test also supports the validity of the instruments, with p-values = 0.060 (MVBV) and 0.136 (ROA), both above 0.05. Thus, the null hypothesis of instrument validity is not rejected.

Regression results indicate differences in how CEO education affects firm performance depending on the measure used. For ROA, the coefficient on CEO education is positive and statistically significant at the 1% level (p = 0.003), suggesting that additional years of CEO education are associated with improved profitability. This may be because highly educated CEOs are better at implementing accounting and strategic policies that enhance profitability. These findings align with previous studies by Cheng et al. (2010) and Darmadi (2013).

**Table 4.** Impact of CEO education on firm performance

| Variable | (1a) ROA | (1b) MVBV |
|---|---|---|
| L1.ROA | 0.989*** (0.000) | |
| L1.MVBV | | 0.520*** (0.000) |
| BS | 0.003* (0.043) | 0.018 (0.272) |
| Duality | 0.001 (0.655) | -0.048 (0.194) |
| Age | -0.000 (0.578) | 0.003* (0.058) |
| CFO | 7.2e-14*** (0.000) | -3.7e-14 (0.101) |
| **EDU** | **0.003***** (0.003) | **-0.002** (0.892) |
| FS | -0.013*** (0.008) | 0.083 (0.288) |
| LEV | 0.017 (0.459) | -0.36 (0.126) |
| _CONS | 0.263** (0.016) | -1.78 (0.320) |
| N | 1822 | 1822 |
| Instruments | 11 | 11 |
| AR(1) | 0.001 | 0.000 |
| AR(2) | 0.342 | 0.976 |
| Sargan test | 0.136 | 0.06 |

*Note: ***, *, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Conversely, in the MVBV model, CEO education has a negative but statistically insignificant effect. This implies that CEO education does not directly influence firm market value from investors' perspectives. A plausible explanation is that highly educated CEOs may focus more on long-term strategies and operational fundamentals rather than short-term market value maximization. This result is consistent with Bhagat et al. (2010), who found no significant link between CEO education and long-term financial performance. In particular, in a market like Vietnam, individual investors account for a large proportion and often react to short-term information, crowd effects, or easily observable financial indicators, rather than thoroughly assessing governance factors such as education levels (Phan et al., 2023). This further reinforces the reason why the impact of CEO education on MVBV may be weak or insignificant.

### *2. Nonlinear Impact of CEO Education on Firm Performance*

The study incorporates the squared term of CEO education in the model to examine potential nonlinear effects. The regression results for equations (2a) and (2b), corresponding to ROA and MVBV, respectively, are presented in Table 5.

Table 5 presents the one-step system GMM estimates for the ROA and MVBV models. The models pass key diagnostic tests, including the absence of second-order autocorrelation and the validity of the instrument set, thereby ensuring result reliability.

The regression results show that the number of

years of CEO education (EDU) has a negative and statistically significant impact on ROA at the 5% level (p = 0.011), suggesting that higher educational attainment may initially reduce firm performance in the short term—possibly due to CEOs focusing on long-term strategies rather than short-term profitability. However, the squared term of CEO education ($EDU^2$) is positive and statistically significant at the 1% level (p = 0.005), indicating a U-shaped nonlinear relationship between CEO education and firm performance. That is, at low or moderate levels of education, the impact on performance is negative, but beyond a certain threshold, higher education leads to performance improvements.

**Table 5.** Nonlinear effects of CEO education on firm performance

| Variable | (2a) ROA | (2b) MVBV |
|---|---|---|
| ROA L1 | 0.969*** (0.000) | |
| MVBV L1 | | 0.527*** (0.000) |
| Boardsize | 0.003** (0.031) | 0.019 (0.230) |
| Duality | -0.002 (0.603) | -0.040 (0.179) |
| Age | 0.000 (0.596) | 0.003* (0.073) |
| CFO | 7.14e-14*** (0.000) | -3.6e-13 (0.111) |
| EDU | -0.036** (0.011) | -0.293* (0.073) |
| $EDU^2$ | 0.001*** (0.005) | 0.008* (0.070) |
| FS | -0.012*** (0.008) | 0.077 (0.322) |
| LEV | 0.016 (0.462) | -0.327 (0.157) |
| _CONS | 0.616*** (0.000) | 0.998 (0.592) |
| N | 1822 | 1822 |
| Instruments | 12 | 12 |
| AR(1) | 0.000 | 0.000 |
| AR(2) | 0.339 | 0.962 |
| Sargan test | 0.175 | 0.052 |

*Note: ***, *, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

A similar pattern emerges in the MVBV model: EDU has a negative coefficient (p = 0.073), while $EDU^2$ has a positive coefficient (p = 0.070), again suggesting a nonlinear effect. At lower levels of education, MVBV tends to decline, perhaps because more educated CEOs are more cautious or long-term oriented. However, once education surpasses a certain point, their knowledge and experience enable better strategic decisions, leading to increased market value.

The U-shaped relationship for both ROA and MVBV can be interpreted using the turning point formula proposed by Plassmann and Khanna (2007):

$$X = \frac{\beta 1}{(-2\beta 2)}$$

The turning point for MVBV is approximately 18.37 years of education, and for ROA it is around 16.78 years. According to the study's classification, 16-19 years of education corresponds to postgraduate (master's level) study, depending on the field. This suggests that the impact of CEO education is not linearly progressive, but rather there exists an optimal threshold. Graduates with only a bachelor's degree may lack practical experience, resulting in negative effects, but as CEOs further enhance their knowledge, their ability to apply it effectively improves firm performance.

## V. Conclusion and Research Implications

This study investigates the impact of CEO educational attainment on the performance of non-financial firms listed on the Hanoi Stock Exchange (HNX) from 2013 to 2022. Education is measured by the number of years of formal schooling. The findings yield two key insights:

First, higher CEO education is positively associated with accounting-based performance measures (ROA), but not with market-based measures (MVBV). This

may be because CEOs with strong academic backgrounds are more adept at applying accounting and financial techniques to optimize profitability. However, investors may not perceive educational qualifications as a decisive factor when valuing firms, leading to limited impact on market value.

Second, the study reveals a U-shaped nonlinear relationship between CEO education and firm performance. In the early stages, education may have a negative impact due to the CEO's focus on long-term goals rather than short-term gains. However, once education reaches a certain threshold (typically postgraduate level—around 17-19 years), its effect becomes positive. At this stage, CEOs are likely to combine specialized knowledge with real-world experience, leading to improved business outcomes.

The empirical findings of this study yield several notable implications for corporate governance and executive development policies.

First, firms should adopt a holistic approach in executive selection by considering both the educational attainment of CEOs and the way such qualifications are interpreted by external stakeholders, particularly investors. While formal education contributes to internal management efficiency, its signaling effect on market perception may vary and should be carefully evaluated in appointment decisions.

Second, executive training and development programs should not be limited to technical or academic instruction. Instead, they should incorporate modules on financial communication, investor engagement, and strategic disclosure practices. Enhancing CEOs' capabilities in these areas can strengthen investor confidence and align managerial actions with shareholder expectations.

Third, the nonlinear relationship identified between CEO education and firm performance underscores the importance of complementing formal academic qualifications with practical managerial experience. Organizations should therefore facilitate opportunities for experiential learning, mentorship, and strategic exposure, particularly for executives at early and mid-career stages. Such initiatives can help bridge the gap between theoretical knowledge and its effective application in dynamic business environments.

Despite the use of one-step system GMM to address endogeneity, the issue of heteroskedasticity is not fully resolved. Future studies may apply two-step GMM for greater efficiency and accuracy. Moreover, expanding the scope to include other CEO characteristics such as leadership experience or management style may offer a more holistic view of executive impact on firm performance. Additionally, examining the role of education across different industry sectors may shed light on how the impact of academic attainment varies by context.

## Conflicts of Interest

No potential conflict of interest was reported by the author(s)

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