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Operating-Cycle Frontiers and Earned Equity Accumulation: Global Evidence Across Life-Cycle Stages and Institutions

Muhammad Ashraf[1], Samreen Ramzan[2], Ahmad Ghazali*[3]

Abstract

This study investigates whether operating-cycle duration is associated with the accumulation of earned equity and whether this relation varies across corporate life-cycle stages and institutional settings. Using a global panel of non-financial and non-utility firms from 134 economies during 2000-2025, the analysis treats retained earnings scaled by total assets as a cumulative measure of internally generated equity rather than as a short-term profitability ratio. Quadratic regressions show a concave association between the cash conversion cycle and retained earnings, indicating that both excessively compressed and excessively extended operating cycles can be inconsistent with stronger internal-financing capacity. Additional tests show that the fitted frontier depends on model specification, inventory and receivables behavior, life-cycle stage, and national institutional setting. The evidence supports a context-dependent operating-liquidity frontier and cautions against converting any single turning point into a universal managerial benchmark. The study contributes to working-capital, corporate life-cycle, and internal-finance research by linking operating liquidity choices with the long-run stock of earned equity and by clarifying when nonlinear estimates should be interpreted conservatively.

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1. Introduction

Operating decisions and support operations as part of the operating cycle are among the most frequent financial decisions in the business world, yet the long-term consequences of these operating-cycle decisions on the ability of the company to raise capital internally, which is a key resource requirement, remains underexamined. The inventory, receivables and payables will help to identify the speed of the cash to sales conversion and the amount of financing required for day to day operations. In corporate finance research these decisions are frequently viewed as short-term liquidity decisions and retained earnings are frequently interpreted as the impact of profitability, payout policy and financing history. This separation is convenient from an analytical point of view, but an important economic channel is hidden: multiple operating-cycle decisions can affect the flow of profits generated by the firm, and ultimately the amount of earned equity that can be tapped for future financing.

This distinction is important, as retained earnings are not merely another measure of profitability. Return on assets, operating margin and Tobin's Q are measures of current performance or valuation, while retained earnings divided by total assets are a measure of the

[1] Department of Management & Administrative Sciences, University of Narowal, Narowal, Pakistan.
E-mail: ashraf.iub@gmail.com, muhammad.ashraf@uon.edu.pk
[2] Department of Commerce. Islamia University of Bahawalpur, Bahawalpur, Pakistan
E-mail: samreen.waqar@iub.edu.pk
[3] Department of Management Sciences, University of Gujrat, Gujrat, Pakistan
E-mail: ahmad.ghazali@uog.edu.pk

amount of internally generated equity. This stock of earned equity is an indicator in the life-cycle perspective of corporate finance that a company has shifted from the use of contributed funds to internally financed maturity (DeAngelo, DeAngelo, & Stulz, 2006). A firm can be profitable in the current year but exhibit low retained earnings, and a mature firm can have a strong base of capital due to past years of retained earnings and have a very weak base of current retained earnings. The operating-cycle policy then facilitates the analysis from a short-horizon working-capital management perspective to the long-horizon financing capacity perspective, linking the two together in the process.

Prior working-capital research indicates that the cash conversion cycle is correlated with profitability, investment, valuation and financial flexibility (Deloof, 2003; Kieschnick, Laplante, & Moussawi, 2013; Aktas, Croci & Petmezas, 2015). Recent studies also indicate that heterogeneity exists across countries, institutional settings, firm constraints, foreign ownership, competitive conditions, and reporting quality in the CCC-performance relation (Banerjee & Deb, 2025; Galil et al., 2026; Johan et al., 2024; Sawarni et al., 2023; Silva & Silva, 2026; Zhou et al., 2025). Most of this evidence, however, assesses performance in the short timeframe and not the overall balance of internally invested capital. It thus remains uncertain, however, from the literature whether an operating-cycle design which is efficient in the short run is also conducive to the accumulation of earned-equity over time.

This is particularly important since the operating cycle is not likely to have an uniform linear effect. A very short cycle can be indicative of cash released, but may also be due to low stock levels, restrictive customer credit or high levels of supplier financing. The longer the cycle can provide more continuity for sales, customer relations, and flexibility of production, but after a certain length of time, it can result in higher costs for storing inventory, credit losses, financing costs, and the risk of it becoming obsolete. These conflicting processes imply that there should not be a straight line to ever shorter cycles, but rather a concave operating-liquidity frontier. The answer to the question isn't necessarily “firms should always shorten the cash conversion cycle”, it's whether there is a range that makes sense where operating slack can be generated to support retained earnings before the costs of carrying cash outweigh the benefits.

Two forms of heterogeneity, which make this question more complex. First, there are operating needs that are different for corporate life cycle stages. Introduction and Growth firms tend to be subject to uncertain demand, lower supplier bargaining power, and higher financing pressure whereas the Mature firms tend to have stronger information systems, more stable production process, and higher earned-equity balances. The length of the cycle may be longer for Shakeout and Decline firms due to restructuring, obsolete inventories, or declining customer quality. Second, national institutional development affects the cost of liquidity. But while in advanced financial systems the implementation of better contract enforcement, payment systems, factoring markets, logistics, and credit information can reduce precautionary operating capital, emerging and developing markets can require the use of additional operating capital or expose the market to higher costs to use that same capital.

This study examines whether there is a relationship between operating-cycle duration and the accumulation of earned equity and whether this relationship is different for different institutional settings and life-cycle stages. The empirical analysis relies on a global panel of publicly listed non-financial and non-utility corporations in 134 economies for the period 2000-2025. The main outcome variable is retained earnings scaled of total assets. The cash conversion cycle is modeled linearly and quadratically and fitted turning points are presented for the analysis to assess whether the frontier is within the range of observed data. The design also isolates the impact of the CCC effects from inventory, receivables and payables, and provides a comparison for each of Dickinson's life-cycle stages at both the Advanced and Emerging and Developing Economy levels.

The paper makes four contributions. First, it changes the dynamics of working capital from profitability to accumulation of earned equity, thus making day-to-day operating choices relate to long-term internal financing capacity. Second, it is an empirical proposition of nonlinearity that is tested and the statistical and economic significance of the fitted optima is assessed. Third, it combines theory of corporate life cycle with the cross-country institutional development to demonstrate that the operating-liquidity frontier is not the universal benchmark for managers. Fourth, it makes it clear how to interpret fitted turning points in an interacted model as descriptive subgroup comparisons if the interactions are nonlinear.

Operating-cycle design is shown to be nonlinear and context dependent to the accumulation of earned-equity. While moderate operating slack can foster sales, a production continuity, and customer credit, excessive inventory residence, slow collections, or tight cash flow with suppliers can erode retained earnings. The fitted frontier varies with respect to model specifications, institution and operating-cycle components, life-cycles. These results contradict the mechanical theory that shorter cash cycle is always better, and suggest a contingent approach to working-capital governance.

The remainder of the paper is organized as follows: The related literature and the formation of the hypotheses are presented in Section 2. Next, the data, theoretical framework, empirical model and estimation strategy are described in Section 3. The results of the empirical study and their relevance for working-capital management and accumulation of earned-equity are discussed in Section 4. The conclusion, policy implications, limitations, and suggestions for future research are included in Section 5.

2. Literature Review and Hypothesis Development

2.1 Earned equity, internal finance, and corporate maturity

Retained earnings are the cumulative profits that have been retained within the firm instead of being paid out to shareholders. They are more than just a balance sheet item: They indicate the amount of financing that has been provided by the company's own resources. The earned-contributed capital mix is argued as a measure of corporate maturity in DeAngelo et al. (2006), and subsequent life-cycle studies relate retained earnings to payout, financing, and risk-bearing. Therefore retained earnings scaled by total assets is a convenient proxy for the amount of accumulated internal capital for the present study, and not a measure of profitability for a short period.

This stock-flow distinction, which is critical to the research design. No single operating decision that one can apply to one year's operating decision and automatically achieve a large retained-earnings balance; but, continued operating policies can affect the order in which profits are generated which leads to the accumulation of retained earnings. Efficient inventory control can minimize inventory holding and stock-out costs, while disciplined receivables can help minimize credit losses, and disciplined supplier financing can help maintain liquidity without negatively impacting relationships. On the other hand, constant operating friction may squeeze margins and diminish the profit to be retained. The theoretical channel is thus cumulative: channel design can influence how over time firms can create earned equity.

Similarly, a high RE/TA ratio does not imply that the company is currently operating efficiently. It is a reflection of the profitability achieved in the past, the payout policy, write-offs, mergers and acquisitions, and the asset denominator. This persistence poses a challenge to causal interpretation and also makes RE/TA an appropriate outcome for a study on long run internal capital formation. The key question is whether the retained-earnings position of firms with different operating-cycle configurations is systematic after controlling for firm characteristics and the institutional environment and firm life-cycle stage.

2.2 Operating-cycle trade-offs and a concave earned-equity frontier

The cash conversion cycle summarizes three related operating decisions, namely the time it takes for the firm to convert its inventory into sales, the time it takes for customers to pay the firm, and the time it takes for the firm to pay off its suppliers. In general, a shorter cycle typically means that the cash commitment invested in operations is shorter, but the economic implication of a shorter cycle varies according to the source of the operation. This can free up cash without impacting sales, and having too little inventory can lead to stock out and lost sales. While tighter receivables will diminish credit risk, it can also lead to lower customer relationships if the credit terms placed become too restrictive. Extended terms may help to save cash, but a very long "due" may lead to additional costs or production delays.

These opposing mechanisms suggest a concave operating cycle – earned equity relationship. Efforts to conserve cash at extremely low or negative cycle lengths may involve unusually aggressive collection policies, low inventory levels, or a high dependence on supplier financing. These policies can provide a short-term liquidity boost at the expense of the operations and relationships. Operating slack can facilitate production continuity, customer service and sales growth as the cycle gets longer. Outside of an efficient range, however, other inventory, receivables and financing requirements increase carrying costs, losses on receivables and administrative costs. The net result is a reasonable interior frontier.

This contingent interpretation is supported by recent evidence. Kiymaz et al. (2024) document differential effects of the working capital between developed and emerging economies at the aggregate level, and at the component level, and Johan et al. (2024) document the impacts of the cash conversion cycle on the performance of the BRICS economies. The value of working-capital policy is also found to be context-specific; that is, not based on a specific target (Banerjee & Deb, 2025; Galil et al., 2026; Sawarni et al., 2023; Silva & Silva, 2026; Zhou et al., 2025). This paper builds upon that literature by looking at retained earnings as a result of a series of events.

Hypothesis 1 (nonlinear earned-equity frontier): Retained earnings relative to total assets are associated with operating-cycle duration in a concave manner, with a statistically identifiable interior range at which the fitted RE/TA outcome is maximized.

2.3 Corporate life cycle as an operating constraint

Across stages of the corporate life cycle, the same length of the operating cycle can carry different meanings to the economy. Introduction firms typically have unpredictable demand, restricted credit records, limited bargaining power and zero or negative retained earnings. Growth firms grow products, customers, and markets, all of which can lead to higher levels of inventory and receivables, even with disciplined managers. Stable operations, credit information, supplier relationships, and retained earnings are aspects of having mature firms. A long cycle is more indicative of stress than it is of a buffer for Shakeout and Decline firms where restructuring, excess capacity, obsolete inventory, or weaker customer quality can occur.

The following theoretical foundations explain for these differences through life-cycle research on the life cycle. Operating, investing and financing cash-flow patterns categorize stages as identified by Dickinson (2011) and Habib and Hasan (2019) demonstrate that outcomes vary systematically of financing, investment, risk, governance and reporting outcomes across the corporate life cycle. Hasan et al. (2021) report on the differences in trade credit across the stages of the firm's life cycle, while Sethi and Bapat (2026) illustrate the changes in working-capital transactions through the firm's life cycle. The recent findings of Muhammad et al. (2026) also lend support to the thesis that cash conversion cycles depend on life cycle conditions and economic development conditions.

These arguments suggest that there is no single operating-cycle benchmark that applies to all businesses. Mature firms may operate with leaner cycles since they have more powerful systems and bargaining power. Stages of growth may require longer operating slack to accommodate the growth as may stages of distress due to operational frictions, not to investment. Thus, the placement of the earned-equity frontier must differ at each stage of Dickinson's life cycle and any guess as to the placement of the frontier should be tested.

Hypothesis 2 (life-cycle heterogeneity): The location of the maximizing operating-cycle frontier differs across Dickinson life-cycle stages. A secondary directional expectation is that Mature firms will exhibit a lower fitted maximum than expansionary or distressed stages, but support for this stronger claim requires formal cross-stage evidence.

2.4 Institutional development and the cost of operating liquidity

The cost and value of operating liquidity are influenced by national institutions. In the Advanced Economies, the effect of contract enforcement, depth of banking and factoring markets, electronic payments, reliable logistics, and credit information on the demand for precautionary inventories and receivables is negative. Under these conditions, companies could maintain effective operations by establishing shorter cycles. Weaker enforcement, restricted access to external financing, slower payments and logistics networks can lead to higher buffer requirements in Emerging and Developing Economies, and higher cost of operating capital.

The direction of the institutional effect is thus theoretically ambiguous. The optimal cycle might be shortened through improvements in institutions, which can lower transaction frictions, but also allow firms to offer strategic customers credit and/or to purchase and hold inventories without incurring high financing costs. In weaker institutions, firms may require more operating slack available to shield production and customer relations, but because external financing is limited, it may not be possible to profitably carry operating slack. This institutional perspective is supported by the cross-country evidence of cash cycles and working-capital policies presented by Anton and Nucu (2022), Chang, Chen, and Mon (2024), and Jalal and Khaksari (2020).

Recent studies, a number of studies on trade-credit and sustainability issues have highlighted the need to consider institutional context. Cumming et al. (2026) demonstrate that governance reforms affect trade credit, and Nguyen et al. (2025) link firm-level climate exposure and trade-credit behavior. Magerakis and Habib (2026) show that biodiversity risk is related to working-capital management. These studies indicate that inventory, receivables, and payables are more strategic operating channels that are part of the governance, environmental and institutional conditions rather than simply mechanical accounting ratios.

Hypothesis 3 (institutional heterogeneity): The fitted operating-cycle frontier for retained-earnings accumulation differs between Advanced Economies and Emerging and Developing Economies, without imposing an ex ante directional sign.

2.5 Joint life-cycle and institutional moderation

Life-cycle needs are shaped by institutions where firms operate. A Growth firm in an Advanced Economy could use supplier finance, digital payments, efficient logistics, and enforceable contracts to enable growth in a different operating model than an Advanced Economy's Growth firm would need to operate in an Emerging or Developing Economy. Similarly, Mature firms with a tight financial environment can use relationship-based trade credit more than Mature firms with access to more external liquidity. This interaction implies that the operating-cycle frontier can vary not only according to stage/ institution separately, but also according to configuration of stage/institution.

The empirical implication is a set of turning points of the stages, not a single global optimum. These turning points are however nonlinear functions of the estimated parameters, and may be sensitive to model specification. The evidentiary value of a visual comparison of subgroup estimates is useful but not the same as a formal test. For this reason, the manuscript treats independent estimates of vertices as the stronger evidence for joint moderation, and treats formal nonlinear comparisons as the weaker evidence.

Hypothesis 4 (joint moderation): Life-cycle stage and institutional setting jointly condition the operating-cycle frontier, producing statistically distinguishable maxima for at least some stage-by-institution comparisons.

3. Methodology

3.1 Data

The analysis uses the supplied global panel of publicly listed non-financial, non-utility corporations. The database covers 134 economies and fiscal years 2000–2025. Financial institutions are excluded because deposit funding, regulatory liquidity requirements, and the meaning of inventory and trade credit differ fundamentally from those of industrial and service firms. Regulated utilities are also excluded because their operating cycles and financing structures are heavily shaped by regulation. The full descriptive database contains 325,148 firm-year observations. Requiring non-missing values for the dependent variable, operating-cycle measure, and the full set of firm-level controls produces a common regression sample of 319,990 observations. This distinction is retained throughout the paper so that the headline sample size is not confused with the estimation sample.

The original sample-distribution table contained placeholder zeros for institutional and life-cycle categories. The revised Table 1 reconstructs the distribution of the common regression sample directly from the observation counts reported in the supplied life-cycle and institutional regressions. Advanced Economies contribute 181,076 observations (56.59%) and EMDE economies contribute 138,914 observations (43.41%). By life-cycle stage, the common sample contains 38,272 Introduction observations (11.96%), 80,286 Growth observations (25.09%), 147,673 Mature observations (46.15%), 8,195 Shakeout observations (2.56%), and 45,564 Decline observations (14.24%). These categories sum exactly to the 319,990 observations used in the benchmark multivariate models.

Table 1. Analytical Regression Sample Distribution by Institutional Group and Corporate Life-Cycle Stage

Classification dimension	Category	Observations (N)	Share (%)
Institutional development	Advanced Economies (AE)	181,076	56.59
Institutional development	Emerging & Developing Economies (EMDE)	138,914	43.41
Corporate life cycle	Introduction	38,272	11.96
Corporate life cycle	Growth	80,286	25.09
Corporate life cycle	Mature	147,673	46.15
Corporate life cycle	Shakeout	8,195	2.56
Corporate life cycle	Decline	45,564	14.24
Regression sample	Total	319,990	100.00

Note. Category counts are reconstructed from the supplied institutional and life-cycle regression tables and refer to the common multivariate sample (N = 319,990). The broader descriptive database contains 325,148 firm-year observations.

3.2 Theoretical Framework and Empirical Modeling

The primary dependent variable is retained earnings divided by total assets and multiplied by 100 (RE/TA). This ratio is winsorized at the first and ninety-ninth percentiles in the supplied data. An alternative outcome, retained earnings divided by total equity (RE/TE), is used in robustness analysis. Because retained earnings can be negative after accumulated losses, both measures have substantial left tails even after winsorization. The descriptive statistics show a mean RE/TA of 4.05%, a median of 17.12%, and a minimum of −534.15%. The large difference between the mean and median reflects the economically important presence of firms with deeply negative accumulated earnings.

The main explanatory variable is the cash conversion cycle, calculated from inventory days, receivables days, and payables days and bounded to −100 to 365 days. The supplied descriptive statistics report a mean of 90.00 days and median of 77.00 days. DSI averages 84.10 days, DSO 70.35 days, and DPO 65.00 days. These components are also entered separately and quadratically in the decomposition tests. The aggregate cycle can be negative when supplier credit exceeds the combined time invested in inventory and customer receivables; such observations are economically possible and are retained within the pre-specified lower bound.

Life-cycle stages follow Dickinson's (2011) cash-flow-signature method, which classifies firm-years using the signs of operating, investing, and financing cash flows. The resulting categories are Introduction, Growth, Mature, Shakeout, and Decline. National institutional setting follows the supplied IMF-based classification into Advanced Economies and Emerging Markets and Developing Economies. The regressions control for log total assets, financial leverage, cash holdings, capital expenditures scaled by assets, return on assets, and sales growth. These controls capture scale, capital structure, liquidity, investment intensity, current operating performance, and expansion pressure that could jointly influence both the operating cycle and the accumulated retained-earnings stock.

3.3 Empirical Strategy

The empirical model links retained earnings to the cash conversion cycle, its squared term, firm-level controls, and fixed effects. The baseline specification is written as:

$$RE/TA_{it} = \alpha + \beta_1 CCC_{it} + \beta_2 CCC_{it}^2 + \gamma' X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

$$CCC_{it} = DSI_{it} + DSO_{it} - DPO_{it} \qquad (2)$$

$$CCC^* = -\beta_1/(2\beta_2), \text{ where } \beta_2 < 0 \qquad (3)$$

In Equation (1), RE/TA is retained earnings scaled by total assets, CCC is the cash conversion cycle, X is the vector of firm controls, and the fixed effects absorb common time shocks and, where specified, industry or firm heterogeneity. Equation (2) decomposes the operating cycle into inventory days, receivables days, and payables days. Equation (3) gives the model-implied turning point for concave quadratic specifications. A turning point is interpreted only when it lies within the observed data support and remains economically plausible.

Heterogeneity, decomposition, and joint contrasts.

Subsample tests use an alternative RE/TE outcome and partitions by gross margin and firm size. Component models enter DSI, DSO, and DPO individually and jointly. A component-specific turning point is interpreted only if it lies within the observed component range and the curvature is statistically supported. This rule is important for the payables result, whose reported standalone turning point is −672.41 days despite DPO being observed only between approximately 3 and 278 days. Such an extrapolated vertex is a mathematical property of the fitted quadratic, not an economically observed optimum.

Stage-specific models are estimated across the five Dickinson categories. Institutional models compare AE and EMDE subsamples. Table 9 reports six independently estimated joint stage-by-institution vertices with Delta-method standard errors and confidence intervals, while Table 9B reports formal pairwise contrasts from a pooled fully interacted model. The distinction matters because the vertices produced by independent subgroup regressions need not be numerically identical to nonlinear combinations from a separately estimated pooled interaction model.

Robustness and identification.

The supplied robustness table reports four strategies: lagged operating-cycle terms, a two-stage least-squares specification using industry-year median cycle measures as instruments, a high-cash-buffer subsample, and a post-2010 sample. These tests are informative about persistence and specification sensitivity. They are not sufficient, on the information supplied, to establish causal identification. In particular, the IV table does not report first-stage coefficients, partial F-statistics, weak-instrument diagnostics, or overidentification tests. Industry-year median cycle measures may plausibly capture common operating conditions, but their exclusion from the retained-earnings equation requires justification and testing. The paper therefore describes the 2SLS result as an instrumental-variable sensitivity test rather than as definitive causal evidence.

4. Empirical Results and Their Discussion

4.1 Empirical Results

Table 2 documents substantial heterogeneity in accumulated earnings and operating-cycle policies. The distribution of RE/TA is strongly asymmetric, which is consistent with a global sample containing young, restructuring, and distressed firms as well as mature firms with accumulated internal capital. This dispersion supports the use of retained earnings as a cumulative earned-equity measure rather than as a simple current-performance indicator.

The operating-cycle measures also vary widely across firms. This variation matters because a fitted quadratic maximum can be interpreted only when it is located within the observed support of the data. Estimates close to the imposed upper or lower bound are therefore treated as boundary-sensitive rather than as precise managerial benchmarks.

Table 2. Descriptive Statistics for Primary Variables

Variable	Mean	Std. Dev.	P25	Median	P75	Min	Max
Retained Earnings / Assets (%)	4.05	78.11	3.83	17.12	33.04	-534.15	79.58
Retained Earnings / Equity (%)	4.72	166.30	11.18	37.31	64.37	-1210.11	125.04
Cash Conversion Cycle (Days)	90.00	82.37	32.40	77.00	133.50	-100.00	365.00
Days Sales of Inventory (Days)	84.10	70.65	32.10	67.40	115.60	0.60	336.70
Days Sales Outstanding (Days)	70.35	52.37	35.00	59.80	92.30	1.30	282.40
Days Payables Outstanding (Days)	65.00	49.98	31.10	52.40	83.80	3.20	277.60

Table 2. Descriptive Statistics for Primary Variables

Variable	Mean	Std. Dev.	P25	Median	P75	Min	Max
Firm Size (Log Assets)	12.17	2.04	10.80	12.08	13.45	7.42	17.43
Financial Leverage (%)	22.51	19.22	5.78	19.59	34.57	0.00	86.97
Cash Holdings (%)	0.13	0.13	0.04	0.09	0.19	0.00	0.64
Capital Expenditures (%)	0.05	0.05	0.01	0.03	0.06	0.00	0.27
Return on Assets (%)	3.47	7.33	1.07	3.60	6.75	-32.01	23.38
Sales Growth (%)	12.16	30.19	-2.85	7.09	21.07	-52.19	152.35

Note. All continuous variables are winsorized at the 1st and 99th percentiles. Statistics refer to the supplied valid sample for each variable.

Table 3 shows that simple correlations provide only limited guidance. Accumulated earned equity is more closely aligned with firm scale, profitability, and capital structure than with any single operating-cycle component. The multivariate specifications are therefore necessary to evaluate whether the operating cycle has an independent nonlinear association with retained earnings.

Table 3. Pearson Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) RE/TA	1.000										
(2) CCC	0.054	1.000									
(3) DSI	-0.035	0.758	1.000								
(4) DSO	0.005	0.450	0.102	1.000							
(5) DPO	-0.135	-0.057	0.280	0.472	1.000						
(6) Size	0.263	-0.120	-0.078	-0.048	0.037	1.000					
(7) Lev	-0.211	-0.025	0.014	-0.081	-0.023	0.103	1.000				
(8) Cash	-0.076	-0.040	-0.037	-0.000	0.013	-0.079	-0.361	1.000			
(9) CapEx	0.058	-0.110	-0.071	-0.139	-0.068	0.015	0.086	-0.115	1.000		
(10) ROA	0.560	-0.024	-0.065	-0.122	-0.183	0.155	-0.168	-0.007	0.145	1.000	
(11) Growth	-0.026	-0.059	-0.046	-0.112	-0.088	-0.041	-0.009	0.033	0.125	0.176	1.000

Note. Pairwise Pearson correlations are reported for the supplied variables.

4.1.1 Baseline quadratic results

Table 4 provides the main evidence for Hypothesis 1. After adding the squared cycle term in the model, the estimated signs are consistent with the concave relationship between operating-cycle duration and retained earnings. The findings suggest that moderate operating slack is correlated with greater earned-equity accumulation, and that after a certain point, the cycle length becomes costly.

Table 4. Baseline Regressions: Operating-Cycle Duration and Retained Earnings / Assets

Independent Variables	(1) Pooled OLS	(2) Year FE	(3) Quadratic OLS	(4) Industry & Year FE	(5) Firm FE
Cash Conversion Cycle (CCC)	0.0685***	0.0675***	0.1532***	0.1611***	0.1353***
	(0.0031)	(0.0031)	(0.0078)	(0.0079)	(0.0076)
CCC Squared (CCC^2)			-0.0003***	-0.0004***	-0.0002***
			(0.0000)	(0.0000)	(0.0000)
Firm Size (Log Assets)	7.3802***	7.3295***	7.3775***	7.4311***	23.2312***
	(0.1786)	(0.1789)	(0.1790)	(0.1791)	(0.6043)
Financial Leverage	-0.7358***	-0.7378***	-0.7334***	-0.7548***	-0.7512***
	(0.0213)	(0.0214)	(0.0213)	(0.0212)	(0.0193)
Cash Holdings	-67.4531***	-68.3209***	-67.4671***	-61.6025***	-3.2472
	(2.7354)	(2.7555)	(2.7633)	(2.7196)	(2.0652)
Capital Expenditures	5.2298	6.9954	8.9931*	15.8103***	30.3501***
	(3.6775)	(3.7064)	(3.7029)	(3.6958)	(2.3660)
Return on Assets	5.3995***	5.4141***	5.3743***	5.2795***	1.9983***
	(0.0838)	(0.0841)	(0.0846)	(0.0823)	(0.0504)
Sales Growth	-0.2581***	-0.2569***	-0.2566***	-0.2411***	-0.0340***
	(0.0064)	(0.0066)	(0.0065)	(0.0064)	(0.0044)
Constant	-81.7750***	-80.5856***	-84.0968***	-89.0133***	-258.2086***
	(2.4905)	(2.4952)	(2.5367)	(3.0014)	(6.7126)
Optimal CCC* (Days)	—	—	219.46***	226.96***	274.73***
Year Fixed Effects	No	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	No	Yes	No
Firm Fixed Effects	No	No	No	No	Yes
Observations (N)	319,990	319,990	319,990	319,937	319,990
R-squared	0.3983	0.3987	0.4006	0.4090	0.2341

*Note. Dependent variable is Retained Earnings / Assets (%). Robust standard errors clustered by firm are reported in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Turning points are the Delta-method values supplied in the empirical results file.*

The concave pattern is consistent with the industry and year fixed-effects specification. The stability of this relation indicates the fact that the baseline relation is not merely a result of the sector composition or common macroeconomic shocks. Simultaneously, the estimated vertex is an average, not an absolute benchmark of the firms with different business models.

The firm fixed-effects model focuses on changes within the firm, as opposed to cross-firm differences. Since retained earnings are persistent, this specification therefore yields a different fitted frontier. The contrast over specifications provides some support for the major nonlinear hypothesis and also helps to temper the interpretation.

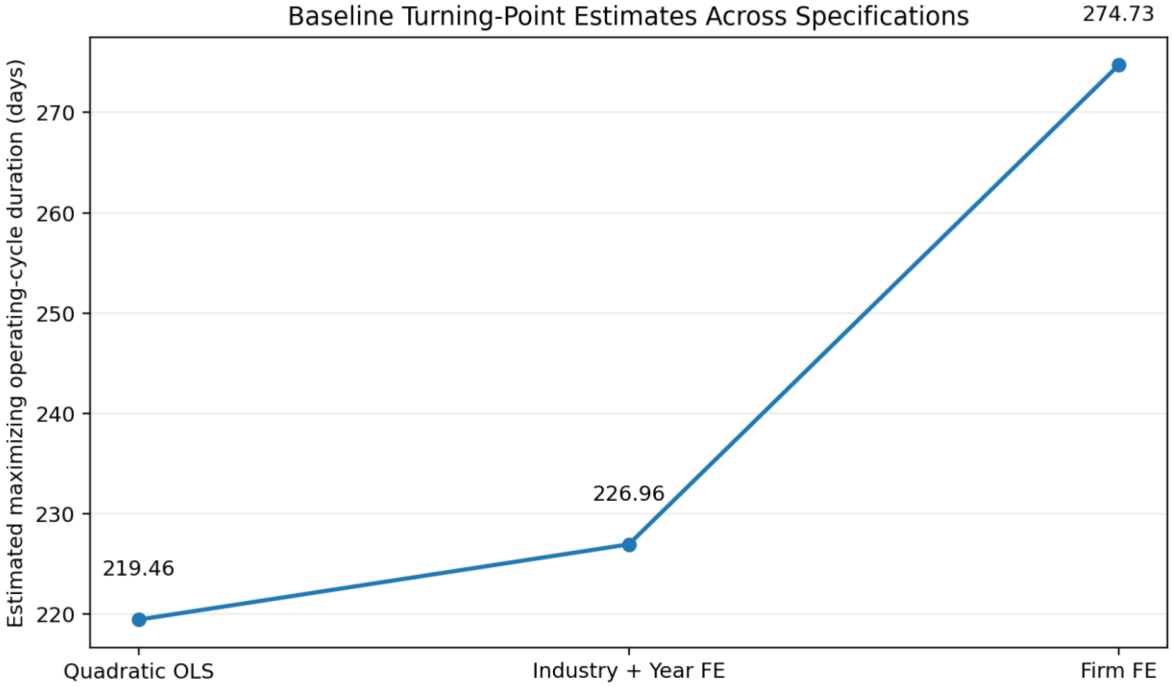
The control variables are economically informative. As predicted, financial leverage is negatively related to accumulated earned equity in all models, and is statistically highly significant after accounting for profitability and size. ROA is highly positive, a result of being a cumulative earnings measure. The growth is negative, consistent with high growth firms investing heavily and at an early stage of the cycle, having limited earnings. Under pooled specifications, cash holdings are strongly negative and are not significant under firm fixed effects, indicating that a lot of the cross-sectional cash-retained-earnings correlation is due to the fact that there are persistent firm attributes that explain the correlation.

More recently, corporate cash and investment analyses have suggested that tax uncertainty, economic policy uncertainty, agency uncertainty, corporate investment demand, and politically driven governance have all proven to be significant influences on liquidity decisions. These studies further underscore the importance of comprehending the retained earnings and operating-cycle decisions alongside uncertainty, financing flexibility, and investment constraints (Berchtold et al., 2026; Duong et al., 2020; Javadi et al., 2021; Liu & Liu, 2025; Xu et al., 2026).

Finally, firm asset tangibility is found to be important in financing efficiency across all stages in the firm's life cycle, indicating that the structure of the asset base (in addition to retained earnings, leverage, and operating liquidity) should be considered together (Ghazali et al., 2025).

Before Figure 1, the baseline evidence can be summarized as follows. The figure compares the model-implied turning points across the principal specifications and shows that the estimated frontier is broadly concave but specification dependent. This visual comparison helps connect the regression evidence to the study's first objective: identifying whether operating-cycle design is associated with earned-equity accumulation.

Figure 1: *Baseline Turning-Point Estimates Across Specifications*



4.1.2 Alternative outcomes and cross-sectional heterogeneity

Table 5 shows that the nonlinear result is not confined to one scaling of retained earnings or one firm type. The alternative earned-equity measure and most subsample tests preserve the concave pattern, although some estimates are close enough to the data boundary to require restraint. The appropriate interpretation is therefore robustness of nonlinearity, not precision of a single optimal cycle.

The gross-margin split is especially informative. High-margin firms may use inventory availability and customer credit as commercial tools, but a boundary-proximate fitted maximum should not be read as evidence that very long operating cycles are generally desirable. The result instead indicates that business model and pricing power condition how operating liquidity translates into retained earnings.

The firm-size split provides a similar caution. Size alone does not determine the earned-equity frontier. Large and small firms can differ in bargaining power, financing access, and operating complexity, but those differences do not collapse into a simple larger-firm or smaller-firm rule.

4.1.3 Inventory, receivables, and payables decomposition

Table 6 demonstrates that the aggregate cycle conceals distinct component mechanisms. Inventory days produce an economically interpretable concave relation, consistent with the idea that some stock buffer supports production and sales while excessive holding periods impose carrying and obsolescence costs.

Table 5. Robustness Checks: Alternative Earned-Equity Measure and Subsample Partitions

Independent Variables	(1) RE / Equity	(2) High Gross Margin	(3) Low Gross Margin	(4) Large Firms	(5) Small Firms
Cash Conversion Cycle (CCC)	0.3016***	0.1172***	0.1884***	0.0755***	0.1890***
	(0.0167)	(0.0103)	(0.0101)	(0.0056)	(0.0136)
CCC Squared (CCC^2)	-0.0007***	-0.0002***	-0.0004***	-0.0002***	-0.0004***
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Firm Size (Log Assets)	14.9995***	8.4696***	5.9384***	2.3965***	16.1473***
	(0.3653)	(0.2622)	(0.1814)	(0.1621)	(0.5793)
Financial Leverage	-1.3496***	-0.8240***	-0.6866***	-0.6234***	-0.8178***
	(0.0438)	(0.0304)	(0.0246)	(0.0211)	(0.0323)
Cash Holdings	-118.3704***	-68.0649***	-42.7786***	-19.6034***	-95.7775***
	(5.2973)	(3.5026)	(3.3841)	(2.2361)	(3.9046)
Capital Expenditures	51.8394***	22.6213***	18.6883***	14.7904***	10.8119*
	(8.2068)	(5.0955)	(4.5861)	(3.6459)	(5.3268)
Return on Assets	10.4350***	5.3067***	6.0208***	2.5574***	5.9881***
	(0.1735)	(0.1099)	(0.1096)	(0.0886)	(0.0933)
Sales Growth	-0.4097***	-0.3038***	-0.2087***	-0.1668***	-0.2671***
	(0.0144)	(0.0100)	(0.0076)	(0.0057)	(0.0094)
Constant	-183.4042***	-100.6998***	-68.4447***	-10.5097***	-171.0927***
	(5.3661)	(3.7977)	(2.6652)	(2.3399)	(6.4137)
Optimal CCC* (Days)	220.76***	336.70***	222.22***	202.89***	213.02***
Observations (N)	313,332	160,036	159,954	161,307	158,683
R-squared	0.2745	0.4008	0.4293	0.2776	0.4379

*Note. Robust standard errors are clustered by firm. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The high-gross-margin turning point is close to the upper cycle bound and should be interpreted cautiously.*

Receivables also show a concave relation. Customer credit can support sales relationships and market penetration, but its benefits eventually give way to financing, monitoring, and default costs. This interpretation is consistent with the trade-credit arguments of Petersen and Rajan (1997), Cuñat (2007), and Hasan et al. (2021).

The payables result is different. The supplied evidence does not identify a stable interior payables optimum for retained earnings. This distinction is important because stretching supplier payments can conserve cash in the short run while damaging discounts, reliability, and supplier relationships.

Table 6. Operating-Component Decomposition: Inventory, Receivables, Payables, and Retained Earnings

Independent Variables	(1) Inventory (DSI)	(2) Receivables (DSO)	(3) Payables (DPO)	(4) All Components
Days Sales Inventory (DSI)	0.0641***			0.0519***
	(0.0104)			(0.0105)
DSI Squared (DSI^2)	-0.0002***			-0.0001*
	(0.0000)			(0.0000)
Days Sales Outstanding (DSO)		0.2023***		0.2463***
		(0.0121)		(0.0131)
DSO Squared (DSO^2)		-0.0006***		-0.0005***
		(0.0000)		(0.0000)
Days Payables Outstanding (DPO)			-0.0834***	-0.2010***
			(0.0134)	(0.0145)
DPO Squared (DPO^2)			-0.0001	0.0001*
			(0.0001)	(0.0001)
Firm Size	6.9781***	7.0397***	7.0991***	7.4696***
	(0.1748)	(0.1753)	(0.1767)	(0.1798)
Financial Leverage	-0.7428***	-0.7151***	-0.7594***	-0.7251***
	(0.0215)	(0.0216)	(0.0216)	(0.0215)
Cash Holdings	-70.2749***	-69.4995***	-71.4806***	-67.2441***
	(2.7731)	(2.7317)	(2.7371)	(2.7264)
Capital Expenditures	-3.9538	5.9323	-6.8021	10.7869**
	(3.7155)	(3.6696)	(3.6951)	(3.6546)
Return on Assets	5.4023***	5.4834***	5.2891***	5.2949***
	(0.0846)	(0.0849)	(0.0849)	(0.0845)
Sales Growth	-0.2654***	-0.2565***	-0.2749***	-0.2575***
	(0.0066)	(0.0065)	(0.0065)	(0.0065)
Constant	-71.7298***	-81.5986***	-63.3877***	-81.5815***
	(2.3858)	(2.6111)	(2.3176)	(2.5948)
Component Turning Point (Days)	139.47***	172.14***	-672.41***	-672.41***
Observations (N)	319,709	319,740	319,616	319,370
R-squared	0.3925	0.3969	0.3962	0.4045

Note. Year fixed effects are included. Robust standard errors are clustered by firm. The reported DPO turning point lies outside observed support and is not interpreted as an economic optimum.

The component evidence shows why managers should not manage the cash conversion cycle as a single mechanical benchmark. The same aggregate cycle can arise from very different inventory, receivables, and payables choices, and those choices have different implications for earned-equity accumulation.

4.1.4 Life-cycle heterogeneity

Table 7 reports separate quadratic regressions by Dickinson stage. All five stage-specific models show positive linear and negative squared cycle terms, supporting a concave association within each stage.

Table 7. Operating-Cycle Heterogeneity Across Dickinson Corporate Life-Cycle Stages

Independent Variables	(1) Intro	(2) Growth	(3) Mature	(4) Shakeout	(5) Decline	(6) Interacted
Cash Conversion Cycle (CCC)	0.1653***	0.1127***	0.1265***	0.1772***	0.1597***	0.3394***
	(0.0225)	(0.0081)	(0.0069)	(0.0348)	(0.0153)	(0.0245)
CCC Squared (CCC^2)	-0.0004***	-0.0003***	-0.0003***	-0.0004**	-0.0004***	-0.0009***
	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Firm Size	12.7910***	5.0541***	4.8239***	10.4424***	8.8875***	7.1431***
	(0.4452)	(0.1937)	(0.1608)	(0.7177)	(0.3146)	(0.1788)
Financial Leverage	-0.7913***	-0.4157***	-0.8334***	-1.1263***	-0.8987***	-0.7260***
	(0.0473)	(0.0214)	(0.0231)	(0.0803)	(0.0375)	(0.0217)
Cash Holdings	-86.8972***	-43.5120***	-20.5691***	-61.9404***	-69.8725***	-68.1639***
	(7.7821)	(2.9525)	(2.2919)	(10.4905)	(4.2185)	(2.7836)
Capital Expenditures	120.2650***	37.7030***	11.7151*	58.5054	-26.4975	3.6988
	(11.3270)	(3.3544)	(4.9531)	(38.9746)	(14.1462)	(3.8179)
Return on Assets	7.4932***	2.9165***	1.9574***	6.9058***	6.5637***	5.2229***
	(0.1250)	(0.0866)	(0.0671)	(0.2982)	(0.1401)	(0.0850)
Sales Growth	-0.1621***	-0.1757***	-0.1511***	-0.1985***	-0.2394***	-0.2465***
	(0.0150)	(0.0080)	(0.0080)	(0.0348)	(0.0150)	(0.0065)
Constant	-144.1787***	-56.1488***	-35.5424***	-102.2434***	-95.6803***	-99.2088***
	(6.4237)	(2.9229)	(2.1629)	(11.1082)	(4.7859)	(2.9008)
Optimal CCC* (Days)	212.94***	220.96***	209.76***	251.14***	220.35***	220.35***
Observations (N)	38,272	80,286	147,673	8,195	45,564	319,990
R-squared	0.5584	0.1717	0.2204	0.3582	0.4100	0.4040

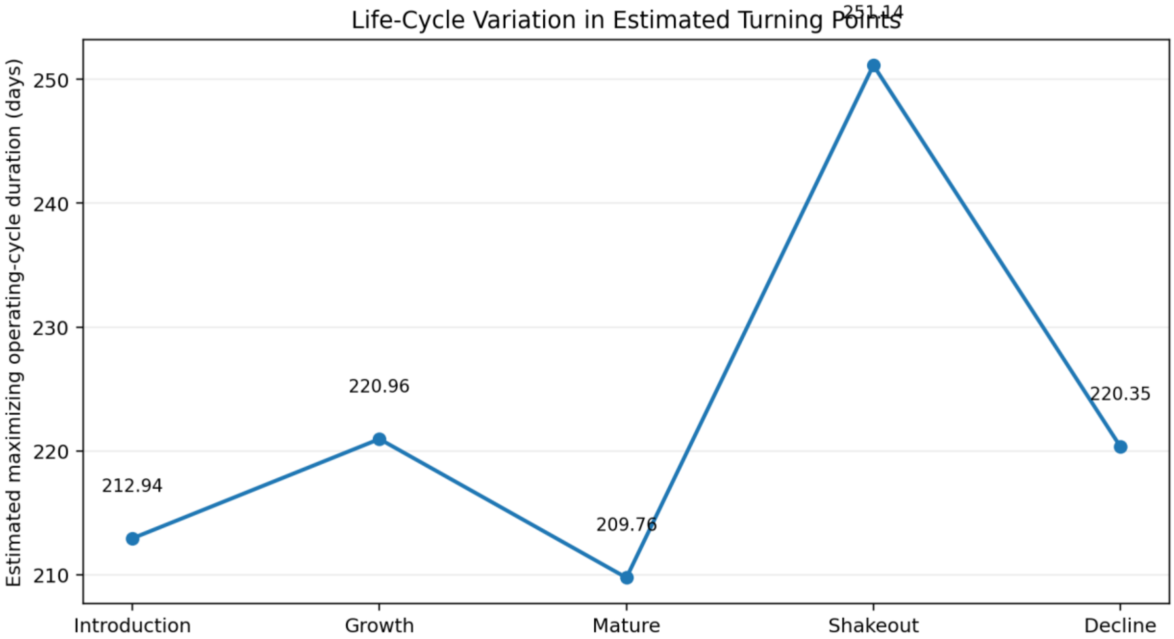
*Note. Life-cycle stages follow Dickinson (2011). Robust standard errors are clustered by firm. *** p < 0.001, ** p < 0.01, * p < 0.05.*

The reported maxima are 212.94 days for Introduction, 220.96 for Growth, 209.76 for Mature, 251.14 for Shakeout, and 220.35 for Decline. These values replace the substantially different figures in the original narrative and are used consistently throughout the revised manuscript.

The Mature-stage maximum is the lowest among Growth, Mature, and Decline, which is directionally consistent with the original life-cycle argument, but the difference is not large: about 11 days relative to Growth and roughly 10.6 days relative to Decline. Introduction is also close to Mature. Shakeout is the clear outlier at 251.14 days, although that stage contains only 8,195 observations, far fewer than the other categories. A small and potentially heterogeneous Shakeout group can produce less stable nonlinear estimates, so the point estimate should be interpreted cautiously.

Before Figure 2, the life-cycle evidence indicates that operating-cycle frontiers move with organizational state. The figure helps show that the pattern is stage specific rather than monotonic. This directly addresses the second research objective by illustrating why a mature firm, a growth firm, and a restructuring firm should not be evaluated against the same operating-cycle benchmark.

Figure 2: *Life-Cycle Variation in Estimated Turning Points*



The regression coefficients on other covariates also vary by stage. Firm size is positive throughout but especially large in Introduction and Shakeout. Leverage is negative in every stage, with larger negative coefficients in Shakeout and Decline. ROA is positive throughout, as expected, but its association with accumulated retained earnings is strongest in Introduction and Shakeout. These patterns support the broader proposition that the determinants of earned equity are state dependent. They also caution against attributing the full life-cycle variation in retained earnings to operating-cycle management alone.

4.1.5 Institutional setting

Table 8 provides the cleanest split-sample comparison of Advanced Economies and EMDE firms using the same regression structure. The reported maximizing point is 216.99 days for

Advanced Economies and 199.62 days for EMDE firms. This result is the opposite of the original narrative, which reported 224.28 and 232.06 days and argued that emerging-market firms required longer cycles. The supplied empirical table instead indicates a shorter fitted maximum in EMDE settings.

Table 8. Institutional Setting Moderation: Advanced versus Emerging and Developing Economies

Independent Variables	(1) Advanced Economies	(2) Emerging Markets (EMDE)	(3) Pooled Interaction
Cash Conversion Cycle (CCC)	0.1706***	0.1265***	0.1221***
	(0.0125)	(0.0075)	(0.0078)
CCC Squared (CCC²)	-0.0004***	-0.0003***	-0.0003***
	(0.0000)	(0.0000)	(0.0000)
Firm Size	9.3614***	3.8737***	7.7266***
	(0.3165)	(0.1702)	(0.1906)
Financial Leverage	-0.8129***	-0.6623***	-0.7312***
	(0.0321)	(0.0246)	(0.0212)
Cash Holdings	-61.0236***	-30.0700***	-63.5435***
	(4.0835)	(2.2952)	(2.7227)
Capital Expenditures	12.9346	38.2073***	1.8303
	(6.6782)	(3.0126)	(3.7104)
Return on Assets	6.1280***	2.6386***	5.2791***
	(0.1032)	(0.0709)	(0.0830)
Sales Growth	-0.3171***	-0.1100***	-0.2642***
	(0.0103)	(0.0054)	(0.0066)
Constant	-114.0659***	-32.7447***	-81.5796***
	(4.4906)	(2.2235)	(2.4854)
Optimal CCC* (Days)	216.99***	199.62***	199.62***
Observations (N)	181,076	138,914	319,990
R-squared	0.4495	0.2768	0.4031

*Note. Year fixed effects are included and standard errors are clustered by firm. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.*

The institutional split supports heterogeneity but not the assumption that weaker institutions always imply longer value-supporting cycles. When external finance is costly, firms may have less capacity to carry long inventories or receivables even if enforcement and logistics frictions create a desire for buffers. The finding is therefore best understood as evidence that institutional constraints work through competing channels.

4.1.6 Joint life-cycle and institutional estimates

Table 9 adds a joint partition. The independently estimated vertices for Advanced Economies are 217.04 days in Growth, 236.91 in Mature, and 226.07 in Decline. For EMDE firms they are 200.24, 193.58, and 195.88 days, respectively. The associated 95% Delta-method confidence intervals are wide for the AE partitions and narrower for the EMDE partitions. These point estimates again suggest that the EMDE maxima are lower than the corresponding AE values in all three separately estimated stage models, although the Mature pattern differs within the AE group because the AE Mature point estimate exceeds AE Growth.

Table 9. Joint Life-Cycle and Institutional Turning-Point Estimates

Institutional Setting	Life-Cycle Stage	Optimal CCC* (Days)	Delta SE	95% Conf. Interval	p-value	Observations (N)
Advanced	Growth	217.04	15.21	[187.23, 246.85]	< 0.001	42,760
Advanced	Mature	236.91	18.03	[201.56, 272.25]	< 0.001	86,022
Advanced	Decline	226.07	21.46	[184.02, 268.12]	< 0.001	26,106
EMDE	Growth	200.24	6.82	[186.88, 213.60]	< 0.001	37,526
EMDE	Mature	193.58	5.60	[182.60, 204.55]	< 0.001	61,651
EMDE	Decline	195.88	8.77	[178.69, 213.07]	< 0.001	19,458

Note. Point estimates and 95% confidence intervals are the independently estimated joint stage-by-institution turning points supplied in Table 8.

Table 10 reports formal pairwise tests from a pooled fully interacted model. The EMDE-versus-AE contrast is not significant for Growth (−22.57 days, $p = 0.255$) or Mature (−25.41 days, $p = 0.228$), but it is significant for Decline (+26.91 days, $p = 0.014$). Within Advanced Economies, the formal Mature-versus-Growth difference is not significant (+24.62 days, $p = 0.276$). Within EMDE, the formal Mature-versus-Growth contrast is significant (+21.77 days, $p = 0.010$). Because these formal nonlinear contrasts are generated from a pooled interacted regression, they should not be mechanically equated to the arithmetic differences between independently estimated Table 9 vertices. The different signs in some comparisons underscore the importance of reporting the estimation basis explicitly.

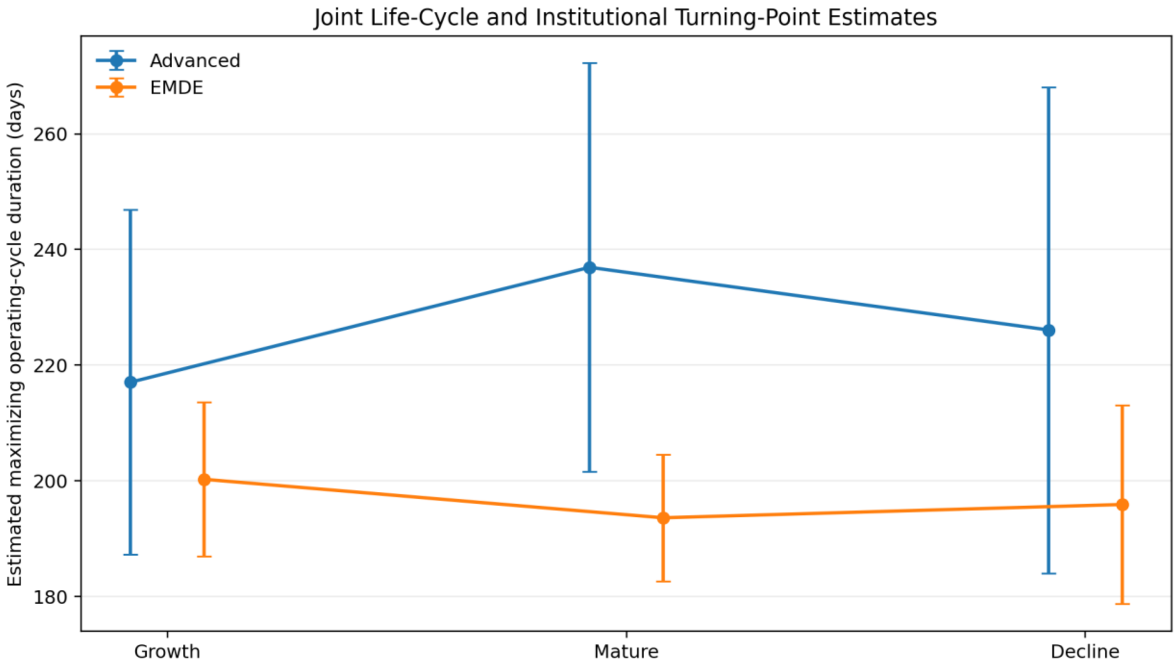
Table 10. Formal Delta-Method Contrasts of Joint Turning Points

Pairwise Comparison	Difference in CCC* (Days)	Delta SE	z-statistic	p-value	95% Conf. Interval
EMDE Growth vs AE Growth	-22.57	19.83	-1.14	0.255	[-61.44, 16.31]
EMDE Mature vs AE Mature	-25.41	21.10	-1.20	0.228	[-66.77, 15.95]
EMDE Decline vs AE Decline	26.91	10.90	2.47	0.014	[5.55, 48.27]
AE Mature vs AE Growth	24.62	22.60	1.09	0.276	[-19.68, 68.91]
EMDE Mature vs EMDE Growth	21.77	8.50	2.56	0.010	[5.10, 38.44]

Note. Formal contrasts are from the supplied pooled fully interacted Delta-method regressions. They should not be equated mechanically with arithmetic differences between independently estimated Table 9 vertices.

Before Figure 3, the joint evidence shows that life-cycle effects and institutional effects should be considered together. The figure presents the estimated stage-by-institution frontiers with uncertainty intervals and connects the empirical results to the study's third objective: explaining why operating liquidity has different implications across organizational and national contexts.

Figure 3



Note. Points and error bars reproduce the Table 9 estimates and 95% Delta-method confidence intervals. Formal pairwise significance is reported separately in Table 9B.

4.2 Discussion of Findings

The main finding is not the exact location of any one turning point. The stronger contribution is that earned-equity accumulation is systematically related to operating-cycle design in a nonlinear and context-dependent manner. This finding extends working-capital research by showing that liquidity policy is associated not only with contemporaneous profitability but also with the cumulative internal capital that firms retain over time.

The results also qualify the common managerial preference for ever-shorter cash cycles. A compressed cycle can release cash, but it can also reduce service quality, constrain customer credit, and weaken supplier relationships. Conversely, a long cycle can support sales and continuity only when the firm has the margins, financing capacity, and institutional support to carry the associated costs. The discussion therefore favors context-sensitive operating-cycle governance over a universal benchmark.

4.2.1 Robustness and identification limits

The robustness analysis provided in Table 11 shows that the nonlinear result largely holds, but also demonstrates that causal inferences should to be remain restrained. One year lagged cycle duration and its square are lagged in the specification. Both the coefficient of the positive linear term and the coefficient of the negative quadratic term have positive linear and quadratic signs as expected, and are both highly significant. Nevertheless, the table does not show a turning point of this model using the Delta method. As a result, the revised manuscript is not repeated for 226.47 days, as this number is not found in the table provided.

Table 11. Sensitivity Tests: Lagged Terms, Instrumental Variables, Cash Buffers, and Post-2010 Sample

Independent Variables	(1) Lagged WCM	(2) 2SLS IV	(3) High Cash Buffer	(4) Post-2010 Non-Crisis
Cash Conversion Cycle (CCC)		0.1464***	0.1420***	0.1512***
		(0.0104)	(0.0109)	(0.0086)
CCC Squared (CCC^2)		-0.0003***	-0.0003***	-0.0003***
		(0.0000)	(0.0000)	(0.0000)
Lagged CCC (t-1)	0.1423***			
	(0.0083)			
Lagged CCC^2 (t-1)	-0.0003***			
	(0.0000)			
Firm Size	7.0215***	6.7985***	9.6895***	7.5699***
	(0.1901)	(0.2030)	(0.2923)	(0.1950)
Financial Leverage	-0.7277***	-0.7223***	-0.7684***	-0.7740***
	(0.0229)	(0.0244)	(0.0318)	(0.0239)
Cash Holdings	-64.6632***	-62.2159***	-60.7644***	-68.5807***
	(2.9479)	(3.1727)	(3.5618)	(3.0376)
Capital Expenditures	11.0834**	13.8753**	-10.2479	5.9581
	(3.9470)	(4.2418)	(5.5780)	(4.4464)
Return on Assets	5.3509***	5.2897***	5.7034***	5.5513***
	(0.0976)	(0.1110)	(0.1025)	(0.0946)
Sales Growth	-0.2941***	-0.2802***	-0.3183***	-0.2619***
	(0.0078)	(0.0087)	(0.0095)	(0.0077)
Constant	-78.1068***	-74.7964***	-109.1842***	-87.3925***
	(2.6841)	(2.8701)	(4.1867)	(2.7763)
Optimal CCC* (Days)		235.13***	235.91***	215.39***
Observations (N)	283,805	253,104	160,707	226,195
R-squared	0.3793	0.3611	0.4297	0.4039

Note. The 2SLS model uses the supplied industry-year median cycle instruments. The table does not report first-stage or weak-instrument diagnostics; accordingly, the model is interpreted as a sensitivity test rather than definitive causal identification.

The values for the positive linear and negative quadratic terms in the sensitivity specification are reported for the 2SLS as 235.13 days. This is reasonably close to the estimates based on the cross-sectional data and no evidence was found of any elimination of concavity when the operating-cycle terms were instrumented with the industry-year medians. However, the table does not include overidentification test, weak-instrument or Kleibergen-Paap first-stage strength statistics. It also fails to show that retained earnings are the result of industry-year operating conditions only acting through the company's operating cycle. Therefore, the 2SLS model is viewed as a robustness exercise rather than a causal identification design for the following reasons.

The days with the highest cash buffer in a subsample give a maximum of 235.91 days. A somewhat longer fitted maximum may be economically feasible, in firms that have abundant cash, they can finance inventory and customer credit with less external funding. The result further demonstrates that the nonlinear pattern is not limited to the liquidity-constrained firms. In the post-2010 specification, it yields a lower maximum of 215.39 days, implying that the frontier fitted can change across macro-financial regimes. This regime sensitivity is consistent with recent evidence that uncertainty and shocks impact working-capital and financial flexibility requirements.

Several additional specification issues that need to be addressed. First, RE/TA is a persistent stock, which means there is a possibility of serial correlation and dynamic adjustment. Firm-clustered standard errors deal with the within-firm dependence of residuals but do not incorporate a within-firm model of the persistence of the dependent variable itself. A future version could use a different microdata base to estimate dynamic specifications (including lagged RE/TA) with care taken to control for Nickell bias and instrument proliferation. Second, the wide range of 2000–2025 includes significant developments in payments technology, supply-chain digitization, global trade, the financial crisis, and Covid. Fixed effects relate to common shocks, but the coefficients may be different for sub-periods. Third, it is an accounting composite measure. Two companies with the same combined CCC may end up with two completely different inventories, receivables and payables.

The findings of the components show that these dimensions do not have interchangeable effects. Fourthly, the shorter cycle of −100 to 365 days above makes the estimation more robust to extreme reporting values, and establishes a support boundary. If the estimate is fitted, it should thus be viewed as boundary sensitive, in particular, if it is fairly high, like the 336.70-day high margin estimate. Last, but not least, a lesson in reporting from the joint moderation results. The independent subgroup regressions and the pooled nonlinear interaction tests are different types of estimators. Rather than presenting the arithmetic difference between the vertices of subgroups as formal pooled contrasts, a top tier empirical paper should do the following: The updated manuscript is the separation of those objects, and reports the associated uncertainty. Before the final journal is submitted to the journal, the pooled interaction term should be recorded along with the specific contrasts used to compare each of the Table 9B comparisons, so that the direction of each contrast could be reproduced unambiguously.

5. Conclusion and Policy Implications

5.1 Conclusion

This study examines whether there is a relationship between operating-cycle design and the accumulation of earned equity. The evidence points to a concave relationship between the cash conversion cycle and retained earnings scaled by total assets, and also suggests that the estimated frontier is specification-sensitive, changes depending on the components of the cash conversion cycle, and varies according to the stage of the cash conversion cycle and the institutional context. Most defensible outcome is thus a conditional one: operating liquidity is a component of the capacity for financing when it is harmonized with the financing discipline.

The component results support this conclusion. Inventory and receivables are the clearest indicators of meaningful interior frontiers, and there is no stable optimum in the supplied results for payables. This distinction is important because it can be achieved in very different commercial policies, this is what a firm's aggregate cash conversion cycle is. Coordinated management of inventory, customer credit, and supplier finance is, therefore, a better way to understand the accumulation of earned-equity than by the cash-cycle target.

The life cycle findings and the institutional findings also suggest that the operating cycle policy should be considered in context. Three types of firms – mature, growth and shakeout – have different operating and financing requirements. The costs of receivables, inventories and external liquidity are also changed in advanced and emerging institutional environments. The results add to the working-capital and corporate life-cycle literature by indicating that short-term decisions made in the operation of the business are linked to long-term decisions regarding the investment of internally generated funds.

5.2 Policy Implications

Decomposition should come first for managers, according to the evidence. Inventory days, receivables days and payables days should be evaluated separately since they are different operating decisions and are different risks. A long cycle is not a long cycle because of obsolete inventory and delayed supplier payments. Boards and financial managers should thus be comparing cycle policy with other companies with similar business models, stages of the life cycle, and financing needs.

Retained earnings and components of the operating-cycle should be examined together for lenders and investors. A firm with a high rate of retained earnings, manageable leverage and tight margins and controls on receivables may also have greater internal financing capacity than a firm with the same aggregate cycle, but with weaker margins and rising customer credit risk. The results provide a basis for the credit assessment frameworks that integrate liquidity ratios, earned-equity measures, profitability, leverage and life-cycle classifications.

For policymakers, the results indicate that financial and commercial infrastructure affects the internal-capital formation of firms. More effective receivables enforcement, accurate credit data, digitized invoicing, streamlined logistics and easy access to supply-chain finance can help to reduce the amount of costly capital tied up in business. Such reforms are particularly pertinent in emerging and developing economies, where financing external activity could prove to be more costly if firms are subject to greater precautionary requirements, yet have limited access to such financing.

5.3 Limitations and Future Research Directions

There are a number of limitations to the findings. First, RE/TA is a cumulative asset that incorporates many of the past years' profits or losses, dividend distribution, acquisition, accounting adjustments, etc. The use of dynamic models, changes in retained earnings, and multi-year accumulation measures should be employed in future research to investigate the time path of operating-cycle decisions and their contribution to the source of internal-capital formation over time.

Second, the evidence that is available is largely of an associational. The available tables do not fully support the robust interpretation of the nonlinear pattern, nor do they give the first-stage, weak-instrument, or overidentification diagnostics that are needed to make strong causal statements. Other exogenous sources of variation such as access to invoice financing, trade-credit shocks, supply-chain disruptions, and regulatory changes could be used in future in order to exploit them for their study.

Third, the institutions' classification must be generic. There are also differences within the advanced and emerging economies, with respect to the enforcement of the law, depth of the banking system, inflation rates, payment technology, logistics, and number of suppliers. Moving forward, it will be important to employ continuous institutional measures and industry-specific frontiers to determine which national and industry conditions affect the earned-equity frontier the most.

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