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**Operational Cost Management Efficiency and Economic Value Creation:
The Mediating Role of Financial Flexibility in Nasdaq Listed Firms**

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Abstract: This paper investigates the influence of operational cost management efficiency on Economic Value Added (EVA) in 36 non-financial firms listed in the Nasdaq exchange through financial flexibility as a mediating variable. The empirical analysis is based on a balanced panel of 36 firms observed annually from 2020 to 2024 (yielding 180 firm-year observations). Principal component analysis is employed to generate the operational cost efficiency index and the financial flexibility index. Fixed effects regression analysis and Sobel mediation test are used. It was found that operational efficiency significantly influences EVA positively ($\beta=0.234$, $p<0.01$) and financial flexibility positively ($\beta=1.813$, $p<0.05$); however, financial flexibility significantly influences EVA negatively ($\beta=-0.008$, $p<0.05$) demonstrating competitive mediation (mediation ratio 6.59%). Financial flexibility does not necessarily increase value since effective capital allocation is essential. Managers should adopt dynamic capital allocation strategies, set investment hurdle rates for excess liquidity, integrate EVA into performance evaluation and executive compensation systems, and optimize rather than maximize liquidity buffers by weighing their insurance value against opportunity costs. Large firms should decentralize decision-making and implement divisional EVA targets to mitigate organizational inertia.

كفاءة إدارة التكاليف التشغيلية وخلق القيمة الاقتصادية: الدور الوسيط للمرونة المالية في الشركات المدرجة في بورصة ناسداك

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المستخلص

تهدف هذه الدراسة إلى تحليل أثر كفاءة إدارة التكاليف التشغيلية في القيمة الاقتصادية المضافة (EVA) لدى (36) شركة غير مالية مدرجة في سوق ناسداك، مع التركيز على دور المرونة المالية بوصفها متغيراً وسيطاً في العلاقة محل الدراسة. التصميم/المنهجية/الأسلوب: اعتمدت الدراسة على بيانات السلاسل الزمنية المقطعية (Panel Data) المتوازنة خلال الفترة (2020-2024)، بإجمالي (180) مشاهدة شركة-سنة. وتم بناء مؤشرين مركبين لكل من كفاءة إدارة التكاليف التشغيلية والمرونة المالية باستخدام تحليل المكونات الرئيسية (PCA) كما طبقت نماذج الانحدار ذات التأثيرات الثابتة مع الأخطاء المعيارية من نوع (Driscoll-Kraay)، فضلاً عن استخدام اختبار سوبل (Sobel Test) لتحليل أثر الوساطة. النتائج: أظهرت النتائج وجود أثر إيجابي مباشر ومعنوي لكفاءة إدارة التكاليف التشغيلية في القيمة الاقتصادية المضافة ($\beta = 0.234$)، وكذلك في المرونة المالية ($\beta = 1.813$)، ($p < 0.01$)، وفي المقابل، تبين أن المرونة المالية تؤثر سلباً وبشكل معنوي في القيمة الاقتصادية المضافة ($\beta = -0.008$)، ($p < 0.05$)، مما يشير إلى وجود وساطة تنافسية (Competitive Mediation) بنسبة وساطة بلغت (6.59%) الأصول/القيمة: توضح الدراسة أن المرونة المالية ليست بالضرورة عاملاً معززاً للقيمة، إذ قد تتأكل المكاسب المتحققة من الكفاءة التشغيلية في حال عدم كفاءة تخصيص رأس المال، مما يبرز أهمية الإدارة الرشيدة للموارد المالية في تعظيم القيمة الاقتصادية المضافة. الأهمية التطبيقية: توصي الدراسة المديرين بتبني استراتيجيات ديناميكية لتخصيص رأس المال، واعتماد القيمة الاقتصادية المضافة (EVA) بوصفها مقياساً لتقييم الأداء، بما يساهم في تعزيز كفاءة استخدام الموارد وتعظيم قيمة المنشأة.

الكلمات المفتاحية: كفاءة إدارة التكاليف التشغيلية؛ القيمة الاقتصادية المضافة؛ المرونة المالية؛ الوساطة التنافسية.

1. Introduction

The contemporary business environment is marked by fast-paced technological disruptions, stiff competition and financial fluctuations. The outbreak of the COVID-19 (2020) and subsequent Federal Reserve tightening measures (2022-2024) have dramatically changed corporate finance environment of technology-based Nasdaq-listed firms (Bates et al., 2009). This calls for reappraisal of financial and operating strategies to support business value. Creation of economic value measured in excess of WACC returns has become the core concern in corporate finance literature (Stewart, 1991; Stern et al., 1995; Al-Shammari & Al Yahya, 2021).

Creation of economic value involves effective financing and management of operating resources. In terms of the Resource-Based View (RBV) paradigm, cost efficiency of operations constitutes an inimitable, strategic competence which boosts competitive advantage (Barney, 1991; Banker et al., 2014). Cost efficiency goes beyond mere cost reduction and encompasses efficient allocation and process improvement, resulting in increased cash flow and profitability (Horngren et al., 2021; Kaplan & Atkinson, 2015). Operating efficiency is particularly crucial for sustainability and wealth maximization of Nasdaq-listed firms characterized by high intensity of research and development, fast obsolescence of technologies and financial instability (Ince & Iskenderoglu, 2025).

Financial flexibility defined as a capacity of a firm to access financial market and change leverage and liquidity without high costs (Myers & Majluf, 1984; DeAngelo & Roll, 2015) acts as a strategic buffer against uncertainty (Byoun, 2011; Al-Shammari & Al Yahya, 2021). While precautionary liquidity safeguards the firm from credit rationing (Opler et al., 1999; Bates et al., 2009), its capacity for economic value generation is contingent upon efficiency of capital allocation. Firms with financial flexibility maintain investments in crises while constrained firms underinvest (Ferrando et al., 2017).

EVA is the best measure of assessing financial performance since it includes returns above the cost of capital including equity and debt (Ismail, 2006; Uyemura et al., 1996). Contrary to traditional measures (e.g., Earnings Per Share (EPS)) EVA involves both management of operating resources and financing. Although academic literature is increasingly concerned about the interaction of operational cost efficiency and financial flexibility, there is a lack of investigation of their interrelation with EVA especially for innovative companies listed at Nasdaq and subject to dynamic changes in the financing environment. The 2020-2024 period is an interesting case of a natural experiment: liquidity increases due to the pandemic followed by the fastest rate hiking cycle in four decades changed the cost of financial flexibility. This study addresses the question whether financial flexibility works in coordination with or against operational efficiency in creation of economic value.

2. Theoretical Framework and Literature Review: This study involves three theoretical frameworks. According to the Resource-Based View (RBV), cost management efficiency is a valuable, rare and inimitable resource for organizations which improves competitive advantage (Barney, 1991; Banker et al., 2014). Efficient cost structure leads to improvement in margins and asset turnover ratio which increases Net Operating Profit After Tax (NOPAT) and reduces invested capital, both improving EVA (Lev, 1974). On the other hand, Agency Theory is the rationale behind EVA superiority to accounting profitability since the former internalizes the cost of capital and minimizes manager incentives for overinvestment of free cash flows (Jensen & Meckling, 1976; Jensen, 1986). Trade-off and Pecking Order theories explain the concept of financial flexibility through tax benefits and bankruptcy costs (Kraus & Litzenberger, 1973) and information asymmetry (Myers & Majluf, 1984) respectively.

According to the Resource-Based View (RBV), valuable, rare and inimitable resources such as cost efficiency provide competitive advantage (Barney, 1991). Agency theory explains why EVA should be used instead of accounting profitability since the former internalizes the cost of capital (Jensen & Meckling, 1976). Financial flexibility is explained by Trade-off and Pecking Order theories through tax benefits, bankruptcy costs and information asymmetry (Kraus & Litzenberger, 1973; Myers & Majluf, 1984).

Cost management efficiency goes beyond cost reduction and includes strategic alignment, optimization of value chain and process improvement (Hornigren et al., 2021; Kaplan & Atkinson, 2015). Effective cost structures improve margins, cash flows and asset productivity, which increases NOPAT and reduces invested capital thus directly improving EVA (Lev, 1974; Ince & Iskenderoglu, 2025).

Financial flexibility gives the company a chance to survive in case of shocks and capitalize on investment opportunities (Denis & McKeon, 2012; Marchica & Mura, 2010). While liquidity buffer helps to mitigate credit rationing (Opler et al., 1999; Bates et al., 2009), too much flexibility can create agency problem. For example, according to Jensen's (1986) free cash flow hypothesis, the extra liquidity can be used for empire building and

negative-NPV investments especially by growth-oriented companies like Nasdaq (Harford, 1999). Economic profit is calculated using EVA approach which discounts a capital charge from NOPAT (Stewart, 1991). Financial flexibility helps to create economic value through real options (Trigeorgis, 1996) although this effect largely depends on quality of the financial slack usage. While efficient operation generates financial flexibility (Pecking Order Theory), only its productive use creates value (Zhao et al., 2010). However, during 2022–2024 the rise in interest rates increased the opportunity cost of liquidity.

Economic profit is calculated using EVA approach which discounts a capital charge from NOPAT (Stewart, 1991). Financial flexibility helps to create economic value through real options (Trigeorgis, 1996) although this effect largely depends on quality of the financial slack usage. While efficient operation generates financial flexibility (Pecking Order Theory), only its productive use creates value (Zhao et al., 2010). However, during 2022–2024 the rise in interest rates increased the opportunity cost of liquidity.

3. Hypotheses Development: Drawing on the theoretical foundations outlined above specifically the Resource-Based View (RBV), Agency Theory, Trade-off Theory, and Pecking Order Theory the following hypotheses are formulated. RBV suggests that cost efficiency is a strategic resource that enhances competitive advantage and, consequently, economic value. Agency Theory underscores the importance of EVA as a metric that internalizes capital costs, while Trade-off and Pecking Order theories highlight the dual role of financial flexibility as both a strategic buffer and a potential source of agency costs. These theoretical linkages guide the logical progression from operational efficiency to financial flexibility and, ultimately, to EVA.

3-1. The Relationship Between Operational Cost Management Efficiency and Economic Value Creation: Operational efficiency in cost management is related to EVA. Ineffective cost management leads to lower NOPAT and higher capital costs, which directly decrease economic value (Barney, 1991; Banker et al., 2014).

H1: Operational cost management efficiency positively impacts economic value creation.

3-2. Operational Cost Management Efficiency and Financial Flexibility:

Cost management efficiency positively impacts financial flexibility. Efficient operating cash flow means that there is less need for external funding, hence financial slack (Myers & Majluf, 1984; DeAngelo & DeAngelo, 2007).

H2: Cost management efficiency positively impacts financial flexibility.

3-3. The Relationship Between Financial Flexibility and Economic Value Creation:

It is argued that financial flexibility will affect economic value creation. Financial flexibility can allow for investments and guard against underinvestment (Trigeorgis, 1996; Ferrando et al., 2017). But the sign of financial flexibility is ambiguous because of agency costs (Jensen, 1986). But if financial flexibility is created without consideration of operational requirements and is used ineffectively, it can increase the opportunity cost of liquidity, and agency issues may decrease economic value (Jensen, 1986; Opler et al., 1999) especially at times of increased interest rates.

H3: Financial flexibility significantly affects economic value creation but the sign is empirically established.

3-4. The Mediating Role of Financial Flexibility: Financial flexibility moderates the impact of operational efficiency on EVA. While operational efficiency generates resources, the mediation may be competitive if flexibility is misallocated (Zhao et al., 2010).

H4: Financial flexibility mediates the relationship between efficient operational cost management and economic value creation.

4. Research Methodology

4-1. Research Design and Overview: This study employs a balanced panel research design covering the period 2020–2024. The positivist, deductive approach is adopted, utilizing quantitative secondary financial data to test pre-existing theoretical relationships between operational cost management efficiency, financial flexibility, and Economic Value Added (EVA). Panel data estimation is used to enhance precision, control for unobserved heterogeneity, and capture firm-level dynamics. The analysis proceeds in three stages: (1) descriptive statistics and diagnostics; (2) estimation of three sequential fixed-effects panel regressions to identify direct and mediating

effects; and (3) robustness checks using alternative standard error specifications.

4-2. Population, Sample, and Sampling Technique: The population of the present study is comprised of firms listed on the Nasdaq Stock Market. This choice is justified by the fact that Nasdaq is one of the largest and most transparent stock markets globally, where high levels of disclosure and reliability of financial reporting practices together with high availability of firm-level financial information are observed.

Purposive sampling procedure was used since the research necessitates having complete and consistent financial information of firms to develop multidimensional operational efficiency measures, financial flexibility measures, and EVA. It would be impossible to obtain all the required variables using random sampling method.

Criteria for sample selection are as follows:

- ❖ The availability of complete annual audited financial reports for the period from 2020 to 2024.
- ❖ Continuous listing of firms on Nasdaq during the whole period of the study.
- ❖ The availability of all the information needed for the calculation of EVA, operational efficiency measures, and financial flexibility measures.
- ❖ The exclusion of financial institutions and banks due to specific regulatory framework, capital structure, and financial reports.

As a result of sample selection, the sample comprises 36 firms listed on Nasdaq, yielding rise to the balanced panel of 180 firm-year observations (36 firms × 5 years).

4-3. Data Sources and Collection Procedures: Secondary financial data were collected from audited annual financial statements and credible financial databases for 36 Nasdaq-listed non-financial firms over the period 2020–2024, yielding 180 firm-year observations. The data were organized into a balanced panel and transformed to construct the study variables. As operational efficiency and financial flexibility are multidimensional constructs, Principal Component Analysis (PCA) was applied to the full panel to generate composite index scores from the first principal component.

4-4. Variable Measurement and Operational Definitions

4-4-1. Dependent Variable: Economic Value Added (EVA): The Economic Value Added (EVA) is used as the dependent variable as it can be seen to be a value-oriented performance metric that is used to measure how well companies create returns that are higher than the cost of the invested capital. It differs from conventional accounting measures by taking into consideration the cost of capital.

The formula for EVA is defined as the NOPAT less the capital cost of invested capital where WACC is incorporated in the equation (Li, 2023; Zhang & Huang, 2023; Johan, 2018):

$$EVA_{it} = NOPAT_{it} - (Invested\ Capital_{it} \times WACC_{it})$$

The weighted average cost of capital is calculated by using the Capital Asset Pricing Model (CAPM) in lieu of ROE in determining the cost of equity owing to the theoretical weaknesses of the latter as a proxy of the cost of equity and Damodaran's equity risk premium with a one-year delay to maintain a consistent time frame in relation to the financial data. The daily price and returns of stocks and indexes needed for CAPM have been consistently gathered and manipulated through Google Sheets. In addition, the formula for calculating WACC is:

$$WACC_{it} = (E_{it}/V_{it} \times R_{e,it}) + (D_{it}/V_{it} \times R_{d,it} \times (1-T_{it})), \text{ where } V_{it} = E_{it} + D_{it}$$

The EVA concept is regarded as a strong value-based performance measurement tool because it transcends conventional accounting profit measurements through its consideration of the cost of the total capital invested, with positive EVA representing the creation of value, while negative EVA represents the destruction of value (Zhang & Huang, 2023; Lalo & Cahyaningsih, 2022).

4-4-2. Independent Variable: Operational Cost Management Efficiency (OCM_EFFICIENCY): Cost Management Operational Effectiveness means that the firm is effective in strategic planning, monitoring, and controlling of operational costs for better resource usage and value creation. Cost management operational effectiveness allows firms to be profitable, have good competition performance, and have sustainable financial performance because of effective resource usage (Horngren et al., 2021;

Kaplan & Atkinson, 2015). In line with the cost management research, this multidimensional variable is assessed by means of four indicators:

- ❖ **Cost of Goods Sold Ratio (COGSR):** Measures production costs relative to sales revenue and reflects the firm's efficiency in controlling direct production costs.
- ❖ **Operating Profit Margin (OPM):** Captures the firm's ability to convert sales revenue into operating profit and serves as a key indicator of operational performance.
- ❖ **Operating Expense Ratio (OER):** Measures operating expenses relative to revenue, where lower values indicate more effective cost control.
- ❖ **Asset Turnover (AT):** Evaluates the efficiency with which the firm's assets are utilized to generate sales revenue, reflecting the effectiveness of resource utilization.

Prior to conducting Principal Component Analysis (PCA), the Cost of Goods Sold Ratio (COGSR) and the Operating Expense Ratio (OER) were reverse-coded because higher values of these ratios indicate lower operational efficiency. This transformation guaranteed that larger values for all the four indicators would indicate greater cost management efficiency and make the construction and interpretation of the composite index easier.

A composite index that would account for the variance of four indicators with minimized dimensions and redundancy while capturing their shared variability was created using the Principal Components Analysis (PCA). It is suitable in this case due to its capacity to capture the shared variability of correlated indicators while creating a concise and statistically robust composite index of the construct (Jolliffe, 2002; Hair et al., 2022). The first principal component that accounted for the maximum variance was used as the composite index of the Operational Cost Management Efficiency.

Table (1): Results of Principal Component Analysis (PCA) and Sample Adequacy Tests for Constructing the Operational Cost Management Efficiency Index

Panel A: PCA Eigenvalues and Variance Explained					
Component	Eigenvalue	Difference	Proportion	Cumulative	
Comp1	1.9147	0.9174	0.4787	0.4787	
Comp2	0.9973	0.3822	0.2493	0.7280	
Comp3	0.6152	0.1423	0.1538	0.8818	
Comp4	0.4728	.	0.1182	1.0000	
Panel B: Principal Component Eigenvectors (Loadings)					
Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
COGSR	-0.6021	0.0741	0.1063	0.7878	0
OPM	0.0691	0.9958	0.0393	-0.0461	0
OER	0.5708	0.0096	-0.6346	0.521	0
AT	0.554	-0.0536	0.7645	0.3252	0
Panel C: Factor Test & Sampling Adequacy Measures					
Statistical Test	Value	Interpretation			
Determinant of the Correlation Matrix	0.555	Well above zero, indicating no extreme multicollinearity.			
Bartlett's Test of Sphericity (Chi-square / p-value)	82.819 (p = 0.000)	Statistically significant, rejecting H0 (variables are intercorrelated).			
Kaiser-Meyer-Olkin (KMO) Measure	0.665	above the 0.5 threshold.			

The factor analysis results in the table indicate strong consistency among operational variables and their high capacity to explain shared variance, thereby justifying the adoption of this composite index as a precise and reliable measure of operational cost management efficiency.

4-4-3. Mediating Variable: Financial Flexibility (FIN_FLEXIBILITY): Financial flexibility can be defined as a firm's ability to raise funds internally, remain liquid, and take advantage of finance when needed. It helps firms cope with any financial disruptions and make investments that are profitable without relying too much on external funding, as suggested by the extant literature (Bancel & Mittoo, 2011; Chen, 2025; Hess & Immenkötter, 2014; Lee, 2023; Nkeng & Forzeh, 2025):

❖ Current Ratio: $CR_{it} = \text{Current Assets}_{it} / \text{Current Liabilities}_{it}$

- ❖ Operating Cash Flow Ratio: $OCFR_{it} = \text{Operating Cash Flow}_{it} / \text{Current Liabilities}_{it}$
- ❖ **Unused Debt Capacity (Target Leverage Gap):** $SDC_{it} = \text{Target Leverage}_{it} - \text{Actual Leverage}_{it}$, representing the financing space available to the firm to raise leverage when needed, a dynamic measure that shifts with the firm's operational and investment circumstances rather than a deviation from a fixed target (Denis & McKeon, 2012; Marchica & Mura, 2010; DeAngelo & Roll, 2015).

Table 2. Results of Principal Component Analysis (PCA) and Sample Adequacy Tests for Constructing the Financial Flexibility Index

Panel A: PCA Eigenvalues and Variance Explained				
Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.806	1.0874	0.602	0.602
Comp2	0.7187	0.2433	0.2396	0.8416
Comp3	0.4753	.	0.1584	1
Panel B: Principal Component Eigenvectors (Loadings)				
Variable	Comp1	Comp2	Comp3	Unexplained
Current Ratio	0.6275	-0.0519	0.7769	0
Operating Cash Flow Ratio	0.5406	0.7471	-0.3868	0
Unused Debt Capacity	-0.5603	0.6627	0.4969	0
Panel C: Factor Test & Sampling Adequacy Measures				
Statistical Test	Value	Interpretation		
Determinant of the Correlation Matrix	0.617	Well above zero, indicating no extreme multicollinearity.		
Bartlett's Test of Sphericity (Chi-square / p-value)	85.5670 (p = 0.000)	Statistically significant, rejecting H0 (variables are intercorrelated).		
Kaiser-Meyer-Olkin (KMO) Measure	0.62	above the 0.5 threshold.		

The table above demonstrates the success of Principal Component Analysis (PCA) and sample adequacy tests in extracting a unified financial flexibility index, with KMO values exceeding acceptable statistical thresholds, confirming the sub-variables' efficiency in reliably capturing corporate financial capacity.

4-4-4. Control Variables: For controlling the effect of operating efficiency and financial flexibility on EVA, the following control variables have been taken into account:

Firm Size (SIZE): The size of the firm is measured as the natural logarithm of total assets:

Large firms can derive benefit from the economies of scale, but on the other hand, they suffer from organizational complexity.

Market-to-Book Ratio (MTB)

$MTB_{it} = \text{Market Value}_{it} / \text{Book Value}_{it}$

Growth opportunities are an important feature of capital-structure theories and are used as a proxy variable for growth opportunities of a firm (Lee, 2023; Chen, 2025). The growth opportunities of the firm can be captured by MTB.

Leverage (LEV): Debt-to-Asset Ratio is measured as:

$LEV_{it} = \text{Total Debt}_{it} / \text{Total Assets}_{it}$

The leverage variable controls for the impact of capital structure on EVA, since highly levered firms may suffer from constraints of financial capability (Jensen & Meckling, 1976).

Firm Growth (GROWTH): Growth of a firm is calculated as the year-over-year percentage change in the sales revenue:

$GROWTH_{it} = (\text{Sales}_{it} - \text{Sales}_{i,t-1}) / \text{Sales}_{i,t-1}$

In order to calculate this growth lag for the first year of the study period (2020), data on sales for the prior year (2019) was gathered; the 2019 data is utilized only in the calculation of growth rate for 2020 and was dropped from the final dataset of 180 observations. Growth accounts for differences in growth opportunities between firms, following the growth opportunities literature (Myers, 1977).

4-5. Data Pre-processing Procedures: Prior to estimation, the following pre-processing steps were undertaken: (i) data completeness checks to maintain the balanced panel structure; (ii) Winsorization at the 1st and 99th percentiles to mitigate outlier effects without discarding observations; (iii) Z-score standardization of continuous variables to ensure comparability across scales; (iv) separate PCA on operational efficiency and financial flexibility indicators, with the first principal component retained as the composite index for each construct; and (v) diagnostic testing for heteroskedasticity, autocorrelation, and cross-sectional dependence.

4-6. Diagnostic and Pre-Estimation Tests: Diagnostic tests confirmed the absence of serious multicollinearity ($VIF < 10$), supported the use of fixed-effects over random-effects (Hausman test), and detected significant cross-

sectional dependence (Pesaran CD = 2.045, $p = 0.041$). While the Modified Wald test indicated groupwise heteroskedasticity, the Wooldridge test failed to reject the null of no first-order serial correlation. Given the short time dimension ($T = 5$), panel unit root tests were omitted following Bond (2002) and Baltagi (2013). Consequently, Driscoll–Kraay standard errors were employed to account for heteroskedasticity and cross-sectional dependence.

4-7. Panel Regression Model Specification: To examine the direct and indirect relationships among operational efficiency, financial flexibility, and EVA, three sequential fixed-effects panel regression models were estimated. All models include firm fixed effects and year fixed effects to control for unobserved time-invariant firm characteristics and common annual shocks.

Model 1: Direct Effect of Operational Cost Management Efficiency on EVA

$$EVA_{it} = \beta_0 + \beta_1 OCM_EFFICIENCY_{it} + \beta_2 SIZE_{it} + \beta_3 MTB_{it} + \beta_4 LEV_{it} + \beta_5 GROWTH_{it} + \sum_t \delta_t Year_t + \varepsilon_{it}$$

This model examines whether operational cost management efficiency has a direct effect on Economic Value Added.

Model 2: Effect of Operational Cost Management Efficiency on Financial Flexibility

$$FIN_FLEXIBILITY_{it} = \beta_0 + \beta_1 OCM_EFFICIENCY_{it} + \beta_2 SIZE_{it} + \beta_3 MTB_{it} + \beta_4 LEV_{it} + \beta_5 GROWTH_{it} + \sum_t \delta_t Year_t + \varepsilon_{it}$$

This model examines whether operational efficiency contributes to firms' financial flexibility.

Model 3: Mediating Effect of Financial Flexibility

$$EVA_{it} = \beta_0 + \beta_1 OCM_EFFICIENCY_{it} + \beta_2 FIN_FLEXIBILITY_{it} + \beta_3 SIZE_{it} + \beta_4 MTB_{it} + \beta_5 LEV_{it} + \beta_6 GROWTH_{it} + \sum_t \delta_t Year_t + \varepsilon_{it}$$

This model evaluates whether financial flexibility explains the mechanism through which operational efficiency affects EVA.

4-8. Mediation Analysis Procedure: Mediation is assessed using the three-step regression framework of Baron & Kenny (1986). The statistical significance of the indirect effect is tested using the Sobel (1982) test. Independently of this significance test, the direction and pattern of the direct and indirect effects are classified following the typology proposed by Zhao, Lynch, and Chen (2010) as complementary (direct and indirect effects of the same sign, both significant), competitive (direct and indirect effects of opposite signs, both significant), indirect-only, or direct-only non-mediation.

It is worth noting that Zhao et al. (2010) advocate bootstrap resampling procedures for establishing the significance of the indirect effect, primarily to relax the assumption that the sampling distribution of the indirect effect is normal. The adoption of the Zhao et al. (2010) typology in the present study concerns the classification of the mediation pattern only and does not require the adoption of bootstrap resampling for significance testing; the two are separate methodological choices. The rationale for retaining the Sobel test as the significance-testing procedure is detailed in Section 3.9.

3.9 Estimation Technique and Robustness Checks

It has been observed that the Sobel test tends to be conservative, as it has less power, accompanied with low levels of Type I error rate as compared to bootstrap tests (MacKinnon et al., 2002). The conservatism of the test suggests that an indirect effect identified through the test was done so despite and not due to the fact that the test was less powerful.

5. Empirical Results and Hypothesis Testing

5-1. Descriptive Statistics and Correlation Analysis

5-1-1. Descriptive Analysis: The descriptive statistics for the research variables are presented in Table 3 below. The EVA variable is characterized by considerable variation (Mean = 9,301.44, SD = 16,623.74, Min = -643.45, Max = 63,122.26), suggesting that the level of value created varies significantly between firms in the sample. Firm size (Mean = 10.52) and leverage (Mean = 0.399) show the presence of diversified firms in terms of size and capital structure. To control for comparability, all continuous variables were standardized to Z-scores before estimation (Gujarati & Porter, 2009; Wooldridge, 2013).

Table (3): Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
EVA	180	9301.44	16623.74	-643.45	63122.26
OCM_EFFICI~Y	180	-0.23	0.29	-0.78	0.41
FIN_FLEXIB~Y	180	1.84	0.58	0.98	3.36
SIZE	180	10.52	1.20	8.20	13.24
MTB	180	4.74	2.47	1.49	12.40
LEV	180	0.40	0.12	0.21	0.62
GROWTH	180	0.08	0.08	-0.09	0.34

5-1-2. Correlation Analysis: The correlation matrix that is shown in Table (4) represents the level of linear association among the variables utilized in this research. This analysis serves as a preliminary diagnostic test that aims to explore any relationships and also identify the presence of multicollinearity.

Table (4): Pearson Correlation Matrix

Variable	EVA	OCM_EFFICIY	FIN_FLEXIBY	SIZE	MTB	LEV	GROWTH
EVA	1.000						
OCM_EFFICIY	0.395	1.000					
FIN_FLEXIBY	0.177	-0.018	1.000				
SIZE	0.667	0.548	0.004	1.000			
MTB	0.452	0.334	0.046	0.459	1.000		
LEV	-0.240	-0.177	0.033	-0.257	0.125	1.000	
GROWTH	0.037	-0.008	0.027	-0.022	0.000	0.053	1.000

The correlation matrix for the Pearson correlation is displayed in Table 4. It can be seen from the findings that there is a positive correlation between the efficiency of operational cost management and EVA ($r = 0.395$), as suggested by the Resource-Based View (Barney, 1991). Firm size has a positive correlation with EVA ($r = 0.667$) and OCM_EFFICIENCY ($r = 0.548$). Leverage has a negative correlation with EVA ($r = -0.240$) as per the agency theory (Jensen & Meckling, 1976). None of the correlation coefficients are greater than multicollinearity cut-off values ($VIF < 10$).

5-2. Regression Results and Hypothesis Testing: Table (5) contains the results of the fixed effects panel regression models estimated using the Driscoll-Kraay estimator to analyze the direct impacts and mediation effects between the research variables. Standardization was done for all continuous variables by means of the Z-score before estimation to enable comparability between the different variables. Therefore, the estimated coefficients provide information on the direction and magnitude of the impact of the variables.

Table (5): Fixed-Effects Panel Regression Results Using Driscoll–Kraay Standard Errors

Variable	Model 1			Model 2			Model 3		
	Coef.	Std. Err.	t-value	Coef.	Std. Err.	t-value	Coef.	Std. Err.	t-value
Constant	-0.027**	0.007	-3.89	-0.448**	0.098	-4.57	-0.030**	0.007	-4.47
OCM_EFFICIENCY	0.220***	0.040	5.53	1.813**	0.576	3.15	0.234***	0.044	5.27
FIN_FLEXIBILITY	-	-	-	-	-	-	-0.008**	0.002	-3.35
SIZE	-0.094*	0.041	-2.29	-3.026**	0.820	-3.69	-0.117*	0.040	-2.93
MTB	0.012	0.009	1.33	0.344*	0.137	2.51	0.014	0.010	1.44
LEV	0.040	0.029	1.39	0.905**	0.200	4.54	0.047	0.030	1.57
GROWTH	0.030***	0.005	6.14	0.154	0.094	1.63	0.031**	0.006	5.53
Number of obs	180			180			180		
Number of groups	36			36			36		
F value	160.12			16.97			173.93		
Prob > F	0.000			0.008			0.000		
within R-squared	0.205			0.118			0.217		
Year	Yes			Yes			Yes		
*** p<0.01; ** p<0.05; * p<0.10									

The regression results reported in Table 3 provide the empirical evidence for testing the proposed hypotheses. The following sections discuss the findings of each model in detail.

5-2-1. Analysis of First Hypothesis Testing Results: The first hypothesis examined the direct effect of Operational Cost Management Efficiency (OCM_EFFICIENCY) on Economic Value Added (EVA). As reported in Model 1, the coefficient of OCM_EFFICIENCY is positive and statistically significant ($\beta = 0.220$, $t = 5.53$, $p < 0.01$), indicating that improvements in operational cost management efficiency significantly enhance firms economic value creation. Specifically, this coefficient reflects the robust positive association between cost management efficiency and EVA based on within-firm variations. Accordingly, the first hypothesis is supported. Regarding the control variables, firm growth exhibits a positive and statistically significant relationship with EVA ($\beta = 0.030$, $t = 6.14$, $p < 0.01$), suggesting that firms with higher growth opportunities generate greater economic value. firm size has a negative coefficient ($\beta = -0.094$, $t = -2.29$),

whereas market-to-book ratio (MTB) and leverage (LEV) do not show statistically significant effects. The overall model is statistically significant ($F = 160.12$, $p < 0.001$), with a within R^2 of 0.205, indicating that approximately 20.5% of the within-firm variation in EVA is explained by the independent and control variables.

5-2-2. Analysis of Second Hypothesis Testing Results: The second hypothesis investigated the effect of Operational Cost Management Efficiency on Financial Flexibility. Model 2 shows that OCM_EFFICIENCY has a positive and statistically significant impact on financial flexibility ($\beta = 1.813$, $t = 3.15$, $p < 0.05$). It should be noted that this standardized coefficient exceeds unity, which is a mechanical consequence of the interaction between total-sample Z-score standardization and within-firm fixed-effects demeaning; because the mediator's standardized units reflect total sample variance while the fixed effects estimator operates on within-firm deviations, the resulting coefficient does not violate standard regression assumptions but rather represents a scale artifact common in standardized fixed effects panel models (Wooldridge, 2013). It should be noted that this standardized coefficient exceeds unity, which is a mechanical consequence of the interaction between total-sample Z-score standardization and within-firm fixed effects demeaning; because the mediator's standardized units reflect total sample variance while the fixed effects estimator operates on within-firm deviations, the resulting coefficient does not represent a violation of standard regression assumptions but rather a scale artifact common in standardized fixed effects panel models (Wooldridge, 2013). The above output proves that high operational cost management efficiency has a significant relationship with financial flexibility at firm level either through liquidity, ability to finance, or financial strength. Thus, the second hypothesis is confirmed. The significant variables among the control variables include firm size and leverage, where firm size negatively influences financial flexibility ($\beta = -3.026$, $t = -3.69$, $p < 0.05$), and leverage positively influences financial flexibility ($\beta = 0.905$, $t = 4.54$, $p < 0.01$). On the other hand, market-to-book ratio has a positive impact, but firm growth does not have a significant relationship. The model is significant ($F = 16.97$, $p = 0.008$) with 11.8% explanatory power for within financial flexibility (Within $R^2 = 0.118$).

5-2-3. Analysis of Third Hypothesis Testing Results: Hypothesis Three investigated whether Financial Flexibility mediates the relationship between Operational Cost Management Efficiency and EVA. Using Baron and Kenny's mediation model (1986), Model 3 involves both the independent and the mediating variables. According to the results, Operational Cost Management Efficiency still has a positive and statistically significant influence on EVA ($\beta = 0.234$, $t = 5.27$, $p < 0.01$) implying that improvement of operational cost management efficiency directly improves firms' economic value added after controlling for financial flexibility and other explanatory variables.

On the other hand, Financial Flexibility has a statistically significant negative influence on EVA ($\beta = -0.008$, $t = -3.35$, $p < 0.05$). Thus, after controlling for operational cost management efficiency, an increase in the level of financial flexibility leads to a decrease in Economic Value Added. This might be explained by the fact that keeping excess liquidity or the ability to borrow can be costly or imply conservatism, which does not contribute to value added at the time of the research.

Statistical significance of the mediation was tested using the Sobel test. According to the results, the indirect effect of operational cost management efficiency on EVA through financial flexibility is statistically significant ($z = -2.47$, $p = 0.013$). Since the direct effect of operational cost management efficiency is still positive and statistically significant, while the indirect effect transmitted through financial flexibility is negative and statistically significant, the mediation is considered to be competitive (inconsistent) mediation according to the classification of Zhao et al. (2010). Hence, operational cost management efficiency has a positive direct effect and a negative indirect effect on Economic Value Added mediated through financial flexibility.

As for the control variables, firm growth still has a statistically significant positive impact ($\beta = 0.031$, $t = 5.53$, $p < 0.01$), while the size of the firm exerts a negative and statistically significant effect ($\beta = -0.117$, $t = -2.93$, $p < 0.05$). Both market-to-book ratio (MTB) and leverage (LEV) have no statistically significant impact on EVA. Additionally, the overall model proves to be highly statistically significant ($F = 173.93$, $p < 0.001$) and within R^2 equals 0.217.

6. Discussion, Conclusion and Recommendations

6-1 Discussion: This study examines the impact of operational cost management efficiency on EVA for Nasdaq-listed firms (2020–2024), highlighting the mediating role of financial flexibility. The period is of special interest as it includes expansionary monetary policy (2020–2021) and rapid tightening (2022–2024). It would be interesting to examine whether the value relevance of financial flexibility depends on the opportunity cost of liquid funds, which has rarely been studied in previous literature.

Our findings confirm that operational cost management efficiency significantly and positively affects EVA ($\beta = 0.220$, $p < 0.01$), consistent with the Resource-Based View (Barney, 1991) and prior studies (Osazefua, 2019; Lee, 2023). Efficient resource utilization provides profits in excess of the cost of capital, especially in technology-intensive industries. This relationship is statistically significant and economically meaningful since the standard deviation of the efficiency in managing operational costs leads to 0.22 standard deviation of the EVA change. Following the resource-based theory, operational efficiency cannot be viewed only as a tool to reduce costs but as a strategic resource that helps achieve effectiveness and productivity. It also turns out that operational efficiency results in higher financial flexibility ($\beta = 1.813$, $p < 0.05$), thus supporting the pecking order theory (Myers & Majluf, 1984) and the dynamic trade-off theory (DeAngelo & Roll, 2015). Operationally efficient firms provide additional operating cash flows and have lower leverage ratios and thus keep unused debt capacity. This result is in line with DeAngelo & DeAngelo (2007) and Marchica & Mura (2010), who state that financial flexibility allows firms to manage risks and take advantage of investment opportunities. Additionally, this result proves that operational efficiency is among mechanisms used by firms to accumulate financial resources, which was especially important for Nasdaq firms surviving the pandemic shock in 2020–2021.

However, the novelty of the paper is due to competitive mediation of financial flexibility (Sobel Test: $Z = -2.47$, $p = 0.013$). Competitive mediation ratio is equal to 6.59%, meaning that 6.6% of the total effect of operational efficiency on EVA is mediated by a negative indirect channel. While operational efficiency increases EVA directly ($\beta = 0.234$, $p < 0.01$), financial flexibility has a negative influence ($\beta = -0.008$, $p < 0.05$). In other words, accumulation of liquidity or unused debt without value-creating

investments destroys economic value, consistent with the free cash flow hypothesis stated by Jensen (1986). In 2022–2024, due to rising interest rates, the opportunity cost of holding cash became higher, making this value destruction even more prominent. Thus, the strategic value of operational efficiency consists of two sides: while it creates value due to cost savings, its effect on EVA through financial flexibility requires balancing risk management and capital efficiency.

Moreover, such competitive mediation also fits the recent literature related to the dark side of financial flexibility. While Al-Shammari & Al-Yahya (2021) and Bancel & Mittoo (2011) proved that financial flexibility helps increase liquidity and investment capacity in normal conditions, Eldomiaty et al. (2026) and Johan (2018) discovered that excessive debt capacity and negative EVA despite positive ROE emerge due to inefficient allocation of financial resources. While previous research established that financial flexibility increases liquidity and investment capacity in normal conditions, our paper expands it by showing that the potential of financial flexibility to destroy value is not a static characteristic of poorly governed firms but an active mediation mechanism which can offset the value created by operational efficiency. Thus, the relation between operational efficiency and EVA is conditional: it depends on how efficiently the financial resources accumulated due to operational efficiency are being allocated and utilized. Concerning control variables, firm growth has a positive effect on EVA ($\beta = 0.031$, $p < 0.01$), thus supporting the growth options theory by Myers (1977), whereas firm size has a negative impact on financial flexibility and EVA ($\beta = -0.117$, $p < 0.05$), capturing the small-firm effect on Nasdaq. Large firms suffer from organizational inertia and delays in capital allocation, thus hampering the effect of operational efficiency on EVA (Banz, 1981). The insignificant values of MTB and leverage confirm the dynamic adjustment of capital structure to operational shocks, not static targets (DeAngelo & Roll, 2015).

To conclude, operational excellence is a necessary but insufficient condition for value creation. The firms need to complement their efficiency with the efficient capital allocation, making sure that the generated cash flows are reinvested in value-creating projects rather than kept as unused liquidity. Financial flexibility should not be considered as a target of

accumulation but as a tool which needs to be reinvested quickly to ensure the creation of EVA in the highly volatile environment.

6-2. Conclusion: This study has been devoted to the role of financial flexibility as the mediating factor in the relationship between operational cost management efficiency and EVA for the companies listed at the Nasdaq Stock Market from 2020 to 2024. It has provided convincing evidence for the fact that cost management efficiency is a significant driver of EVA that is one of the major factors of value creation. At the same time, the research has revealed the complicated competitive mediation mechanism when operational efficiency works as the two-sided factor of financial flexibility. Despite the fact that cost management efficiency is the main factor of the creation of free internal resources, the findings of this study have demonstrated that high liquidity or borrowing capacity has a negative influence on the value of EVA. This refutes the idea that "the more flexibility the better". On the contrary, from the viewpoint of contingency approach, the value of financial flexibility is determined by the difference between the marginal productivity of financed capital and the costs of its financing. In addition to the extra safety from the side of financial flexibility, it is necessary to take into account its cost that consists of the postponing of investments in high-yielding projects. The inefficiency of the process of operation cannot be enough; it is necessary to establish the optimal combination between the protection from flexibility and its cost. Thus, the interaction of operational efficiency and financial flexibility can be characterized by the "paradox of value" when the resources that provide flexibility are the reasons for the value destruction.

6-3. Implications and Recommendations

- 1. Dynamic Capital Allocation:** Rather than accumulating liquidity traditionally, companies have to consider dynamic capital allocation strategy. Investment hurdle rate procedures should be set up in order to allocate any excess liquidity over certain threshold into predefined strategic operations like research and development, strategic acquisitions, or buy-back of shares. Thus, financial flexibility will not just act as an insurance but as the tool to create value. Excess financial flexibility creates insignificant negative effect on EVA. Therefore, it should be used efficiently in innovative projects in case of the rising interest rates.

2. **Optimizing Financial Flexibility:** Firms should stop trying to maximize liquidity and start optimizing it instead. Managers should estimate the marginal advantage of the liquidity (its insurance value) in comparison with the marginal cost of it (WACC less return on liquid assets). In case of increasing interest rates, such analysis has to be done on quarterly basis in order to make sure that liquidity does not become a burden but remains a value added resource.
3. **EVA-Driven Incentive Systems:** In order to make sure that managers' decisions will correspond with the shareholders' interests, it is recommended to introduce EVA as a tool for the performance measurement and executive compensation. EVA driven incentive systems like EVA bonus banks and stock options related to EVA improvement will make sure that managers take the cost of capital into account (Stewart, 1991; Stern et al., 1995). This is especially relevant in case of Nasdaq listed firms under earnings pressure.
4. **Reducing Size Effect:** In case of big Nasdaq firms, decision making should be decentralized and divisional EVA targets introduced in order to reduce inertia and speed up capital allocation process (Kaplan & Atkinson, 2015). Moreover, implementation of ZBB or ABC systems can help big firms to keep cost discipline of their small competitors.
5. **Building Up Internal Capabilities:** Taking into account the fact that the internal factors have more influence on the EVA creation than the external ones, it is recommended to focus on building up internal capabilities regarding cost control and financial discipline. Introduction of ERP solutions, RPA, and advanced analytics will improve cost transparency and cash flow predictability (Ince & Iskenderoglu, 2025). Sound internal infrastructure based on cost control is much more reliable tool for value creation than dependence on the market situation.
6. **Future Research:** Future research has to be done in terms of specific industry-related financial flexibility thresholds and identification of "point of no return" in terms of which liquidity stops being beneficial. Besides, it is interesting to study corporate governance mechanisms like independent boards and institutional ownership in terms of how they moderate the relationship between financial flexibility and EVA. Also, future research should examine the influence of digitization and introduction of artificial intelligence on the efficiency of operations, financial flexibility, and EVA. The influence of digitization on value transfer is another field of

investigation, especially in terms of Nasdaq firms, using machine learning for their cost management process.

6-4. Limitations: A key limitation is that the statistical significance of the indirect effect was established via the Sobel (1982) test, which is premised on the assumption of asymptotic normality of the sampling distribution of the indirect effect. This particular strategy represents a certain methodological choice because it was chosen due to the relatively large sample size ($n = 180$) and the conservativeness of the Sobel test compared to other tests (MacKinnon et al., 2002). The current study used the aforementioned approach as a stringent justification rather than a lenient one for the hypothesis of mediation (see Section 3.9). However, bootstrap resampling techniques, which do not rest upon this particular assumption, constitute an important methodological innovation that might be pursued in the future.

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