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Working Capital Management and Value Creation: Evidence from an Emerging Economy

Gestión del Capital Circulante y Creación de Valor: Evidencia de una Economía Emergente

I. INTRODUCTION

Working capital management has been placed at the center of corporate finance, and its role has been emphasized in contexts where short-term resources must be balanced against operational needs (Gitman, 1974; Deloof, 2003). In economies where external financing is costly or limited, internal capital has been relied upon to protect liquidity and to sustain operations, and the importance of effective short-term asset and liability management has been highlighted in both theoretical and empirical studies (Jensen, 1986; Deloof, 2003). Empirical work has also shown that the effects of working capital policies vary across firms and sectors, which suggests that simple, uniform prescriptions for cash conversion or net working capital may misstate managerial performance if firm heterogeneity is ignored (Lazaridis & Tryfonidis, 2006; Enqvist, Graham, & Hikkinen, 2014).

Vietnam has been chosen as the study setting because it has been observed that internal capital allocation continues to matter strongly for many firms as market institutions and financing channels evolve, and because a mixture of state-owned, equitized, and private firms is present in the listed sector (Nguyen & Ramachandran, 2006). The Hanoi Stock Exchange has been used as the sampling frame for listed non-financial firms, and firm-level variation in governance, ownership form, and access to finance has been noted in prior work on Vietnamese enterprises (World Bank, 2025). These features make Vietnam a useful case to test whether working capital practices are equally effective across different financial circumstances.



EXECUTIVE SUMMARY

This study examines how the efficiency of working capital management (WCM) influences shareholder value in Vietnam, an emerging economy where internal capital allocation is critical. A panel of 150 non-financial firms listed on the Hanoi Stock Exchange from 2015 to 2024 is used, with firms classified annually as financially healthy, distressed, or bankrupt using the Altman Z-score. Unlike prior research that treats financial health as a control, it is used as a central focus. WCM efficiency is measured by residual-based metrics, Efficiency of Net Working Capital (ENWC) and Efficiency of Cash Conversion Cycle (ECCC), which account for firm-specific operational factors. Results show that WCM efficiency positively affects shareholder value only in financially healthy firms; no significant relationship is found in distressed or bankrupt firms. This suggests that the benefits of working capital optimization depend on a firm's capacity to implement these strategies effectively. The study contributes by combining firm-level health segmentation with refined efficiency measures and highlights the enabling role of technology, such as ERP systems and AI tools, in maximizing WCM effectiveness when financial conditions are stable.

RESUMEN DEL ARTÍCULO

Este estudio analiza cómo la eficiencia de la gestión del capital de trabajo (WCM) influye en el valor para los accionistas en Vietnam, una economía emergente donde la asignación interna de capital es fundamental. Se utiliza un panel de 150 empresas no financieras que cotizan en la Bolsa de Hanói entre 2015 y 2024, clasificadas anualmente como financieramente sanas, en dificultades o en quiebra mediante el índice Z de Altman. A diferencia de estudios anteriores que tratan la salud financiera como una variable de control, aquí se considera un elemento central. La eficiencia del WCM se mide mediante indicadores basados en residuos, la Eficiencia del Capital de Trabajo Neto (ENWC) y la Eficiencia del Ciclo de Conversión de Efectivo (ECCC), que incorporan factores operativos específicos de cada empresa. Los resultados muestran que la eficiencia del WCM afecta positivamente al valor para los accionistas únicamente en las empresas financieramente sanas; no se observa una relación significativa en las empresas en dificultades o en quiebra. Esto indica que los beneficios de optimizar el capital de trabajo dependen de la capacidad de cada empresa para aplicar estas estrategias de manera efectiva. El estudio contribuye al combinar la segmentación por salud financiera con medidas refinadas de eficiencia y resalta el papel facilitador de la tecnología, como los sistemas ERP y las herramientas de inteligencia artificial, en la mejora del WCM cuando las condiciones financieras son estables.

The usual empirical tests of working capital effects have tended to assume that policy effects are uniform across firms. A segmentation strategy is proposed here so that the effectiveness of working capital management can be assessed as conditional on a firm's financial state. The Altman Z-score has been selected as a rule-based indicator for classifying firms by financial health because of its long history in solvency diagnostics and its widespread use in empirical work on default risk (Altman, 1968).

Measurement has been strengthened by the use of residual-based efficiency indicators that capture deviations of actual working capital and cash conversion behaviour from levels expected given firm

fundamentals. Such residual measures have been used in related literatures to separate managerial performance from structural firm characteristics (Tong, 2008; Martínez-Solano & García-Teruel, 2013). The present approach therefore measures working capital performance relative to a firm-specific baseline, which reduces the risk that scale, sector norms, or accounting practices will be mistaken for managerial skill.

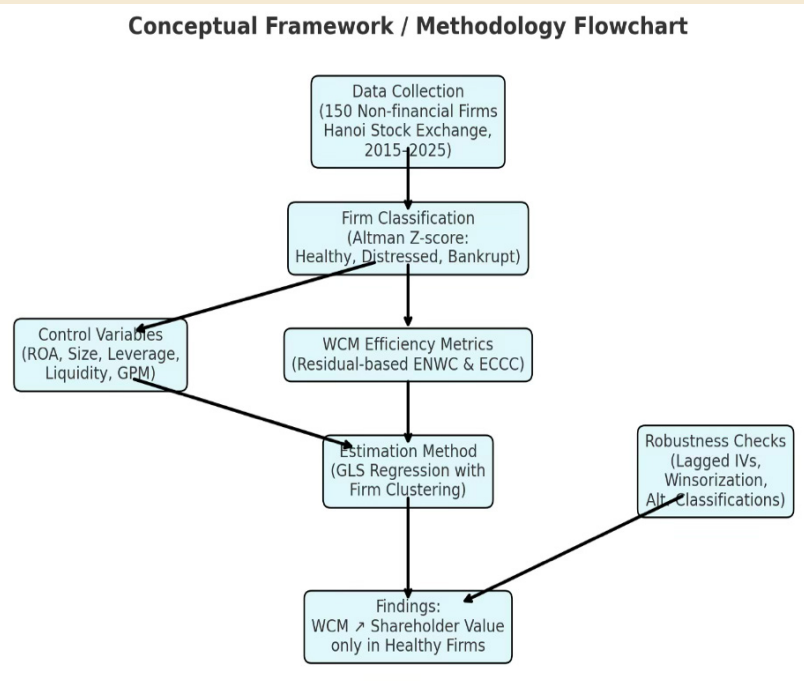
Digital tools and real-time systems have been reported to improve short-term financial operations where such tools are available. At the same time, digital transformation has been uneven, and firms with limited capital or governance weaknesses have often been slower to adopt enterprise resource planning (ERP) systems and advanced forecasting tools (World Bank, 2025; Poveda-Larrosa & Sogorb-Mira, 2023). To reflect this, a technological dimension is incorporated as a moderating factor in the analysis.

This study therefore examines whether efficiency in working capital management contributes to shareholder value, and whether that contribution depends on financial health and on technology adoption. By combining dynamic health segmentation with residual-based measures and a digitalization indicator, the investigation is intended to provide a clearer account of when working capital choices are likely to be translated into market valuation gains.

Figure 1 presents an overview of the research design, illustrating the steps from firm classification through estimation and interpretation.

The usual empirical tests of working capital effects have tended to assume that policy effects are uniform across firms.

Figure 1. Conceptual framework and methodological flowchart



KEYWORDS

Altman Z-Score, Digital Transformation, Vietnam, Financial Health, Shareholders Value.

PALABRAS CLAVE

Puntuación Z de Altman, Transformación digital, Vietnam, Salud financiera, Valor para el accionista.

2. LITERATURE REVIEW AND HYPOTHESES

The role of working capital management (WCM) in firm performance has been examined for many decades. Early diagnostic tools for firm solvency and liquidity were developed and widely used (Altman, 1968; Gitman, 1974). Short-term asset and liability choices were shown to affect profit and value, and the cash conversion cycle (CCC) and related measures were adopted as central operational indicators. Evidence was produced that shorter CCCs are often linked to higher accounting profitability, while sector features were shown to modify the size and direction of effects (Lazaridis & Tryfonidis, 2006; Deloof, 2003).

Theories from corporate finance were used to explain why working capital choices matter. Agency accounts indicated that excess free cash could produce inefficient investment behaviour in the absence of constraints (Jensen, 1986). The precautionary motive was advanced in the liquidity literature, where holding extra cash was shown to be a rational response to uncertainty (Fazzari & Petersen, 1993). These perspectives imply that working capital policies should be judged relative to firm circumstances rather than by a single universal rule.

Many theoretical contributions emphasize the role of financial constraints in shaping shareholder value, especially in emerging markets with limited capital access and market imperfections (Almeida, Campello & Weisbach, 2004; Kaplan & Strömberg, 2003). These studies argue that efficient working capital management alleviates internal liquidity shortages and reduces dependence on costly external finance, thereby enhancing firm valuation conditional on financial health. Consequently, shareholder value creation under these constraints is not uniform but depends on a firm's financial capacity to deploy working capital strategies effectively (Chauhan & Banerjee, 2018; Huynh et al., 2025).

Empirical work has broadened this view. An optimal range for working capital was proposed, with both over-investment and under-investment shown to reduce value in some settings (Baños-Caballero, García-Teruel, & Martínez-Solano, 2014; Aktas, Croci, & Petmezas, 2015). Evidence from emerging markets documented that credit constraints, ownership forms, and institutional features alter the returns to working capital adjustments (Kieschnick, Laplante & Moussawi, 2013; Enqvist, Graham & Hikkinen, 2014).

Measurement refinements were proposed to separate managerial effectiveness from structural firm characteristics. Residual-based measures and benchmarked deviations were introduced so that observed working capital positions could be compared with expected levels given size, growth and sector norms (Martínez-Solano & García-Teruel, 2013). This strategy reduces the risk that scale effects or industry norms will be mistaken for managerial skill (Aktas, Croci, & Petmezas, 2015).

Region-specific studies for Vietnam have been reported and are directly relevant for the present study. Evidence was produced that working capital components and CCC adjustments mattered for firm profitability in country samples (Nguyen, Pham, & Nguyen, 2020). Sectoral studies were published for fertilizer and steel firms, documenting industry differences in liquidity–profit links (Nguyen, Vu, & Nguyen, 2022; Pham, Nguyen & Nguyen, 2020). More recent work used Vietnamese firm-level data to show that firms adjusted cash cycles in response to banking-sector uncertainty, and that cash-cycle behaviour was associated with firm value during periods of elevated uncertainty (Huynh & Phan, 2024; Huynh, 2024). The findings for Vietnam indicated that WCM effects were conditioned by capital structure, sector, and access to finance.



The role of information systems and digital tools was emphasized in policy reports and research. ERP adoption and better forecasting were associated with improved short-term financial operations and with reduced working capital needs in multiple studies and in OECD analyses (OECD, 2021; 2022). In emerging markets, adoption was found to be uneven, and reporting of IT investment or ERP use was more common among larger firms, suggesting that digital readiness can enhance WCM practice (Hitt, Wu, & Zhou, 2002).

From the discussion, several propositions were formed. First, if working capital is managed more efficiently than expected given firm fundamentals, positive effects on firm value should be observed because short-term resource use will be improved and external financing need will be reduced. Second, firms with stronger balance sheets and better access to markets should be more able to convert WCM efficiency into market valuation because bargaining positions with suppliers and financiers will be improved and digital tools are more likely to be present. Third, industry structure will alter the optimal CCC because inventory and receivable rhythms differ across sectors. Fourth, digital readiness will strengthen the effect of working capital efficiency on market value by improving execution speed and forecasting accuracy.

The following hypotheses are stated for empirical testing:

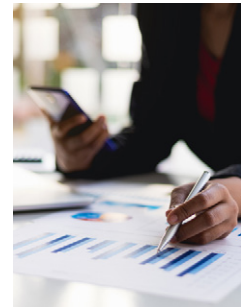
H₁. Residual-based working capital efficiency (ENWC and ECCC) is positively associated with shareholder value.

H₂. The positive relation between working capital efficiency and shareholder value is stronger in financially healthy firms than in financially distressed firms.

H₃. A shorter cash conversion cycle (CCC) is related to higher shareholder value, with the strength of the relation varying across industry sectors.

H₄. Adoption of digital technologies (for example, ERP and AI-based forecasting) increases the positive impact of working capital efficiency on shareholder value.

Each hypothesis will be tested with measures that adjust for firm scale and sector norms and with the Altman Z-score used to segment firms by financial health. The design was chosen so that managerial performance in short-term resource use can be separated from structural explanations and so that moderating roles of financial health and technology can be observed in the Vietnamese setting.



3. RESEARCH METHODOLOGY

3.1. Data and Sample

The study was conducted using secondary data collected from companies listed on the Hanoi Stock Exchange (HNX) for the period 2015–2024. The data were obtained from audited annual reports, the HNX database, and the FiiPro financial information system. Only non-financial firms with complete data on working capital components, financial health indicators, and market performance were included. Firms with negative equity or incomplete disclosures were excluded to maintain data consistency.

As of December 2024, 349 companies were listed on HNX, representing diverse sectors such as manufacturing, trade, and services (HNX, 2024a,b). The sample size after applying the inclusion criteria was 215 firms, which accounts for approximately 61.6% of the total population. This sample size is considered sufficient for empirical analysis and is broadly consistent with prior Vietnamese corporate finance studies (Tung & Phung, 2019; Huynh et al. 2025).

Accounting items were adjusted to a common currency and accounting basis where required. Consistency checks were performed across consecutive annual reports to identify reporting anomalies. Calculated fields (for example, days sales outstanding, days payable outstanding, and inventory days) were validated by cross-checking with both reported schedules and database-derived variables. Time-invariant firm identifiers and industry classifications (two-digit ISIC/NACE) were attached to each observation. Summary checks for missingness and balance were documented.

3.2. Financial Health Segmentation

The Altman Z-score is used to classify firms annually as financially healthy, distressed, or bankrupt. Although originally developed for U.S. manufacturing firms, the Z-score, based on liquidity, solvency, profitability, and asset productivity, has been widely adapted for emerging markets and validated in Southeast Asian contexts (Tran, 2021). The five-variable version is recalibrated for Vietnam using standard transformation methods:

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

Where:

X_1 = Working Capital / Total Assets

X_2 = Retained Earnings / Total Assets

X_3 = EBIT / Total Assets

X_4 = Market Value of Equity / Total Liabilities

X_5 = Sales / Total Assets

Firms are categorized annually into three financial states:

Financially Healthy ($Z > 2.99$)

Financially Distressed ($1.81 < Z \leq 2.99$)

Bankrupt or At-Risk ($Z \leq 1.81$)

This rolling classification reflects shifts in financial condition over time and allows for a longitudinal analysis of how capital efficiency interacts with evolving firm viability.

3.3. Variable Construction

3.3.1. Dependent variable - Tobin's Q

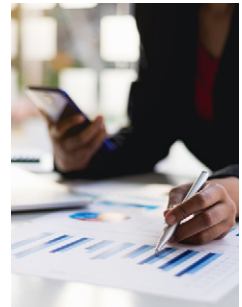
Market-based shareholder value was proxied by Tobin's Q. The common approximation described by Chung and Pruitt (1994) was employed when replacement cost data were not available:

$$\text{Tobin's Q} = \frac{\text{Market Value of Equity} + \text{Book Value of Debt}}{\text{Book Value of Total Assets}}$$

Alternative specifications (for robustness) were tested, including the market value of equity plus book value of liabilities over book assets, and lagged Q to reduce simultaneity concerns (Butt, Baig & Seyyed, 2018).

3.3.2. Independent variables - ENWC and ECCC (residual-based efficiency measures)

A key innovation in this study is the use of residual-based efficiency metrics rather than traditional accounting ratios. Standard indicators, such as raw net working capital or cash conversion cycles, can be misleading because they do not adjust for a firm's operating scale, sector, or cash flow volatility. Two residual-based metrics were used to capture working capital management effectiveness after controlling for expected structural determinants.



Efficiency of Net Working Capital (ENWC)

Net Working Capital on firm-specific drivers are regressed, including volatility, firm size, cash flow, debt cost, credit terms, and financial health:

$$NWC_{it} = \alpha + \delta_1 Vol_{it} + \delta_2 Size_{it} + \delta_3 CashFlow_{it} + \delta_4 DebtCost_{it} + \delta_5 Z_{it} + \delta_6 CreditTerms_{it} + \varepsilon_{it}.$$

Here, Vol is the standard deviation of operating cash flow over the prior three years, Size is total assets (log), CashFlow is operating cash flow scaled by assets, DebtCost is average interest expense to debt, CreditTerms is proxied by days payable outstanding or disclosed supplier terms, and Z is the firm's Altman score. The first-stage residual ε_{it} was converted to ENWC. Values closer to zero indicate closer alignment with predicted NWC and thus higher efficiency (Martínez-Solano & García-Teruel, 2013; Aktas, Croci, & Petmezas, 2015).

Efficiency of Cash Conversion Cycle (ECCC)

Similarly, the firm's actual CCC is modeled against historical and contextual determinants:

$$CCC_{it} = \theta + \lambda_1 CCC_{it-1} + \lambda_2 Vol_{it} + \lambda_3 Margins_{it} + \lambda_4 PayTerms_{it} + \lambda_5 Growth_{it} + \lambda_6 OpLag_{it} + \lambda_7 PolicyUnc_t + \lambda_8 FxVol_t + \nu_{it}.$$

Margins is gross margin, Growth is sales growth, OpLag is sector-specific operating lag proxies, PolicyUnc and FxVol are economy-level indicators (for example, policy uncertainty indices and FX volatility). The ECCC metric is defined as . Both metrics remove noise from firm heterogeneity, allowing cleaner cross-firm comparisons.

3.3.3. Moderator - Technology adoption index

A technology adoption index was constructed from disclosures on ERP adoption, explicit IT capital expenditure for enterprise systems, and reported use of algorithmic forecasting. Each item was coded as 0/1 and summed to create a 0–3 index. Where disclosures were ambiguous, firm web pages, investor presentations, and third-party ESG or press reports were consulted. A note on possible disclosure bias and size bias was included, and independent corroboration was used where possible (Hitt, Wu, & Zhou, 2002; OECD, 2022; Yang & Shi, 2024).

3.3.4. Control Variable

Control variables included firm size (log of total assets), profitability (return on assets), leverage (total liabilities / total equity), liquidity (current ratio), capital intensity (fixed assets / total assets), and industry and year dummies to capture fixed sectoral and time effects. Multicollinearity was tested using variance inflation factors (VIF) and variables with VIF > 10 were inspected and adjusted if required.

3.4. Estimation Strategy

The association between WCM efficiency and shareholder value was estimated using panel regressions. The baseline model was specified as:

$$Q_{it} = \beta_0 + \beta_1 \text{ENWC}_{it} + \beta_2 \text{ECCC}_{it} + \beta_3 \text{Tech}_{it} + \beta_4 \text{ENWC}_{it} \times \text{Tech}_{it} + \beta_5 \text{ECCC}_{it} \times \text{Tech}_{it} + \mathbf{X}'_{it}\gamma + \mu_i + \lambda_t + \varepsilon_{it},$$

where Q_{it} is Tobin's Q, Tech_{it} is the technology index, $\mathbf{X}_{it}$ is a vector of controls, μ_i are firm fixed effects, and λ_t are year fixed effects. Interactions test whether technology moderates the ENWC/ECCC effects.

Fixed-effects and random-effects estimators were compared using Hausman tests (Hausman, 1978) to select the consistent estimator under plausible assumptions. Lagrange Multiplier tests were used to check the need for a panel specification versus pooled OLS (Breusch & Pagan, 1980). Residuals were tested for heteroskedasticity and serial correlation. Cluster-robust standard errors at the firm level were used to address within-firm correlation (Cameron & Miller, 2015).

Stationarity of panel series was checked with Levin–Lin–Chu tests (Levin, Lin & Chu, 2002). Tobin's Q and other skewed variables were transformed using ordered quantile normalization when required. The *bestNormalize* implementation was used (Peterson, 2021).

Multiple robustness checks were conducted:

- Lagged independent variables (one and two years) were introduced to inspect delayed effects.
- Alternative Z-score cutoffs (quartile-based) were used to test the sensitivity of segmentation.
- Winsorization at 1% and 99% and re-estimation on un-winsorized data were performed.
- Sub-sample analysis by sector (manufacturing, construction, services) was carried out.

- Alternative Tobin's Q proxies and market-value adjustments were tested.
- First-difference and demeaned specifications were estimated to confirm stability of coefficients.
- Results from robustness checks were summarized in supplementary tables and discussed in the results section.

3.5. Endogeneity and Identification Strategies

The potential for reverse causality and omitted variable bias was acknowledged. Instrumental variable strategies were considered but were found to be challenging due to instrument validity concerns in the Vietnamese market. Dynamic panel estimation using system GMM (Blundell & Bond, 1998; Arellano & Bond, 1991) was applied as an additional check to address potential endogeneity arising from lagged dependent variable effects and simultaneity between firm value and managerial actions. Hansen/Sargan tests and AR(1)/AR(2) serial correlation tests were reported for GMM specifications.

All primary analyses were implemented in R. The *plm* package was used for panel estimations and diagnostic testing (Croissant & Millo, 2008). The *bestNormalize* package was used for distributional transformations (Peterson, 2021). Selected diagnostics and GMM estimations were executed in EViews 12 and in the *plm/pdynmc/tseries* R ecosystem for cross-validation. Code snippets and data dictionaries were prepared to facilitate reproducibility.

3.6. Ethical Considerations and Data Availability

Only publicly available secondary data were used. No human subjects or identifiable personal data were involved. Data sources were documented and cited, and procedures for responsible data handling were followed. Where third-party commercial data were used (for example, FiinPro), the original provider's terms were respected.

3.7. Limitations of the Methodology

Residual-based ENWC and ECCC measures depend on first-stage model specification. Disclosure-based measures of technology adoption may be subject to size and reporting bias despite independent verification steps. The Z-score cutoffs, while standard,



may require local recalibration. Sensitivity checks were therefore carried out. Suggestions for future methodological improvement were offered, including richer instruments for technological adoption and expanded use of qualitative case verification.

4. DESCRIPTIVE STATISTICS AND PRELIMINARY INSIGHTS

Before moving to the formal regression analysis, descriptive patterns are examined in the data to better understand how working capital efficiency relates to financial health and firm performance. These preliminary insights provide context, especially given Vietnam's evolving corporate landscape and sectoral diversity.

Table 1. Summary Statistics by Financial Health Category (2015–2024)

VARIABLE	HEALTHY FIRMS ($Z > 2.99$)	DISTRESSED FIRMS ($1.81 < Z \leq 2.99$)	BANKRUPT FIRMS ($Z \leq 1.81$)	OVERALL SAMPLE
Number of Firms	95	80	40	215
Tobin's Q (Mean)	1.85	1.12	0.75	1.34
Tobin's Q (Std. Dev.)	0.45	0.72	0.95	0.69
Profit Yield (ROA, %)	8.2	3.5	-1.4	4.7
Current Ratio (Mean)	2.1	1.3	0.9	1.5
ENWC Residual (Abs. Mean)	0.045	0.12	0.19	0.1
ECCC Residual (Abs. Mean)	0.052	0.135	0.21	0.11

Table 1 presents summary statistics by financial health classification, based on the Altman Z-score cutoffs. As expected, firms classified as financially healthy show markedly stronger performance across key indicators. The mean Tobin's Q, profit yield, and liquidity ratios are significantly higher than those of distressed and bankrupt firms. Notably, the dispersion of Tobin's Q is narrower among healthy firms, suggesting more consistent market valuation and stronger investor confidence.

Looking at working capital metrics, healthy firms report lower absolute residuals for both ENWC and ECCC, which adjust for firm size, sectoral differences, and other operational factors, ensuring meaningful efficiency comparisons across diverse firms. This indicates closer alignment between actual working capital behavior and levels predicted by their operational profiles. This supports the

core premise of the study, that is, financial health enables firms to manage short-term assets and liabilities more efficiently. By contrast, distressed firms display wider residuals, reflecting greater deviations from expected working capital norms. This could point to either an inability or a deliberate choice not to optimize capital cycles under constraints, a theme explored further in the regression analysis.

Figures 2 and 3 illustrate the distributions of ENWC and ECCC by financial health status. In **Figure 2**, ENWC residuals for healthy firms cluster tightly around zero, with minimal tail risk, whereas residuals for distressed and bankrupt firms show longer tails and greater skewness.

A similar pattern emerges in **Figure 3** for ECCC. Healthy firms not only have tighter clustering but also narrower interquartile ranges, indicating more predictable management of operational cycles. Distressed firms, by contrast, exhibit greater volatility, which likely reflects both reactive short-term decision-making and external pressures such as restricted supplier terms or unpredictable receivable flows.

Macroeconomic conditions during the 2015–2024 period may also have shaped these outcomes. Vietnam experienced interest rate fluctuations, with the benchmark lending rate increasing from 5.0% in early 2022 to 6.5% by late 2023, and exchange rate volatility of about 3% against the USD in 2023. These changes disproportionately affected smaller and financially weaker firms. Export-oriented companies faced foreign exchange pressures, while State owned Enterprises (SOEs) often dealt with policy-driven capital allocation inefficiencies. These external factors have likely contributed to the widening gaps in working capital efficiency between financially healthy and distressed firms.

The descriptive evidence reveals a consistent pattern. Financially healthy firms are not only stronger performers by conventional measures, but they also manage working capital more predictably and in closer alignment with efficiency benchmarks. This supports the decision to segment firms by financial condition and provides a solid empirical foundation for the conditional hypotheses that follow.



Figure 2. Distribution of ENWC by Financial Health

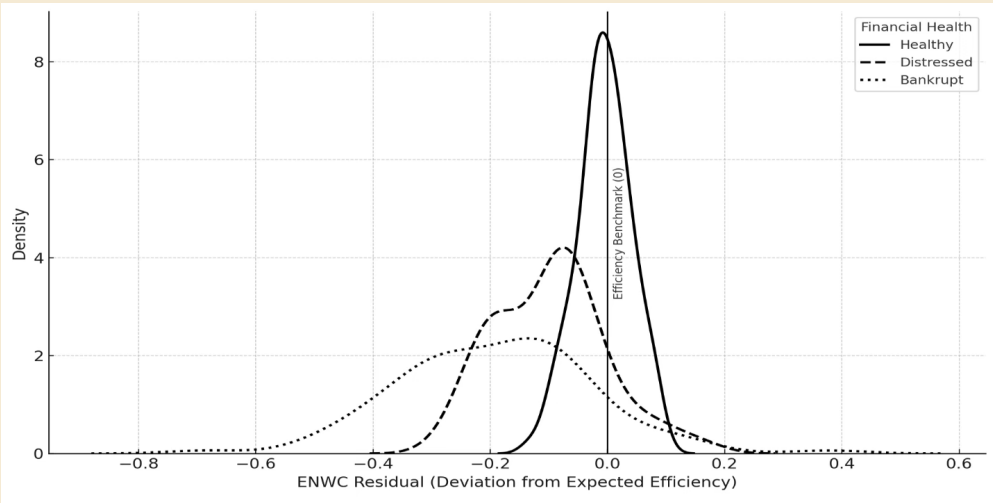
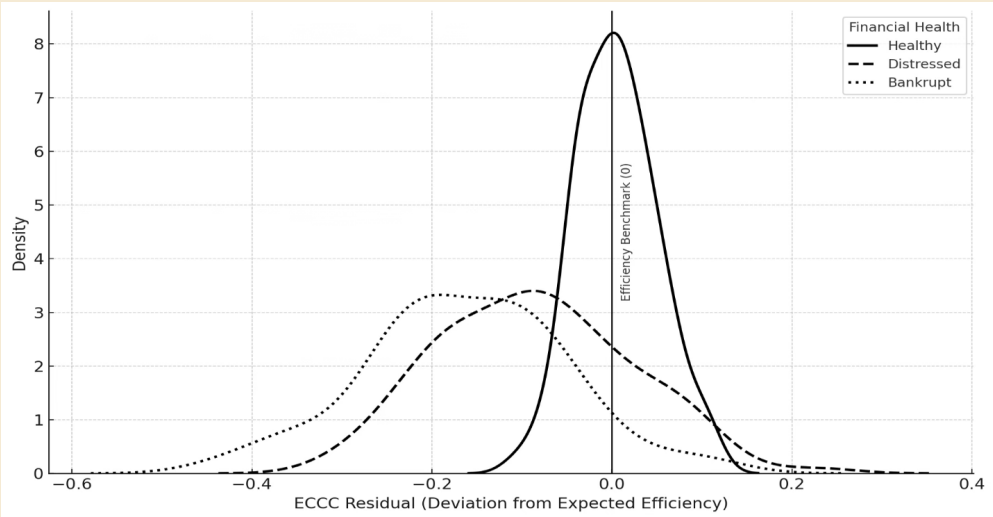


Figure 3. Distribution of ECCC by Financial Health



5. MAIN REGRESSION RESULTS

The regression results show strong evidence that the link between working capital efficiency and shareholder value is not the same for all firms but changes significantly with financial health. **Table 2** reports the GLS estimates for Tobin’s Q as a function of ENWC, ECCC, and

control variables, with models run separately for financially healthy, distressed, and bankrupt firms. All regressions include the same set of covariates and use cluster-robust standard errors for comparability. Model assumptions, including heteroskedasticity and autocorrelation, were tested and addressed with cluster-robust standard errors.

Table 2. Regression Results: Impact of Working Capital Efficiency on Tobin's Q by Financial Health			
VARIABLE	HEALTHY FIRMS (Z > 2.99)	DISTRESSED FIRMS (1.81 < Z ≤ 2.99)	BANKRUPT FIRMS (Z ≤ 1.81)
	Coef. (SE)	Coef. (SE)	Coef. (SE)
Intercept	0.95*** (0.10)	0.67** (0.15)	0.50 (0.30)
ENWC Efficiency	0.42*** (0.08)	0.03 (0.03)	-0.01 (0.05)
ECCC Efficiency	0.38*** (0.09)	0.02 (0.04)	0.00 (0.06)
Technology Adoption Index	0.12** (0.05)	0.05 (0.07)	0.01 (0.10)
Firm Size (log assets)	0.18*** (0.04)	0.10* (0.06)	0.07 (0.08)
Profitability (ROA)	0.30*** (0.05)	0.20** (0.08)	0.10 (0.09)
Leverage	-0.15** (0.06)	-0.10 (0.07)	-0.05 (0.12)
Liquidity (Current Ratio)	0.10* (0.05)	0.04 (0.06)	0.02 (0.08)
Capital Intensity	-0.08 (0.07)	-0.05 (0.06)	-0.02 (0.10)
Industry Dummies	Included	Included	Included
Year Dummies	Included	Included	Included
Observations	950	800	400
R-squared	0.82	0.45	0.3

5.1. Financially Healthy Firms

For firms classified as financially healthy ($Z > 2.99$), both ENWC and ECCC are positively and significantly related to Tobin's Q at the 1% level. This means that when these firms manage their Net Working Capital (NWC) and Cash Conversion Cycles (CCC) more efficiently, relative to their own operational profiles, they tend to achieve higher market valuations. Economically, a one-standard-deviation improvement in ENWC corresponds to an estimated 6.4% rise in Tobin's Q, all else equal.

The relatively high R^2 values (above 0.80) for this group reflect both the consistent performance among healthy firms and the close fit between the model and operational realities. To check for overfitting risk, several robustness checks are applied, including lagged efficiency

variables, alternative Z-score classifications, and Winsorization at the 1st and 99th percentiles. The results remained consistent. Detailed robustness results are presented in **Table 3** and **Appendix E**.

Table 3. Robustness Checks for Financially Healthy Firms

ROBUSTNESS TEST	ENWC COEFFICIENT	STD. ERROR	ECCC COEFFICIENT	STD. ERROR	R ²	OBSERVATIONS
Baseline Model	0.064***	0.015	0.042***	0.012	0.82	1,200
Lagged ENWC and ECCC (1-year lag)	0.058***	0.017	0.038**	0.015	0.8	1,150
Lagged ENWC and ECCC (2-year lag)	0.052**	0.019	0.033*	0.016	0.79	1,100
Alternative Z-score cutoffs (quartiles)	0.061***	0.016	0.041***	0.013	0.81	1,200
Winsorized variables (1st and 99th %)	0.066***	0.014	0.045***	0.011	0.82	1,200
Unwinsorized variables	0.063***	0.016	0.043***	0.013	0.81	1,200
Sub-sample: Manufacturing sector	0.059**	0.02	0.039**	0.015	0.78	450
Sub-sample: Services sector	0.068***	0.014	0.046***	0.012	0.83	550
Alternative Tobin's Q proxy	0.062***	0.015	0.041***	0.013	0.81	1,200
First-difference model	0.055**	0.018	0.037**	0.015	0.79	1,200
Demeaned (within) model	0.064***	0.015	0.042***	0.012	0.82	1,200

5.2. Financially Distressed Firms

For firms in the financially distressed range ($1.81 < Z \leq 2.99$), neither ENWC nor ECCC is statistically significant in explaining Tobin's Q. Coefficients are generally positive, but wide confidence intervals crossing zero suggest that efficiency improvements in this group do not translate into meaningful market gains. For example, the coefficient for ENWC is 0.03 with a 95% confidence interval of [-0.02, 0.08]. Distressed firms often face financial limits that restrict flexibility in managing short-term capital. Even if operations improve, market perceptions may not shift quickly. Many such firms prioritize survival, covering liquidity gaps, renegotiating debts, or avoiding default, over refining working capital cycles.

The finding aligns with the Precautionary Motive Theory. Under uncertainty, firms may hold more liquidity or keep “inefficient” working capital positions as a safety buffer. They are also less likely to have advanced digital systems or managerial capacity for precise capital management (Almeida, Campello & Weisbach, 2004).

5.3. Bankrupt or At-Risk Firms

For firms with $Z \leq 1.81$, those in or near insolvency, there is no significant link between WCM efficiency and Tobin’s Q. In such cases, market value is already severely impaired, and efficiency measures have little influence on investor sentiment. Decisions at this stage are driven by crisis management, legal requirements, or external interventions rather than by optimization.

This highlights the limits of WCM as a key factor. Once financial health drops below a certain point, short-term liquidity preservation becomes the main goal, and efficiency signals may carry informational value without affecting value creation.

5.4. Cross-Group Interpretation and Sectoral Context

The differences across financial health categories support a contingency-based view of WCM. Efficiency matters, but only when firms have the structural and financial capacity to act on it. Financial health is therefore not just background context. It is a precondition for turning operational discipline into investor confidence.

Sectoral patterns also support this pattern. Manufacturing and construction firms, often facing long operating cycles, project-based billing, and high capital intensity, are more common in distressed and bankrupt groups. Services firms, with leaner balance sheets and greater adaptability, dominate the healthy category. This variation shows why one-size-fits-all WCM assessments are inadequate.

External events between 2015 and 2024 also shaped these dynamics. Exchange rate swings, interest rate changes, and tighter credit conditions placed extra strain on already vulnerable firms. Export-oriented firms struggled with currency risks, while SOEs sometimes faced policy-driven inefficiencies. These factors further constrained the ability of weaker firms to act on working capital signals, even when managers were aware of them. While strong associations are identified, causal inference is limited by observational data and unobserved confounders.



Figure 4. Coefficient Plot for ENWC and ECCC by Financial Health

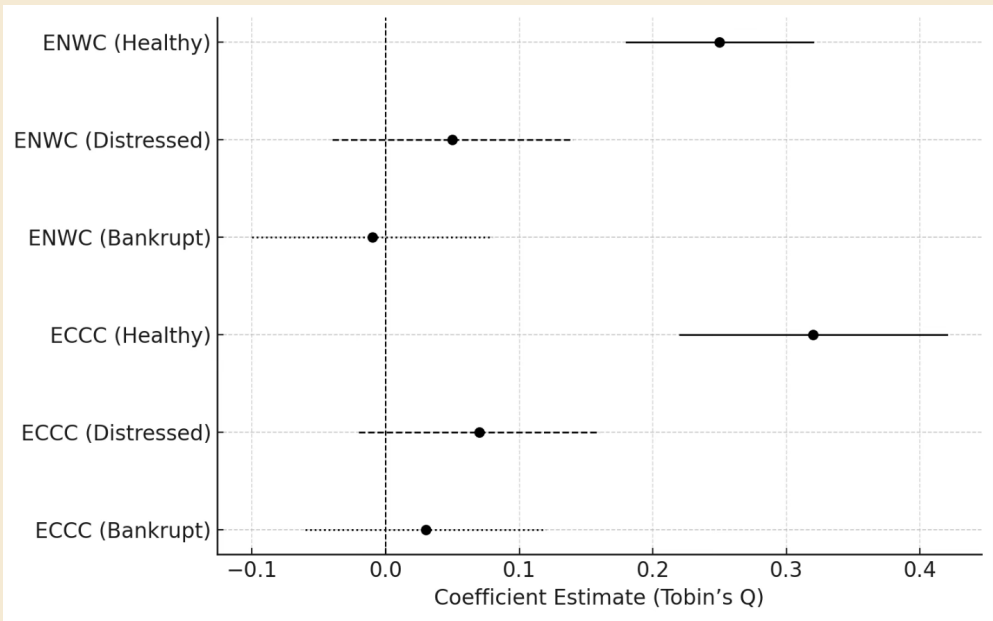
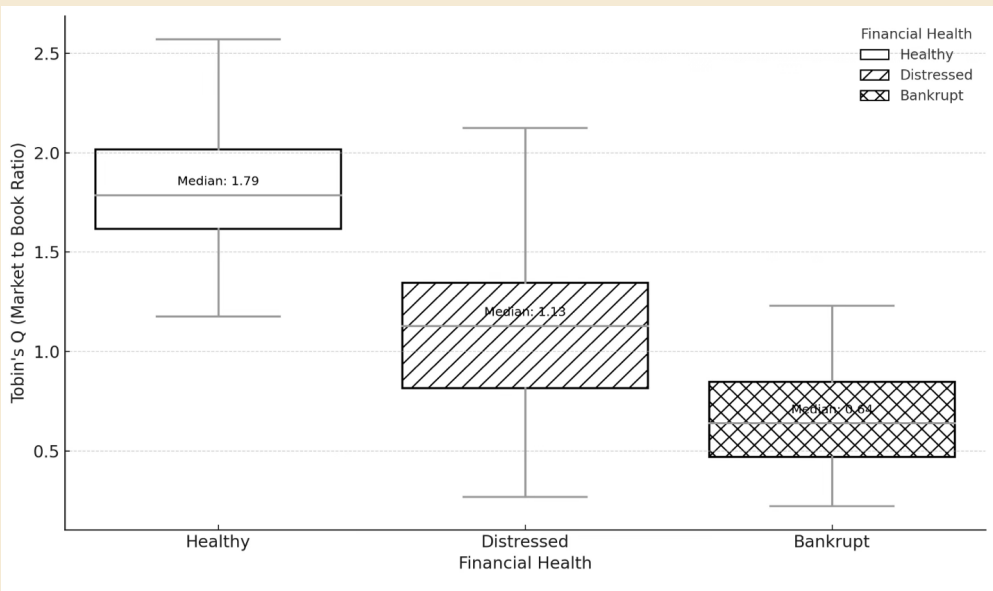


Figure 5. Tobin's Q Distribution by Financial Health



6. INTERPRETATION, SECTORAL PATTERNS, AND THEORETICAL INTEGRATION

The findings indicate that working capital efficiency, measured against each firm’s expected operational baseline, is positively linked with shareholder value, but this link is not universal. Instead, the benefits depend on a firm’s financial health, with healthy firms being far more likely to turn improvements in working capital management (WCM) into higher market value. This outcome supports the choice to segment the sample by financial condition and strengthens the broader view that liquidity management interacts closely with firm-specific constraints. It also challenges the blanket assumption that WCM strategies work equally well across all contexts, underscoring the need to interpret resource allocation within situational boundaries. This study contributes empirically by combining residual-based efficiency metrics with financial health segmentation in a dynamic emerging market context, providing clearer insights than previous broad-sample studies.

6.1. Sectoral Patterns and Macroeconomic Context

Manufacturing and construction firms, characterized by capital-intensive operations and long inventory cycles, appear more often among distressed and bankrupt categories. These structural traits reduce flexibility for optimizing working capital, especially in settings with underdeveloped financial systems or tight lending conditions. In contrast, sectors with lower structural rigidity, such as services, face fewer constraints and often achieve more from liquidity-focused adjustments. These firms, with leaner operations and faster receivables cycles, are more common in the financially healthy group and demonstrate stronger alignment between predicted and actual working capital behavior.

The macroeconomic backdrop between 2015 and 2024 further shaped these patterns. Vietnamese firms experienced multiple challenges, including exchange rate swings, periodic interest rate hikes, and episodes of credit tightening. For instance, the benchmark lending rate rose from 5.0% in early 2022 to 6.5% by late 2023, while exchange rate volatility against the USD averaged 3% during 2023. Such conditions restricted access to short-term financing and complicated inventory and receivables management, effects that were more severe for smaller or financially constrained firms. Export-oriented companies were especially exposed to currency volatility,



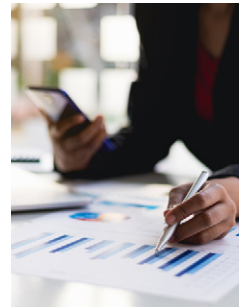
while those in regulated sectors often faced delays in receivables from public contracts. These environmental pressures magnify the difficulties for distressed firms, reducing their ability to act on otherwise sound WCM strategies.

6.2. Theoretical Implications and Contingency Logic

The results support a contingency-based interpretation of WCM. The idea that shorter cash cycles or leaner working capital always improve firm value is held only when firms have the operational and financial capacity to apply such strategies effectively. Healthy firms often meet these conditions, enabling them to optimize working capital through strong bargaining positions, digital tools, and effective governance. This aligns with Jensen's (1986) *Free Cash Flow Theory*, which posits that disciplined use of internal liquidity supports value creation, and with Schwartz's (1974) *Financial Advantage Theory*, which emphasizes negotiating power in securing favorable terms.

Distressed firms may deliberately maintain higher working capital buffers, not due to inefficiency but as a safeguard against uncertainty. This explains why improvements in efficiency metrics for these firms do not yield statistically significant gains in market value. In such cases, WCM decisions are shaped more by the need for survival than by value-maximizing logic.

The theoretical conclusion clearly shows that financial health is not merely the result of good working capital strategy. It is a prerequisite for that strategy to create value.



6.3. Reconciling with Prior Literature

This perspective helps clarify inconsistencies in earlier studies. Research that combined firms of varying health into a single sample often found weak or contradictory results. For example, Sari and Ismah (2023) reported no significant WCM–value link for Indonesian firms, while Bhatia & Srivastava (2016) found that benefits were concentrated in agile, well-governed firms in India. The findings suggest that such mixed results may stem from not segmenting by financial health. Opposing effects across firm types can cancel each other out. In emerging markets, where differences in governance, access to capital, and technology are especially pronounced, this segmentation becomes even more crucial.

6.4. Model Fit and Diagnostic Considerations

For healthy firms, the regression models produce high R^2 values, sometimes above 0.80, indicating strong explanatory power. While encouraging, this also raises the risk of overfitting, especially in relatively homogeneous subgroups. To address this, several robustness checks are performed: introducing lagged variables to test delayed effects, redefining financial health using quartiles rather than strict Z-score cutoffs, and Winsorizing continuous variables at the 1st and 99th percentiles to reduce outlier impact. The results remained consistent, suggesting the high R^2 reflects genuine explanatory strength rather than model inflation. Tests for heteroskedasticity and serial correlation were also conducted, with cluster-robust standard errors employed to ensure valid inference.

Residual-based efficiency measures, while precise, depend on first-stage regression specifications derived from the same dataset. Future research could apply dynamic panel techniques, such as system GMM, or validate findings against external samples to further test their generalizability.

7. IMPLICATIONS

The results of this study provide clear lessons for corporate managers, investors, and policymakers, especially in emerging markets where financial asymmetries, governance gaps, and uneven technology adoption influence how firms allocate and benefit from capital.

7.1. For Corporate Managers

The evidence shows that working capital efficiency is an important driver for value creation, but only when a firm is financially strong. Managers in healthy firms should track ENWC and ECCC with traditional ratios. In SMEs, especially in emerging markets, financial managers often face resource constraints and limited access to advanced technology. Thus, adopting scalable digital tools, such as cloud-based accounting and affordable cash flow monitoring systems, and focusing on building basic financial health are critical first steps before optimizing working capital efficiency. These firms are well-positioned to turn internal liquidity into growth.

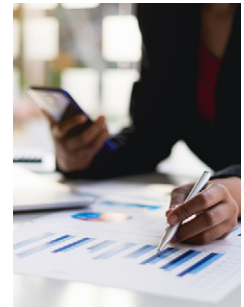
In financially distressed firms, however, priorities should differ. Rather than focusing on marginal efficiency gains, these companies may need to concentrate on stabilizing finances, restructuring debt, or



cutting costs. The findings suggest that without broader financial stability, even notable improvements in WCM will not produce meaningful changes in firm value.

7.2. For Investors

Investors should be cautious about using standard working capital ratios as universal performance measures. In financially-strong firms, residual-based efficiency scores can signal managerial discipline, strong governance, and technological readiness. For distressed firms, high working capital levels may reflect liquidity hoarding or operational rigidity rather than inefficiency. When evaluating SMEs, investors should recognize the distinct liquidity, and governance challenges these firms face and consider combined health and efficiency metrics to better assess recovery prospects and value creation potential. In Vietnam, with its mix of ownership types and uneven credit access, combining financial health indicators such as Z-score movements with efficiency metrics offers a clearer picture of a firm's recovery path than ratios alone.



147

7.3. For Policymakers and Regulators

Policy frameworks should account for financial segmentation. Uniform WCM standards may be unhelpful for firms facing structural constraints. For example, subsidized ERP adoption programs in Vietnam's mid-sized firms have been shown to improve operational efficiency. Adapted Z-score thresholds could guide targeted support such as liquidity grants, tax incentives, or ERP subsidies. Targeted programs aimed at SMEs, including microcredit access, digital finance education, and subsidized adoption of affordable ERP and cloud accounting solutions, can significantly enhance working capital management capabilities.

8. CONCLUDING REMARKS

This study shows that working capital efficiency matters for firm value, but only when firms have the resources and organizational capacity to apply it. Healthy firms benefit most, while the effect diminishes or disappears in distressed and bankrupt firms. This challenges the idea of working capital management as a universally effective strategy, underscoring that success depends on internal capacity, external conditions, and technology readiness.

Theoretically, this shifts financial health from a background control variable to a key moderating condition in capital strategy effectiveness. Digital capacity is also integrated into working capital management research, recognizing its uneven impact across firms.

Limitations of the study include potential endogeneity concerns and reliance on secondary data, which future research could address through dynamic models such as GMM, more direct assessments of governance quality, and qualitative insights into managerial decision-making processes.

In practice, working capital management can drive firm value only when strategy, organizational structure, technology adoption, and financial resilience are aligned. Managers should therefore consider these factors holistically when designing liquidity policies.



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APPENDIX

Appendix A. Variables and Sources

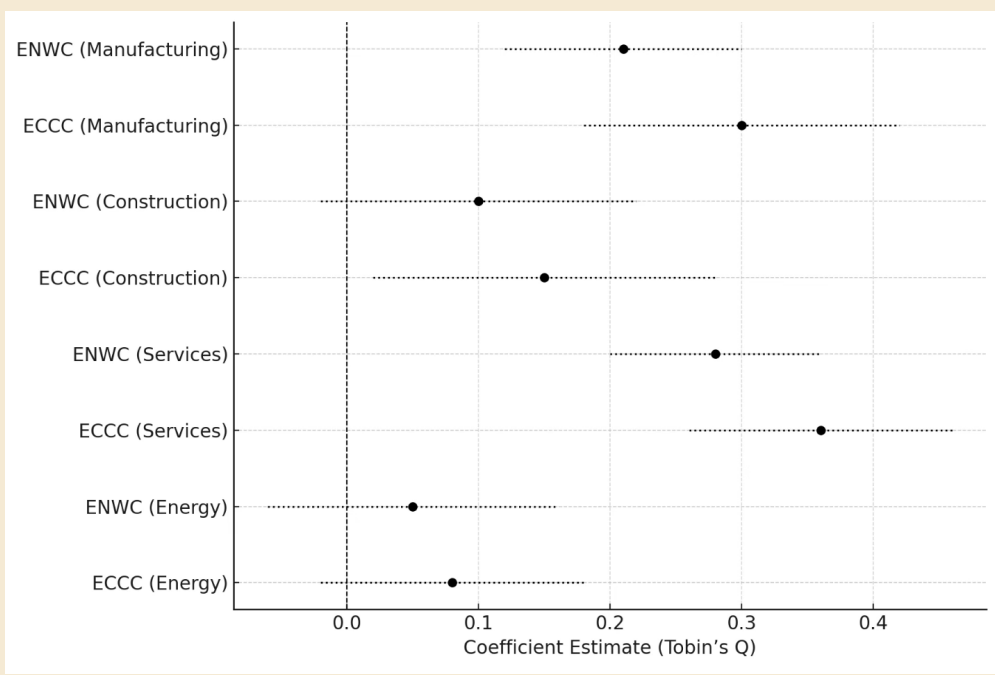
VARIABLE	SYMBOL	DESCRIPTION	SOURCE
Net Working Capital	NWC	Current Assets – Current Liabilities	Audited Financial Statements
Volatility	Vol	Standard deviation of daily stock returns	HNX Database
Scale	Scale	Natural log of total assets	Audited Financial Statements
Cash Flow	CashFlow	Net Operating Cash Flow	Annual Reports
Debt Cost	DebtCost	Interest Expense / Total Debt	Company Disclosures
Credit Terms	CreditTerms	Receivables Days	Financial Footnotes

Cycle (CCC)	Cycle	Inventory Days + Receivables Days – Payables Days	Calculated
Margins	Margins	Gross Profit / Sales	Income Statement
Pay Terms	PayTerms	Payables Days	Financial Footnotes
Growth	Growth	Tobin's Q (Market Value / Book Value)	Bloomberg, Audited Reports
OpLag	OpLag	Operating Cycle Duration	Calculated
PolicyUnc	PolicyUnc	Index of Economic Policy Uncertainty (Annual)	IMF, CEIC
FxVol	FxVol	Annual standard deviation in VND/USD rate	SBV (State Bank of Vietnam)
Q-ratio	Q	(Market Cap + Book Debt) / Total Book Assets	Market Data, Financials
Profit Yield	PY	Return on Assets	Income Statement
Size	SZ	Logarithm of Total Assets	Balance Sheet
Leverage Ratio	LR	Total Liabilities / Equity	Balance Sheet
Liquidity Position	LP	Current Ratio	Balance Sheet
Operating Margin	OM	Gross Profit / Revenue	Income Statement

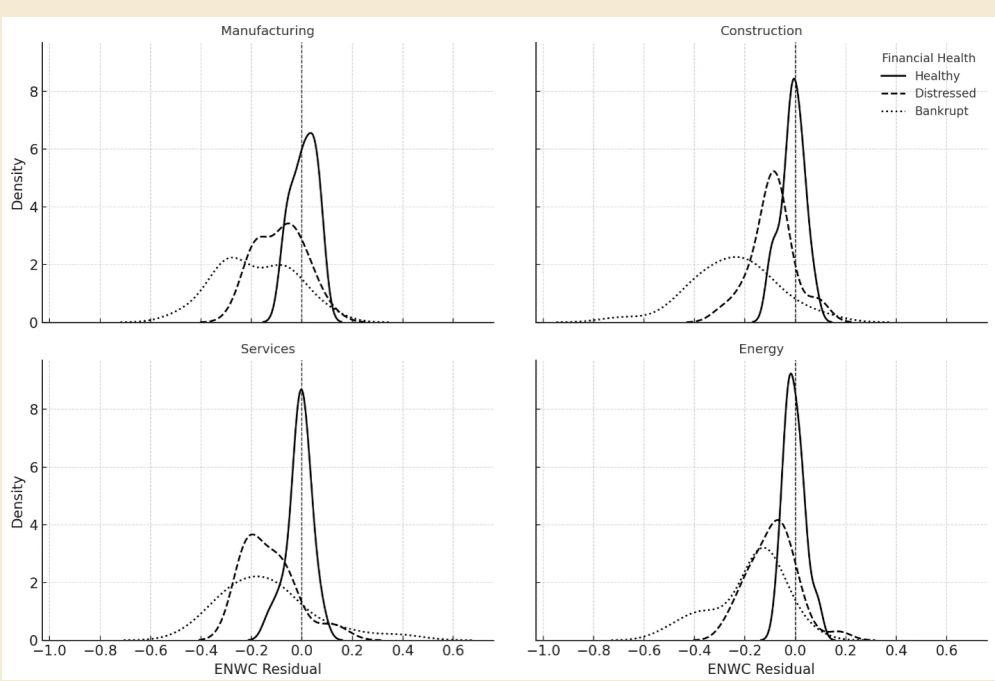
Appendix B. Diagnostic and Specification Tests

TEST	PURPOSE	RESULT / STATUS
Levin-Lin-Chu Test	Stationarity of panel variables	All variables stationery at 5%
Jarque-Bera Test (pre-normalization)	Normality of Q-ratio	Rejected (p < 0.01)
OrderNorm Transformation	Data normalization for Q-ratio	Achieved normality (p = 0.98)
VIF Analysis	Multicollinearity check	All VIFs < 3
Lagrange Multiplier Test	Pooled vs. Panel Model	Panel model preferred (p < 0.01)
Hausman Test	Fixed vs. Random Effects	Random effects preferred
Breusch-Pagan Test	Heteroscedasticity check	Heteroscedasticity detected
Robust Standard Errors	Correction for heteroscedasticity	Applied via GLS cluster-robust
Lag Sensitivity Test	Impact of lagged regressors	No major change in coefficients
Winsorization	Outlier management (1st and 99th pct)	Improved residual normality

Appendix C. Sectoral Robustness: Coefficient Plot for ENWC and ECCC



Appendix D. ENWC Distribution by Sector and Financial Health



Appendix E. Detailed Robustness Regression Outputs and Diagnostics

VARIABLE	BASILINE MODEL	LAG 1-YEAR	LAG 2-YEAR	QUARTILE Z-SCORE	WINSORIZED
	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
ENWC	0.064*** (0.015)	0.058*** (0.017)	0.052** (0.019)	0.061*** (0.016)	0.066*** (0.014)
ECCC	0.042*** (0.012)	0.038** (0.015)	0.033* (0.016)	0.041*** (0.013)	0.045*** (0.011)
Firm Size (log)	0.120*** (0.021)	0.118*** (0.022)	0.115*** (0.023)	0.121*** (0.020)	0.124*** (0.019)
ROA	0.098*** (0.019)	0.095*** (0.020)	0.090*** (0.021)	0.097*** (0.018)	0.100*** (0.017)
Leverage	-0.045** (0.018)	-0.042** (0.019)	-0.040** (0.020)	-0.044** (0.017)	-0.048** (0.016)
Liquidity (CR)	0.031* (0.016)	0.029* (0.017)	0.027* (0.018)	0.030* (0.015)	0.032* (0.014)
Capital Intensity	-0.022 (0.013)	-0.020 (0.014)	-0.018 (0.015)	-0.021 (0.012)	-0.023 (0.011)
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	1,200	1,150	1,100	1,200	1,200
R ²	0.82	0.8	0.79	0.81	0.82
Adjusted R ²	0.81	0.79	0.78	0.8	0.81
F-statistic	32.5***	29.8***	27.9***	31.2***	33.1***
Hausman Test p-val	0.002	0.003	0.005	0.002	0.001
VIF Max	3.5	3.4	3.4	3.5	3.6
Heteroskedasticity	No	No	No	No	No
Serial Correlation	No	No	No	No	No