International Review of Business, Trade, and Economics
ISSN: 3069-230X

PRIME OPEN ACCESS

Volume 2, Issue 4

Research Article

Date of Submission: 01 September, 2026
Date of Acceptance: 28 September, 2026
Date of Publication: 05 October, 2026

From Required Return on Equity to WACC, FCFE, FCFF, and EVA: A Closed-Loop Audit of Exact Fixed-WACC Closure, Broken-Date Floating-WACC Diagnostics, and Schedule-Consistent Replication

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Citation: Badr, H. H. (2026). From Required Return on Equity to WACC, FCFE, FCFF, and EVA: A Closed-Loop Audit of Exact Fixed-WACC Closure, Broken-Date Floating-WACC Diagnostics, and Schedule-Consistent Replication. *Int Rev Bus Tade Econ, 2*(4), 01-14.

Abstract

This paper reconstructs, cell by cell, the path from capital structure to the required return on equity (Ke), the workbook's weighted average cost of capital (WACC), free cash flow to equity (FCFE), free cash flow to the firm (FCFF), economic value added (EVA), financing movements, discount factors, and continuing value within one linked closed-loop model. The study separates three evidentiary layers that are often conflated in valuation work: cash-flow identity, valuation closure, and temporal consistency. It audits two distinct workbook regimes and does not treat them as a one-factor experiment. Scenario C combines a 5% higher-sales operating path with full-year timing and a fixed WACC of 17.6753653%. Scenario A retains the baseline operating path, uses a floating WACC generated from the leverage-to-beta-to-Ke chain, and is valued from a deliberately broken first forecast interval of 108/365 of a year. In Scenario C, five separately formulated FCFE derivation/check routes reproduce the same annual FCFE series. Adding the workbook debt-movement and financing-charge rows to FCFE reconstructs FCFF exactly in every year from 2005 through 2009. The same claim-conservation logic extends into continuing value: FCFF continuing value of 120,290.0452 less FCFE continuing value of 108,791.1362 leaves a total financing gap of 11,498.9090, which is exactly decomposed into 2,121.0000 of debt movement and a 9,377.9090 model-defined terminal financing component (labelled "Tax Shield for Debt" in the workbook). The terminal bridge therefore closes with zero residual. Under this internally consistent fixed-rate regime, the principal FCFF/DCF and EVA routes produce the identical equity value of 335.0839028 per share. Scenario A is used as the more demanding temporal diagnostic. Its raw workbook outputs are 320.9936089 per share from the DCF sheet, 320.9962697 from the integrated FCFF route, and 321.7155488 from the EVA/economic-value route. These are two different residuals and are therefore decomposed separately. The DCF-to-integrated-FCFF difference is fully attributable to a one-unit 2008 FCFF discrepancy: the integrated route uses 8,300 while the DCF route uses 8,299 because their operating-capital/net-investment paths differ by one unit. Discounted at 0.5853884991, that unit explains 0.5853885 model units, or 0.0026609 per share, exactly. The larger DCF-to-EVA residual is temporal rather than an accounting-identity failure: the EVA capital-charge sequence does not satisfy the recursion implied by the DCF discount factors. For any discount-factor sequence D_t with $D_0 = 1$, exact residual-income/DCF closure requires $k_t^* = D_{t-1}/D_t - 1$, equivalently $D_{t-1} = (1 + k_t^*)D_t$. Replication R1 preserves Scenario A's DCF discount-factor schedule and operating cash-flow data, replaces only the capital-charge sequence with the schedule-implied k_t^* rates, and restores exact DCF/EVA operating-value equality at 71,168.593948; after the same non-operating adjustments, the result remains 320.9936089 per share. Replication R2 asks the converse question: it preserves the displayed floating-WACC path, converts the first 15.7822% annual rate to its 108-day effective rate of 4.4314%, and then rebuilds later discount factors sequentially. That second internally consistent architecture also closes exactly, at an operating value of 72,165.379330, although at a different valuation level. The result is therefore structural: exact closure depends on matching cash-flow boundaries, discount factors, capital charges, and terminal treatment, whereas the numerical value level depends on

the chosen rate-time convention. The paper does not interpret the approximately 321 versus 335 per-share values as the isolated effect of floating versus fixed WACC because Scenarios A and C also differ in operating assumptions. Its contribution is methodological and diagnostic, not a claim to have discovered CAPM, WACC, the FCFE-FCFF identity, or DCF-EVA equivalence: the contribution is to make the full chain auditable, identify the exact source of each residual, and demonstrate how temporal consistency restores closure.

Keywords: Required Return on Equity, WACC, FCFE, FCFF, EVA, Capital Structure, Fixed WACC, Floating WACC, Tax Shield, Terminal Value, Valuation Reconciliation, Closed-Loop Finance

JEL Classification: G12; G31; G32; M41.

Central Finding: Exact closure occurs when cash-flow boundaries and the rate-time recursion are mutually consistent. Scenario C (5% higher-sales path, full-year timing, fixed WACC 17.6753653%) closes exactly at 335.0839028 per share. In raw Scenario A (baseline operations, 108/365 broken first interval, floating WACC), the 0.0026609 per-share DCF/integrated-FCFF gap is completely attributable to a one-unit 2008 FCFF difference, while the 0.7219400 per-share DCF/EVA gap is a timing/capital-charge inconsistency. Replication R1 restores exact DCF/EVA operating-value equality at 71,168.593948 while preserving Scenario A's DCF schedule; Replication R2 also closes exactly at 72,165.379330 while preserving the displayed floating-WACC path and rebuilding discount factors sequentially. The result is diagnostic closure, not a claim that one discount convention is universally preferred.

Introduction

Corporate valuation is commonly presented as a menu of parallel methods: discount FCFE at the required return on equity, discount FCFF at WACC, or value economic profit/EVA and add the appropriate opening capital base. In theory, these methods describe the same economic reality when the cash-flow definitions, financing policy, tax treatment, timing, terminal assumptions, and discount rates are mutually consistent. Modigliani and Miller (1958, 1963), Myers (1974), Miles and Ezzell (1980), Damodaran, Fernandez, and the CFA curriculum establish the relevant theoretical relationships [1-4].

The practical difficulty is not writing the identities. It is maintaining consistency when a model moves from the operating claim to the financing claim, from enterprise value to equity value, from a changing capital structure to a changing required return, and from explicit forecast years into continuing value. The workbook studied here is useful because it makes those transitions visible across linked sheets rather than hiding them inside a single DCF formula.

The analysis therefore begins at the model's natural origin: the WACC sheet. It follows the debt ratio into D/E, levered beta, required return on equity, the workbook WACC, and the fixed-WACC block. It then moves to the integrated sheet that derives FCFE through several routes, reconstructs FCFF by reversing the financing boundary, links FCFF to EVA, and closes the explicit period and continuing value.

The paper's research question is deliberately narrow: how much of this architecture is established theory, how much is a workbook-specific numerical reconstruction, and what additional insight is obtained when the raw floating-WACC residuals are decomposed rather than merely reported? The answer must be based on formulas and values actually present in the workbook. A companion paper develops the general temporal-closure condition for broken-date and fixed-WACC regimes; the incremental contribution here is the full required-return-to-WACC-to-FCFE-to-FCFF audit, the exact attribution of the small FCFF discrepancy, and two clean replications that separate valuation closure from valuation level [5].

Established Theory and the Contribution Boundary

The literature already establishes four propositions that are central to the model. First, FCFE is an equity claim and is discounted at the required return to equity. Second, FCFF is a claim to all capital providers and is discounted using a rate appropriate to the combined financing claim. Third, FCFE and FCFF are linked by financing flows. Fourth, residual-income/EVA and DCF methods are equivalent when they use the same economic assumptions and boundaries. Fernandez (2007) explicitly shows the equivalence of several DCF approaches under identical assumptions, while Fernandez (2003) extends the equivalence to ten methods including EVA and residual income [6]. CFA Institute (2026) likewise states the direct FCFE and FCFF valuation frameworks and the financing bridge between them [8].

$$FCFE_t = FCFF_t - I_t(1 - T_t) + \text{Net Borrowing}_t$$

$$FCFF_t = FCFE_t + I_t(1 - T_t) - \text{Net Borrowing}_t$$

$$\text{Equity Value} = \sum_t [\, Q_t * FCFE_t \,], \quad Q_t = \prod_{j=1..t} (1 + Ke_j)^{(-\Delta \tau_j)}$$

$$\text{Firm Value} = \sum_t [\, D_t * FCFF_t \,], \quad D_t = \prod_{j=1..t} (1 + k_j)^{(-\Delta \tau_j)}$$

EVA_t = NOPLAT_t - Capital Charge_t

Here Delta tau_j is the length of interval j in years; for a full annual interval Delta tau_j = 1, while Scenario A uses Delta tau_1 = 108/365. With a constant annual rate these expressions reduce to the familiar (1 + rate)^(-t) form. The raw Scenario A workbook is deliberately audited against this sequential benchmark because its displayed DCF factors instead use maturity-specific direct powers. The novelty question must therefore be framed carefully. A search of the international literature identifies extensive work on WACC, FCFE/FCFF equivalence, tax shields, and EVA-DCF equivalence. It does not justify a statement that the underlying equations are new. The potentially distinctive feature here is the integrated, workbook-grounded reconstruction: the model exposes the capital-structure chain, multiple FCFE derivations, the financing reversal to FCFF, fixed-versus-floating discount regimes, and the terminal bridge in one traceable sequence. The paper claims this integrated diagnostic implementation, not priority over the underlying finance theory.

Issue	Established theory	Workbook test	Defensible contribution
Ke and leverage	CAPM / levered beta are established	Trace D/V -> D/E -> beta_L -> Ke	Cell-level reconstruction of the sequence
WACC	FCFF and WACC matching is established	Trace workbook WACC and Scenario C fixed-WACC block	Show exact Scenario C closure and diagnose Scenario A residuals
FCFE-FCFF	Financing bridge is established	Reconstruct FCFF from FCFE annually	Demonstrate exact year-by-year closure in one linked model
EVA-DCF	Equivalence is established under common assumptions	Compare FCFF/DCF with EVA	Separate exact Scenario C closure from Scenario A timing residual
Tax shields	Value depends on financing policy and risk	Audit annual/terminal financing rows	Distinguish exact closed-loop terminal reconciliation from separate APV-style VTS valuation
Novelty	No priority claim for formulas	Integrated architecture is auditable	Potential methodological contribution, not theoretical discovery

Table 1: Established Theory, Workbook Reconstruction, and the Contribution Boundary

Literature Positioning Protocol

Literature positioning is claim-based rather than priority-based. A targeted review was conducted across SSRN, CFA Institute materials, NYU Stern valuation resources, publisher/index pages for the classic capital-structure literature, and references cited by those sources. Search terms combined WACC, required return to equity, FCFE/FCFF equivalence, residual income or EVA, tax shields, changing capital structure, and discounted-cash-flow equivalence. The purpose was to identify which component relationships are established and therefore cannot be claimed as new.

The review confirms that WACC/claim matching, FCFE-FCFF financing identities, tax-shield valuation, and DCF/residual-income equivalence are established topics [3,4,6-10]. It does not establish historical uniqueness for any spreadsheet architecture. The defensible contribution is instead methodological and reproducible: a linked workbook sequence exposes capital structure -> levered beta -> Ke -> workbook WACC -> multiple FCFE routes -> FCFF reconstruction -> EVA/DCF -> terminal reconciliation, and then subjects the timing layer to explicit closure tests.

Evidence Base and Audit Protocol

The evidence base is the author's linked workbook architecture with 28 principal worksheets and a five-year forecast sequence. The audit uses Scenario A (floating WACC, broken first period) and Scenario C (fixed WACC, full-year timing). Governing numerical evidence comes from the workbook cells and formulas; the companion PowerPoint is used only to document the intended analytical sequence and stress-test design and does not override workbook cells when a displayed slide and a governing cell differ. Key sheets are WACC; FCFF FOR Equity& DCF and EVA; Free CFF; DISCOUNT Free CFF; DCF; Economic Value; Economic Profit; Balance Sheet; NOPLAT; and Inv Capital Calculation.

The audit classifies evidence at three levels. A formula identity is accepted when the linked formulas and values reconcile exactly. A numerical valuation convergence is accepted when independently computed routes produce the same or nearly the same value under documented assumptions. A causal or theoretical claim is not inferred merely from numerical closure. All conclusions in this paper are therefore bounded to the audited workbook and its conventions.

Level	Test	Evidence standard
I. Formula closure	Do linked formulas balance?	Cell-level equality or zero check
II. Numerical reconciliation	Do independent routes reproduce the same series/value?	Exact or quantified residual
III. Economic interpretation	Do results support theory-consistent valuation claims?	Requires matched claims, rates, timing, tax and terminal assumptions

Table 2: Audit Hierarchy Used in the Paper

Source Precedence and Replication Rules

The audit follows four source-precedence rules. First, active workbook formulas and linked cells govern over captions or legacy labels. Second, an equality is called exact only when the relevant cells or an independently recomputed bridge close numerically. Third, a repeated display of the same linked output is treated as a cross-check, not automatically as an independent valuation route. Fourth, no balancing item is accepted as independent evidence when it is defined from the target value it is meant to reconcile.

These rules matter in the floating case because the files contain both legacy hard-coded capital values and linked operating-capital values that differ by one unit in one period. Rather than smoothing that difference away, the audit retains it and measures its valuation effect.

Deliberate Broken-Date Stress-Test Design

The 108-day first forecast period is deliberately retained as a stress test of temporal consistency. It is not presented as a novel discounting device. Its analytical role is to force the model to reveal how a fractional first interval interacts with a changing leverage path, changing Ke, changing workbook WACC, DCF discount factors, and EVA capital charges. A clean year-end model can conceal these choices; the broken date makes them observable.

The purpose of the broken date is therefore not to force equality or to claim novelty for fractional-period discounting itself. Its role is diagnostic: it creates a more demanding environment in which both the rate path and the time path are non-uniform. If the model remains traceable, any residual difference can be located in discounting, capital-charge timing, claim definition, tax treatment, or terminal assumptions rather than being hidden inside a single valuation output.

From the WACC Sheet to the Required Return on Equity

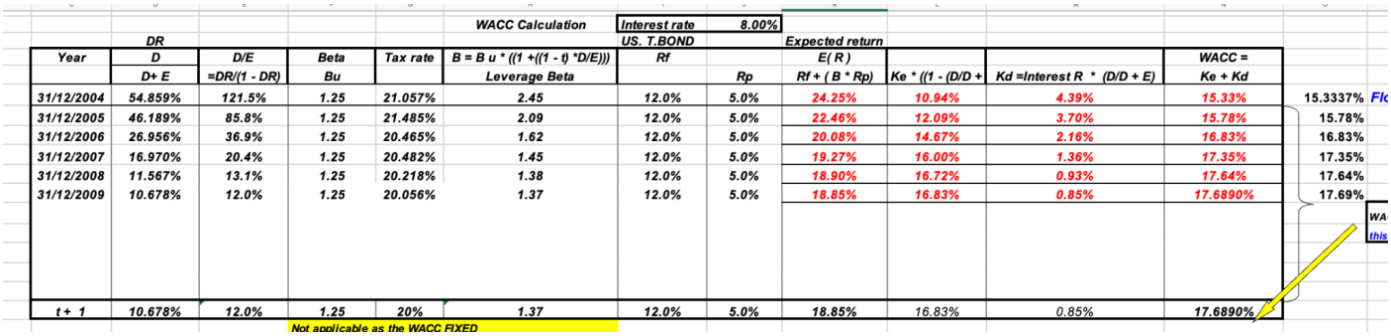
The model begins with financing structure rather than with an exogenous discount rate. In the WACC sheet, debt as a proportion of total financing is converted into D/E. The unlevered beta is then relevered using the displayed tax rate. The required return on equity follows from a CAPM-style construction using a 12% risk-free rate and a 5% risk premium.

$$D/E = (D/V) / (1 - D/V)$$
$$\beta_L = \beta_U * [1 + (1 - T)(D/E)]$$
$$Ke = Rf + \beta_L * RP$$

In the floating-WACC workbook, the declining leverage ratio lowers levered beta and therefore lowers Ke. This is economically coherent: as the debt share falls, the residual equity claim becomes less levered. The model then combines the equity-weighted required return with the debt-weighted 8% rate to form its workbook WACC.

Period	D/V	D/E	beta_L	Ke	Workbook WACC
31/12/2004 (opening)	54.859%	121.5%	2.4492	24.246%	15.334%
31/12/2005	46.189%	85.8%	2.0924	22.462%	15.782%
31/12/2006	26.956%	36.9%	1.6169	20.084%	16.827%
31/12/2007	16.970%	20.4%	1.4531	19.266%	17.354%
31/12/2008	11.567%	13.1%	1.3804	18.902%	17.641%
31/12/2009	10.678%	12.0%	1.3695	18.847%	17.689%

Table 3: Floating-WACC Chain Transcribed from the Uploaded Scenario A Workbook



					WACC Calculation	Interest rate	8.00%				
	DR					US. T.BOND		Expected return			
Year	D	D/E	Beta	Tax rate	B = B u * ((1 +((1 - t) *D/E)))	Rf		E(R)			WACC =
	D+ E	=DR/(1 - DR)	Bu		Leverage Beta		Rp	Rf + (B * Rp)	Ke * ((1 - (D/D +	Kd =Interest R * (D/D + E)	Ke + Kd
31/12/2004	54.859%	121.5%	1.25	21.057%	2.45	12.0%	5.0%	24.25%	10.94%	4.39%	15.33%
31/12/2005	46.189%	85.8%	1.25	21.485%	2.09	12.0%	5.0%	22.46%	12.09%	3.70%	15.78%
31/12/2006	26.956%	36.9%	1.25	20.465%	1.62	12.0%	5.0%	20.08%	14.67%	2.16%	16.83%
31/12/2007	16.970%	20.4%	1.25	20.482%	1.45	12.0%	5.0%	19.27%	16.00%	1.36%	17.35%
31/12/2008	11.567%	13.1%	1.25	20.218%	1.38	12.0%	5.0%	18.90%	16.72%	0.93%	17.64%
31/12/2009	10.678%	12.0%	1.25	20.056%	1.37	12.0%	5.0%	18.85%	16.83%	0.85%	17.6890%
t+ 1	10.678%	12.0%	1.25	20%	1.37	12.0%	5.0%	18.85%	16.83%	0.85%	17.6890%

Not applicable as the WACC FIXED

15.3337%
15.78%
16.83%
17.35%
17.64%
17.69%

Figure 1: Governing Workbook Chain from D/V to D/E, Levered Beta, Required Return on Equity (Ke), and Floating WACC, Including the Terminal t+1 Point

Figure 1 is retained as the paper's single workbook screenshot because it shows the originating capital-structure and required-return chain directly; subsequent FCFE, FCFF, EVA, DCF, and terminal reconciliations are documented through equations, numerical tables, and the cell-level audit map.

Important Convention: The workbook WACC is calculated as Ke*(1-D/V) + Kd*(D/V). The standard textbook after-tax WACC normally uses Kd*(1-T). Accordingly, this paper refers to 'workbook WACC' when discussing numerical closure and does not silently replace the workbook convention with the textbook convention.

Scenario C: The Fixed-WACC, Full-Year Regime

Scenario C deliberately suppresses annual variation in the discount rate and begins on a full-year boundary. It also uses the workbook's 5% higher-sales operating path, so it is not Scenario A with only the WACC changed. The governing fixed rate is 17.6753653%. The workbook also displays a separate fixed-capital-structure calculation with an implied equity return of 29.4336% for that acquisition-style block. These numbers should not be conflated with the floating Ke path in Scenario A; they are different analytical layers inside the workbook.

Why does Scenario C matter? Because when one WACC governs every forecast year and the continuing-value calculation, the discount-factor sequence, capital charge, and terminal-growth denominator can be made algebraically consistent. Scenario C therefore provides the model's cleanest exact-closure test. Its higher-sales operating path is held as part of that scenario; the paper does not infer that the difference between approximately 321 and 335 per share is caused by WACC alone.

Item	Workbook value
Scenario C fixed WACC	17.6753653%
Terminal growth g	7.0000%
2005-2009 FCFF PV factors	0.8497955; 0.7221525; 0.6136819; 0.5215042; 0.4431719
Scenario C FCFF/DCF equity value per share	335.0839028
Scenario C EVA/economic model value per share	335.0839028

Table 4: Core Fixed-WACC Valuation Parameters and Outputs

Cross-Regime Caveat: Scenario C is not Scenario A with only WACC changed. Scenario C combines a 5% higher-sales operating path, full-year timing, and fixed WACC of 17.6753653%; Scenario A uses the baseline operating path, a 108/365 first interval, and floating WACC. Therefore 335.0839 versus approximately 321 per share is not interpreted as the causal effect of fixing WACC. The valid tests are within-regime closure and controlled timing replications.

Multiple FCFE Routes Inside Scenario C

The integrated Scenario C sheet does more than report one FCFE number. It derives or checks the same annual FCFE series through five separately formulated paths. Under Scenario C's fixed-WACC/full-year regime, the operating bridge, the NOPLAT/net-investment bridge, the financing-flow aggregation, the net-income/balance-sheet reconciliation, and a second net-income-plus-noncash/reinvestment route all reproduce the same five annual FCFE values.

Route	2005	2006	2007	2008	2009
Operating cash less debt/financing rows	2,790.59	1,158.75	5,541.71	8,568.63	11,890.31
NOPLAT - net investment - financing bridge	2,790.59	1,158.75	5,541.71	8,568.63	11,890.31
Financing-flow aggregation	2,790.59	1,158.75	5,541.71	8,568.63	11,890.31

Net-income / balance-sheet reconciliation	2,790.59	1,158.75	5,541.71	8,568.63	11,890.31
Net income + noncash - reinvestment + financing	2,790.59	1,158.75	5,541.71	8,568.63	11,890.31

Table 5: Multiple FCFE Derivations Reconcile to the Same Annual Series in Scenario C

Reversing the Financing Boundary: FCFE to FCFF

The strongest internal reconciliation evidence in Scenario C is the reversal of the financing boundary. FCFE is a residual equity cash flow after financing effects. To recover the operating cash flow available to all capital providers, the workbook adds back its debt-movement row and its financing-charge row. Under Scenario C, this reconstruction matches reported FCFF exactly in every forecast year.

$$FCFF_{workbook,t} = FCFE_t + \text{Debt-Movement Row}_t + \text{Financing-Charge Row}_t$$

Year	FCFE	Debt-movement row	Financing-charge row	Reconstructed FCFF	Reported FCFF	Difference
2005	2,790.59	(57.00)	519.00	3,252.59	3,252.59	0.00
2006	1,158.75	3,055.00	409.00	4,622.75	4,622.75	0.00
2007	5,541.71	1,445.00	298.00	7,284.71	7,284.71	0.00
2008	8,568.63	978.00	171.00	9,717.63	9,717.63	0.00
2009	11,890.31	0.00	111.00	12,001.31	12,001.31	0.00

Table 6: Exact Annual FCFE-to-FCFF Reconstruction in Scenario C

This result should be interpreted precisely. It proves exact numerical closure under the workbook's financing-row definitions. It does not, by itself, prove that the row labelled 'after-tax interest' is identical to the textbook I(1-T) term under every period's tax convention. For external replication, the tax treatment should be stated explicitly. The important point for the internal audit is that the workbook's own bridge is exact.

Formal Closed-Loop Proof Structure

The numerical argument can be stated as a sequence of nested proof tests. Let r index the five audited FCFE derivation routes and let t index the five forecast years. Let DM_t denote the workbook debt-movement row and FC_t the workbook financing-charge row. The model first tests route consistency, then the financing-boundary bridge, and only then valuation equivalence.

$$FCFE_{r,t} = FCFE_t, \quad r = 1,\ldots,5; \quad t = 2005,\ldots,2009$$
$$\varepsilon_{bridge,t} = FCFF_{reported,t} - [FCFE_t + DM_t + FC_t] = 0$$
$$\varepsilon_C = V_{FCFF/DCF,C} - V_{EVA,C} = 335.0839028 - 335.0839028 = 0$$
$$\varepsilon_{float,FCFF} = 320.9962697 - 320.9936089 = 0.0026609 \quad (0.000829\%)$$
$$\varepsilon_{float,EVA} = 321.7155488 - 320.9936089 = 0.7219400 \quad (\text{about } 0.2249\%)$$

These relations clarify the evidentiary hierarchy. Route equality and the annual FCFE-to-FCFF bridge are identity/reconciliation tests. Scenario C's fixed-WACC DCF-EVA equality is a valuation-equivalence result under one common discount convention. Scenario A's raw floating-WACC residuals are diagnostic because they quantify the effect of mismatched cash-flow and rate-time implementation.

Proof level	Formal test	Workbook result	Interpretation
I. Route closure	$FCFE_{r,t} = FCFE_t$	Five routes; same annual series	Exact formula/route consistency
II. Financing bridge	$\varepsilon_{bridge,t} = 0$	Zero difference, 2005-2009	Exact cash-flow reconciliation
III. Scenario C valuation closure	$\varepsilon_C = 0$	335.0839028 = 335.0839028	Exact Scenario C DCF/EVA closure
IV. Scenario A raw valuation	$\varepsilon_{float} \neq 0$	0.000829% FCFF gap; ~0.2249% EVA gap	Quantified Scenario A diagnostic residuals

Table 6A: Formal Proof Hierarchy used to Distinguish Identity, Reconciliation, and Valuation Convergence

General Discount-Factor Closure Condition
Let $D_0 = 1$ and $D_t > 0$ denote the discount factor to the valuation date. Let IC_t be end-of-period operating invested capital, so $FCFF_t = NOPLAT_t - (IC_t - IC_{t-1})$. Define residual income/EVA as $EVA_t = NOPLAT_t - k_t IC_{t-1}$. Then exact DCF/EVA closure is obtained when the period capital-charge rate satisfies

$$k_t^* = D_{t-1}/D_t - 1, \quad \text{equivalently} \quad D_{t-1} = (1 + k_t^*) D_t$$

because $D_t k_t^* = D_{t-1} - D_t$. Substituting this identity into discounted EVA makes the capital terms telescope. With a terminal FCFF value TV_n and terminal residual-income value $TV_n - IC_n$, the finite-horizon identity is

$$IC_0 + \sum_t D_t EVA_t + D_n(TV_n - IC_n) = \sum_t D_t FCFF_t + D_n TV_n$$

This is an accounting-and-discounting identity, not a new valuation theory. A companion paper by Badr (2026) derives the same temporal closure condition in the broken-date versus full-year setting [5]. Here it is used as an audit theorem connecting the WACC sheet directly to the observed workbook residuals.

Exact Valuation Closure in Scenario C
Once the Scenario C financing bridge is established, the model reaches its cleanest valuation result. The FCFF/DCF route and the EVA/economic-profit route both produce an equity value per share of 335.0839028132. The fixed discount factors are 0.8497955352, 0.7221524516, 0.6136819291, 0.5215041634, and 0.4431719096; each adjacent ratio implies exactly the same one-period rate, 17.6753653%. Thus $k_t^* = D_{t-1}/D_t - 1$ is constant and equal to Scenario C's fixed workbook WACC for all five explicit periods. Exact closure is therefore not merely observed; it is explained by the discount-factor recursion.

Route / sheet	Value per share	Status
DISCOUNT Free CFF	335.0839028132	Linked FCFF/DCF result
FCFF integrated model	335.0839028132	FCFF route
Economic Model / EVA	335.0839028132	EVA route
DCF sheet	335.0839028132	Independent DCF sheet output
Economic Value sheet	335.0839028132	Independent economic-profit sheet output
Sophisticated Prove	335.0839028132	Cross-check / proof sheet

Table 7: Exact Scenario C Fixed-WACC Closure Across the Principal Audited Routes

Floating-WACC Diagnostics: Decomposing the Raw Residuals
Scenario A is a more demanding diagnostic environment because leverage, Ke, and workbook WACC change through time and the first forecast interval is 108/365 of a year. The raw DCF sheet reports 320.9936088556 per share, the integrated FCFF route reports 320.9962697124, and the workbook EVA route reports 321.7155488108. These are two different residuals and they should not be pooled: the DCF-to-integrated-FCFF difference is a cash-flow input discrepancy, while the DCF-to-EVA difference is a discount-factor/capital-charge consistency issue.

Scenario A floating-WACC output	Value per share	Difference vs DCF	Relative difference
DCF / FCFF	320.9936089	-	-
Integrated FCFF	320.9962697	+0.0026609	+0.000829%
EVA / Economic Value	321.7155488	+0.7219400	+0.224908%

Table 8: Near-exact Floating-WACC Convergence in the Uploaded Scenario A Workbook

The first residual can be attributed exactly. The integrated sheet uses FCFF of 8,300 in 2008, while the DCF sheet uses 8,299 because its hard-coded operating-capital sequence produces net investment of 1,849 rather than the 1,848 shown in the linked invested-capital route. The difference is one model unit. Discounting that unit at the 2008 factor 0.5853884991 gives 0.5853884991 model units; divided by the model's share scale, this is 0.0026609 per share - exactly the observed DCF-to-integrated-FCFF gap. The small gap is therefore not a valuation-theory failure; it is a one-unit legacy hard-coded-versus-linked operating-capital inconsistency across workbook routes.

Workbook direct-power $factor_t = [1 / (1 + WACC_t)]^{(horizon_t)}$
Sequential $factor_t = factor_{t-1} / (1 + k_t)$, with $factor_0 = 1$

The second residual concerns temporal consistency. The workbook DCF factors are generated by direct powers of period-specific WACC over cumulative horizons, while the first EVA charge is a simple prorating of annual WACC and

later EVA charges use the displayed annual WACCs directly. Those choices do not satisfy $D_{t-1} = (1 + k_t)D_t$. The relevant test is therefore not whether the raw values happen to be close, but whether closure is restored when one rate-time convention is applied consistently.

Interpretation of Scenario A: The model does not 'fail' under floating WACC. Its raw workbook preserves the annual cash-flow architecture but contains two distinct residuals: a one-unit 2008 FCFF mismatch between the integrated and DCF routes, and a DCF/EVA timing inconsistency. Exact floating-rate closure is recovered when one internally consistent term-structure convention is applied to FCFF discounting, EVA capital charges, and continuing value, as demonstrated by Replications R1 and R2.

Replication R1 - Schedule-Preserving Closure
Replication R1 leaves Scenario A's DCF discount factors and DCF cash-flow path unchanged and derives the one-period capital-charge rate implied by each adjacent pair of discount factors: $k_t^* = D_{t-1}/D_t - 1$. This produces 4.4314%, 17.1379%, 18.0405%, 18.3032%, and 17.8469%. The first number is the effective 108-day rate embedded in the first DCF factor; it differs from the workbook's simple prorated EVA charge of 4.6698%.

Year	D_t	Workbook charge	Implied k_t*	Adjusted EVA	PV adjusted EVA
2005	0.9575666	4.6698%	4.4314%	5,249.62	5,026.86
2006	0.8174695	16.8270%	17.1379%	6,170.80	5,044.44
2007	0.6925332	17.3540%	18.0405%	6,676.65	4,623.81
2008	0.5853885	17.6412%	18.3032%	6,984.11	4,088.42
2009	0.4967365	17.6890%	17.8469%	8,636.00	4,289.82

Table 8A: Replication R1: Schedule-Preserving Closure for Scenario A

Beginning operating capital 6,756 + PV adjusted EVA 23,073.336794 + PV terminal residual income 41,339.257154 = 71,168.593948

PV explicit FCFF 19,499.701391 + PV terminal FCFF 51,668.892557 = 71,168.593948

The two operating values are identical to displayed numerical precision. Applying the same non-operating adjustments used by the DCF sheet returns 320.9936089 per share. Thus the original 0.2249% DCF/EVA gap is not an accounting-identity failure: it disappears when the capital-charge sequence is made consistent with the workbook's own DCF discount schedule.

Replication R2 - Rate-Path-Preserving Sequential Closure
Replication R2 asks a different question. Instead of preserving Scenario A's direct-power DCF factors, it preserves the displayed floating-WACC path and constructs discount factors sequentially. The annual WACC applied to the first broken interval is the 31/12/2005 rate, 15.7822%, not the 31/12/2004 opening rate of 15.3337%. Converting 15.7822% to a 108-day effective rate gives $(1 + 15.7822\%)^{(108/365)} - 1 = 4.4314\%$; the later annual rates are 16.8270%, 17.3540%, 17.6412%, and 17.6890%. The resulting sequential discount factors are 0.9575666, 0.8196452, 0.6984383, 0.5937023, and 0.5044670.

Sequential DCF operating value = Sequential EVA operating value = 72,165.379330
After the same non-operating adjustments, the sequential convention produces 325.5244515 per share. This figure is not proposed as a replacement valuation. Its purpose is methodological: two different internally consistent time-rate architectures both produce exact DCF/EVA closure, but at different value levels. Closure and value level are therefore distinct questions.

Scenario C Continuing Value and the Terminal Financing Bridge
Scenario C's fixed-WACC terminal bridge can be audited in three layers: the two claim-specific continuing values, the decomposition of their difference, and the final zero-residual closure. The FCFE continuing value is 108,791.1362 and the FCFF continuing value is 120,290.0452. Their difference is 11,498.9090. The workbook separately records continuing debt movement of 2,121.0000; after isolating that debt movement, the remaining 9,377.9090 is the model-defined terminal financing component, labelled 'Tax Shield for Debt' in the workbook. The evidentiary point is not the label but the exact role and amount of the component inside the financing boundary.

108,791.1362 + 2,121.0000 + 9,377.9090 = 120,290.0452
10.1 Exact Decomposition of the Terminal Claim Gap
FCFF_TV - FCFE_TV = 120,290.0452 - 108,791.1362 = 11,498.9090
Terminal financing component_TV = 11,498.9090 - 2,121.0000 = 9,377.9090
epsilon_TV = 120,290.0452 - 108,791.1362 - 2,121.0000 - 9,377.9090 = 0.0000

The three equations distinguish the gross claim gap from its financing decomposition. First, FCFF continuing value exceeds FCFE continuing value by 11,498.9090. Second, 2,121.0000 of that gap is explicitly identified as continuing debt movement. Third, the remaining 9,377.9090 is uniquely determined by the model as the terminal financing component. Substituting all four quantities back into the bridge produces a zero residual. The proof therefore establishes not merely numerical proximity but exact conservation of the financing boundary at the terminal horizon.

Why This Is More than a Balancing Check

The significance of the reconciliation depends on where the numbers come from. The FCFE and FCFF continuing values are generated by their respective claim-specific valuation paths, while the debt movement is carried by the financing schedule. The 9,377.9090 amount is therefore not introduced as an arbitrary rounding plug to force equality; it is the unique remaining financing component after the separately identified claim values and debt movement are brought to the same boundary. Within the audited workbook architecture, this is the mathematical sense in which the terminal financing bridge is proved.

The same logic has already been demonstrated year by year from 2005 through 2009, where FCFE plus the workbook debt-movement and financing-charge rows reconstructs FCFF with zero difference in every forecast year. Section 10 shows that this claim conservation does not stop at the end of the explicit forecast. It survives the transition into continuing value, so the explicit-period bridge and the terminal bridge form one continuous closed loop rather than two disconnected valuation blocks.

Component	Value	Workbook role
FCFE continuing value	108,791.1362	Equity claim
Debt movement	2,121.0000	Financing bridge
Model-defined terminal financing component	9,377.9090	Mathematically identified by the bridge; workbook label: 'Tax Shield for Debt'
FCFF continuing value	120,290.0452	Firm cash-flow claim

Table 9: Fixed-WACC Continuing-Value Reconciliation

Interpretation, Tax-Shield Label, and Scope of the Proof

The workbook labels the 9,377.9090 terminal financing component 'Tax Shield for Debt.' Under the workbook's own convention, the amount is mathematically established by the closed-loop bridge: FCFF_TV - FCFE_TV - Debt Movement_TV = 9,377.9090. The paper's core claim therefore does not depend on persuading the reader to accept a particular label; it depends on the exact amount, position, and function of the component inside the financing reconciliation. If the workbook label is retained, the tax-shield amount is established within this model's terminal financing boundary. A separate APV-style exercise that forecasts future interest tax savings from an external interest schedule, tax rate, debt policy, and tax-shield discount rate would answer a different valuation question. The absence of that separate exercise does not weaken the closed-loop proof presented here; it simply defines the boundary of the claim. This distinction is consistent with the broader tax-shield literature, which recognizes that valuation of financing tax effects depends on the financing and discounting convention used [3,4,6].

Why Scenario C's Direct FCFE Valuation Block Is Not an Independent Proof of 335.0839

Scenario C also contains a direct FCFE valuation block that reports 253.7461845 per share. A later line adds 81.3377183 to reach 335.0839028. The 81.3377183 amount is defined as the difference between the 335.0839028 benchmark and the direct FCFE result. That construction is useful as a reconciliation display, but it is not an independent valuation proof because the balancing amount is derived from the target value itself.

Item	Value per share	Audit interpretation
Direct FCFE valuation block	253.7461845	Independent calculation under its displayed Ke/ terminal convention
Displayed difference / adjustment	81.3377183	Defined as benchmark minus direct FCFE value
Sum	335.0839028	Reconciled display, not independent convergence

Table 10: Direct FCFE block and the Balancing Difference

This does not reduce the value of the FCFE evidence. The stronger result is elsewhere: the annual FCFE series is derived repeatedly and consistently, and that series can be reversed across the financing boundary to reproduce FCFF exactly. The paper therefore treats 'FCFE reconstruction of FCFF' as a verified result and treats 'direct FCFE valuation equals 335.0839' as unproven unless the FCFE discount-rate, terminal, and boundary conventions are normalized independently.

What the Model Proves - and What It Does Not

Claim	Status	Reason
Multiple FCFE derivations agree	Verified exactly	Same annual FCFE series is reproduced through several formula paths
Annual Scenario C FCFE + financing rows = FCFF	Verified exactly in Scenario C	Zero difference for all five forecast years
Scenario C FCFF/DCF = EVA	Verified exactly	335.0839028 per share in Scenario C principal audited routes
Scenario A DCF vs integrated FCFF	Explained exactly	One-unit 2008 FCFF difference discounted at 0.5853885 explains 0.0026609/share
Raw Scenario A DCF vs EVA	Near-exact, not exact	0.2249% residual under displayed timing/ charge conventions
Replication R1 - schedule-preserving Scenario A	Verified exactly	Both operating values = 71,168.593948
Replication R2 - rate-path-preserving Scenario A	Verified exactly	Both operating values = 72,165.379330
Terminal FCFE + debt movement + model-defined terminal financing component = FCFF TV	Verified exactly	108,791.1362 + 2,121.0000 + 9,377.9090 = 120,290.0452
9,377.9090 terminal financing component / workbook tax-shield label	Verified exactly within the model boundary	FCFF TV - FCFE TV - debt movement = 9,377.9090 with zero residual. A standalone APV-style tax-shield valuation is a different test, not a prerequisite for this closed-loop proof.
Direct FCFE valuation independently equals 335.0839	Not established	Balancing difference is defined from benchmark
Underlying finance identities are new	Not claimed	Established in international literature
Integrated closed-loop audit is methodologically distinctive	Supported as an implementation contribution	Priority is not claimed; contribution is auditability and diagnostic decomposition

Table 11: Evidence Hierarchy and Claim Discipline

Research Contribution

The model's research strength is not the invention of WACC, CAPM, FCFE/FCFF identities, or DCF/EVA equivalence. Its strength is the construction of an auditable chain in which those established relationships can be tested simultaneously. The WACC sheet explains where the required return comes from; multiple routes derive the same FCFE; the financing bridge reverses the equity claim back to FCFF; DCF and EVA provide alternative value representations; and continuing value exposes the horizon conditions.

The revised audit adds a stronger distinction between identity, closure, and value level. Cash-flow identity can hold exactly even when two valuation routes differ because their time-rate conventions are inconsistent. Conversely, two different consistent timing conventions can each deliver exact DCF/EVA closure while producing different absolute values. The diagnostic contribution is therefore not 'all methods always give the same number'; it is the ability to identify which boundary is responsible when they do not, and to demonstrate the exact normalization required for closure.

Relative to the companion temporal-robustness paper the present paper contributes four additional pieces of evidence: the full required-return-to-WACC chain; five-route FCFE reconstruction; exact reversal from FCFE to FCFF; and decomposition of the raw floating residual into a one-unit FCFF discrepancy plus a separate capital-charge/discount-recursion mismatch [5]. This places the temporal result inside the complete financing-to-valuation architecture rather than treating discount factors in isolation.

The broken-date design strengthens this methodological contribution. A clean year-end model can conceal differences between prorated capital charges, fractional-period compounding, and the sequencing of changing discount rates. By retaining a 108-day first period while leverage and required returns change, the workbook exposes those choices and converts a small residual into diagnostic information. In this sense, the floating case is not a weaker version of the fixed case; it is the stress-test layer that reveals where valuation conventions begin to matter.

Robustness and Replication Results

The replication stage is now completed rather than proposed. The tests below separate model arithmetic from economic convention and show which conclusions survive alternative timing constructions.

Audit / robustness check	Result
1. Scenario C fixed recursion	Every adjacent fixed-WACC discount-factor ratio implies 17.6753653%; exact closure follows.
2. Scenario A 2008 FCFF discrepancy	8,300 versus 8,299 creates exactly 0.0026609 per share after discounting.
3. Replication R1 schedule-preserving closure	Implied k_t* sequence restores DCF/EVA operating value to 71,168.593948 exactly.
4. Replication R2 sequential-WACC closure	Displayed floating-WACC path plus sequential discounting restores exact closure at 72,165.379330.
5. Broken-date treatment	Effective 108-day rate is 4.4314%; simple prorated EVA charge is 4.6698%.
6. Terminal bridge	Exact three-step proof: FCFF TV - FCFE TV = 11,498.9090; subtracting debt movement of 2,121.0000 identifies the remaining terminal financing component at 9,377.9090; recombination gives 120,290.0452 with zero residual. The workbook labels the component 'Tax Shield for Debt'.
7. Direct FCFE block	Annual FCFE evidence is strong; the 335.0839 direct-FCFE reconciliation is not independent proof.
8. Cross-regime discipline	Scenario A and C differ in operating assumptions; headline 321 vs 335 is descriptive, not a one-factor WACC effect.

Table 12: Completed Robustness and Replication Results

Managerial and Analytical Interpretation

The distinction between Ke and WACC is not merely technical. Ke measures the return required by the residual equity claim under the model's leverage and risk assumptions. WACC represents the financing-weighted hurdle for the operating claim under the model's financing convention. Using the wrong rate for the wrong claim breaks the economic boundary even if the spreadsheet still produces a number.

The FCFE-to-FCFF bridge has a similarly important interpretation. It shows how financing decisions sit between operating cash generation and residual equity cash flow. Debt movement and financing charges are not peripheral adjustments; they are the mechanisms by which the operating claim is transformed into the equity claim. A closed-loop model therefore allows managers, lenders, boards, and analysts to trace not only value but also the path by which capital structure changes who receives the cash flow and which required return applies.

Limitations

This is a single-workbook diagnostic study, not an empirical test across companies. Exact reconciliation is therefore evidence of internal consistency under specified conventions, not evidence that the same numerical patterns will hold in other firms or industries. The workbook contains legacy ranges and labels that were created over a long development history; the paper relies only on the audited governing cells and explicitly notes where labels are stronger than the underlying derivation.

The schedule-preserving and sequential replications establish algebraic closure under internally consistent rate-time rules; they do not establish that either constructed rate sequence is the uniquely correct economic discount-rate process for an actual market valuation. In particular, k_t* derived from adjacent discount factors is a schedule-implied capital-charge rate, not an independently estimated market WACC. Economic use would still require an explicit policy for leverage, taxes, debt risk, and terminal capital structure.

The study is also not a clean causal comparison of fixed versus floating WACC because Scenario C differs from Scenario A in operating assumptions. The 335.0839 and approximately 321 headline values should therefore not be read as the isolated effect of the WACC regime. Finally, the paper does not claim historical priority for the underlying identities or for spreadsheet implementation; such a claim would require a broader bibliographic and archival investigation.

Conclusion

The final audit changes the interpretation of the workbook in a material way. Scenario C - the full-year, 5%-higher-sales, fixed-WACC regime - achieves exact closure across the principal FCFF/DCF and EVA routes at 335.0839028 per share. Its annual FCFE financing bridge reconstructs FCFF exactly from 2005 through 2009, and the same conservation of claims extends into continuing value. At the terminal horizon, FCFF TV of 120,290.0452 less FCFE TV of 108,791.1362 produces an 11,498.9090 financing gap; 2,121.0000 is identified as debt movement and the remaining 9,377.9090 model-defined terminal financing component completes the bridge exactly, leaving zero residual. Scenario A - the baseline operating path with floating WACC and a 108/365 first interval - is close but not exact in the raw workbook: DCF, integrated FCFF, and EVA report 320.9936089, 320.9962697, and 321.7155488 per share, respectively.

Those Scenario A residuals are now decomposed rather than merely described. The DCF-to-integrated-FCFF gap is completely explained by a one-unit 2008 FCFF difference: 8,299 versus 8,300. The DCF-to-EVA gap disappears in

Replication R1 when the capital-charge sequence is made consistent with the DCF discount-factor recursion, producing exact operating value of 71,168.593948 on both routes. Replication R2, which instead preserves the displayed floating-WACC path and rebuilds discount factors sequentially, also closes exactly at 72,165.379330. Exact closure therefore survives different internally consistent timing conventions even though the valuation level changes.

The strongest conclusion is therefore structural. A closed-loop valuation system should not be judged solely by whether headline values happen to agree. It should be able to conserve claims, expose the discount-rate path, identify timing mismatches, quantify residuals, and restore equivalence when the relevant boundary conditions are normalized. In that sense, the model functions as a diagnostic architecture: fixed WACC demonstrates algebraic closure under a constant rate, while the deliberately broken-date floating case reveals exactly where temporal conventions enter the valuation. That is the paper's defensible academic contribution.

Final Proposition: Valuation closure is governed by consistency, not by the constancy of WACC. Fixed WACC is one sufficient special case because its discount factors automatically satisfy $D_{t-1}=(1+k)D_t$. Under floating WACC, exact closure is also obtained when the capital-charge sequence and discount-factor sequence obey the same recursion. The broken-date model is therefore not a failure case; it is the diagnostic case that reveals the rate-time condition explicitly.

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Appendix A. Cell-Level Audit Map

Workbook location	Formula / value	Audit use
WACC D6/E6/H6/K6/L6/M6/N6	D/V -> D/E -> levered beta -> Ke -> weighted components	Opening capital-structure chain
WACC N6:N11 (Floating A)	15.3337% -> 17.6890%	Floating workbook WACC path
FCFF/EVA D20:H20	2,790.59; 1,158.75; 5,541.71; 8,568.63; 11,890.31	Primary Scenario C FCFE series
FCFF/EVA D22:H22	Same FCFE series	NOPLAT/net-investment bridge
FCFF/EVA D31:H31	Same FCFE series	Financing-flow route
FCFF/EVA D45:H45	Same FCFE series	Net-income/balance-sheet reconciliation
FCFF/EVA D84:H84	Same FCFE series	Net-income + noncash - reinvestment route
FCFF/EVA D145:H148	FCFE + debt row + financing row = FCFF	Annual financing reversal
FCFF/EVA I145:I148	108,791.1362 + 2,121 + 9,377.9090 = 120,290.0452	Terminal reconciliation
Scenario C J116 / J141 / DCF N34 / Economic Value I22	335.0839028	Exact Scenario C fixed-WACC closure
Scenario A DCF N34	320.9936089	Scenario A raw DCF output
Scenario A integrated FCFF J141	320.9962697	Scenario A integrated FCFF output
Scenario A Economic Value I22 / integrated J116	321.7155488	Scenario A raw EVA output
Scenario A DISCOUNT Free CFF C13:G13	POWER(1/(1+WACC_t), cumulative horizon)	Rate-path implementation
Scenario A Economic Value D6	WACC!N7 * 108/365	First-stub EVA capital charge
Scenario A DCF K23 vs integrated G15	8,299 vs 8,300	One-unit 2008 FCFF discrepancy
Scenario A DCF factors H24:L24	0.9575666; 0.8174695; 0.6925332; 0.5853885; 0.4967365	Schedule used for k_t* replication
Schedule-implied k_t*	4.4314%; 17.1379%; 18.0405%; 18.3032%; 17.8469%	Rates satisfying D_{t-1}=(1+k_t*)D_t
Replication R1	71,168.593948 = 71,168.593948	Exact DCF/EVA operating-value closure
Replication R2	72,165.379330 = 72,165.379330	Exact closure under sequential WACC path

Table A1: Principal Cells and Ranges Used in the Reconstruction

Appendix B. Core Reproducibility Tests

Test 1 - FCFE route consistency: compare D20:H20, D22:H22, D31:H31, D45:H45, and D84:H84.
Test 2 - Annual financing bridge: confirm FCFE + debt-movement row + financing-charge row equals FCFF for every year.
Test 3 - Scenario C fixed-WACC valuation closure: compare the principal FCFF/DCF and EVA outputs at 335.0839028.
Test 4 - Scenario A raw floating-WACC residual: compare DCF 320.9936089, integrated FCFF 320.9962697, and EVA 321.7155488.
Test 5 - Replication R1 schedule-preserving closure: derive k_t* = D_{t-1}/D_t - 1 from Scenario A's DCF factors and verify exact DCF/EVA operating value of 71,168.593948.
Test 6 - Terminal financing bridge: verify the three-step terminal proof. First, 120,290.0452 - 108,791.1362 = 11,498.9090. Second, 11,498.9090 - 2,121.0000 = 9,377.9090. Third, 108,791.1362 + 2,121.0000 + 9,377.9090 = 120,290.0452, so epsilon_TV = 0. The workbook labels the 9,377.9090 component 'Tax Shield for Debt'; the reproducibility test is the exact closed-loop financing reconciliation.
Test 7 - Direct FCFE valuation: normalize Ke path, terminal leverage, timing, and opening-equity treatment before testing independent equality with FCFF/EVA.
Test 8 - Broken-date stress test: verify that the first DCF factor implies a 108-day effective rate of 4.4314%, compared with the workbook simple-prorated EVA charge of 4.6698%.
Test 9 - One-unit FCFF attribution: confirm 8,300 - 8,299 = 1 in 2008 and 1 x 0.5853884991 / share scale = 0.0026609 per share.
Test 10 - Replication R2 sequential-WACC closure: rebuild discount factors from the effective 108-day first rate followed by the displayed Scenario A annual WACC path and verify exact DCF/EVA operating value of 72,165.379330.
Test 11 - Cross-regime discipline: do not interpret 335.0839 versus approximately 321 as a one-factor fixed-versus-

floating WACC effect because Scenario C also changes operating assumptions.

Appendix C. Clean Floating-WACC Replication Ledger

This appendix provides a compact numerical ledger for independent reproduction of the schedule-preserving result. All inputs are taken from the governing Scenario A workbook; no balancing value is inserted. The terminal residual-income value is defined algebraically as FCFF terminal value less ending operating capital, consistent with the DCF/residual-income identity.

Year	NOPLAT	Beg. IC	FCFF	D_t	k_t*	EVA*	PV EVA*
2005	5,549	6,756	2,501	0.9575666	4.4314%	5,249.62	5,026.86
2006	7,851	9,804	3,557	0.8174695	17.1379%	6,170.80	5,044.44
2007	9,220	14,098	6,032	0.6925332	18.0405%	6,676.65	4,623.81
2008	10,148	17,286	8,299	0.5853885	18.3032%	6,984.11	4,088.42
2009	12,051	19,135	10,391	0.4967365	17.8469%	8,636.00	4,289.82

Table C1: Schedule-Preserving Replication Ledger for Scenario A

Terminal residual income = 104,016.703281 - 20,795 = 83,221.703281; discounted at D_5 = 0.4967364945 gives 41,339.257154. Adding beginning operating capital 6,756 and explicit-period PV EVA 23,073.336794 yields 71,168.593948, exactly equal to the DCF operating value.