

Volume 2, Issue 3

Research Article

Date of Submission: 26 August, 2026

Date of Acceptance: 21 September, 2026

Date of Publication: 28 September, 2026

Working Capital Management and Financial Performance of Moroccan Listed Companies A Panel Data Analysis over the 2021–2024 Period

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Citation: Loubaris, R. (2026). Working Capital Management and Financial Performance of Moroccan Listed Companies A Panel Data Analysis over the 2021–2024 Period. *Lett Econ Res Updates*, 2(3), 01-10.

Abstract

This article analyzes the relationship between operating working capital requirement (WCR) management and the financial performance of Moroccan listed companies. The study is based on a balanced panel of ten non-financial groups observed from 2021 to 2024, representing 40 firm-year observations. Data are extracted from consolidated financial statements published in annual financial reports available from the Moroccan Capital Market Authority. WCR is proxied by the number of days of sales tied up in inventories and trade receivables, less days of trade payables. Performance is measured by return on assets (ROA). OLS estimates with time effects and firm-clustered standard errors indicate a negative and statistically significant association between WCR and ROA: one additional day of WCR is associated with a 0.018 percentage-point decrease in ROA. However, this relationship loses significance when firm fixed effects are introduced and remains only marginal in first differences. By contrast, relative indebtedness has a robust negative effect, while sales growth is positively associated with changes in performance. The individual WCR components are not significant. The results therefore call for distinguishing structural differences across sectors from short-term trade-offs within the same firm and do not support a causal conclusion.

Key Words: Working Capital Requirement, Return on Assets, Operating Cycle, Panel Data, Moroccan Listed Firms

Introduction

Corporate finance is not limited to long-term investment and financing decisions. A substantial share of value is created in day-to-day operations: purchasing, storing, selling, invoicing, collecting receivables, and paying suppliers. A financing need arises between the initial cash outflow and the final cash inflow. When this need is poorly managed, a company that is profitable from an accounting perspective may experience cash-flow pressures, bear higher financial expenses, or forgo value-creating projects. Conversely, excessive compression of inventories or customer credit can cause stockouts, impair service quality, and slow sales. Working capital management therefore involves a trade-off among liquidity, operating risk, and profitability.

This issue is particularly relevant in an environment where supply chains have experienced successive shocks, financing costs have risen, and payment terms remain a decisive variable in interfirm relationships. For financial managers, the objective is not necessarily to minimize every working-capital item, but to achieve a level consistent with the business model, bargaining power, and commercial strategy. Fast-turnover retailers, for example, may report negative working capital because of immediate cash collection and deferred supplier payments, whereas heavy industry ties up more resources in inventories and receivables.

The international literature frequently documents a negative relationship between the length of the cash conversion cycle and profitability [1,2]. It nevertheless highlights nonlinearities and contingent effects: below a certain level, further

reductions in working capital may destroy value by limiting sales or increasing stockout risk [3,4]. Results also vary with the business cycle, sector, and financial constraints [5,6]. In Morocco, Aguenau et al. (2015) studied 43 listed non-financial companies between 2006 and 2012 and obtained results that depended on the performance measure used, leaving open the question of whether these relationships remain stable in a more recent period [7].

The present research provides a targeted update for 2021–2024. It uses public consolidated data for ten listed non-financial groups and compares several econometric specifications. The objective is twofold: to assess the overall association between operating working capital requirement and ROA, and then to determine whether this association persists after controlling for time-invariant firm characteristics. The contribution is therefore less about identifying a universal coefficient than about showing how results change between cross-sectional comparison and analysis of within-firm variation.

The central research question is formulated as follows: to what extent does operating working capital requirement management influence the financial performance of Moroccan listed non-financial companies over 2021–2024? Two secondary questions follow. First, which items—inventories, trade receivables, or trade payables—are most closely associated with ROA? Second, does the observed relationship withstand firm fixed effects and estimation in first differences?

The article is organized into six parts. Following the theoretical framework and review of empirical studies, the hypotheses are formulated. The methodology specifies the sample, variables, and models. The results are then presented and discussed, before drawing managerial implications, limitations, and avenues for future research.

Theoretical and Conceptual Framework

The operating cycle links the acquisition of production inputs to the collection of sales proceeds. Inventories and trade receivables are cyclical uses of funds: they absorb resources until they are converted into cash. Trade payables, by contrast, represent a spontaneous source of financing because they defer the cash outflow associated with purchases. In a functional presentation, operating working capital requirement corresponds to the difference between operating current assets and operating current liabilities. Its absolute amount is useful for internal management, but comparison across firms of different sizes requires normalization.

The indicator used here expresses working capital requirement in days of sales. It adds the period during which resources are tied up in inventories and receivables and then subtracts the duration of supplier credit. It is close to the cash conversion cycle, while using revenue as a common denominator because of the consistent availability of consolidated data. A positive value means that part of the cycle must be financed before collection; a negative value indicates that supplier financing exceeds the resources tied up in inventories and receivables. Such a situation may be structural and does not, by itself, signal financial weakness.

Each component reflects a distinct decision. Inventory protects against demand uncertainty and stockouts, but entails storage, obsolescence, and financing costs. Customer credit supports commercial competitiveness and reduces information asymmetries, but delays cash collection and creates default risk. Supplier credit is a flexible source of financing, but excessive extension may damage the supply relationship or lead to the loss of discounts. An aggregate view should therefore be complemented by a component-by-component analysis.

Working capital requirement in days = Inventory days + Accounts receivable days – Accounts payable days

The Liquidity–Profitability Trade-off

A so-called conservative policy maintains more current assets and limits dependence on short-term liabilities. It reduces the risk of stockouts or operational insolvency, but may lower return on assets because low-yielding resources remain tied up. An aggressive policy reduces inventories, accelerates collections, and relies more heavily on supplier credit. It releases cash and may improve profitability, but increases the probability of stockouts, commercial pressure, and reputational risk. The optimum therefore lies between these two extremes.

Trade-off theory explains that the marginal benefits of liquidity decline while the opportunity costs of tied-up capital increase. Pecking-order theory complements this view: when external financing is costly or rationed, cash released through faster working-capital turnover becomes a priority internal source of funds. Financially constrained firms should therefore place greater value on shortening their cycle. Agency theory further suggests that excessive current assets may facilitate inefficient use of resources by managers, whereas tight cash control imposes discipline.

These arguments support an average negative relationship between working capital requirement and profitability, but they do not rule out a nonlinear relationship. A firm may initially increase sales by granting longer payment terms or holding more inventory; beyond a threshold, financing costs and impairment risk dominate. Baños-Caballero et al. (2012) show precisely that an optimal level may exist [3]. The linear estimate in this study should therefore be interpreted as an average local effect within the sample examined.

Financial Performance and Transmission Mechanisms

Financial performance is proxied by return on assets, defined as net income divided by total assets. This ratio measures the ability of the asset base to generate profit after financial expenses and taxes. A reduction in working capital requirement can affect the numerator by lowering financing costs, bad-debt losses, or inventory write-downs. It can also affect the denominator by reducing the assets required for a given level of sales. Conversely, an excessively restrictive policy may compress revenue and earnings.

Financial leverage is included as a control variable. Greater debt can provide positive leverage when economic profitability exceeds the cost of debt, but it also increases financial expenses and risk. In a model where ROA is based on net income, a negative association with indebtedness is plausible. Size controls for economies of scale, access to financing, and diversification, while year effects capture shocks common to all firms.

Literature Review and Hypotheses

Using a large sample of Belgian firms, Deloof (2003) concludes that managers can improve profitability by reducing receivable and inventory periods [1]. García-Teruel and Martínez-Solano (2007) likewise find a negative relationship between cycle delays and the profitability of Spanish SMEs [2]. Padachi (2006) also highlights the cost of high inventory and receivable levels among Mauritian manufacturing firms [8]. These studies underpin the prevailing hypothesis that accelerating the cycle generates gains.

Results concerning trade payables are more ambiguous. A longer payment period provides free or low-cost financing, which should support profitability. However, it may also reflect a firm in difficulty that delays payments; reverse causality then produces a negative correlation. Deloof (2003) emphasizes this endogeneity mechanism [1]. Similarly, a long receivable period may be inefficient or may reflect a deliberate commercial policy designed to stimulate demand. Accounting ratios do not always identify the underlying managerial intent.

More recent studies shift attention toward the optimum and the context. Baños-Caballero et al. (2014) show that financial constraints alter the optimal level of working capital [4]. Enqvist et al. (2014) find that the effect of working capital management depends on the business cycle [5]. Aktas et al. (2015) associate adjustments toward a more efficient policy with performance and investment [9]. A meta-analysis by Jaworski and Czerwonka (2021), however, highlights substantial heterogeneity across countries and liquidity measures. The expected effect is therefore neither mechanical nor uniform [10].

Evidence Specific to the Moroccan Context

The study by Aguenau et al. (2015) provides the most direct benchmark [7]. Using 43 non-financial companies listed in Casablanca between 2006 and 2012, the authors employ ROA and gross operating income. The relationships obtained vary according to the performance measure: several coefficients are not significant for ROA, whereas receivable and payable periods are more closely associated with gross operating income. This divergence shows that the choice of profitability numerator can alter conclusions. The present study retains ROA to ensure comparability while updating the period. The 2021–2024 interval follows the health crisis and includes pressures on supply, energy costs, and financing. The sectoral diversity of the Moroccan market is descriptively useful, but it increases structural heterogeneity. For this reason, a firm fixed-effects estimate complements the pooled analysis. Soukouni and Bamousse (2023) also note, in a multidisciplinary review, that optimizing working capital requires reducing tied-up resources without compromising future profitability or the ability to meet obligations [11].

Research Hypotheses

- H1 – Operating working capital requirement expressed in days of sales is negatively associated with ROA.
- H2 – The number of inventory days is negatively associated with ROA.
- H3 – The number of accounts receivable days is negatively associated with ROA.
- H4 – The number of accounts payable days is positively associated with ROA.
- H5 – Financial leverage is negatively associated with ROA, all else being equal.

H1 concerns the synthetic indicator and is the main hypothesis. H2 to H4 decompose the operating mechanism. H5 is not a central working-capital-management hypothesis; it is used to verify that the relationship under study does not merely capture financial structure. The hypotheses are tested at the 5% level, while marginal results at the 10% level are also reported.

Methodology

The sample comprises ten non-financial groups listed on the Casablanca Stock Exchange: Afriquia Gaz, Auto Hall, Ciments du Maroc, Cosumar, Delta Holding, Disway, LabelVie, LafargeHolcim Maroc, Lesieur Cristal, and Sonasid. Banks, insurance companies, and financial firms are excluded because their balance sheets and regulation make operating working capital difficult to compare with that of industrial or commercial firms. The final selection meets three criteria: continuous availability of consolidated accounts, presence of the required items, and comparability over four fiscal years. The 2021 and 2022 figures come from the 2022 annual financial reports; those for 2023 and 2024 come from the 2024 reports, with comparative columns used to check consistency. The documents are available in the “Financial Statements”

section of the AMMC. Amounts were standardized in millions of dirhams. A double review of balance sheets, income statements, and notes was used to identify revenue, consolidated net income, total assets, equity, inventories, trade receivables, and trade payables. The panel is balanced: 10 firms $\times$ 4 years = 40 observations.

Company	Main sector
Afriquia Gaz	Gas distribution
Auto Hall	Automotive distribution
Ciments du Maroc	Construction materials
Cosumar	Sugar agro-industry
Delta Holding	Industrial holding
Disway	Technology distribution
LabelVie	Large-scale retail
LafargeHolcim Maroc	Construction materials
Lesieur Cristal	Agro-industry
Sonasid	Steel industry
Source: author's classification based on annual financial reports and AMMC issuer profiles.	

Table 1: Sample Composition

Definition of Variables

$$ROA_{it} = 100 \times \text{Net income}_{it} / \text{Total assets}_{it}$$

$$INV_{it} = 365 \times \text{Inventories}_{it} / \text{Revenue}_{it}$$

$$REC_{it} = 365 \times \text{Trade receivables}_{it} / \text{Revenue}_{it}$$

$$PAY_{it} = 365 \times \text{Trade payables}_{it} / \text{Revenue}_{it}$$

Working capital requirement in days equals $INV + REC - PAY$. Leverage (LEV) corresponds to $100 \times (\text{total assets} - \text{equity}) / \text{total assets}$. Size (SIZE) is the natural logarithm of total assets. Sales growth (GROWTH) is the annual percentage change. Using revenue as the denominator for all three components ensures a homogeneous measure; however, it differs from the convention of relating inventories and payables to cost of sales. This difference should be kept in mind in external comparisons.

Code	Calculation	Interpretation	Expected sign
ROA	Net income / total assets (%)	Performance	–
BFRJ	JST + JCR – JFR	Net cycle in days of sales	–
JST	$365 \times \text{inventories} / \text{CA}$	Inventory period	–
JCR	$365 \times \text{receivables} / \text{CA}$	Customer credit	–
JFR	$365 \times \text{payables} / \text{CA}$	Supplier credit	+
LEV	$100 \times \text{debt} / \text{assets}$	Financial leverage	–
TAILLE	$\ln(\text{total assets})$	Size	Indeterminate
CROISS	Annual change in sales (%)	Sales dynamics	+

Table 2: Operationalization of Variables

Econometric Models and Software

Four models are estimated. Model 1 relates ROA to aggregate working capital requirement, leverage, size, and year indicators. Model 2 replaces working capital requirement with its three components. Model 3 simultaneously introduces firm and year fixed effects so that the relationship is identified solely from within-group variation. Model 4 is estimated in first differences; it explains the annual change in ROA by changes in working capital requirement and leverage, sales growth, and year effects.

Calculations are performed in Python 3 using pandas for data preparation, NumPy and SciPy for estimation and tests, and matplotlib for charts. Coefficients are obtained by ordinary least squares. Standard errors are robust and clustered at the firm level using a CR1 correction to account for heteroskedasticity and within-group error correlation. With only ten clusters, probabilities are calculated from a Student's t distribution with nine degrees of freedom; cautious interpretation remains necessary.

$$M1 : ROA_{it} = \alpha + \beta_1 BFRJ_{it} + \beta_2 LEV_{it} + \beta_3 TAILLE_{it} + \delta_t + \varepsilon_{it}$$

$$M3 : ROA_{it} = \alpha_i + \beta_1 BFRJ_{it} + \beta_2 LEV_{it} + \beta_3 TAILLE_{it} + \delta_t + \varepsilon_{it}$$

Results

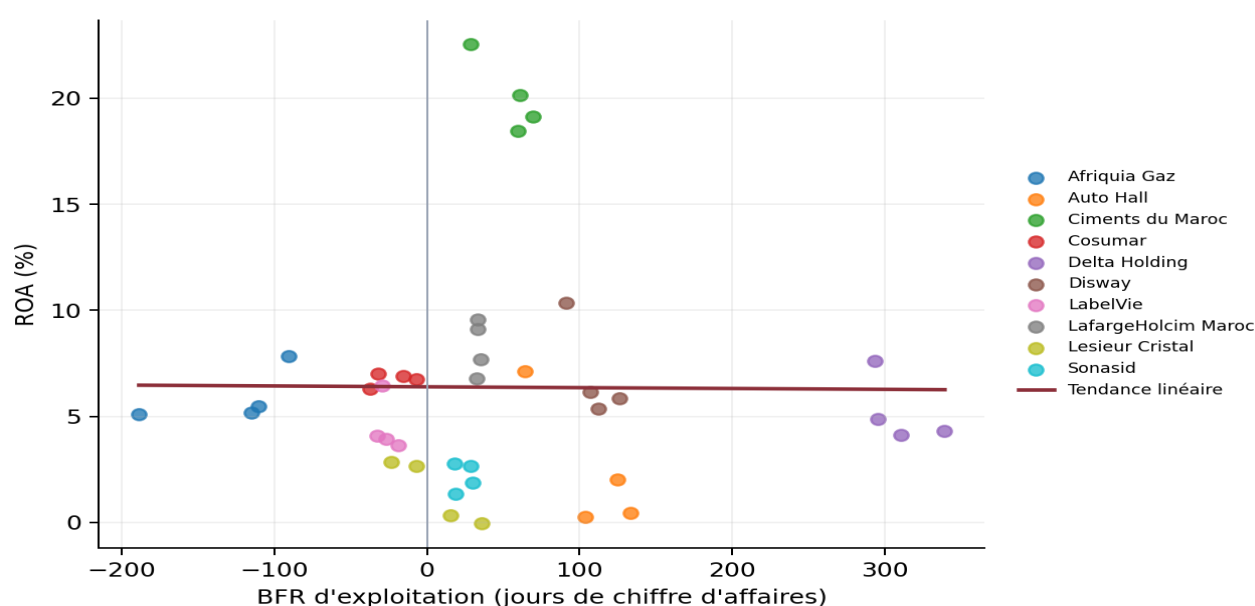
Average ROA is 6.37%, with high dispersion (standard deviation of 5.32 percentage points) and a maximum of 22.54%. Average working capital requirement represents 46.68 days of sales, but the standard deviation reaches 112.16 days. The range, from -188.35 to 338.91 days, confirms the coexistence of very different business models. Negative values are notably consistent with activities in which trade payables finance more than the inventories and receivables observed.

Variable	N	Mean	Std. dev.	Min.	Median	Max.
ROA (%)	40	6.37	5.32	-0.06	5.41	22.54
WCR (days)	40	46.68	112.16	-188.35	31.15	338.91
Inventory (days)	40	72.95	40.54	17.35	65.71	185.83
Receivables (days)	40	73.34	59.17	15.59	52.59	252.83
Payables (days)	40	99.60	52.01	27.16	96.01	243.80
Leverage (%)	40	55.73	14.75	29.03	54.56	77.35
Size (ln assets)	40	8.77	0.75	7.00	8.59	9.95
Sales growth (%)	30	4.90	11.68	-13.96	2.22	41.83

Source: author's calculations based on AMMC annual financial reports. Underlying accounting amounts are in millions of MAD.

Table 3: Descriptive Statistics

On average, inventories represent 72.95 days, receivables 73.34 days, and payables 99.60 days. Average leverage reaches 55.73% of total assets. Annual sales growth, calculable for 30 observations after differencing, averages 4.90% but ranges from -13.96% to 41.83%. These dispersions justify controls for size, leverage, and year, as well as fixed-effects estimation.



Source: Author's elaboration. The line represents an uncontrolled descriptive trend

Figure 1: Unadjusted Relationship between Operating Working Capital Requirement and ROA

Correlations and Multicollinearity

Variable	ROA	BFRJ	JST	JCR	JFR	LEV	TAILLE
ROA	1.00						
BFRJ	-0.01	1.00					
JST	-0.31	0.74	1.00				
JCR	-0.06	0.89	0.72	1.00			
JFR	-0.29	-0.57	0.01	-0.21	1.00		
LEV	-0.75	-0.44	0.04	-0.38	0.54	1.00	

TAILLE	-0.01	-0.45	-0.16	-0.46	0.32	0.29	1.00
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Source: author's calculations (N = 40). Lower triangle shown.

Table 4: Pearson Correlation Matrix

The raw correlation between ROA and aggregate working capital requirement is close to zero (-0.01), whereas leverage is strongly and negatively correlated with ROA (-0.75). This contrast foreshadows the importance of multivariate controls. Receivable days are strongly correlated with working capital requirement (0.89), and inventory days at 0.74 , as expected because these variables are components of the indicator. Variance inflation factors in the decomposed model nevertheless remain below 5: 2.95 for inventories, 3.98 for receivables, 1.50 for payables, 2.00 for leverage, and 1.47 for size. No critical multicollinearity signal is therefore detected under this conventional threshold.

Multivariate Estimates

Variable	M1	M2	M3	M4
BFRJ	-0.018** (0.006)	,	-0.014 (0.023)	,
JST	,	0.004 (0.031)		
JCR	,	-0.037 (0.027)	,	,
JFR	,	0.017 (0.017)	,	,
LEV	-0.343** (0.106)	-0.365** (0.125)	-0.365** (0.125)	,
TAILLE	0.573 (1.172)	0.262 (1.298)	0.262 (1.298)	,
Δ BFRJ	,	,	,	-0.019 (0.011)
Δ LEV	,	,	,	-0.148*** (0.033)
CROISS	,	,	,	0.072** (0.023)
Year effects	Yes	Yes	Yes	Yes
Firm effects	No	No	Yes	Differences
Observations	40	40	40	30
R ²	0,714	0,726	0,972	0,613
Adjusted R ²	0,662	0,656	0,955	0,532

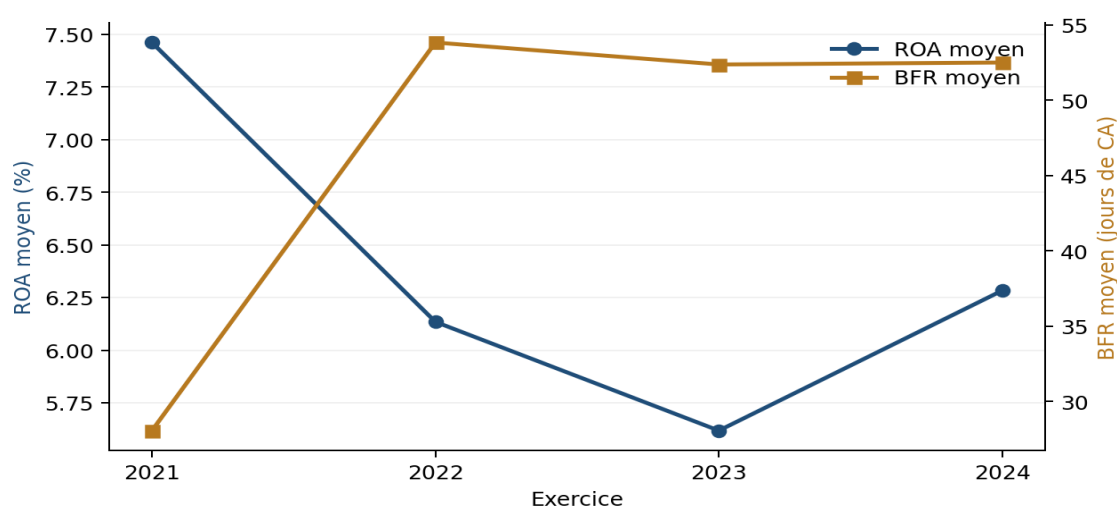
Notes: CR1 standard errors clustered by firm in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. M1–M3: dependent variable ROA; M4: Δ ROA. Constants and year effects are not reported.

Table 5: Regressions of ROA and its Change

In M1, the working capital requirement coefficient equals -0.0185 and is significant at 5% ($p = 0.0156$). All else equal, ten additional days of working capital requirement are associated with a decrease of about 0.185 percentage points in ROA. The magnitude is economically visible but should not be interpreted causally. Leverage has a coefficient of -0.343 ($p = 0.0103$), while size is not significant. The model explains 71.4% of the observed variance. M2 decomposes the cycle. Receivable days have the expected sign (-0.037) but are not significant ($p = 0.198$). Payable days are positive (0.017 ; $p = 0.356$), also in the hypothesized direction, whereas inventory days display a very small positive coefficient. No individual item therefore produces a statistically established effect. Leverage remains negative and significant (-0.365 ; $p = 0.017$). The result for aggregate working capital requirement thus appears to stem from the combination of items and structural differences rather than from a single component. M3 controls for time-invariant firm characteristics. The working capital requirement coefficient remains negative (-0.014), but its standard error increases and its p-value reaches 0.546. Leverage, by contrast, retains a significant negative association (-0.320 ; $p = 0.019$). The difference between M1 and M3 suggests that the pooled WCR–ROA association is partly driven by persistent differences across business models or sectors. In other words, firms that structurally require less working capital are often more profitable, but an annual reduction in working capital within the same firm is not systematically followed by a measurable increase in ROA over this short period.

M4 confirms the need for caution. In first differences, Δ WCR has a coefficient of -0.019 and marginal significance at 10% ($p = 0.102$, just above the threshold). A ten-point increase in leverage is associated with a decrease of about 1.48

percentage points in the change in ROA, and sales growth is positively related to ΔROA (0.072; $p = 0.013$). Commercial dynamics and financial structure therefore appear more clearly related to annual changes in performance than the adjustment of working capital requirement alone.



Source: Author's elaboration based on the balanced panel

Figure 2: Annual Evolution of Average ROA and Working Capital Requirement

Decisions on the Hypotheses

Hyp.	Relationship	Result	Decision
H1	BFRJ $\rightarrow$ ROA (-)	Supported in M1; not robust to fixed effects	Partially supported
H2	JST $\rightarrow$ ROA (-)	Positive coefficient, not significant	Not supported
H3	JCR $\rightarrow$ ROA (-)	Expected sign, not significant	Not supported
H4	JFR $\rightarrow$ ROA (+)	Expected sign, not significant	Not supported
H5	LEV $\rightarrow$ ROA (-)	Negative and significant in M1 to M3	Supported

Table 6: Summary of Hypothesis Tests

Discussion

The negative coefficient in M1 is consistent with opportunity-cost logic: the longer resources remain tied up in operations, the less net income is generated by total assets. It is consistent with the general direction of the findings of Deloof (2003) and García-Teruel and Martínez-Solano (2007) [1,2]. It also accords with the internal-financing perspective: a firm that shortens its cycle reduces its reliance on debt or releases cash for productive uses.

The disappearance of significance under fixed effects is, however, the most informative result. It means that a comparison across firms cannot mechanically be translated into a time-series recommendation for each of them. A retailer may operate sustainably with negative working capital and a manufacturer with positive working capital, without the latter necessarily being poorly managed. Margins, seasonality, bargaining power, and production technologies determine structural levels. Fixed effects absorb these characteristics and require identification to come from within-firm changes; with only four years, this variation is limited and estimates become less precise.

The lack of significance of the components partly echoes the Moroccan evidence of Aguenau et al. (2015) for ROA [6]. It may result from several factors. First, the items are interdependent: reducing inventories may require granting more customer credit or securing suppliers. Second, net income incorporates financing, taxes, and non-operating items that dilute the relationship with the cycle. Finally, consolidated aggregation masks different practices across subsidiaries. A gross operating indicator could be more sensitive to day-to-day working-capital decisions.

The robust result for leverage calls for a cautious but operational interpretation. Because ROA is constructed from net income, heavier financial charges can directly weigh on the ratio. It is also possible that less profitable firms rely more heavily on debt, which points to reverse causality. In any event, working capital management and financial structure should not be analyzed separately: high working capital requirement is all the more costly when financed by expensive debt.

Managerial Implications

The first implication is to manage working capital requirement relative to a sector benchmark and the firm's own history. Setting a uniform target number of days for all activities would be counterproductive. Financial management should decompose the WCR gap into volume, timing, and mix effects, then identify the processes explaining the change: sales forecasts, inventory policy, invoicing quality, disputes, customer collection, or supplier terms.

The second implication is to associate each reduction with a risk and service measure. A cash-management program should not reward inventory reduction alone if the stockout rate deteriorates, nor receivable reduction alone if sales or customer loyalty decline. Balanced indicators can combine inventory days and service level, customer payment period and dispute rate, supplier payment period and strategic dependence.

The third implication concerns governance. Sales managers influence customer payment terms, purchasing teams negotiate payments, operations determine inventories, and finance measures the cost of capital. A cross-functional cash-management unit, supported by monthly reviews and clearly identified owners, is more appropriate than purely accounting treatment at year-end. The robust leverage coefficient also suggests monetizing gains: each day of working capital released should be linked to the amount of debt avoided and the corresponding financing cost.

Finally, the results call for distinguishing short-term objectives from value creation. Compressing working capital may immediately improve cash flow without increasing earnings if it merely reflects a payment deferral. Policy should seek sustainable improvements: forecast reliability, automated collections, segmentation of credit terms, assortment optimization, and supplier collaboration.

Limitations and Extensions

The first limitation concerns sample size: ten firms and four years. The consistent availability of consolidated items justifies this scope, but the tests rely on only ten clusters. Non-significant coefficients may reflect limited statistical power. Extending the analysis to the entire market over ten years or more would make it possible to estimate sector effects, nonlinear relationships, and lags.

The second limitation concerns measurement. Revenue is used as a common denominator because perfectly comparable information on purchases and cost of sales is unavailable. The calculated working capital requirement does not capture advances, tax liabilities, and other operating items. A more detailed database would allow reconstruction of the conventional cash conversion cycle and separation of operating and non-operating working capital requirements.

The third limitation is endogeneity. Profitability itself influences inventory, customer-credit, and supplier-payment decisions. Fixed effects and first differences reduce some biases without establishing causality. Instrumental variables, a dynamic GMM model, or a quasi-experiment exploiting a regulatory change would be relevant extensions. Finally, 2021 may still reflect the health crisis; adding pre-2020 years would improve cyclical comparison.

Conclusion

This research aimed to assess the relationship between working capital management and financial performance for ten listed Moroccan non-financial groups between 2021 and 2024. Analysis of 40 observations shows that a longer working capital requirement is associated with lower ROA in the pooled model: one additional day corresponds to approximately -0.018 percentage points of ROA. However, this relationship is not robust to the introduction of firm fixed effects and appears only marginally in first differences. The cycle components are not individually significant, while financial leverage remains negatively related to ROA in all level specifications.

The research question therefore calls for a nuanced answer. Working capital control is indeed associated with performance when different firms are compared, but the data do not allow us to assert that an annual reduction mechanically produces a profitability gain within each firm. Sector structure, business model, and commercial policy play a determining role. The main hypothesis is therefore partially supported, and causal caution is essential.

For managers, the central lesson is to seek an optimal rather than a minimal working capital requirement. Management should incorporate financing cost, service quality, supply resilience, and growth. For research, expanding the sample and using dynamic methods would help isolate the direction of causality. The study nevertheless provides a recent, transparent, and reproducible basis for understanding the operational finance of Moroccan listed companies.

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Appendix A. Data Traceability

The analytical database was constructed exclusively from public financial information. For each group, the 2022 and 2024 annual financial reports were downloaded from the AMMC issuer portal. The 2021 and 2023 values were checked against the comparative columns of the following fiscal year. Items were entered in millions of dirhams and ratios were recalculated. Source data include revenue, consolidated net income, total assets, equity, inventories and work in progress, trade receivables and related accounts, and trade payables and related accounts. Differences in terminology between IFRS and local standards were harmonized according to economic substance. Financial institutions were excluded. Extreme ratios were retained when they corresponded to an identifiable business model; no winsorization was applied.

Issuer	2021–2022	2023–2024	Scope
Afriquia Gaz	RFA 2022	RFA 2024	Consolidated statements
Auto Hall	RFA 2022	RFA 2024	Consolidated statements
Ciments du Maroc	RFA 2022	RFA 2024	Consolidated statements
Cosumar	RFA 2022	RFA 2024	Consolidated statements
Delta Holding	RFA 2022	RFA 2024	Consolidated statements
Disway	RFA 2022	RFA 2024	Consolidated statements
LabelVie	RFA 2022	RFA 2024	Consolidated statements
LafargeHolcim Maroc	RFA 2022	RFA 2024	Consolidated statements
Lesieur Cristal	RFA 2022	RFA 2024	Consolidated statements
Sonasid	RFA 2022	RFA 2024	Consolidated statements
Public Access: AMMC – list of issuers’ financial statements			

Table A1: Documents Used by Company

Appendix B. Reproducibility Protocol

Processing follows five steps: (1) import and type checking; (2) sorting by firm and fiscal year; (3) calculation of ratios, growth, and first differences; (4) construction of regression matrices with year indicators and, for M3, firm indicators; and (5) calculation of OLS estimators and the clustered robust CR1 variance-covariance matrix. Charts are produced from the same enriched table.

Checks include accounting consistency of units, absence of duplicate firm-year observations, panel balance, the correlation matrix, and variance inflation factors. The file retains the initial observations and derived ratios. This procedure allows exact reproduction of the descriptive statistics, coefficients, standard errors, and charts presented in the article.

Model	Dependent variable	Explanatory variables	Effects	N
M1	ROA	BFRJ, LEV, TAILLE	Year	40
M2	ROA	JST, JCR, JFR, LEV, TAILLE	Year	40
M3	ROA	BFRJ, LEV, TAILLE	Firm + year	40
M4	Δ ROA	Δ BFRJ, Δ LEV, CROISS	Year	30

All models use standard errors clustered by firm.

Table B1: Structure of the Four Models