Retiring on Bitcoin Without a Reflecting Floor

Safe Spending Is a Range, Not a Rate, and a Sell Ladder Pays Only if Euphorias Return

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Research on simulated worlds. Not financial advice; no result here is a guarantee.

v1.2 (2026-11-18) corrects a sampling bias shared with Papers 21 and 22: the 12-month shock blocks under-drew the first and last months of the sample, whose shocks were well below average, which made the statistical worlds about 10% kinder than intended. Every simulation was rerun with the corrected draw. The recommendation is unchanged; holding's safe coverage in the statistical worlds is one grid step lower, and check C4 now fails (Section 13).

v1.3 (2026-11-18) adds the result of F011-R (`report/f011r_rivals.md`), a registered addendum that ran three of Paper 22's rules against L2-R1 under this report's spending, worlds and decision rule. With Paper 22's rivals included, the registered rule recommends L2-R3 from today: the same ladder, buying back in thirds at 1.0×, 0.75× and 0.5× trend. From the trend and from a peak it recommends L2-R1. F011's own result stands as the answer among its eight layers; no number in this report changes.

v1.4 (2026-11-19) prepares the report for publication as Paper 23: a new title, and the two earlier studies named by their paper numbers, Paper 21 (drafted as F009) and Paper 22 (drafted as F010). No result changes.

Drafted as research report F011; the registered addendum F011-R (`report/f011r_rivals.md`) keeps that name. Builds on Paper 16 (Passive vs Active Retirement), Paper 21 (Floor-Kelly With Money In and Money Out, `report/kelly_cashflow.md`) and Paper 22 (Sell Into Euphoria, Buy Back at the Trend, `report/ladder_rebuy.md`). Plan: research proposal `research/F011-proposal.md` v1.4 and pre-registration `research/F011-preregistration.md` (commit 1a5cc49), both committed before any F011 code (Section 13 gives the timings and their limits). The proposal had an independent review (8.0 out of 10) and three further reviews by readers who had not seen the earlier drafts (7.5, 8.5 and 9.2). What was known when is in Section 13. Answers registry item OQ17 for the claims it lists (C4.6 to C4.12 and C5.3, all from Paper 16); the registry entry names Papers 15 to 17, and Paper 15's withdrawal figures and any retirement figures in Paper 17 are not rerun here.

Abstract

A Bitcoin retiree needs two answers: how much can I spend, and what do I sell to pay for it? Paper 16 proposed spending a share of the floor's growth, the **coverage**: the first year's spending is a share of the dollar rise of the floor (0.42× the power-law trend) over the next 12 months, then indexed to inflation. It found 80% coverage "functionally" free of ruin, but its model let the price bounce off the floor. This report reruns Paper 16's claims without that reflection (registry item OQ17), in Paper 16's own engines and in the twelve simulated worlds of Papers 21 and 22, and tests what to sell, under a decision rule registered in advance.

Coverage. Without reflection, Paper 16's tiers fail at its own start. In its own model, holding's safe coverage (at most 1% ruin over 30 years) falls from 103.6% to 46.1%, and 80% coverage carries 12.3% ruin instead of 0.00%. From today's price, half the trend, the safe coverage ranges from 50% to 110% across the core worlds. 80% coverage (about $19,300 a year per Bitcoin, 25% of today's stack) is safe where the price rebounds from the floor as it has historically, and carries 21% and 15% ruin in the statistical worlds BASE and FADING.

What to sell. The decision rule registered in advance picks **L2-R1**, Paper 22's ladder: sell half the Bitcoin at 2× trend and half again at each higher rung, spend that cash first, and buy everything back at the trend. Among the eight rules tested it was the only winner from today, from the trend and from a peak, and under every sensitivity put through the rule. It still passed when trades were allowed only at month-end. **With Paper 22's rivals included, the registered rule recommends L2-R3** from today (F011-R, registered separately): the same ladder, buying back in thirds at 1.0×, 0.75× and 0.5× trend instead of all at the trend (score 0.806 against 0.773). From the trend and from a peak it recommends L2-R1, as it does in F011-R's secondary readings with wider intramonth swings and at lower spending. No rule scores above L2-R3, and the ruin-floor settings do not change the answer. The results below for L2-R1 are the answer among F011's eight rules.

What it gives. It costs nothing where no euphoria comes. After one euphoria it leaves a retiree with about twice the Bitcoin a holder has 10 to 14 years later (about 1.5 times at low spending). Its gain in safe spending is small: +4.8 coverage points on average.

What the result rests on. Almost three quarters of its score comes from the statistical worlds, three of which are built on price swings wider than history's. Its lead shrinks with month-end trading (score 0.500 instead of 0.773). With month-end trading and without its two largest contributors, BASE and BROKEN, it still scores 0.423 against at most 0.070 for any other rule.

Where it is weak. If multiples ratchet up, it sits in cash for decades (at year 30, 0.04 Bitcoin-equivalent against a holder's 0.19). In a random walk, on the worst tenth of paths the price runs away after it has sold, and it is left with about 3% of a holder's Bitcoin, held as cash.

What was tested separately. Two rules that Paper 22 found ahead of or safer than L2-R1 in these weak spots, trend-anchored Kelly and the price-anchored ladder L2-RP, were not candidates here; F011-R ran them afterwards, with L2-R3. L2-RP is the robust one where multiples drift or ratchet up, but scores lower (0.700); trend-anchored Kelly scores 0.648. Three of the owner's four euphoria-funded reserves passed the risk gates but scored far lower; a cash buffer bought at today's price and half floor-Kelly failed them.

Borrowing at the floor (a separate arm, never recommended) adds 25 to 35 points of safe coverage where stays below the floor are short (at least 10 where the grid's top caps the measurement), adds nothing in BASE and FADING, where they are long, and costs margin calls where the trend breaks.

Keywords: Bitcoin, power law, safe withdrawal rate, retirement, coverage, sell ladder, cash reserve, Monte Carlo, pre-registration.

Terms

- **Trend and floor.** The trend is the published power-law fit of Bitcoin's price against time; the floor is 0.42× the trend. The **multiple** is price divided by trend (0.489 on 2026-10-31).

- **Coverage.** The first year's spending as a share of the dollar amount by which the floor rises over the next 12 months, per Bitcoin held; spending then rises with US CPI (rule B1).
- **Ruin.** The first payment that cannot be made. **SC99** (SC95) is the highest coverage, on a 5-point grid, with at most 1% (5%) ruin over 30 years. It is **censored** when it lies off the grid (above 120% or below 5%). **c*** is holding's SC99 in a world: the spending a holder can just afford, at which every rule is compared.
- **Layer.** A rule for what to sell: HOLD (only Bitcoin), BUF2 (a two-year cash buffer bought at the start), ER (euphoria reserves: sell at high multiples into a cash reserve, spend it below the trend), L2-R1 (Paper 22's ladder: sell half at 2×, 3×, 4.5× trend..., buy all back at the trend), FK½ (half floor-Kelly: a Bitcoin and cash mix set by Paper 21's growth formula on the floor, after Merton 1971 and MacLean, Thorp and Ziemba 2010). **Rungs** are the multiples at which a layer sells. LEV and PB16 borrow and are never eligible for recommendation.
- **Bitcoin-equivalent.** Bitcoin plus cash valued in Bitcoin at the current price, net of any debt.
- **Ladder and reserve names.** L2-R1 is Paper 22's ladder that starts selling at **2**× trend and **R**ebuys at **1**× trend; ER4-2 is a euphoria **R**eserve of **4** years filled from **2**× trend.
- **Sweet-spot terms.** A below-trend spell is a run of at least 6 month-end closes below the trend; a floor-zone entry is a month-end close below 0.525× trend after 12 month-ends at or above it.
- **P16-NR.** Paper 16's own three engines rerun with the reflection switched off (Section 4.1).
- **Other abbreviations.** BASE-CAL: BASE with its shocks scaled to history's spread. OLS: ordinary least squares, the fit behind the published trend (OLS42: 0.42× an OLS trend refitted each month, Paper 20's floor line). APR: annual interest rate on borrowing. CPI-U: the US consumer price index for urban consumers. Numbering: body tables are numbered by section (Section 9 has none); figures run in order.
- **G.** Bitcoin-equivalent kept, as a multiple of a holder's Bitcoin, averaged geometrically over years 10 to 14 and over paths. Before taking logs, both stacks are floored at 0.01 Bitcoin-equivalent (1% of the start), so a ruined path counts as 1%, not zero; this **ruin floor in G** (not to be confused with the price floor) is varied to 0.1% and 10% as a check. **S** is the mean of ln G (0 = same as holding). **D** is the change in SC99 against holding, in coverage points.
- **Admissible, co-winner.** A layer is admissible if it is not much riskier than holding in any core world (Section 2.4). Co-winners are admissible layers whose score cannot be told apart from the best by the bootstrap (Efron and Tibshirani 1993).
- **Worlds.** Simulated futures: seven cycle worlds built from history's four cycles, and five statistical worlds from a fitted model. **Core** worlds decide; **stress** worlds (UPSHIFT, BROKEN, NO_REVERSION) test what happens if the power law weakens or fails.
- **Paper 16's terms.** Its **tiers** are coverage levels (80% "endowment", 100%, and 150% and 200% with the playbook). The **playbook** (PB16 here) is its borrowing rule: borrow the spending instead of selling whenever the price is at or below 1.6× the floor, and repay at the trend. A **margin call** is a forced sale when debt reaches a set share of the Bitcoin's value.
- **Fills.** A rule trades ("fills") when a price level is crossed. With **daily fills** it acts on daily closes; with **month-end fills**, only on the last close of each month. The **intramonth label** is Paper 22's caveat on the simulated daily prices (Section 2.3). A **refit line** is the trend refitted on a simulated path; **walk-forward lines** are trends fitted only to data known at the time.
- **Sweet spots, gates, variants.** The **sweet spots** are the owner's targets for a reserve (Section 6). The **gates** are the admissibility limits; the **tail gates** are the two on bad outcomes (ruin and the

10th percentile). The **bonus** and **dry-powder variants** of ER4-2 pay out, or buy Bitcoin with, a reserve that is overfull (Section 9).

- **Checks C1 to C6, predictions P1 to P8.** Results registered before the runs, to test the engines (checks) and the reasoning (predictions); scored in Section 12. Codes such as C4.6 to C4.12 and C5.3 (Section 4) are different: they are Paper 16's claims as numbered in the Observatory's registry. Analyses A1 to A12 are the registered analyses (A3: Paper 16's tiers in F011's worlds); Appendix tables are numbered A1 to A18 separately.
- **The brief, the owner, the registry, OQ17.** The brief is the list of Paper 16 findings that prompted this report (proposal Section 2.1), each checked here against its source (Sections 4 and 5); the owner is the Observatory's owner, who proposed the euphoria reserve; the registry is the Observatory's list of claims (`research/claims.md`), and OQ17 is its open question asking for the retirement claims C4.6 to C4.12 and C5.3 to be rerun without the reflecting floor. Those claims come from Paper 16; the entry also names Papers 15 and 17, whose own figures are not rerun here and stay open.

Key findings

1. **Paper 16's coverage tiers depend on its reflecting floor** (Section 4). In Paper 16's own engines, with the same code, seeds and paths and only the reflection switched off:
   - holding's safe coverage at 99% over 30 years falls from 103.6% to 46.1% at 3% inflation; at 6% inflation no coverage on Paper 16's grid (from 40%) is safe at 99%;
   - the 80% "endowment tier" has 12.3% ruin at 3% inflation and 22.6% at 6%, instead of 0.00% and 0.045%;
   - 100% coverage has 30.1% and 49.2% ruin, instead of 0.46% and 4.3%.

   With reflection on, the engines reproduce all 356 published ruin probabilities exactly (check C6).
2. **Paper 16's borrowing playbook does not depend on reflection, inside Paper 16's model** (Section 4). Its 99% boundary moves from 175.7% to 176.1% (3% inflation), its stress battery stays below 1% ruin at 150%, and, without reflection, 99.998% of the borrowing spells that returned to the trend were cleared at that first close (3.6% of spells never returned within 30 years). The reason is that it never sells below 1.6× the floor: it borrows. That model lets debt grow without limit and counts ruin only when the stack is gone. In F011's worlds without reflection, at 150% coverage from the trend, 14% to 22% of the playbook's paths end up owing more than they own at some payment (BASE, BASE-CAL, FADING), and its 200% tier fails in three of the four worlds (Section 4.2).
3. **How much can a holder spend from today?** (Section 5). Today's price is 0.489× the trend, so 100% coverage is a 31.3% first-year withdrawal and 80% is 25.0%. The highest coverage with at most 1% ruin over 30 years (SC99) is:
   - 85%, 100%, 90%, 110%, 80% and 90% in the six cycle worlds (CALM_FLOOR, CALM_MISS, EUPH_FLOOR, EUPH_MISS, DECAY, WILD);
   - 50%, 80% and 55% in the statistical core worlds (BASE, DAMPED, FADING);
   - 25% where the trend breaks (BROKEN), and none at all in a random walk (NO_REVERSION).

   In 11 of the 18 world-and-start cells these equal the value that Paper 21's and Paper 22's results implied before any run, or a step the plan had listed in advance as undecided. In the other 7, all

in the statistical worlds, they sit one grid step lower, so check C4 fails: the implied values came from Paper 21's and Paper 22's runs on the biased draw that this version corrects (Section 13).

4. **The brief's "$19,200 a year at 80%" (computed here as $19,300 from the 2026-10-31 close) holds where the price rebounds from the floor as it has in history, or rarely reaches it** (Section 5). From today it has at most 1% ruin in the six cycle core worlds (at most 0.15%) and in DAMPED, whose halved shocks rarely reach the floor, but 21.3% ruin in BASE and 15.4% in FADING (check C1). The brief's **"100% works only at certain multiples"** is supported in this form: from today, among the core worlds, 100% coverage has at most 5% ruin only in CALM_MISS and EUPH_MISS, the two worlds whose troughs stay well above the floor. The other seven have more, WILD least (6.3%; check C2).
5. **Recommended under the registered rule among the eight layers: L2-R1** (Section 3). Sell half the Bitcoin held at 2× trend, half again at 3×, then at 4.5× and every ×1.5; spend the cash first; buy everything back at 1.0× trend. With Paper 22's rivals included (F011-R), the rule recommends L2-R3 from today and L2-R1 from the trend and from a peak.
    - **Score:** S = 0.773 (cycle family 0.435, statistical family 1.111), the highest of five admissible layers, and the only co-winner (the next, ER2-2, scored 0.082; interval for the difference -0.703 to -0.679). As registered, the scores average over the eleven worlds other than NO_REVERSION, so the stress worlds UPSHIFT and BROKEN count; over the nine core worlds alone L2-R1 scores 0.744 and ER2-2 0.084.
    - **Spending:** D = +4.8 coverage points on average (at least: EUPH_MISS is capped at the grid's top); up to +20 points after a euphoria where the floor follows (EUPH_FLOOR: 110% against 90%). D has no interval: L2-R1's lead in D over the admissible reserves (4.8 against 3.3 to 4.2) is one grid step in FADING, decided by a few paths in 2,000, so on spending the layers that sell high cannot be told apart.
    - **Execution and the ruin floor:** admissible with month-end fills (S 0.500), and the recommendation is unchanged with the ruin floor in G at 0.1% or 10%.
    - **The field:** the eight registered layers. Paper 22's closest rivals were not candidates here. F011-R ran three of them afterwards under the same spending and rule. With them, **L2-R3** (Paper 22's ladder buying back in thirds at 1.0×, 0.75× and 0.5× trend) is the winner and the only co-winner from today (S 0.806 against L2-R1's 0.773; interval for S_L2-R1 - S_L2-R3 -0.040 to -0.027), and the recommendation, also with the ruin floor at 0.1% or 10%. No layer scores above it. From the trend L2-R1 is the only co-winner; from a peak the two are co-winners, and L2-R1 is recommended as the simpler. L2-R3's lead comes from the cycle worlds; in the statistical family alone L2-R1 leads (1.111 against 1.105).
6. **No euphoria costs nothing; a euphoria pays** (Sections 3 and 6). In CALM_FLOOR, CALM_MISS and DECAY, L2-R1 and the 2× reserves traded on fewer than 0.5% of paths and kept a holder's Bitcoin (G 1.00) and SC99 (P1 supported). After one euphoria, L2-R1 kept 2.30× a holder's Bitcoin where the floor followed and 2.15× where it did not (medians at year 12: 0.66 against 0.28 Bitcoin, and 0.57 against 0.26); the euphoria reserve ER4-2 kept 1.41× and 1.13× and raised SC99 by 20 and 10 points (P2 supported).
7. **A cash buffer bought at today's price is ruinous at a holder's spending** (Section 6). BUF2 sells two years of spending on the first day (31% to 69% of the stack in the core worlds) and was ruined on 6% to 100% of paths at c* in seven of nine core worlds. Half floor-Kelly holds too little Bitcoin to pay a holder's spending: it had the lowest SC99 in all nine core worlds, tied with holding's in BASE (P5 supported), and was ruined on 93% to 100% of paths in six of them. Neither is admissible.

8. **The reserves rarely reach the owner's sweet spots** (Section 6). ER4-2's reserve paid every month of a below-trend spell in 55% (EUPH_FLOOR) to 63% (EUPH_MISS) of spells, short of the registered 80%, and held a year of spending at only 18% to 19% of floor-zone entries (P8 not supported). It reached both sweet spots only in WILD; in BASE it misses drawdown cover by a hair (79.6%). L2-R1's cash never covers a drawdown, because it buys Bitcoin back at the trend on the way down: its edge is buying back cheaper, not a reserve.
9. **Stress worlds** (Section 3).
    - *Multiples ratchet up (UPSHIFT).* At 10 to 14 years L2-R1 kept 1.74× a holder's Bitcoin and ER4-2 0.77× (prediction P3 expected the reverse there and is not supported). But L2-R1's cash is never put back into Bitcoin: by year 30 it holds a median 0.04 Bitcoin-equivalent against a holder's 0.19.
    - *Random walk (NO_REVERSION, run at 50% coverage).* Most paths are ruined by year 30 under either rule (62% for a holder, 58% for L2-R1). L2-R1 kept 0.68× a holder's Bitcoin, and only 3% on its worst tenth of paths. On those paths the price ran away after the ladder sold. None of them is ruined by year 14: they hold cash worth a median of about 170 years of spending at year 12, but almost no Bitcoin.

    NO_REVERSION is outside the score, as registered. These two are L2-R1's weak cases.
10. **From the trend and from a peak (statistical worlds), L2-R1 is again the only co-winner** among the eight layers (Section 7), and with F011-R's rivals it is again the recommendation from both starts (from a peak, L2-R3 is also a co-winner). From 2.5× trend, selling high helps under the registered convention, in which a rung already passed is sold on day one (finding 13). On D, BUF2 becomes admissible and adds 16 points of safe coverage, and L2-R1 at least 31. The four-year reserves add about 28 but are not admissible (10th-percentile gate in DAMPED). Half floor-Kelly helps in BASE but cuts DAMPED's safe coverage from 110% to 90% and is not admissible.
11. **Borrowing at the floor (separate arm, never recommended) buys spending only where the price returns** (Section 8). With 25% loan limits and margin calls, LEV raised safe coverage by 25 to 35 points where it could be measured (CALM_FLOOR, DECAY, DAMPED) and by at least 10 to 30 where the grid's top, 120%, caps it (CALM_MISS, EUPH_FLOOR, EUPH_MISS, WILD), left BASE and FADING unchanged with margin calls on 4% to 6% of paths, and lowered it where the trend breaks (59% to 82% of paths had a margin call). Paper 16's playbook, judged on net wealth without reflection, owed more than it owned on 14% to 22% of paths at 150% coverage (Section 4.2).
12. **Other spending rules** (Section 9). A fixed dollar amount (B0) starts 5 to 15 points higher but loses half its real value over 30 years. The variable rule (V) almost never runs out in the core worlds (its safe coverage is at the grid's 120% top). Run at c* (the coverage a holder can just afford under the main rule, B1), its lowest year pays a median 95% to 100% of the first year's in the core worlds, and 27% where the trend breaks (BROKEN). Its catch is that the yearly amount is not known in advance: it follows the floor's growth and the Bitcoin held. The bonus variant rarely pays: on the median path, one bonus in 14 years after a euphoria and two in BASE and FADING, against a target of one every four years. The dry-powder variant, which buys Bitcoin near the floor with the reserve's excess, kept 1.89× a holder's Bitcoin in EUPH_FLOOR.
13. **The sensitivities change the numbers, not the recommendation** (Section 10). With intramonth swings scaled by 0.75 or 1.25, cash at 2.65% or rule levels on each path's refit line, L2-R1 is again the only co-winner (S 0.642 to 0.943). Its lead grows with the intramonth swings (BASE: 3.45× to 6.19× a holder's Bitcoin), so it depends on acting on daily closes. From 2.5× trend, most of the selling layers' gain in safe coverage comes from selling on the first day: when rungs

at or below the start count as used, L2-R1's safe coverage in BASE is 80% instead of at least 120% (holding: 70%), though most of its Bitcoin gain remains (5.82× instead of 7.83×). Reflection raises holding's SC99 in BASE by 40 points (check C3). Gold or stocks in place of cash do not rescue half floor-Kelly.

14. **History is description, and it says the start matters** (Section 11). On walk-forward lines to 2026-10: from the 2016-07 halving, holding and L2-R1 both survived 110% coverage (ER4-2 80%, half floor-Kelly 70%). From the 2017 top, L2-R1 survived at least 300% against holding's 155%. From the 2021 top it survived 150% against holding's 115%, but less than every other selling layer (175% to 185%). From 2020-05 the two-year reserve (160%) beat L2-R1 (145%). From the flagged 2012-11 start, holding (145%) beat L2-R1 (65%).

1. Introduction

1.1 The question

Paper 16 defined a Bitcoin retirement rule anchored on the power-law floor, a model-based cousin of the fixed safe withdrawal rate (Bengen 1994). The floor is 0.42× the published trend: a statistical lower bound used as a planning worst case, never a guarantee. Each year it rises by a dollar amount per Bitcoin that the model fixes in advance. The first year's spending is a share of that rise, the **coverage**, and then rises with inflation. Paper 16 reported that 80% coverage was an endowment ("ruin is functionally zero", 0.00% to 0.12% over 30 and 50 years), and that 100% survived 30 years with 95.5% to 99.5% confidence.

Paper 16's simulation reflected the price off the floor: whenever the residual fell below the floor, it was mirrored back above it. Paper 21 showed that this assumption adds about 10 points to Bitcoin's 30-year safe withdrawal rate from today's price, and the registry asked for Paper 16's claims to be rerun without it before they are cited again (OQ17).

The owner also asked what to sell. The idea: sell more when the price is far above the trend, keep the proceeds as cash, and spend from the cash when the price is low, so that no Bitcoin is sold cheap. Ideally the reserve covers a full drawdown, leaves dry powder near the floor, pays a bonus when a euphoria overfills it, and ends with more Bitcoin than at the start.

1.2 Coverage is not a withdrawal rate

As a share of the stack's value, coverage c is a withdrawal rate w = c × 0.42 × g / m, where g is the trend's growth over the next 12 months (36.4% on 2026-10-31) and m is the price as a multiple of the trend (Figure 1).

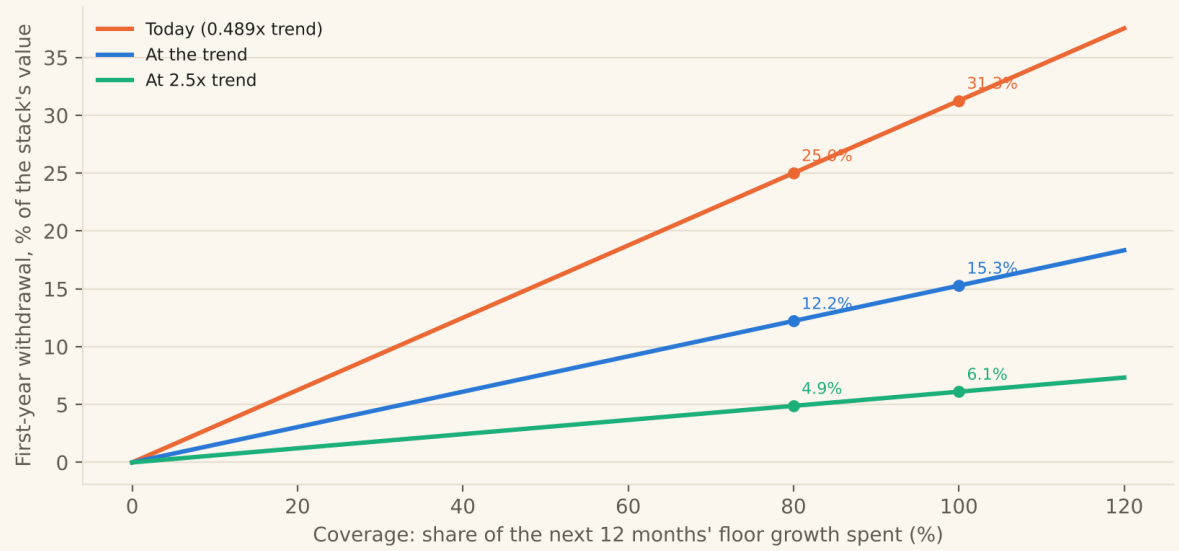
Table 1. First-year withdrawal as a share of the stack, by coverage and start (arithmetic from the published formula).

Start	100% coverage	80% coverage	60% coverage
Today (0.489× trend)	31.3%	25.0%	18.8%
At the trend (Paper 16's start)	15.3%	12.2%	9.2%
At 2.5× trend	6.1%	4.9%	3.7%

Paper 16 valued the stack at the trend price. A holder today, at half the trend, pays twice that rate for the same coverage. The dollar figure is the same: 80% of the floor's rise from 2026-10-31 to 2027-10-31 is about $19,300 a year per Bitcoin.

Figure 1. The same coverage is a different withdrawal rate at each start

w = c x 0.42 x g / m on 2026-10-31: the trend grows 1.364x in 12 months; m is the trend multiple. Paper 16 started at the trend.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_figures.py). Simulated, after 0.25% trading costs, before tax.

1.3 Questions

1. **Coverage.** Without a reflecting floor, what coverage keeps 30-year ruin at or below 1%? Does Paper 16's tier hold at its own start, and how much of any gap is reflection?
2. **Reserve.** At the same spending, does a reserve funded by euphoria sales keep more Bitcoin, lower ruin or smooth spending, compared with selling Bitcoin at every payment?
3. **Rivals.** How does it compare with a cash buffer bought at the start, half floor-Kelly (Paper 21) and the L2-R1 ladder (Paper 22)?
4. **Sweet spots.** How often does each rule hit the owner's targets?
5. **Leverage (separate arm).** What does borrowing at the floor add, and what does it risk?

2. Rules, Worlds and Decision Rule

The full specification is the pre-registration; this section summarises it.

2.1 Spending

- **B1 (primary): the coverage rule.** The first-year amount A0 = c × the next 12 months' floor growth, per Bitcoin; each month-end pays A0/12, indexed to CPI. These are Paper 21's withdrawal conventions, so B1 with holding reproduces Paper 21's and Paper 22's Bitcoin-only results path by path.
- **B0 (secondary): naive.** A0 fixed in dollars, paid weekly.

- **V (secondary): variable.** Each year the allowance is reset to c × that year's floor growth × the Bitcoin-equivalent then held.
- **Ruin:** the first payment the liquid wealth cannot cover. Spending then stops.

2.2 Layers

Table 2a. The eight primary layers (four ER variants: ER2-2, ER4-2, ER2-1.5, ER4-1.5).

Code	Rule	Spending comes from
HOLD	All Bitcoin	Bitcoin sales
BUF2	Two years of spending sold into cash on day one; topped up to two years at any month-end at or above the trend	Cash below the trend, Bitcoin above
ER{R}-{a}	Euphoria reserve: at price levels (rungs) of a× trend (2× or 1.5×), then 2× (when a = 1.5×), 3×, 4.5× and every ×1.5 (up to 76.9× trend, Paper 22's list), sell only what fills the reserve to R years of spending (R = 2 or 4); each rung fires once and is live again after a close below the trend; the reserve never buys Bitcoin	Reserve below the trend, Bitcoin above
L2-R1	Paper 22's ladder: sell half at 2×, 3×, 4.5×…; buy back with the whole pool at 1.0× trend	The pool first, then Bitcoin
FK½	Half floor-Kelly in Bitcoin and cash on the published floor (Paper 22's version of Paper 21's rule)	Pro rata, monthly rebalance

Every trade costs 0.25%; cash earns 4.05%. Rungs and buy-backs fill on simulated daily closes; payments are made at month-end.

Leverage arm (never recommended). LEV borrows each payment while the month-end close is below 1.6× the floor, up to 25% loan-to-value, at 10% APR (annual interest; 15% and 20% are stresses), with a margin call at 50%; debt is repaid at the first close at or above the trend. PB16 is Paper 16's own playbook (borrow below 1.6× the floor, sell half at 1.5×, 2× and 3× trend, redeploy at the trend), coded step by step from Paper 16's engine.

2.3 Worlds

- **Cycle family:** Paper 22's seven worlds, built from history's four cycle shapes. Core: CALM_FLOOR, CALM_MISS, EUPH_FLOOR, EUPH_MISS, DECAY, WILD. Stress: UPSHIFT.
- **Statistical family:** Paper 21's five worlds. Core: BASE, DAMPED, FADING. Stress: BROKEN, NO_REVERSION.

Table 2b. The twelve worlds (Paper 22 Section 2.2; Paper 21 Section 2.7). Months below the floor: share of month-end closes, all paths (Appendix Table A17); history 2012 to 2026: 2.2%. BASE-CAL, a sensitivity, is BASE with its shocks scaled to history's spread (× 0.82).

World	Family, role	What it assumes (levels as multiples of the trend)	Months below the floor
CALM_FLOOR	cycle, core	Peaks 1.1× to 1.6×; troughs reach the floor (0.38× to 0.48×)	3.2%

World	Family, role	What it assumes (levels as multiples of the trend)	Months below the floor
CALM_MISS	cycle, core	Peaks 1.1× to 1.6×; troughs stay above it (0.55× to 0.75×)	0.1%
EUPH_FLOOR	cycle, core	One euphoria first (peak 2.5× to 4×), then calm peaks; troughs reach the floor	3.2%
EUPH_MISS	cycle, core	One euphoria first, then calm peaks; troughs stay above the floor	0.1%
DECAY	cycle, core	Peaks shrink each cycle from 1.16×; troughs reach the floor	4.3%
WILD	cycle, core	Peaks 1.0× to 4× and troughs 0.35× to 0.70×, drawn afresh each cycle	2.4%
UPSHIFT	cycle, stress	Troughs rise 25% to 50% each cycle; peaks 2.5 to 4 times the trough	0.1%
BASE	statistical, core	Reversion toward 0.92× the trend (AR(1): each month the gap shrinks by a fixed share) with shocks resampled from history in 12-month blocks (circular: a block may wrap from the last months of history to the first)	16.3%
DAMPED	statistical, core	BASE with its shocks halved	0.8%
FADING	statistical, core	BASE with shocks shrinking to 10% by year 30	5.2%
BROKEN	statistical, stress	Price grows at half the trend's rate	78.0%
NO_REVERSION	statistical, stress	A random walk around the trend	49.2%

- 2,000 paths × 30 years per world; the same paths for every rule and coverage level; daily closes from Paper 22's resampled intramonth library.
- **Intramonth label** (a caveat carried over from Paper 22, as the proposal required). The simulated daily prices within each month come from Paper 22's library, and Paper 22's own check found it unlike history in every world (Paper 22 Section 12). In the months with the largest moves, simulated dips run 1.25 to 1.52 times deeper than history's, which helps buy-backs fill. In the statistical worlds, simulated highs reach only 0.77 to 0.83 of history's, which makes sell rungs harder to reach. Every result that fills on daily closes carries this label; results with month-end fills do not.
- **Starts:** today (0.489× trend) in all twelve worlds decides. The trend and 2.5× trend in the five statistical worlds are read separately.
- **No reflecting floor** in any primary run. BASE is harsher than history (16% of months below the floor against 2.2%; Appendix Table A17).

2.4 Decision rule

1. **Comparison spending.** In each world every layer runs at c*, the highest coverage at which holding has at most 1% ruin (SC99). NO_REVERSION, where no coverage is safe, runs at 50% and leaves the scores.
2. **Admissible** in each of the nine core worlds: ruin at c* at most 1 point above holding's; SC99 at most one 5-point step below holding's; G ≥ 0.95; 10th percentile ≥ 0.80. G is the geometric-

mean ratio of the layer's Bitcoin-equivalent (Bitcoin plus cash valued in Bitcoin) to holding's Bitcoin over months 120 to 168; the 10th percentile is taken across paths of each path's own ratio.

3. **Scores.** S = mean ln G, half from each family, over the eleven worlds other than NO_REVERSION: the stress worlds UPSHIFT and BROKEN count in the scores, though not in admissibility. D = mean change in SC99 against holding, in coverage points, half from each family, leaving out worlds where holding's SC99 is censored (off the grid: UPSHIFT at the top, NO_REVERSION at the bottom).
4. **Winner and co-winners:** highest S; co-winners within the 90% bootstrap interval (1,000 joint path resamples).
5. **Recommendation:** the simplest co-winner with S ≥ 0 in both families and D ≥ -1.0; a daily-fill layer must also pass with month-end fills.

3. The Answer

Table 3. The registered decision, from today. S over the eleven scored worlds (all but NO_REVERSION); admissibility over the nine core worlds. The ER layers and L2-R1 fill on daily closes and carry the intramonth label (Section 2.3). Full tables by world: Appendix Tables A2 to A6.

Layer	Admissible	S	S cycle	S stat	D (points)	G: EUPH_FLOOR	G: EUPH_MISS	G: CALM_FLOOR	G: BASE
HOLD	yes	0	0	0	0	1.00	1.00	1.00	1.00
BUF2	no	-1.124	-1.935	-0.313	-6.2	0.27	0.04	0.43	0.87
ER2-2	yes	0.082	0.111	0.052	+3.8	1.37	1.22	1.00	1.06
ER4-2	yes	0.059	0.056	0.062	+4.2	1.41	1.13	1.00	1.07
ER2-1.5	yes	0.071	0.106	0.037	+3.3	1.31	1.09	1.18	1.04
ER4-1.5	no	-0.069	-0.154	0.016	+2.3	1.21	0.80	1.18	1.02
L2-R1	**yes**	**0.773**	**0.435**	**1.111**	**+4.8**	**2.30**	**2.15**	**1.00**	**4.48**
FK½	no	-1.619	-2.460	-0.778	-23.8	0.07	0.04	0.22	0.51

The winner is L2-R1, and it is the only co-winner. Its score is 0.773 against 0.082 for the next layer, ER2-2 (a geometric-mean G of about 2.2× a holder's Bitcoin against about 1.09×), and the bootstrap interval for every other admissible layer's score minus L2-R1's lies far below zero (ER2-2: -0.703 to -0.679). It passes every recommendation condition:

- S ≥ 0 in both families (0.435 and 1.111) and D = +4.8 ≥ -1.0;
- with month-end fills it is still admissible, with S = 0.500;
- with the ruin floor in G at 0.1% or 10% of the starting stack, the recommendation does not change. The floor binds rarely for the admissible layers: at the registered 1% floor, at most 0.2% of paths in any core world hit it (2.1% at the 10% floor), against up to 100% for BUF2 and FK½.

How much does the answer depend on which worlds are scored? The bootstrap interval for the score difference is narrow because it covers only path sampling; the larger uncertainty is which world model is right. As a check added after review (not registered), S was recomputed leaving out one scored world at a time, and for each family on its own (Appendix Table A6b). L2-R1 ranks first in every variant: its S runs from 0.708 (without BASE) to 0.876 (without DAMPED), against at most 0.091 for any other admissible layer in the leave-one-out variants, and it leads both the cycle family alone

(0.435 against ER2-2's 0.111) and the statistical family alone (1.111 against ER4-2's 0.062). Combining the two main doubts, with month-end fills and without BASE and BROKEN, L2-R1's S is 0.423 against at most 0.070 for any other admissible layer; its month-end G is at least 1.00 in every remaining world: 2.08 in EUPH_FLOOR and 1.95 in EUPH_MISS after their single euphoria, 2.10 in WILD (Appendix Table A6b; per world in `analysis/f011_results.json`, `ME:L2-R1`).

Over the nine core worlds alone, which is not the registered score, L2-R1's S is 0.744 and the admissible reserves' 0.077 to 0.084.

L2-R1 is also the registered "most spending" reading (the admissible layer with the highest D; +4.0 points over every world, half from each family, with censored values at their bound). D carries no interval, and the lead is thin: against the admissible reserves' 3.3 to 4.2 it is one grid step in FADING (at 60% coverage L2-R1 has 18 ruined paths in 2,000, the reserves 22 to 24, with the limit at 20). In BASE and DAMPED, L2-R1 and the 2× reserves share the same SC99 (55% and 85%, one step above holding's). On spending, the layers that sell high cannot be told apart.

What was not compared. The candidates were the eight registered layers. The field took one rule from each earlier study: Paper 21's half floor-Kelly and Paper 22's recommended ladder. Paper 22's runners-up were therefore left out, and Paper 22 had found two of them ahead of or safer than L2-R1 in exactly its weak spots:

- **Trend-anchored Kelly** (a Bitcoin and cash mix set by Kelly's formula on the expected growth to the trend four years ahead; not the half floor-Kelly tested here). In Paper 22 it scored above L2-R1 with month-end fills, with intramonth swings × 0.75 and with a smooth, normally distributed model of prices within the month (Paper 22's Gaussian bridge).
- **L2-RP, the price-anchored ladder** (it buys back each sale at half its sale price, or at a backstop near 0.74× trend, instead of at the trend). In Paper 22 it was far more robust in UPSHIFT (1.49× against 0.19× at year 30) and NO_REVERSION (0.83× against 0.52× in Paper 22's corrected rerun).

"Only co-winner" and "stays on top" in this report mean among the eight registered layers.

F011-R: the rivals under spending. F011-R (`report/f011r_rivals.md`), registered on 2026-11-10 before any of its code, ran three of Paper 22's rules against HOLD and L2-R1 under this report's spending, worlds and decision rule: L2-R3 (Paper 22's ladder buying back in thirds at 1.0×, 0.75× and 0.5× trend), L2-RP and trend-anchored Kelly (TA 1). With Paper 22's rivals included, the registered rule recommends **L2-R3** from today. It is the winner and the only co-winner (S 0.806 against L2-R1's 0.773; 90% interval for S_L2-R1 - S_L2-R3 -0.040 to -0.027), adds the most safe spending (D +5.6 against +4.8), and leads L2-R1 with month-end fills too (0.566 against 0.500). The recommendation does not change with the ruin floor at 0.1% or 10%, and no layer scores above L2-R3. From the trend, L2-R1 is the only co-winner; from 2.5× trend, L2-R1 and L2-R3 are co-winners and L2-R1 is recommended as the simpler.

L2-R3's lead comes from the cycle worlds (EUPH_FLOOR, WILD) and from BROKEN. In the statistical family alone L2-R1 leads (1.111 against 1.105), and it keeps more Bitcoin in DAMPED and FADING, where L2-R3's deeper orders wait for falls that do not come. L2-RP (0.700) and TA 1 (0.648) score lower; L2-RP is the robust one in NO_REVERSION (0.97× a holder's Bitcoin against 0.68× for L2-R1) and in UPSHIFT. In F011-R's secondary readings (not part of its decision), L2-R3 stays ahead with intramonth swings × 0.75, but L2-R1 is recommended with swings × 1.25, at half of c* (as the simpler of two co-winners) and at 5% coverage. F011's registered result in this report stands as the answer among its eight layers.

Where L2-R1's score comes from (Figures 2 and 3):

- **No euphoria** (CALM_FLOOR, CALM_MISS, DECAY, peaks below 1.6× trend): it trades on fewer than 0.5% of paths (none in DECAY) and keeps a holder's Bitcoin, with the same SC99.
- **One euphoria** (EUPH_FLOOR, EUPH_MISS, peaks of 2.5× to 4×): it keeps 2.30× and 2.15× a holder's Bitcoin at 10 to 14 years (medians at year 12: 0.66 against 0.28 Bitcoin, and 0.57 against 0.26), and its SC99 is 110% and at least 120%, against holding's 90% and 110%. Without spending, Paper 22 found 1.52× and 1.47× in these worlds. Part of the larger ratio here is the holder's smaller stack: at 5% coverage the same runs give 1.53× and 1.48× (exploratory, `analysis/f011_low_spending.json`).
- **The statistical worlds,** where the price swings widely around the trend: G of 4.48 (BASE), 1.64 (DAMPED) and 3.41 (FADING). These are close to Paper 22's lump-sum results on the same paths (3.94, 1.52 and 3.01 in its corrected rerun). Spending widens them a little: both sell the same Bitcoin below the trend (Appendix Table A9), which is a larger share of the holder's smaller stack. The statistical family supplies about 72% of L2-R1's score (0.555 of 0.773): BASE 24%, BROKEN 20%, FADING 20% and DAMPED 8%. BASE, FADING and BROKEN are built on shocks wider than history's (Section 14).

At year 30 (Appendix Table A9b; G measures years 10 to 14), L2-R1's median Bitcoin-equivalent is at or above a holder's in every scored world but UPSHIFT, where its cash is never redeployed (0.04 against 0.19). It is 0.57 against 0.18 in EUPH_FLOOR and 2.41 against 0.23 in WILD. In BASE it is 30 Bitcoin against 0.50: selling at 2× and buying back at the trend compounds over BASE's wide, frequent swings, so that figure says more about BASE than about the rule.

How much depends on comparing at c*? (exploratory, added after review; `analysis/f011_low_spending.json`). Every layer is compared at the spending a holder can just afford. G is a ratio to the holder's stack, and at c* the holder has sold most of it by year 10, so the same extra Bitcoin is a larger multiple. Rerun at half of c* and at 5% coverage, the ranking is unchanged but the ratios shrink: L2-R1's S is 0.773 at c*, 0.668 at half of c* and 0.633 at 5%; ER4-2's is 0.059, 0.018 and 0.003, and ER2-2's 0.082, 0.021 and 0.003. About a fifth of L2-R1's score, and nearly all of the reserves', comes from the holder's stack shrinking under heavy spending.

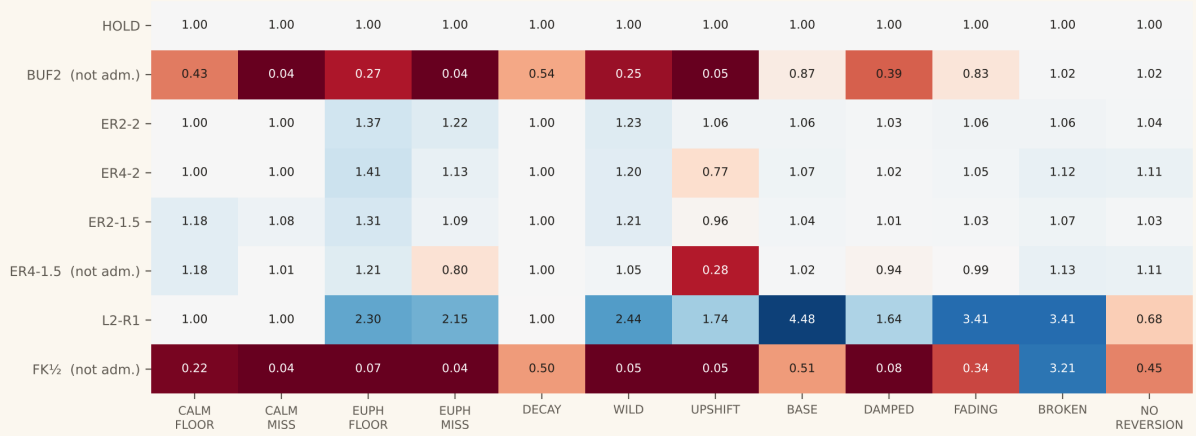
Why the euphoria reserves score lower. An ER layer sells only enough to fill R years of spending, which at 2× trend or above is a small share of the stack, and it never buys back. L2-R1 sells half the stack at each rung and buys it all back at the trend, which multiplies the Bitcoin it holds after each cycle. The reserves keep less Bitcoin but do lower the Bitcoin sold below the trend: ER4-2 sold a median 0.28 Bitcoin below the trend in BASE over 30 years, against 0.43 for holding and for L2-R1 (Appendix Table A9).

Stress worlds (stress verdict; UPSHIFT and BROKEN also count in the scores, but no stress world is an admissibility gate). In UPSHIFT, where the troughs ratchet up and the trend is rarely revisited, L2-R1 kept 1.74× at 10 to 14 years, consistent with Paper 22, where its cash gets stuck only by year 30, and ER4-2 0.77×. In BROKEN, L2-R1 kept 3.41×. In NO_REVERSION, the random walk, at 50% coverage with 62% of a holder's paths ruined, L2-R1 kept 0.68× and the worst 10% of its paths kept 3%, while the reserves kept 1.03× to 1.11×. None of those worst paths is ruined by year 14 (one in 100 is by year 30): the price ran away after the ladder sold, leaving cash worth a median of about 170 years of spending at year 12 against a holder's 0.83 Bitcoin; L2-R1's 30-year ruin there is 58.4% against holding's 62.2% (exploratory detail, `analysis/f011_low_spending.json`). In NO_REVERSION 54% to 68% of paths hit the ruin floor in G (79% for FK½; Appendix Table A3b), so these ratios depend on it:

L2-R1's is 0.64, 0.68 and 0.85 with the floor at 0.1%, 1% and 10%. Values below 0.80 in the stress worlds: L2-R1 in NO_REVERSION (0.68); ER4-2 (0.77), ER4-1.5 (0.28), BUF2 (0.05) and FK½ (0.05) in UPSHIFT; FK½ in NO_REVERSION (0.45).

Figure 2. Bitcoin kept against a holder, at the spending the holder can just afford

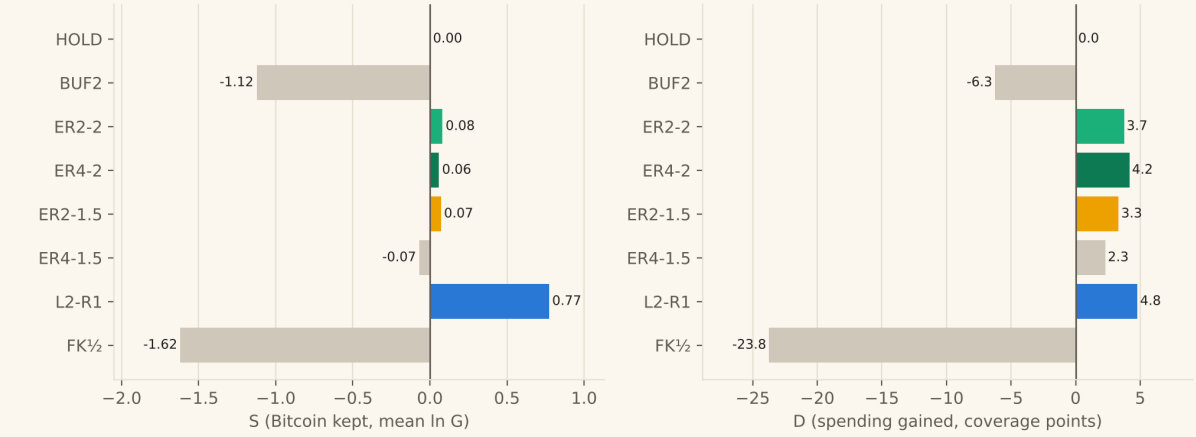
G: geometric-mean ratio of Bitcoin-equivalent to HOLD's Bitcoin, months 120 to 168, at c* = HOLD's SC99 in each world (50% in NO_REVERSION).



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_figures.py). Simulated, after 0.25% trading costs, before tax.

Figure 3. Scores under the registered rule (grey: not admissible)

Both average the two families equally: S over the eleven scored worlds, D over the ten where holding's SC99 is on the grid.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_figures.py). Simulated, after 0.25% trading costs, before tax.

4. Paper 16 Without a Reflecting Floor (OQ17)

4.1 In Paper 16's own engines

Paper 16's results come from three engines in this repository: `mc_floor_growth_ruin.py` (holding), `mc_playbook_with_withdrawals.py` (the playbook) and `mc_sensitivity_battery.py` (the stress battery). Each gained one switch that skips the line reflecting the price off the floor, plus a counter for borrowing spells, and the playbook engine an opt-in yearly median tracker that draws no random numbers (Section 13); nothing else changed. `analysis/f011_p16nr.py` repeats every call of Paper 16's drivers, with their path counts, seeds, coverages, inflation rates and horizons, once with the switch on and once with it off (712 runs).

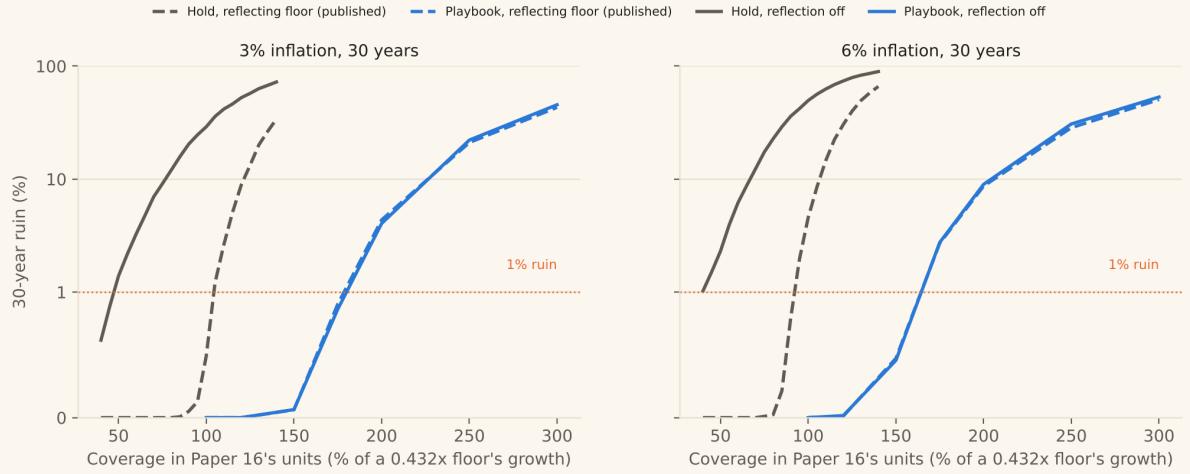
Check C6 passes. With the switch on, all 356 committed ruin probabilities reproduce exactly. Any difference with it off is therefore the reflecting floor and nothing else (Figure 4).

Table 4. Paper 16's claims in its own model, with and without the reflecting floor. Boundaries by linear interpolation of the ruin curve, as Paper 16 found them. At 100% coverage and 6% inflation, Paper 16's text quotes its headline file (4.50% ruin, 95.5% survival); its low-coverage file, used here, gives 4.32%. Full table: Appendix Table A11.

Quantity (Paper 16's units)	Reflecting floor (Paper 16's engines; committed values where they exist)	Reflection off
Hold: coverage at 99%, 3% inflation, 30 years	103.6%	46.1%
Hold: coverage at 95%, 3% inflation, 30 years	114.8%	65.6%
Hold: coverage at 99%, 6% inflation, 30 years	90.9%	below 40% (off the grid)
Hold: coverage at 95%, 6% inflation, 30 years	100.5%	57.4%
Hold: ruin at 80%, 3% inflation, 30 / 50 years	0.00% / 0.002%	12.3% / 13.2%
Hold: ruin at 80%, 6% inflation, 30 years	0.045%	22.6%
Hold: ruin at 100%, 3% / 6% inflation, 30 years	0.46% / 4.32%	30.1% / 49.2%
Hold: median Bitcoin left at 80%, 3%, 30 years	0.47	0.35
Playbook: coverage at 99%, 3% / 6% inflation	175.7% / 155.9%	176.1% / 155.9%
Playbook uplift at 99%, 3% inflation	+72.1 points	+129.9 points
Playbook: ruin at 200%, 3% / 6% inflation	4.35% / 8.67%	4.05% / 8.98%
Battery at 150%: worst cell (bootstrap 95th percentile, 6%)	0.86%	0.82%
Playbook at 150%, 3%: borrowing spells cleared at the first close at the trend	99.999%	99.998%
Playbook at 150%, 3%: borrowing spells still open at year 30	2.3%	3.6%
Playbook at 150%, 3%: median Bitcoin over all paths (ruined = 0) at year 14 (2040) / year 30	4.16 / 178	3.27 / 84.8

Figure 4. Paper 16's own engines with the floor reflection switched off

Same code, seeds and paths; only the reflection line is skipped. Holding loses most of its safe coverage; the borrowing playbook barely moves.



Source: Bitcoin Power Law Observatory, F011 P16-NR (analysis/f011_p16nr.py). Paper 16's model and terms: no trading costs, unlimited debt, ruin when the stack is exhausted.

C4.6 (holding's safe coverage by confidence level) and C4.7 (80% is an endowment tier) do not survive; C4.10 (inflation costs more than the horizon) survives with smaller gaps. Without reflection, a holder at Paper 16's start can spend about 46% of the floor's growth at 99% confidence, not 104%; the 80% endowment tier has 12% to 23% ruin over 30 years. Inflation still matters more than the horizon: 3% to 6% costs 8.2 points of safe coverage at 95% (14.3 with reflection), and 30 to 50 years costs 0.6 (2.15 with reflection).

The playbook claims do survive inside Paper 16's model (C4.8, C4.9, C4.12, C5.3). The playbook borrows instead of selling whenever the price is at or below 1.6× the floor, so it never sells in the zone where reflection acts. Its safe coverage, its 200% boundary (C4.9: at least 91% survival), its stress battery at 150% and the clearance of its debt at the next trend crossing (C5.3: 547,948 of 547,958 crossings; median terminal debt $0) are essentially unchanged. Its uplift over holding grows (+130 points), because holding falls.

C4.11 (most of the playbook's Bitcoin growth comes in the "storm years", cycles 5 to 8, about 2024 to 2040) does not hold even in Paper 16's own model. At 150% coverage and 3% inflation the playbook's median stack falls to 0.68 Bitcoin by year 2, reaches 4.16 by year 14 (2040) and 178 by year 30 with reflection; 3.27 and 84.8 without. Only 2% of the 30-year growth (28% in log terms) comes by 2040 with reflection, and 3% (27%) without: most of it comes after the storm years, not during them (`analysis/f011_p16nr_c411.json`).

Two features of Paper 16's model carry the playbook's result: debt can grow without limit, and a path is ruined only when the Bitcoin stack is exhausted, never by its debt. Section 4.2 and the leverage arm (Section 8) test the playbook in F011's worlds, with and without those terms.

4.2 In F011's worlds, from Paper 16's start

The registered rerun of Paper 16's tiers in F011's worlds is analysis A3 (results in Appendix Tables A12 and A12b). It starts from the trend, in four statistical worlds (BASE, BASE-CAL, DAMPED and FADING), with and without reflection, under three inflation settings: Paper 21's CPI paths, fixed 3% and fixed 6%. Two rules are run. Holding uses B1 with F011's 0.25% trading costs. PB16 is Paper 16's playbook on

Paper 16's own terms: no trading costs, no cash yield, no loan limit, and ruin only when the Bitcoin stack is exhausted. These terms slightly favour PB16 in the uplift. Figure 5 shows BASE; its axis is in Paper 16's units. BASE-CAL is BASE with its shocks scaled to history's spread.

Table 4b. Paper 16's tiers from the trend in F011's worlds. Paper 16's floor was 0.432× the trend, not 0.42×. The same spending is therefore a lower coverage in Paper 16's units: Paper 16's coverage = 0.972 × F011's, so Paper 16's 80% is 82.3% here. This table uses F011's units. Reflection, where on, is at 0.432× as in Paper 16. Boundaries by linear interpolation. "Insolvent on net wealth": at some payment, debt exceeded everything owned.

World, inflation	Hold: coverage at 99%, reflecting / not	Hold: ruin at Paper 16's 80%, reflecting / not	PB16: coverage at 99%, not reflecting	PB16 at 150%, not reflecting: ruin on Paper 16's rule / insolvent on net wealth	PB16: ruin at 200%, not reflecting
BASE, CPI	93% / 62%	0.0% / 10.3%	170%	0.10% / 21.6%	8.3%
BASE, 3%	95% / 63%	0.0% / 10.4%	171%	0.10% / 21.1%	7.9%
BASE, 6%	83% / 55%	0.8% / 23.8%	151%	0.90% / 25.9%	17.4%
BASE-CAL, CPI	93% / 73%	0.0% / 3.1%	161%	0.15% / 14.1%	17.4%
DAMPED, CPI	99% / 97%	0.0% / 0.0%	143%	3.75% / 6.2%	68.8%
FADING, CPI	93% / 68%	0.0% / 6.7%	157%	0.50% / 16.2%	16.3%

With reflection the world model hardly matters; without it, it matters a lot. With reflection, F011's worlds give holding a 99% boundary of 93% to 99% from the trend (F011's units), a little below Paper 16's 103.6% (3% inflation; 106.6% in F011's units). Without it, the boundary falls to 62% in BASE, 68% in FADING and 73% in BASE-CAL; only DAMPED, whose shocks are halved and rarely reach the floor, keeps it (97%). Paper 16's own model, without reflection, is harsher still (46%), probably because its residual can fall further below the floor than F011's worlds allow (not measured here).

Paper 16's 80% tier, at its own start and without reflection, has 10.3% ruin in BASE, 6.7% in FADING and 3.1% in BASE-CAL. It is safe at the 1% level only in DAMPED. From 3% to 6% inflation, holding's 99% boundary falls by 8 to 13 points without reflection and by 12 to 14 with it, across the four worlds; the horizon was not varied in F011's worlds (30 years only).

The playbook looks safe only on Paper 16's terms. Its 99% boundary barely moves without reflection (BASE: 164% to 170%), as in Paper 16's model. But at 150% coverage, on 14.1% (BASE-CAL) to 21.6% (BASE) of paths its debt at some payment exceeded everything it owned; with reflection, 0.15% to 0.7% in BASE, BASE-CAL and FADING. In DAMPED it is 5% to 6% either way. Paper 16's ruin rule never sees these paths, because debt is unlimited and ruin is counted only when the stack runs out. Section 8 runs the playbook with loan limits and net-wealth ruin.

The other playbook claims:

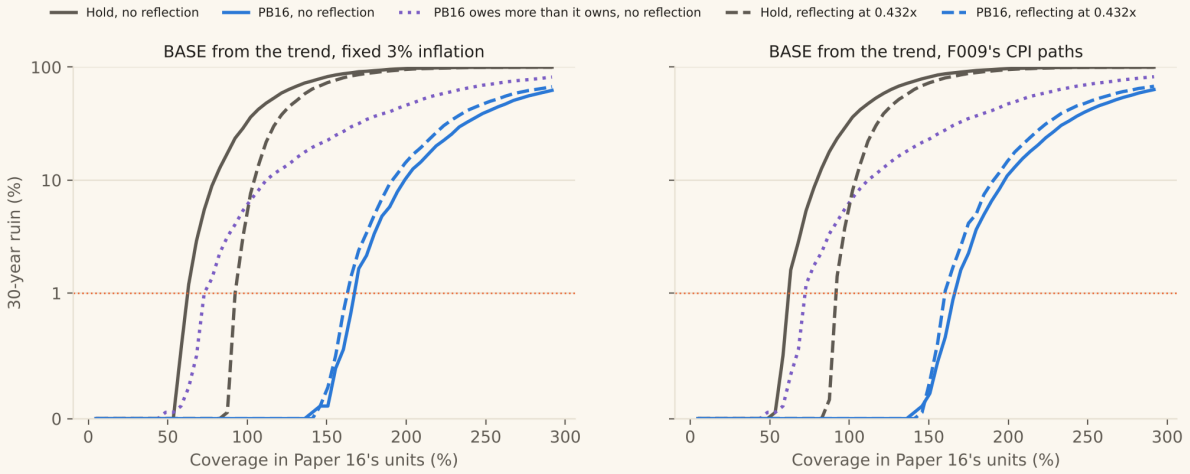
- **C4.9 (200% keeps at least 91% survival) holds only in BASE, and only at moderate inflation:** with Paper 21's CPI paths, ruin is 8.3% in BASE, whose wide swings keep reaching the playbook's 1.5× sell tier, against 16.3% (FADING) to 68.8% (DAMPED, where peaks rarely reach it); across the fixed-inflation settings, 7.9% (BASE, 3%) to 85.3% (DAMPED, 6%), and 17.4% in BASE at 6%.
- **C4.12 (higher APR):** at 150% from the trend, APR 15% and 20% raise ruin on Paper 16's rule only slightly (BASE: 0.10% at 10%, 15% and 20% APR; DAMPED 3.75% to 4.9% and 6.7%).
- **C5.3 (debt clears at the next trend crossing):** when the price returns to the trend, the debt is cleared at once on 99.7% to 100% of crossings (98.5% in DAMPED at 6% inflation), and the

median terminal debt of survivors is $0. But 7.3% of BASE's borrowing spells (967 of 13,239) never see the trend again within 30 years; 2.3% in FADING and 9.3% in DAMPED.

- **C4.11 (storm years):** the playbook's median Bitcoin at 150% from the trend in BASE falls from 1.00 to 0.68 by year 8, then grows to 0.92 by year 12, 2.31 by year 20 and 8.36 by year 30. Most of the growth comes after 2040 (BASE's median is about 1.1 at year 14), not in cycles 5 to 8 (about 2024 to 2040) as C4.11 states; FADING, whose shocks fade, shows the same timing (0.62, 0.73, 1.17, 1.68).

Figure 5. Paper 16's tiers rerun in F011's BASE world, from Paper 16's start

PB16 follows Paper 16's playbook on its terms (no costs, no loan limit; ruin when the stack is exhausted). Purple: paths whose debt exceeded all they owned.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_figures.py). Simulated; HOLD pays 0.25% on sales, PB16 on Paper 16's terms; before tax.

4.3 What OQ17 should record

Table 4c. Paper 16's claims under OQ17. Coverage in the two Paper 16 columns is in Paper 16's units; in the F011 column, in F011's units (Paper 16's = F011's × 0.972). These are readings: no pass or fail criterion was registered for Paper 16's claims, only the reruns. Registry updates follow only with the owner's approval.

Claim	Paper 16 (reflecting)	Without reflection: Paper 16's model	Without reflection: F011's worlds, from the trend	Reading (not a registered test)
C4.6 passive coverage by confidence	103.6% at 99%, 114.8% at 95% (3%)	46.1% and 65.6%	62% to 73% at 99% (BASE, BASE-CAL, FADING); 97% in DAMPED	**Not supported** without reflection
C4.7 80% is an endowment tier	ruin ≤ 0.12%	12.3% (3%), 22.6% (6%)	3.1% to 10.4% with CPI paths or 3% inflation; 12.1% to 23.8% at 6%; 0.0% to 0.15% in DAMPED	**Not supported**
C4.8 playbook uplift at 99%	+72 (3%), +65 (6%) points in the committed files (Paper 16's text: +50 to +75; registry: +50 and +30 to 40)	+130 (3%)	+39 (DAMPED) to +108 (BASE)	**Supported only on Paper 16's terms;** on net wealth the playbook is insolvent on 14% to 22% of paths at 150%

Claim	Paper 16 (reflecting)	Without reflection: Paper 16's model	Without reflection: F011's worlds, from the trend	Reading (not a registered test)
C4.9 200% keeps ≥ 91% survival	95.7% and 91.3%	96.0% and 91.0%	31% to 92% (CPI paths); 15% to 92% over all inflation settings; ≥ 91% only in BASE with CPI paths or 3%	**Not supported** in F011's worlds, except BASE at moderate inflation
C4.10 inflation costs more than the horizon	14.3 against 2.15 points (95%)	8.2 against 0.6	inflation: 8 points (99%, BASE); horizon not varied	**Supported in Paper 16's model,** with smaller gaps; not tested in F011's worlds
C4.11 storm years drive the playbook's Bitcoin growth	most growth in cycles 5 to 8 (about 2024 to 2040); rerun with reflection: 2% of the median path's 30-year growth by 2040 (28% in log terms)	3% by 2040 (27% in log terms)	most growth after 2040	**Not supported,** with or without reflection, and not in Paper 16's own model either
C4.12 uplift robust to the stress battery at 150%	all cells < 1%	all cells < 1%	APR stress small; peak cap and slope decay not rerun	**Supported in Paper 16's model only**
C5.3 borrowing below 1.6× the floor clears at the next trend crossing	yes	99.998% of crossings	98.5% to 100% of crossings, but 2% to 9% of spells never see the trend again	**Supported where the trend returns;** see Section 8 for loan limits

5. How Much Can a Holder Spend?

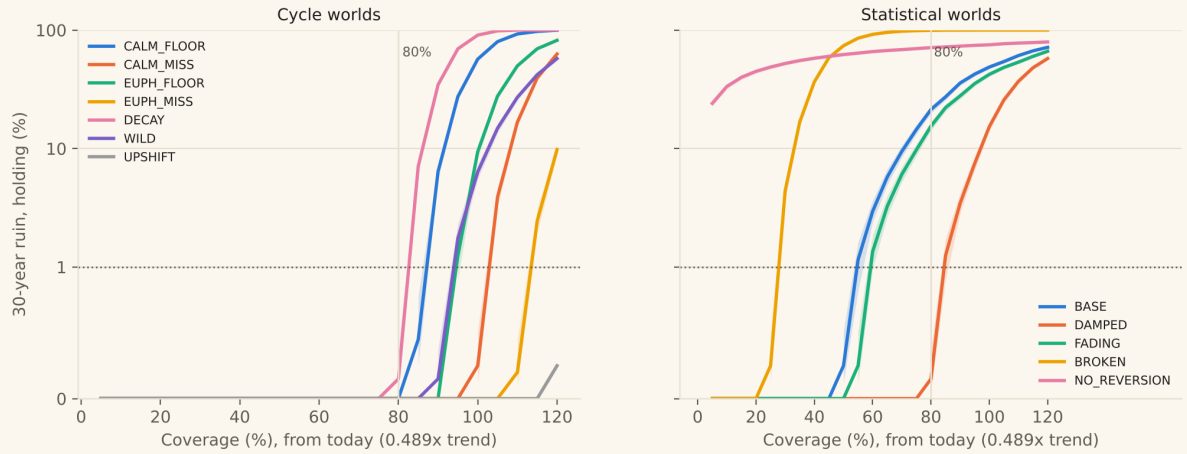
Table 5. Holding, from today (0.489× trend), coverage rule B1, 30 years, no reflecting floor. 100% coverage is 31.3% of the stack in year one. SC99 and SC95: the highest coverage on the 5-point grid with ruin at most 1% and 5%.

World	SC99	SC95	Ruin at 80%	Ruin at 100%
CALM_FLOOR	85%	85%	0.0%	56.9%
CALM_MISS	100%	105%	0.0%	0.25%
EUPH_FLOOR	90%	95%	0.0%	9.4%
EUPH_MISS	110%	115%	0.0%	0.0%
DECAY	80%	80%	0.15%	90.6%
WILD	90%	95%	0.0%	6.3%
UPSHIFT (stress)	≥120%	≥120%	0.0%	0.0%
BASE	50%	60%	21.3%	48.8%
DAMPED	80%	90%	0.15%	15.3%

World	SC99	SC95	Ruin at 80%	Ruin at 100%
FADING	55%	65%	15.4%	42.3%
BROKEN (stress)	25%	30%	99.4%	100.0%
NO_REVERSION (stress)	<5%	<5%	71.1%	75.1%

Figure 6. Ruin by coverage for a holder starting today, without a reflecting floor

B1: the first-year amount rises with CPI. 100% coverage is 31.3% of today's stack; 80% is 25.0%.
Shaded: Wilson 90% interval over 2,000 paths, where ruin is above zero. Dotted: 1% ruin.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_figures.py). Simulated, after 0.25% trading costs, before tax.

How precise is SC99? With 2,000 paths, a measured ruin of 1.0% has a 90% Wilson (1927) interval of 0.7% to 1.4% (Figure 6, shaded), so a world's SC99 could move by one 5-point step in another sample of the same size. The decision rule does not resample SC99 or c*: its bootstrap covers the scores S at fixed c*, and the admissibility gates absorb this noise through their one-step SC99 allowance and the 1-point ruin allowance.

- **In the cycle worlds every SC99 matches what Paper 21's and Paper 22's results implied before any run; in the statistical worlds 7 of 11 cells sit one grid step lower** (check C4 fails). The implied values came from Paper 21's and Paper 22's results on the biased draw that this version corrects (Section 13), and both studies' corrected reruns move the same way. So these numbers re-express Paper 21's and Paper 22's Bitcoin-only safe withdrawal rates in the coverage unit; the new evidence is their reading as coverage, and the layers in the next sections.
- **80% coverage from today is safe at the 1% level wherever the price rebounds from the floor as it has in history:** ruin is at most 0.15% in all six cycle worlds. In the statistical worlds BASE and FADING, where price can stay below the floor much longer than history, it is 21.3% and 15.4% (check C1).
- **100% is safe only where the floor is not reached** (check C2): 99.8% survival in CALM_MISS and 100% in EUPH_MISS, against 9% (DECAY) to 91% (EUPH_FLOOR) in the other floor-reaching worlds; WILD, which the registered check leaves out, has 93.7% (90% interval 92.7% to 94.5%).
- **The range is the answer.** Across the nine core worlds, a holder's safe coverage from today runs from 50% to 110%. A planner who must survive the harsh BASE world would spend 50% in that world (about $12,100 a year per Bitcoin, 15.6% of today's stack); one who trusts history's cycle shapes can spend 80% to 85% where the troughs reach the floor (DECAY, CALM_FLOOR; about $19,300 to $20,500), and up to 110% where they stay above it.

From the trend and from 2.5× trend (statistical worlds; Appendix Tables A10-TREND and A10-PEAK):

Table 5b. Holding's safe coverage by start (first-year withdrawal rate at SC99 in brackets). Ruin by coverage for each start: Appendix Table A1b.

World	From today: SC99, SC95	From the trend: SC99, SC95	From 2.5× trend: SC99, SC95
BASE	50% (15.6% of the stack), 60%	60% (9.2%), 70%	70% (4.3%), 85%
DAMPED	80% (25.0%), 90%	95% (14.5%), 105%	110% (6.7%), ≥120%
FADING	55% (17.2%), 65%	65% (9.9%), 75%	75% (4.6%), 90%
BROKEN (stress)	25%, 30%	25%, 30%	25%, 30%
NO_REVERSION (stress)	<5%, <5%	<5%, <5%	<5%, <5%

- **The same coverage is safer from a higher start** in coverage terms, because the first-year rate is lower; but the rate a holder can take falls as the start rises (from 16% to 4% of the stack in BASE, 25% to 7% in DAMPED), as Paper 21 found.
- **For a product display** (the owner's withdrawal depth gauge): show a range of SC99 for each start multiple, never one safe rate. Like for like, in the three statistical core worlds the ranges are 50% to 80% from today (0.489× trend), 60% to 95% from the trend and 70% to 110% from 2.5× trend. From today, adding the six cycle worlds widens the range to 50% to 110%; the cycle worlds were not run from the other starts. Beside each range show: the floor definition (0.42× the published trend, which was fitted to daily closes from 2010-07-18 to 2026-03-08; the results here use prices to 2026-10-31); that ruin means ruin inside a simulated world; and that the range is not a guarantee. Do not show Paper 16's tiers (80%, 100%, and 150% with the playbook) without saying that they rest on a reflecting floor.
- **Paper 16's tier at its own start** (check C5): 80% coverage in F011's units from the trend has 8.6% ruin in BASE and 5.3% in FADING, against Paper 16's 0.00% to 0.12%. Paper 16's own 80% is F011's 82.3%, because Paper 16's floor was 0.432× the trend, not 0.42× (Section 4.2); there ruin is 10.3% and 6.7%. **100% from the trend is safe only in DAMPED,** where shocks are halved.

6. Reserves, Buffers and Floor-Kelly

The euphoria reserves do what they were designed to do, but modestly.

- **No euphoria:** the 2× reserves (ER2-2, ER4-2) almost never fire in CALM_FLOOR, CALM_MISS or DECAY, whose month-end peaks stay below 1.6× trend (daily closes can spike higher): before year 14 they fired on 0.45%, 0.2% and 0% of paths, and on under 1% over 30 years. They keep a holder's Bitcoin and SC99 (P1 supported: G 1.001, 1.000 and 1.000 for ER4-2). The 1.5× reserves fire on about three quarters of paths in CALM_FLOOR and CALM_MISS (none in DECAY), and gain (ER2-1.5: 1.18× in CALM_FLOOR).
- **A euphoria:** ER4-2 kept 1.41× a holder's Bitcoin in EUPH_FLOOR and 1.13× in EUPH_MISS, and raised SC99 from 90% to 110% and from 110% to at least 120% (P2 supported). ER2-2 kept 1.37× and 1.22×.
- **Bitcoin sold cheap:** ER4-2 sold a median 0.28 Bitcoin below the trend over 30 years in BASE, against 0.43 for holding; 0.40 against 0.70 in EUPH_FLOOR.
- **Ratcheting multiples:** a four-year reserve filled at 2× and spent only below the trend sits idle when the trend is rarely revisited. ER4-2 kept 0.77× in UPSHIFT and ER4-1.5 0.28×; ER4-1.5 also fails admissibility in EUPH_MISS and DAMPED.

A buffer bought today is ruinous at a holder's spending. BUF2 sells two years of spending at 0.489× trend on the first day: 31% of the stack at BASE's c* of 50%, and 50% to 69% in the cycle core worlds (75% in UPSHIFT). At the spending a holder can just afford, BUF2 was ruined on 100% of paths in CALM_MISS, EUPH_MISS and UPSHIFT, 44% in EUPH_FLOOR and 34% in WILD, and kept 0.04× to 0.54× a holder's Bitcoin in the cycle worlds (P4 supported: G below 1 in all six). It survives in BASE, FADING and BROKEN, where c* is low and the sale small. A buffer is cheap only if it is bought high.

Half floor-Kelly cannot pay a holder's spending. On the published floor its target Bitcoin weight is 74% today and falls as the price recovers, then swings with the cycles: two years in, the median across paths is 4% to 46% in the core worlds (an exploratory diagnostic, `analysis/f011_fk_weights.json`). So most of a holder's spending comes out of cash that does not grow with Bitcoin. Its SC99 was the lowest of the eight layers in all nine core worlds, tied with holding's in BASE (P5 supported), from 35% in DAMPED to 70% in DECAY, and at c* it was ruined on 93% to 100% of paths in five of the six cycle core worlds and in DAMPED. This agrees with Papers 21 and 22: from today, holding beats floor-Kelly for a retiree.

Sweet spots (registered thresholds; Appendix Tables A9 and A9b). The owner's targets were measured at c* for every layer:

Table 6. Where each layer met the owner's sweet spots, from today at c*. Spending under B1 is flat in real terms until ruin, so only the drawdown counts for volatility.

Sweet spot	HOLD	ER4-2	L2-R1
Reserve covers a drawdown (≥ 80% of below-trend spells that start with cash are paid without selling Bitcoin, in a world where at least half the paths have such a spell)	never (no reserve)	WILD (82%), UPSHIFT (100%); BASE just short (79.6%); 55% to 63% in the euphoria worlds	never: its cash buys back at the trend
Dry powder at floor-zone entries (≥ 50% with a year of spending in cash)	never	WILD (65%), BASE (79%), FADING, BROKEN, NO_REVERSION; 18% to 19% in the euphoria worlds	never
More Bitcoin than at the start at month 144 (median)	never	never	BASE (2.27), FADING, BROKEN
Break-even in real wealth at month 96 (median)	every world but NO_REVERSION	every world but NO_REVERSION	every world but NO_REVERSION
Lower volatility (drawdown at least 10 points smaller than holding's)	—	EUPH_FLOOR, EUPH_MISS	EUPH_FLOOR, EUPH_MISS, WILD, UPSHIFT, BASE, DAMPED, FADING

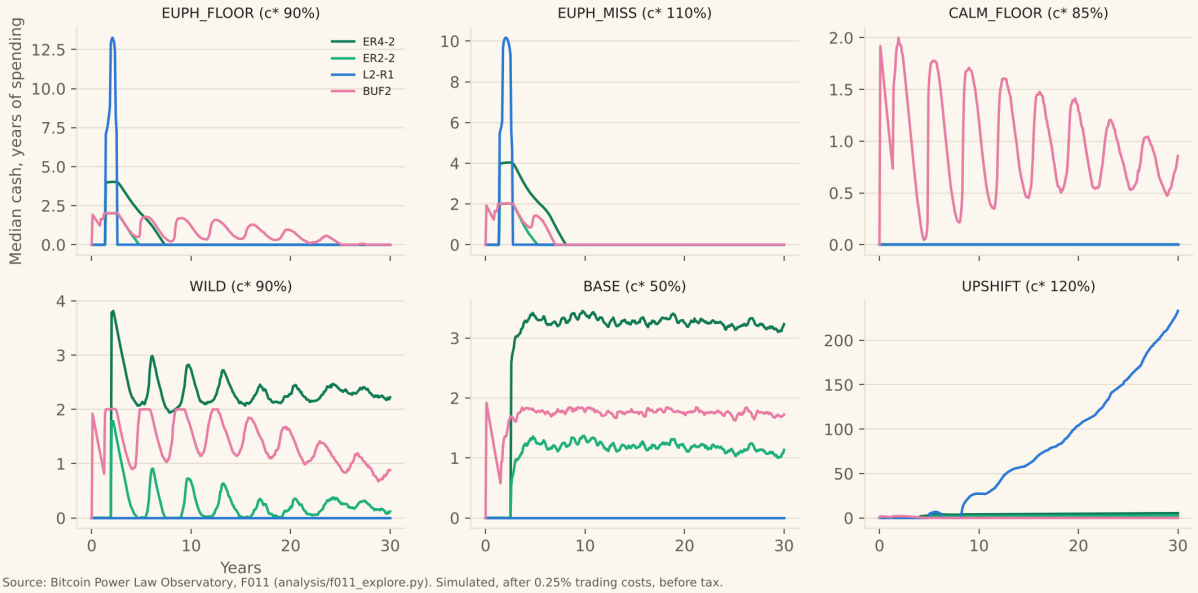
P8 (ER4-2 hits drawdown cover and dry powder in both euphoria worlds, and neither in the calm worlds) is **not supported**. In the calm worlds the reserve almost never fills (on under 1% of paths), as predicted. In the euphoria worlds it fills once, at the single euphoria, and four years of spending runs out before the next deep drawdown ends. A reserve that covers a full drawdown needs either a

second euphoria or a larger fill. At a holder's spending, every layer sells most of its stack. Among the admissible layers only L2-R1, in the statistical worlds BASE, FADING and BROKEN, ends 12 years with more Bitcoin than it started with; the inadmissible FK½ also does in BROKEN (1.82).

How the cash behaves (exploratory; Figure 7). In the euphoria worlds ER4-2 fills its four years once, at the single euphoria, and spends it down over the next five to six years; it is empty by year 7 to 8. L2-R1 briefly holds 10 to 13 years of spending in cash after selling half its stack at the peak, and buys it all back within about a year. In BASE, whose swings keep reaching 2×, ER4-2's reserve stays near 3.3 years throughout. In UPSHIFT, where the price rarely returns to the trend after the troughs ratchet up, L2-R1's cash is never redeployed: its median pool grows to about 230 years of spending by year 30. Its G at 10 to 14 years (1.74) is measured before that cost shows: by year 30 its median Bitcoin-equivalent is 0.04, against a holder's 0.19 (Paper 22 found the same decline without spending). A retiree using L2-R1 holds a large cash pile whenever the price stays above the trend for years.

Figure 7. Exploratory: how much cash each layer holds over time

Median over paths alive at each month-end, in years of current spending, at c* from today.

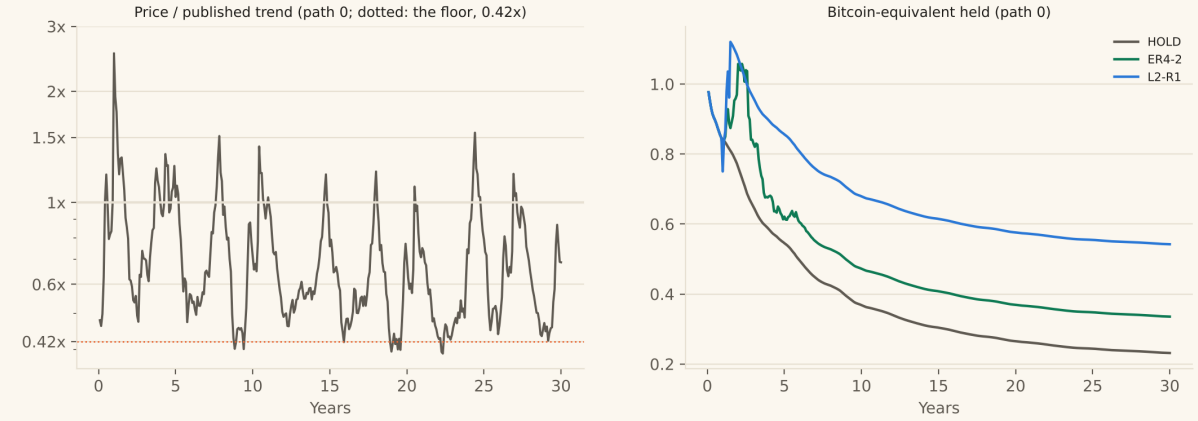


Source: Bitcoin Power Law Observatory, F011 (analysis/f011_explore.py). Simulated, after 0.25% trading costs, before tax.

One path (exploratory; Figure 8). In the first simulated path of EUPH_FLOOR (path 0, not a chosen one), the single euphoria peaks at 2.54× trend in month 12. L2-R1 sells half its Bitcoin at 2× and buys it all back at the trend six months later, leaving it with 1.12 Bitcoin-equivalent against a holder's 0.81. The lead persists: at year 30 it holds 0.54 against 0.23, though the price falls below the floor in four later episodes (years 9, 16, 19 to 20 and 23). ER4-2 fills its reserve at the same peak, spends it over the next six years and ends with 0.34.

Figure 8. Exploratory: one simulated path in EUPH_FLOOR, at c*

A single path, for illustration only.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_explore.py). Simulated, after 0.25% trading costs, before tax.

7. From the Trend and From a Peak

The registered secondary reading repeats the decision rule in the five statistical worlds from the trend and from 2.5× trend (Figure 9; Appendix Tables A10-TREND and A10-PEAK).

Table 7. The decision rule from other starts, statistical worlds only. S and D over BASE, DAMPED, FADING and BROKEN (NO_REVERSION left out of the scores); admissibility in BASE, DAMPED and FADING. From 2.5× trend many layers reach the grid's 120% top, so their D is a lower bound, and BROKEN (a stress world) weighs a quarter of D. Layers that fill on daily closes carry Paper 22's intramonth label (Section 2.3).

Layer	From the trend: admissible, S, D	From 2.5× trend: admissible, S, D
HOLD	yes, 0, 0	yes, 0, 0
BUF2	no, 0.009, +7.50	yes, 0.168, +16.25
ER2-2	yes, 0.062, 0.00	yes, 0.186, +15.00
ER4-2	yes, 0.065, 0.00	no (DAMPED 10th percentile 0.77), 0.193, +27.50
ER2-1.5	yes, 0.045, 0.00	yes, 0.179, +15.00
ER4-1.5	no, 0.003, 0.00	no (DAMPED 10th percentile 0.76), 0.176, +28.75
L2-R1	**yes, 1.158, +3.75**	**yes, 1.664, +31.25**
FK½	no, -0.398, -5.00	no, 0.705, +37.50

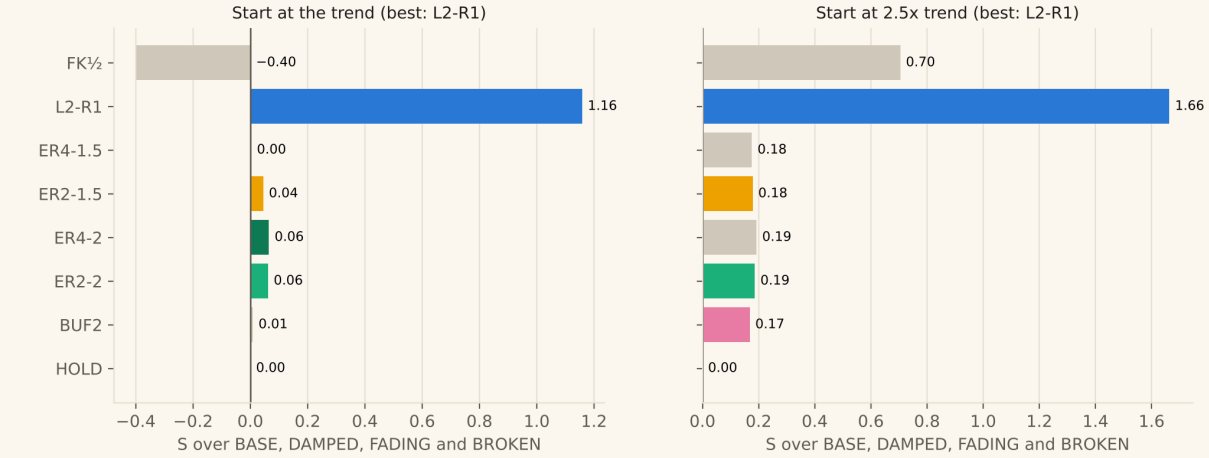
- **L2-R1 is again the only co-winner** from both starts, and admissible with month-end fills (S 0.701 and 1.210). The recommended layer is admissible from a peak in every statistical core world, so the registered disclosure is not triggered.
- **From a peak, selling high is what protects a retiree, and mostly on the first day.** Under the registered convention a rung at or below the start fires at the start close, so every selling layer sells at 2.5× trend on day one; with the opposite start convention most of the gain disappears (Section 10). BUF2, which is ruinous when bought today, is admissible from 2.5× trend and adds 16 points of safe coverage on D (at least 20 over the three core worlds). ER2-2 and ER2-1.5 add 15. The four-year reserves add about 28 but fail the 10th-percentile gate in DAMPED. These D values are lower bounds: L2-R1 sits at the grid's 120% top in BASE, DAMPED and FADING (at least +35 points over the three), and ER4-2 in DAMPED and FADING. Half floor-Kelly's D of +37.5

comes mostly from BROKEN (at least +95 points, a stress world) and BASE (at least +50); over the three core worlds it averages at least +18, and it cuts DAMPED's safe coverage from 110% to 90%. It does protect a retiree at a top in BASE, as Paper 21 found, but its tails fail the gates (10th percentile 0.27 to 0.56; 10% ruin at c* in DAMPED).

- **NO_REVERSION remains L2-R1's weak case:** it kept 0.49× from the trend and 0.40× from 2.5× trend.

Figure 9. The same rule from the trend and from a peak (registered secondary reading)

Statistical worlds only; admissibility in BASE, DAMPED and FADING; grey: not admissible.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_figures.py). Simulated, after 0.25% trading costs, before tax.

8. The Leverage Arm

LEV is holding plus borrowing: below 1.6× the floor each payment is borrowed until the debt reaches 25% of the Bitcoin's value; at 50% a margin call sells Bitcoin back to 25% with a 2% penalty; debt is repaid at the first close at or above the trend; ruin is counted on net wealth. PB16 here is Paper 16's playbook on F011's terms: the same loan limits, costs and net-wealth ruin. Neither is eligible for recommendation (Figure 10; Appendix Table A13).

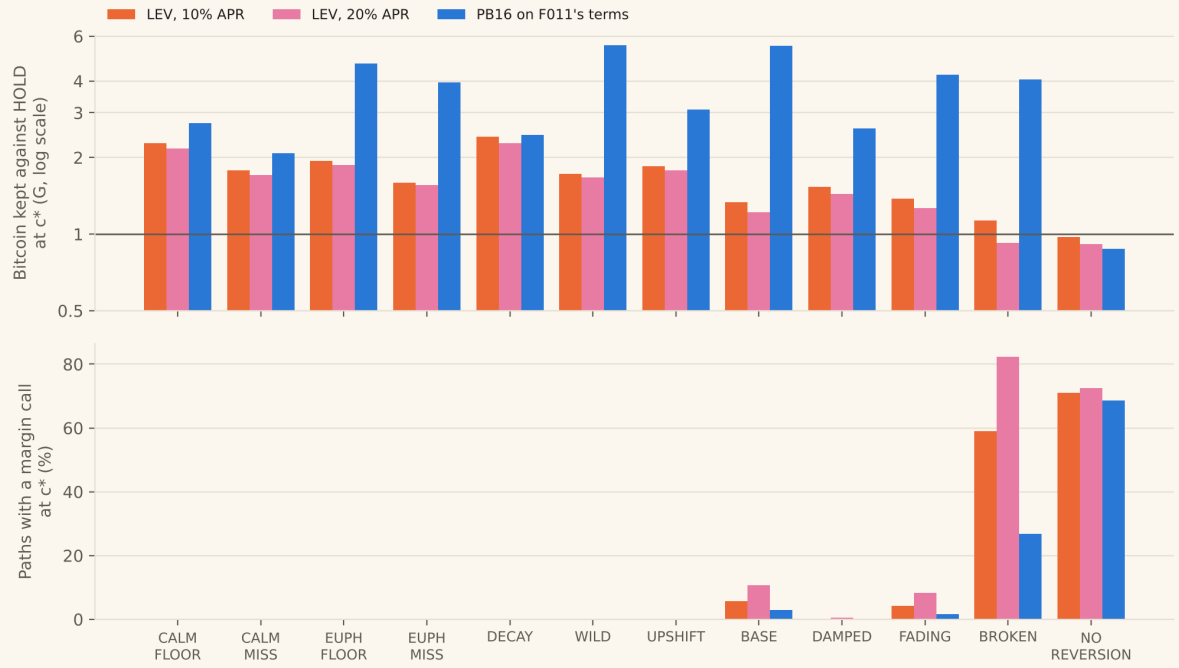
Table 8. The leverage arm from today, at each world's c* (margin calls: share of paths with at least one at c*). ≥120% marks the top of the grid.

World	HOLD SC99	LEV SC99	LEV G	LEV margin calls	LEV at 20% APR: SC99, margin calls	LEV with a credit freeze: SC99, margin calls	PB16 (F011's terms): SC99, G
CALM_FLOOR	85%	115%	2.28	0%	115%, 0%	115%, 0%	≥120%, 2.73
CALM_MISS	100%	≥120%	1.78	0%	≥120%, 0%	≥120%, 0%	≥120%, 2.08
EUPH_FLOOR	90%	≥120%	1.94	0%	≥120%, 0%	≥120%, 0%	≥120%, 4.69
EUPH_MISS	110%	≥120%	1.60	0%	≥120%, 0%	≥120%, 0%	≥120%, 3.95
DECAY	80%	115%	2.41	0%	110%, 0%	110%, 0%	115%, 2.45
WILD	90%	≥120%	1.72	0%	≥120%, 0%	≥120%, 0%	≥120%, 5.53
BASE	50%	50%	1.33	5.7%	45%, 10.7%	55%, 1.2%	55%, 5.49
DAMPED	80%	105%	1.54	0%	95%, 0.45%	100%, 0%	105%, 2.61
FADING	55%	55%	1.38	4.2%	55%, 8.3%	60%, 0.7%	60%, 4.24

World	HOLD SC99	LEV SC99	LEV G	LEV margin calls	LEV at 20% APR: SC99, margin calls	LEV with a credit freeze: SC99, margin calls	PB16 (F011's terms): SC99, G
BROKEN (stress)	25%	15%	1.13	59.1%	10%, 82.3%	25%, 3.5%	15%, 4.05
UPSHIFT (stress)	≥120%	≥120%	1.85	0%	≥120%, 0%	≥120%, 0%	≥120%, 3.08
NO_REVERSION (stress)	<5%	<5%	0.97	71.0%	<5%, 72.5%	<5%, 57.8%	<5%, 0.87

- **Borrowing at the floor buys spending where the price comes back** (P7 supported). LEV raised the safe coverage by 25 to 35 points where it could be measured (CALM_FLOOR 85% to 115%, DECAY 80% to 115%, DAMPED 80% to 105%) and by at least 10 to 30 points where the grid's top caps it (EUPH_FLOOR 90% to at least 120%, EUPH_MISS 110% to at least 120%), with no margin calls at c*, and kept 1.5 to 2.4 times a holder's Bitcoin, because it does not sell at the lows.
- **Where breaches are long, it buys nothing and costs margin calls.** In BASE and FADING its safe coverage is unchanged and 4% to 6% of paths had a margin call at c* (BASE: 8% at 15% APR, 11% at 20%). Where the trend breaks (BROKEN) it lowers the safe coverage (25% to 15%, also at 15% APR; 10% at 20%) and 59% to 82% of paths had a margin call. A credit freeze below the floor cuts margin calls (except in NO_REVERSION) to 1% to 4% and adds one step of safe coverage in BASE and FADING, at some cost in Bitcoin kept (BASE: G 1.33 to 1.17).
- **Paper 16's playbook with loan limits** keeps its large Bitcoin gains (G 2 to 5.5 in most worlds) and is safe at or near the top of the grid in the cycle worlds and DAMPED, but adds only one step in BASE and FADING (55% and 60%) and lowers BROKEN's (15%). Its result in Section 4.2 depended on unlimited debt; with limits and net-wealth ruin, its gains are real only where the price returns to the trend.
- The leverage arm's risks that are not modelled (counterparty failure, a lender withdrawing credit above the floor, forced liquidation on a daily wick) all point the same way: the results above are its best case.

Figure 10. The leverage arm (never eligible for recommendation)
LEV borrows each payment below 1.6x the floor up to 25% loan-to-value; margin call at 50%. PB16 here runs on F011's terms.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_figures.py). Simulated, after 0.25% trading costs, before tax.

9. Other Spending Rules and the Reserve Variants

B0, a fixed dollar amount paid weekly, lets a holder start about 5 to 15 points higher than B1 (CALM_FLOOR 95% against 85%, EUPH_FLOOR 105% against 90%, BASE 60% against 50%, BROKEN 30% against 25%), because it is never raised for inflation: by year 30 its real value is 46% of the first year's (median CPI path). The ranking of the three layers run (HOLD, ER4-2 and L2-R1) does not change. At the world's c* (the registered comparison spending: a holder's SC99 under B1), L2-R1 kept 1.6 to 4.4 times a holder's Bitcoin in the worlds where it trades (0.66 in NO_REVERSION), and ER4-2 0.83 (UPSHIFT) to 1.30 times.

V, the variable rule (each year, c × that year's floor growth × the Bitcoin-equivalent held), almost never runs out: its safe coverage is at the top of the grid (at least 120%) in all nine core worlds. It is not ruin-proof: where the trend breaks (BROKEN) its SC99 is 20%, below B1's 25%. The price is spending that varies. At the world's c* it rarely falls below the first year's in the core worlds: for a holder, the lowest year's real spending has a median of 95% (CALM_MISS) and 97% (EUPH_MISS) of the first year's, and 99.5% to 100% in the other seven (the first year is the lowest, or nearly). In BROKEN it is 27%. Bitcoin sold per year falls sharply over time: in years 26 to 30 a holder sells 2.7% (DECAY) to 8.8% (BASE) of what was sold in years 1 to 5, in every core world (P6 supported, largely built in). The ladder keeps its lead under V: L2-R1 kept 1.4 to 4.1 times a holder's Bitcoin in the worlds where it trades (0.58 in NO_REVERSION).

ER4-2-B pays a bonus when a rung fires with the reserve already full. Bonuses are rare. Over the first 14 years the median path had one bonus in EUPH_FLOOR, EUPH_MISS and WILD (0.29 per four years), two in BASE and FADING (0.57) and none in DAMPED. The registered sweet spot was at least

one every four years in EUPH_FLOOR, EUPH_MISS and WILD; no world reached it. A bonus of a quarter, half or a full year of spending cost 0.01 to 0.06 of G in EUPH_FLOOR (1.40, 1.38 and 1.35, against ER4-2's 1.41).

Under V the same target is read as "up-years" (years with real spending at least 10% above the year before), counted the same way. At c*, a holder had none in CALM_FLOOR, CALM_MISS and DECAY and up to 1.71 per four years in BASE and FADING. In the three target worlds (EUPH_FLOOR, EUPH_MISS, WILD) a holder had 0.29, 0.29 and 0.57 and L2-R1 0.57, 0.57 and 0.86, so none reached one per four years.

ER4-2-D (dry powder) buys Bitcoin near the floor. At a daily close below 1.10× the floor it spends the part of the reserve above two years of spending on Bitcoin. This variant has the largest gain among the reserve variants: G of 1.89 in EUPH_FLOOR (ER4-2: 1.41), 1.39 in WILD (1.20) and 1.12 in BASE (1.07), and a safe coverage of at least 120% in EUPH_FLOOR (110%). It does not help in UPSHIFT (0.77), where the price almost never reaches the floor. The gain has a cost on the reserve's own targets: with less cash left, it covers fewer below-trend spells (EUPH_FLOOR 44% against ER4-2's 55%, WILD 75% against 82%, BASE 68% against 80%) and holds a year of spending at fewer floor-zone entries (12% against 18%, 59% against 65%, 73% against 79%), so it loses ER4-2's drawdown-cover sweet spot in WILD. One coding note: the registered limit of one purchase per re-arm never binds, so after the first purchase the rule also sweeps the reserve's interest into Bitcoin at later such closes (0.1% to 0.2% of the dollars spent this way; Section 13).

Appendix Table A14 gives every world, with each rule's own SC99 next to the results at c*.

10. Sensitivities

The registered sensitivities (pre-registration, "Sensitivities") change the numbers, not the recommendation. Two change more than numbers: month-end fills cut L2-R1's score by more than a third (Section 3), and the opposite start convention removes most of the spending gain from a peak (below). Four of them cover all twelve worlds and can be put through the full decision rule (Table 10). As logged before those runs, these re-decisions do not re-apply the month-end-fill condition. The rest are read world by world (Appendix Tables A15, A16 and A16b).

Table 10. The registered decision under the sensitivities that cover all twelve worlds. In every row L2-R1 is the winner, the only co-winner and the recommendation. All rows fill on daily closes and carry Paper 22's intramonth label (Section 2.3).

Sensitivity	Admissible layers	L2-R1: S	Next best: S
Primary run	HOLD, ER2-2, ER4-2, ER2-1.5, L2-R1	0.773	ER2-2: 0.082
Intramonth swings × 0.75	the same five	0.642	ER2-2: 0.078
Intramonth swings × 1.25	the same five	0.943	ER2-2: 0.086
Cash at 2.65% (instead of 4.05%)	the same five	0.751	ER2-2: 0.077
Matched refit lines	HOLD, ER2-2, L2-R1	0.820	ER2-2: 0.072

Sensitivity	Admissible layers	L2-R1: S	Next best: S
BASE-CAL in place of BASE (added after review)	the same five as the primary run	0.739	ER2-2: 0.082

- **Intramonth swings.** L2-R1 sells at rungs and buys back on daily closes, so the wider the price swings within a month, the more fills it gets and at better prices. The Bitcoin it keeps against a holder scales with the swings:
  - BASE: 3.45×, 4.48× and 6.19× for swings × 0.75, × 1 and × 1.25;
  - FADING: 2.70×, 3.41× and 4.50×;
  - EUPH_FLOOR: 2.17×, 2.30× and 2.52×.

  The reserves barely move (ER4-2 in EUPH_FLOOR: 1.41× in all three). Together with month-end fills (S 0.500, Section 3), this shows that part of L2-R1's lead depends on acting on daily closes. Among the layers compared it stays on top in every case.
- **Cash at 2.65%.** Small changes: L2-R1's S is 0.751, and the reserves lose a little (ER4-2: 0.048 instead of 0.059).
- **Matched refit lines.** Here the rungs and buy-back levels sit on each path's own refit trend, while spending stays on the published floor (a logged deviation). L2-R1 keeps more Bitcoin in the cycle worlds (EUPH_FLOOR 2.51×, WILD 2.68×, UPSHIFT 2.37×) and less in the statistical ones (BASE 3.51×, FADING 2.77×). ER4-2 and ER2-1.5 drop out on the G gate in DAMPED (ER4-2 keeps 0.95× a holder's Bitcoin there). Half floor-Kelly gains in the cycle worlds (CALM_FLOOR 0.53× instead of 0.22×) but stays far below holding.
- **Inflation at CPI + 1 point.** Holding's SC99 falls by one 5-point step in each cycle core world and is unchanged in BASE (50%). The admissible layers' G moves by at most 0.06 (L2-R1 in BASE: 4.54× instead of 4.48×); BUF2's rises by up to 0.10, because c* is lower.
- **BASE-CAL** (BASE with its shocks scaled to history's spread). Holding's SC99 rises from 50% to 60%. Put through the full decision rule in place of BASE, it leaves the answer unchanged: L2-R1 is the only co-winner (S 0.739, statistical family 1.043). L2-R1 keeps 3.41× a holder's Bitcoin instead of 4.48×, and the 2× reserves ER2-2 and ER4-2 1.06× each. Narrower swings shrink L2-R1's lead but do not remove it. BASE-CAL is still harsher on the floor than history: 10.4% of months below the floor (history 2.2%, BASE 16.3%), with a median longest stay of 12 months (Appendix Table A17).
- **Reflection** (check C3). With the floor reflecting price, holding's SC99 in BASE rises from 50% to 90% from today (+40 points; C3 passes at the registered 30) and from 70% to 100% from 2.5× trend. That is about 12.5 points of first-year withdrawal rate from today, in line with Paper 21's estimate of about 10. L2-R1 keeps 5.24× from today and 8.97× from a peak.
- **Opposite start convention** (the ER reserves and L2-R1, from 2.5× trend; Appendix Table A16). Under the registered convention a rung at or below the starting price is sold on day one. Here such rungs count as already used, so nothing is sold on day one. Most of the gain in safe coverage from a peak (Section 7) then disappears; most of the Bitcoin gain remains:
  - SC99 in BASE: L2-R1 80% and ER4-2 75%, instead of at least 120% and 115% (holding 70%);
  - SC99 in FADING: L2-R1 80% instead of at least 120% (holding 75%);
  - SC99 in BROKEN: L2-R1 30% (holding 25%);
  - Bitcoin kept by L2-R1 against a holder: BASE 5.82× (7.83× under the registered convention), DAMPED 2.02× (3.02×), FADING 4.43× (6.00×).

So from a peak, what protects spending is mostly the sale on the first day. A retiree who adopts the rule above a rung has to decide whether to sell at once.

- **Half floor-Kelly with gold or stocks** (statistical worlds, today; Appendix Table A16b). Replacing cash with a partner does not rescue it at a holder's spending:
  - with the sample returns, stocks raise its SC99 by 5 points (BASE 50% to 55%, DAMPED 35% to 40%, FADING 45% to 50%), but it still keeps only 0.04× to 0.58× a holder's Bitcoin in the core worlds;
  - with Paper 21's cut returns (gold 4% and stocks 7% a year), both partners do worse than cash (FADING with stocks: SC99 35%, 44% ruin at c*);
  - only in BROKEN, where Bitcoin's trend fails, does a partner add to a rule that already beats holding (stocks 4.53× against cash 3.21×).
- **Covered in earlier sections:** month-end fills and the ruin floor in G (Section 3), LEV's stresses (Section 8), bonus size (Section 9), and fixed 3% and 6% inflation from the trend (Section 4.2).

11. History

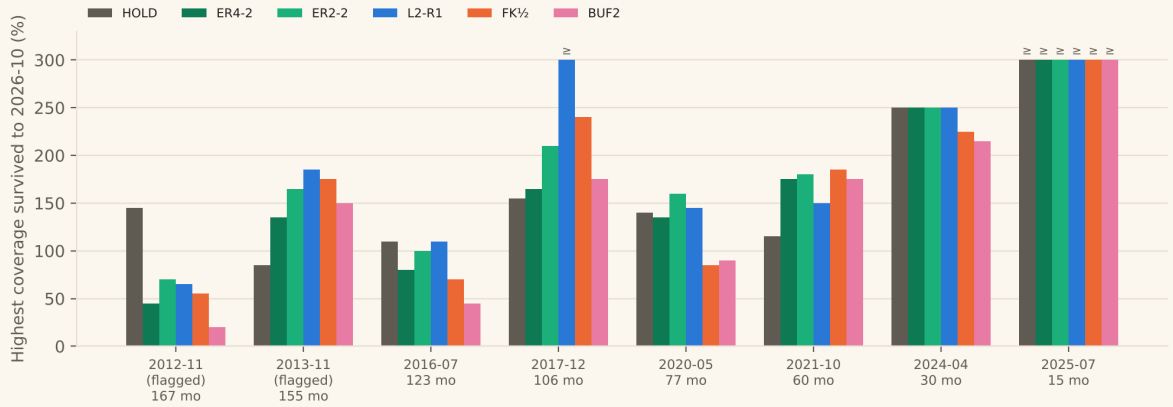
History is description, not a test (Figure 11): about three independent four-year windows, run on walk-forward lines (the OLS trend fitted to data known at the time, and 0.42× it as the floor: Paper 20's OLS42 line), with CPI-U and the T-bill rate. Coverage at each start uses the walk-forward floor's growth over the next 12 months.

Table 11. Highest coverage survived to the 2026-10 close (5-point grid to 300%), walk-forward lines. Starts before 2016 are flagged: the trend then grew 2× to 3× a year, and the young walk-forward line more than doubled after the 2013 sales. Bitcoin-equivalent left: Appendix Table A18; lowest real wealth and largest drawdown at 80% coverage: Appendix Table A18b.

Start	Months	Multiple at start	HOLD	ER4-2	ER2-2	L2-R1	FK½	BUF2
2012-11 (flagged)	167	0.58	145%	45%	70%	65%	55%	20%
2013-11 top (flagged)	155	8.69	85%	135%	165%	185%	175%	150%
2016-07	123	0.51	110%	80%	100%	110%	70%	45%
2017-12 top	106	4.40	155%	165%	210%	≥300%	240%	175%
2020-05	77	0.75	140%	135%	160%	145%	85%	90%
2021-10 top	60	2.13	115%	175%	180%	150%	185%	175%
2024-04	30	0.91	250%	250%	250%	250%	225%	215%
2025-07 (incomplete)	15	1.11	≥300%	≥300%	≥300%	≥300%	≥300%	≥300%

Figure 11. History, walk-forward lines: the highest coverage each rule survived

Coverage on the walk-forward OLS42 floor at each start; 5-point grid to 300% (≥: survived the top of the grid).
Description only: about three independent windows.



Source: Bitcoin Power Law Observatory, F011 (analysis/f011_history.py). Daily closes 2012-2026, CPI-U, 3-month T-bill; 0.25% costs; before tax.

- **From the halvings** (2016-07, 2020-05), when the price sat near or below the trend, holding, L2-R1 and the two-year reserve ER2-2 did about equally well (100% to 110% from 2016, 140% to 160% from 2020). The four-year reserve did worse, and selling into a buffer near the bottom (BUF2) or holding cash (FK½) cost the most.
- **From the tops** (2017-12, 2021-10), every layer that held cash beat holding, and L2-R1 did best from 2017 (at least 300% against 155%). From the 2021 top it did worst of the selling layers (150% against 175% to 185%; holding 115%), and from 2020-05 the two-year reserve (160%) survived more than L2-R1 (145%). The reserves and floor-Kelly protected a retiree who started at a peak. This matches Paper 21's finding that half floor-Kelly helps from a top.
- **History agrees with the simulation on one point: whether selling high helps depends on the start.** Selling high helped a retiree who started at a peak (2017-12, 2021-10 and the flagged 2013-11). It did not help much when the peak came later: from the halving starts, L2-R1 only tied holding (110% against 110% from 2016-07; 145% against 140% from 2020-05) and the four-year reserve did worse; from the flagged 2012-11 start, holding survived 145% against L2-R1's 65%.

12. Scorecard Against the Plan

Five of the six checks pass; C4 fails (below, and Section 13). Six of the eight predictions are supported; P3's UPSHIFT clause and P8 are not.

Checks (implied by earlier results; they validate the engines and answer OQ17):

Table 12a. Registered checks.

#	Check	Result	Verdict
C1	From today, 80% coverage: ruin above 5% in BASE and FADING; at most 1% in all six cycle core worlds	21.3% and 15.4%; at most 0.15%	**Passes**
C2	From today, 100%: at least 95% survival in CALM_MISS and EUPH_MISS; below 95% in BASE, DAMPED, FADING, CALM_FLOOR, DECAY, EUPH_FLOOR	99.8% and 100%; 51%, 85%, 58%, 43%, 9%, 91%	**Passes**

#	Check	Result	Verdict
C3	BASE from today: reflection raises holding's SC99 by at least 30 points	50% to 90% (+40 points)	**Passes**
C4	Holding's SC99 equals the value implied by Paper 21's and Paper 22's results, or one of the undecided steps listed with it (8 cells list them), in 18 world-and-start cells	11 of 18; the other 7 (BASE, DAMPED and FADING from today, BASE and FADING from the trend, FADING and BROKEN from 2.5× trend) one step below	**Fails** (the implied values rest on the biased draw; Section 13)
C5	From the trend, 80%: ruin above 1% in BASE and FADING	8.6% and 5.3%	**Passes**
C6	Paper 16's engines reproduce Paper 16's 356 committed ruin probabilities	all 356, exactly	**Passes**

Predictions:

Table 12b. Registered predictions.

#	Prediction	Informed or built in	Result	Verdict
P1	No euphoria: ER4-2 has G between 0.99 and 1.01 and SC99 within 5 points of HOLD's in CALM_FLOOR, CALM_MISS and DECAY	Built in	G 1.001, 1.000, 1.000; SC99 equal	**Supported**
P2	A euphoria: ER4-2's SC99 at least 5 points above HOLD's and G ≥ 1.00 in EUPH_FLOOR and EUPH_MISS	Partly informed	+20 and +10 points (the latter at the grid's top); G 1.41 and 1.13	**Supported**
P3	L2-R1's G above ER4-2's in the euphoria worlds; ER4-2's above L2-R1's in UPSHIFT	Informed, partly against	2.30 > 1.41 and 2.15 > 1.13; but UPSHIFT 0.77 < 1.74	**Not supported** (UPSHIFT clause)
P4	BUF2's G below 1.00 in at least 4 of 6 cycle core worlds	Largely built in	6 of 6 (0.04 to 0.54)	**Supported**
P5	FK½ has the lowest SC99 of the eight layers in at least 5 of 9 core worlds	Informed	9 of 9 (8 strictly; tied with holding in BASE)	**Supported**
P6	Under V, the median Bitcoin sold in years 26 to 30 is below half that in years 1 to 5, in every core world	Largely built in	2.7% to 8.8% of years 1 to 5 at c*, in all nine	**Supported**
P7	LEV's SC99 at least 5 points above HOLD's in CALM_FLOOR and EUPH_FLOOR; margin calls on at least 5% of BASE's paths	None	+30 and at least +30; 5.7%	**Supported**

#	Prediction	Informed or built in	Result	Verdict
P8	ER4-2 hits the drawdown-cover and dry-powder sweet spots in both euphoria worlds and neither in the calm worlds	Partly built in	Neither in any of the four worlds (cover 55% to 63%, dry powder 18% to 19% in the euphoria worlds)	**Not supported**

13. What Was Known When, and Deviations

Before the proposal:

- Paper 16's results;
- Paper 21's and Paper 22's reports;
- the brief's list of findings, each checked against its source (proposal Section 2.1).

During the proposal reviews (internal review, then an independent review at 8.0/10 and three reviews by readers who had not seen the earlier drafts, at 7.5, 8.5 and 9.2/10), the design changed before anything ran:

- the OQ17 rerun moved to Paper 16's own start (the trend);
- Paper 16's own engines were added as an anchor, with check C6;
- holding's safe coverage in every world was found to be implied by SWR99 values (the highest first-year withdrawal rate with at most 1% ruin) in Paper 21's and Paper 22's results files, so the comparison spending c* was known in advance (proposal Section 2.3);
- the admissibility gate, the spending gate (D ≥ −1.0), the treatment of censored worlds and the rules' starting state were fixed.

No reviewer ran any rule.

Registration is commit 1a5cc49 (15:07 on 2026-11-09), before any F011 code was committed. The code followed within minutes: Paper 16's rerun driver and its results were committed at 15:17, the simulator and its checks at 15:19, and the primary results at 15:36. The order of commits is the only evidence the repository can give that no code preceded the plan. The engine checks ran before any F011 simulator run (one registered run came earlier: Paper 16's engines with reflection off, committed two minutes before the simulator) and inspected only holding, Paper 16's engines with reflection on, and synthetic paths:

- **E1:** F011's paths are identical to Paper 21's;
- **E2:** holding's survival equals Paper 21's `distribute` path by path on 200 paths, in 18 world-and-start cells, at all 24 coverage levels;
- **E3:** 15 hand-computed synthetic cases pass, for HOLD, BUF2, ER4-2, ER4-1.5, L2-R1's start sale, LEV, PB16 on Paper 16's terms and V. This was less than the registered "every rule": there was no case for FK½, B0, the bonus and dry-powder variants or L2-R1's payments, and two BUF2 entries could not fail. After the eighth review those two were replaced by real assertions, and further cases were added (**E3b**, `analysis/f011_checks_review.py`; all pass): 167 hand-computed values and blind reference simulators for the selling layers, the spending rules and the variants, and 15 cases that guard each correction listed below. LEV and PB16 on F011's terms were compared

with blind reference simulators during the eighth review, path for path; those scripts are not in the repository, so E3's borrowing and margin-call cases are their only committed check;
- **E4:** a 20-path timing run;
- **C6:** Paper 16's engines reproduce all 356 published ruin probabilities exactly.

Deviations after registration (logged in the pre-registration with dates and reasons; none changes a registered check, prediction, threshold, world, start or decision step, though the sampling correction below changes one check's verdict). Three were logged after the fact, as marked there: the run order of Paper 16's rerun (above), C4.11's tracker and BASE-CAL through the decision rule. The log itself was committed at 15:50 on 2026-11-09, after the history description (15:25) and the runs with gold or stocks (15:45) had already been made with the choices it records for them. Each choice was an implementation detail the plan left open and was coded before that analysis's own results were seen. But the primary results and an interim decision (committed at 15:36) predate the code for the gold and stock runs (15:45) and the log:

- **History:** actual daily closes enter the simulator's 30-slot month by nearest day, always keeping each month's high and low; history runs B1 only, and reports Bitcoin left and the sweet spots at 80% coverage.
- **Matched refit lines:** rule levels use each path's refit lines, while B1's spending amount stays on the published floor, where it was fixed at the start.
- **Half floor-Kelly with gold or stocks:** Paper 21's two-asset Kelly, with Bitcoin's growth input on the published floor, so that only the partner changes.
- **C4.11's median Bitcoin path** (registered in P16-NR; logged after the fact) was first missed, because the rerun saved only end values; it was added after the fourth independent review of this report's draft with an opt-in yearly tracker in Paper 16's playbook engine that draws no random numbers, so every other result is unchanged.
- **BASE-CAL through the decision rule** (logged after the fact): the registered BASE-CAL sensitivity is also put through the full decision rule in place of BASE (Section 10).
- **Decisions under the sensitivities:** the month-end-fill condition is not re-applied; the runs with scaled intramonth swings take the monthly layers from the primary run.

Correction to the shock draw (v1.2, 2026-11-17; logged in the pre-registration). The statistical worlds draw their monthly shocks from history in 12-month blocks, using Paper 21's code. That code let a block start only in the first N-12 months of the sample (2012-02 to 2026-09), so the months at either end, 2012 and 2025-10 to 2026-09, were drawn less often than the rest. Both stretches had well below-average shocks, and under-drawing them raised the mean drawn shock by about 0.0027 a month: through the AR(1), simulated paths settled about 10% higher against the trend than the fitted model implies. The fix is the standard circular block bootstrap (Politis and Romano 1992): a block may start in any month and wraps from the last months of the sample to the first, so every month is drawn equally often. Papers 21 and 22 share the code and were corrected in the same way (Paper 21 v1.4, Paper 22 v1.3). `F009_BLOCKS=legacy` reproduces the first draw. Every simulation in this report was rerun with the corrected draw, along with the decision, the tables, the figures and the exploratory analyses, and the engine checks E1 to E4 and E3b were repeated (all pass, with the same results); Paper 16's own engines (Section 4.1) and the history runs (Section 11) do not use the draw and are unchanged. What moved:

- **Holding's safe coverage** in the statistical worlds falls by one 5-point step from every start (from today: BASE 55% to 50%, DAMPED 85% to 80%, FADING 60% to 55%); the cycle worlds,

whose shocks are not drawn this way, are unchanged, apart from small shifts through Paper 21's bootstrapped CPI paths.

- **The decision is unchanged.** L2-R1 is the winner, the only co-winner and the recommendation, with the same five admissible layers, from all three starts and under every sensitivity put through the rule. Its score falls from 0.804 to 0.773 (statistical family 1.173 to 1.111; month-end fills 0.511 to 0.500), and its lead in safe spending over the 2× reserves narrows to one grid step in FADING.
- **Check C4 fails.** It compares holding's safe coverage with values implied by Paper 21's and Paper 22's results, which were computed on the biased draw. In 7 of the 18 cells, all in the statistical worlds, the corrected value is one step below the lowest value listed. The check did what it was for: it tested the engines against earlier results, and the earlier results carried the bias. The other checks pass and every prediction keeps its verdict; P5 is now supported with one tie (FK½ and holding at 50% in BASE).
- **Other readings that changed:** Paper 16's 200% tier now survives at 91% or better in BASE with CPI paths or 3% inflation (C4.9, Section 4.2); ER4-2's drawdown cover in BASE falls just short of the registered 80% (79.6%); in NO_REVERSION, ER4-2 and L2-R1 no longer break even in real wealth at month 96 (Table 6); the variable rule's lowest year in BROKEN falls from 44% to 27% of the first year's.

Reviews of this report. The draft had seven independent reviews (7.5, 8.5, 8.7, 8.8, 8.6, 8.9 and 9.0 out of 10), whose fixes are logged in the commit history. An eighth, deeper review (8.3) added what the first seven lacked: line-by-line audits of the simulator against the registered rule text, blind re-implementations of the rules, exact reruns and an independent recomputation of the decision. It confirmed the decision and every primary result, and found the defects listed next. A check of the corrected version followed (9.0 on correctness: the decision recomputed from the raw run files, and reruns that reproduce the committed files exactly), with a separate review of clarity and layout (7 before its fixes, which are in this version).

Corrections after the eighth review (logged after the fact). Independent code audits found four defects, all in secondary results. None touches a primary SC99 or G, the decision, a check or the verdict of a prediction:

- **Bonus count (ER4-2-B).** The code counted bonuses over all 360 months but scaled the count as if it covered months 0 to 168, the registered window. Corrected: BASE is 0.57 per four years, not 1.43, and WILD 0.29, not 0.57 (Section 9). The up-year count under V had the same fault by one year and is corrected with it.
- **Comparison spending for B0 and V.** These runs had taken c* from HOLD's SC99 under the same spending rule (for V the grid's top, 120%, in the core worlds), without saying so. The registered c* is HOLD's SC99 under B1. They were rerun at the registered c*; Section 9, key finding 12 and P6's detail are rewritten, and P6's verdict is unchanged.
- **Opposite start convention, L2-R1.** Rungs marked as used at the start did not re-arm below the trend, as Paper 22's rule requires. Corrected and rerun (Section 10).
- **Spending record in the month of ruin.** The payment that could not be made was recorded as spent: always for L2-R1, and for the other layers only in the narrow band where the Bitcoin covers the payment but not its 0.25% cost (25 to 30 of 48,000 path-levels for a holder in BASE and DECAY). It no longer is, for any layer. One reported figure moved: L2-R1's median 30-year real spending in NO_REVERSION (Appendix Table A9b).

Readings of the registered text that the code makes (code unchanged, now disclosed):

- **Ruin at a payment.** The registered "exact test" (ruin if $W - X \le 0$, where W is liquid wealth and X the payment) and the sentence that sources are "Bitcoin net of cost" disagree in the narrow band $X < W < 1.0025 \cdot X$. The simulator counts that band as ruin at that payment; Paper 21's `distribute` records it one month later, or not at all at month 360. On the registered paths the two agree at every path and level (E2 on 200 paths; the check of the corrected version repeated it on all 2,000 paths in 20 world-and-start cells).
- **ER4-2-D's "at most once until the next re-arm"** never binds: a close below 0.462× trend is also below the trend, so the rung list re-arms the same day. After the first purchase the reserve's interest above two years of spending is also swept into Bitcoin on later closes below 0.462× trend (0.1% to 0.2% of the dollars spent on dry powder).
- **L2-R1's pool** accrues interest as in Paper 22's `Ladder` class: after the day's fills, and at the monthly rate in the month-end variant (a difference of about 5×10^{-6} a month).
- **The rung list** ends at 76.9× trend (Paper 22's list).
- **Up-years under V** are counted over the 13 year-on-year comparisons inside months 0 to 168 and scaled by 48/168, like the bonuses. Scaling by the 156 months those comparisons span would give at most 0.92 per four years in the three target worlds; the verdict is the same.

Registered outputs not delivered: month-end fills under reflection; holding's Bitcoin left at month 360 at Paper 16's 80% from the trend in F011's worlds; Wilson intervals on the ruin curves of Figures 4 and 5 (Figure 6 has them; Figure 4's would be thinner than its lines, at 30,000 to 100,000 paths); the volatility sweet spot for V and the bonus variants (scored on the drawdown alone, and not printed); the rest of the sweet-spot scorecard for the B0, V and variant runs (stored in `analysis/f011_results.json`; only bonuses, up-years, the lowest year and, for ER4-2-D, drawdown cover and dry powder are reported, in Section 9 and Appendix Table A14). The planned script and file names (`f011_spend.py`, `f011_mc_results.json` and others) became `f011_history.py`, per-run files in `analysis/f011/` and `f011_results.json`. **Delivered only after the eighth review:** the sweet-spot scorecard for every layer (Appendix Tables A9 and A9b); the share of floored paths (A3b); SC95 and ruin by start (Tables 5b and A1b); the grid SC99 and SC95 of registered analysis A3 (A12); LEV's debt at ruin (A13); BASE-CAL's diagnostics (A17); history's lowest real wealth (A18b); Paper 22's intramonth label; and the guidance for a product display (Section 5).

Exploratory analyses (labelled as such, not registered): reserve size over time (Figure 7), a single example path (Figure 8), half floor-Kelly's target Bitcoin weight (Section 6), the world-model check (Section 3, Appendix Table A6b), added after the second independent review of this report's draft, BASE-CAL put through the full decision rule (Section 10), added after the fifth, and the low-spending rerun (Section 3), added after the eighth. Bitcoin sold below the trend by year is saved in `analysis/f011_explore.json` but not discussed. The runs behind Figures 7 and 8 use B1 from today, which the corrections after the eighth review did not touch; they were repeated for v1.2 with the corrected shock draw, as were the low-spending rerun and half floor-Kelly's target weight.

14. Limitations

- **The field of candidates.** Only the eight registered layers were compared here. F011-R ran three of Paper 22's rules afterwards, under F011's primary settings only; with them, the registered rule recommends L2-R3 from today and L2-R1 from the trend and from a peak (Section 3).

- **The intramonth library is flagged.** Daily-fill results rest on simulated intramonth paths whose dips are deeper than history's (Section 2.3), which helps the ladder's buy-backs fill. The swings × 0.75 run (S 0.642) removes part of it; month-end fills (S 0.500) remove all of it.
- **The registered G and S are at c*.** At lower spending the ratios shrink: L2-R1's score would be about 0.63 to 0.67 and the reserves' close to zero (Section 3, exploratory).
- **D has no interval.** Differences in SC99 of one grid step rest on fewer than ten paths in 2,000.
- **G is read at years 10 to 14.** By year 30 the picture can reverse (UPSHIFT: L2-R1 0.04 Bitcoin-equivalent against a holder's 0.19) or run far ahead (BASE: 30 against 0.50; Section 3).
- **The comparison spending is a point estimate.** c* is holding's SC99 on 2,000 paths, which could differ by one 5-point step in another sample (Section 5); the bootstrap resamples paths at fixed c*, so this uncertainty is covered only by the gates' allowances, not propagated into S.
- **The power law is the anchor.** Every core world assumes that the published trend continues and that the price keeps returning to it. The three stress worlds relax this (UPSHIFT: multiples ratchet up; BROKEN: half the trend's growth; NO_REVERSION: no pull back to the trend). Coverage is set on the published floor everywhere. Ruin here is model ruin inside a chosen world, not a real-world probability.
- **BASE is harsher on the floor than history, and wider.** 16% of BASE's months sit below the floor, against 2.2% in 2012 to 2026, and its simulated residual is more spread out than history's (Paper 21 Section 2.7; Appendix Table A17). FADING and BROKEN start from the same shocks; DAMPED, with halved shocks, is milder than history. Wide shocks lower the safe coverage and, at the same time, favour selling high and buying back at the trend. About 72% of L2-R1's score comes from the statistical family.
- **The cycle worlds are built from four historical cycles.** Their rebound from the floor is history's; so is the safety of 80% coverage in them.
- **Execution.** L2-R1 and the reserves act on daily closes. L2-R1's score falls from 0.773 to 0.500 with month-end fills; it stays admissible and on top.
- **The sweet spots were measured at the spending a holder can just afford.** At that spending every layer sells most of its stack, which is why almost none ends with more Bitcoin than it started with.
- **Leverage is only partly modelled:** interest, limits and margin calls are; counterparty failure and credit drying up (beyond the freeze stress) are not.
- **Taxes and behaviour are out of scope.** Each sale may be taxable, and spending from a reserve, or buying back, in a crash is hard.
- **Inflation is US CPI** from Paper 21's bootstrapped paths, with one cash rate.
- **The shock draw was corrected after the first run** (Section 13). The comparison values behind check C4 came from the uncorrected draw, which is why C4 fails; Paper 21's and Paper 22's corrected reruns are still in progress, and the figures quoted from them here are from their working versions.

15. Conclusion

How much can a Bitcoin retiree spend? Without a reflecting floor, Paper 16's coverage tiers do not hold at its own start: its 80% "endowment" carries 12% ruin over 30 years in its own model, and 0% (DAMPED) to 10% (BASE) in F011's statistical worlds from the same start. From today's price, half the trend, the honest answer is a range: a holder can spend 50% to 110% of the floor's coming growth,

depending on whether the price behaves like the harsh statistical worlds or like history's cycles. 80% coverage, about $19,300 a year per Bitcoin from today, has at most 1% ruin if the price keeps rebounding from the floor as it has, and far more if it can stay below the floor for years.

What should a retiree sell? Among the eight rules tested, the rule fixed in advance picks Paper 22's ladder, L2-R1: sell half at 2× trend and again at each rung above, spend from that cash first, and buy back everything at the trend. It cost nothing where no euphoria came. Where one did, it left a retiree with about twice the Bitcoin a holder had 10 to 14 years later (about 1.5 times at low spending). It raised safe spending by 4.8 points on average and by up to 20 after a euphoria; on spending it cannot be told apart from the reserves. It was the only co-winner from today, from the trend and from a peak, and it survived month-end fills. With three of Paper 22's rules added (F011-R), the same rule recommends a close variant from today: L2-R3, which buys back in thirds at 1.0×, 0.75× and 0.5× trend instead of all at the trend (S 0.806 against 0.773). From the trend and from a peak it still recommends L2-R1. The two differ only in where they buy back, and which comes first depends on the start and on which worlds one believes.

The owner's euphoria-funded reserve works as designed but modestly: it costs nothing without a euphoria, adds 10 to 20 points of safe spending after one, and sells less Bitcoin below the trend; but in the euphoria worlds it fills once and runs dry before the next deep drawdown ends. A cash buffer pays only if it is bought high: from today's price it is ruinous at a holder's spending, from a peak it adds 16 points. Borrowing at the floor helps where the price recovers from the floor within months, adds nothing where it stays low for years, and costs margin calls where the trend breaks.

Other rules and sensitivities. A fixed dollar amount (B0) allows 5 to 15 points more coverage but loses half its real value over 30 years. The variable rule (V) almost never runs out; at the spending a holder can just afford, its lowest year pays a median 95% to 100% of the first year's in the core worlds, and 27% where the trend breaks. Under the four registered sensitivities that were put through the decision rule, and with BASE-CAL in place of BASE, the recommendation stands; none of the others, read world by world, points against it. L2-R1's lead is largest with daily execution and wide price swings, and smaller with month-end fills or history's narrower spread (BASE-CAL).

Limits. L2-R1's lead rests heavily on the statistical worlds' wide swings (72% of its score). Its cash can stay stuck for decades if multiples ratchet up (UPSHIFT), and in a random walk its worst tenth of paths end with almost no Bitcoin (they hold cash, and none is ruined by year 14). Every rate assumes the power law continues; the floor is a planning worst case, never a guarantee; ruin here is model ruin, not a real-world probability.

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Data and Reproducibility

Data (SHA-256 recorded in the pre-registration and checked by the simulator and the engine checks before their runs; Paper 16's engines read their own committed inputs, which C6 confirms):

- Bitcoin: 5,950 daily closes from 2010-07-18 to 2026-10-31 (`bitcoin-powerlaw-site/shared/datasets/btc_historical.json`, records up to 2026-10-31);
- CPI-U (FRED CPIAUCSL), the 3-month T-bill (FRED TB3MS), gold and the S&P 500 (for the partner sensitivity), as in Paper 21.

Model: published trend log10 T = -16.493 + 5.688 log10(days since 2009-01-03); floor 0.42× trend.

Commands:

```
python3 -W ignore analysis/f011_p16nr.py 4              # analysis/f011_p16nr.json (Paper 16's engines; C6), 6.4 minutes on 4 cores
python3 -W ignore analysis/f011_p16nr.py --c411         # analysis/f011_p16nr_c411.json (C4.11 median Bitcoin path)
python3 -W ignore analysis/f011_checks.py               # analysis/f011/engine_checks.json (E1-E4)
python3 -W ignore analysis/f011_mc.py 2000 4 primary    # analysis/f011/primary_*.json, 16 minutes on 4 cores
python3 -W ignore analysis/f011_mc.py 2000 4 starts,oq17,lev,secondary,sens   # add --resume to finish an interrupted batch
python3 -W ignore analysis/f011_mc.py 2000 1 partners
python3 -W ignore analysis/f011_history.py              # analysis/f011_history.json
python3 -W ignore analysis/f011_decide.py               # analysis/f011_results.json (decision, checks, predictions)
python3 -W ignore analysis/f011_tables.py               # analysis/f011_tables.md
python3 analysis/f011_appendix.py                       # copies the tables into this report's Appendix
python3 -W ignore analysis/f011_figures.py              # figures/f011/
python3 -W ignore analysis/f011_explore.py              # analysis/f011_explore.json (exploratory)
python3 -W ignore analysis/f011_explore.py --fk         # analysis/f011_fk_weights.json (FK1/2's Bitcoin weight)
python3 -W ignore analysis/f011_review_checks/low_spending.py   # analysis/
```

```
f011_low_spending.json (exploratory)
bash report/build_pdf_f011.sh                              # report/spend_floor_growth.pdf
```

Seeds: cycle worlds 20261108; statistical worlds 20261107 (Paper 21's paths); bootstrap (20261109, 7). Paper 16's engines use their own published seeds. Every run's paths are fixed by its world's seed, so results do not depend on run order: the sensitivity batch was interrupted and finished with `--resume`.

Shock draw: the statistical worlds use circular 12-month blocks (`analysis/f009_mc.py`, `block_rows`). Setting `F009_BLOCKS=legacy` before any command above reproduces v1.1's draw, which under-drew the first and last 12 months of the sample (Section 13).

Appendix: Full Tables

Generated by `analysis/f011_tables.py` from `analysis/f011_results.json` and the run files in `analysis/f011/`. Coverage is in % of the next 12 months' growth of the 0.42× published floor. Column abbreviations: CALM_F and CALM_M (CALM_FLOOR, CALM_MISS), EUPH_F and EUPH_M (EUPH_FLOOR, EUPH_MISS), UPSH (UPSHIFT), DAMP (DAMPED), FAD (FADING), BROK (BROKEN), NOREV (NO_REVERSION). Censored values: an SC99 printed as 120% means at least 120% (the grid's top), and 0% means below 5% (the body writes these as ≥120% and <5%).

Intramonth label (Paper 22 Section 12): every result of a layer that fills on daily closes uses Paper 22's resampled intramonth library, in which simulated dips in the largest-move months run 1.25 to 1.52 times deeper than history's (which helps buy orders fill) and, in the statistical worlds, highs reach 0.77 to 0.83 of history's. Month-end-fill rows are free of it.

Table A1. HOLD from today: SC99, SC95, ruin at 80% and 100% coverage

World	SC99	SC95	Ruin at 80%	Ruin at 100%	c*
CALM_FLOOR	85%	85%	0.0%	56.9%	85%
CALM_MISS	100%	105%	0.0%	0.25%	100%
EUPH_FLOOR	90%	95%	0.0%	9.4%	90%
EUPH_MISS	110%	115%	0.0%	0.0%	110%
DECAY	80%	80%	0.15%	90.6%	80%
WILD	90%	95%	0.0%	6.3%	90%
UPSHIFT	120% (right-censored)	120%	0.0%	0.0%	120%
BASE	50%	60%	21.3%	48.8%	50%
DAMPED	80%	90%	0.15%	15.3%	80%
FADING	55%	65%	15.4%	42.3%	55%
BROKEN	25%	30%	99.4%	100.0%	25%
NO_REVERSION	0% (left-censored)	0%	71.1%	75.1%	50%

Table A1b. HOLD by start (statistical worlds): SC99, SC95 and ruin by coverage

World	Start	SC99	SC95	Ruin at 40%	60%	80%	100%	120%
BASE	today	50%	60%	0.0%	2.9%	21.3%	48.8%	71.5%

World	Start	SC99	SC95	Ruin at 40%	60%	80%	100%	120%
BASE	trend	60%	70%	0.0%	0.5%	8.6%	29.0%	53.1%
BASE	2.5x trend	70%	85%	0.0%	0.0%	2.8%	14.1%	34.2%
DAMPED	today	80%	90%	0.0%	0.0%	0.15%	15.3%	57.6%
DAMPED	trend	95%	105%	0.0%	0.0%	0.0%	1.8%	20.3%
DAMPED	2.5x trend	110%	120%	0.0%	0.0%	0.0%	0.0%	2.9%
FADING	today	55%	65%	0.0%	1.4%	15.4%	42.3%	66.2%
FADING	trend	65%	75%	0.0%	0.10%	5.3%	22.4%	45.6%
FADING	2.5x trend	75%	90%	0.0%	0.0%	1.3%	8.6%	25.2%
BROKEN	today	25%	30%	36.5%	92.0%	99.4%	100.0%	100.0%
BROKEN	trend	25%	30%	24.8%	87.0%	98.7%	100.0%	100.0%
BROKEN	2.5x trend	25%	30%	16.2%	79.4%	97.6%	99.9%	100.0%
NO_REVERSION	today	0%	0%	57.9%	65.8%	71.1%	75.1%	79.4%
NO_REVERSION	trend	0%	0%	44.5%	51.9%	57.6%	61.4%	65.3%
NO_REVERSION	2.5x trend	0%	0%	29.8%	35.7%	40.8%	44.5%	47.5%

SC99 and SC95 of 120% are right-censored (at least 120%); 0% is left-censored (below 5%). Ruin over 2,000 paths: a measured 1.0% has a 90% Wilson interval of 0.7% to 1.4%.

Table A2. G (Bitcoin kept against a holder) at c*, by layer and world

Layer	CALM_F	CALM_M	EUPH_F	EUPH_M	DECAY	WILD	UPSH	BASE	DAMP	FAD	BROK	NOREV
HOLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
BUF2†	0.43	0.04	0.27	0.04	0.54	0.25	0.05	0.87	0.39	0.83	1.02	1.02
ER2-2	1.00	1.00	1.37	1.22	1.00	1.23	1.06	1.06	1.03	1.06	1.06	1.04
ER4-2	1.00	1.00	1.41	1.13	1.00	1.20	0.77	1.07	1.02	1.05	1.12	1.11
ER2-1.5	1.18	1.08	1.31	1.09	1.00	1.21	0.96	1.04	1.01	1.03	1.07	1.03
ER4-1.5†	1.18	1.01	1.21	0.80	1.00	1.05	0.28	1.02	0.94	0.99	1.13	1.11
L2-R1	1.00	1.00	2.30	2.15	1.00	2.44	1.74	4.48	1.64	3.41	3.41	0.68
FK½†	0.22	0.04	0.07	0.04	0.50	0.05	0.05	0.51	0.08	0.34	3.21	0.45

† not admissible.

Table A3. 10th percentile of the cycle-averaged ratio at c*

Layer	CALM_F	CALM_M	EUPH_F	EUPH_M	DECAY	WILD	UPSH	BASE	DAMP	FAD	BROK	NOREV
HOLD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
BUF2	0.31	0.03	0.17	0.03	0.41	0.16	0.03	0.71	0.28	0.66	0.92	0.69
ER2-2	1.00	1.00	1.18	1.06	1.00	1.03	0.87	0.99	0.99	0.99	1.00	0.94
ER4-2	1.00	1.00	1.16	0.92	1.00	1.00	0.59	0.96	0.94	0.94	1.00	0.87
ER2-1.5	1.00	1.00	1.11	0.94	1.00	1.02	0.73	0.97	0.93	0.96	1.00	0.91
ER4-1.5	1.00	0.90	0.99	0.64	1.00	0.83	0.12	0.90	0.79	0.87	1.00	0.81
L2-R1	1.00	1.00	1.58	1.51	1.00	1.26	0.98	1.60	1.00	1.35	1.00	0.03
FK½	0.08	0.03	0.03	0.03	0.26	0.03	0.03	0.18	0.02	0.13	1.66	0.02

Table A3b. Share of paths that hit the ruin floor in G (1% of the start), by layer and world (%)

Layer	CALM_F	CALM_M	EUPH_F	EUPH_M	DECAY	WILD	UPSH	BASE	DAMP	FAD	BROK	NOREV
HOLD	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.0	54.0
BUF2	0.6	100.0	5.9	100.0	0.1	5.2	100.0	0.1	2.1	0.3	0.0	54.8
ER2-2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.2	0.0	54.0
ER4-2	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.2	0.0	54.0
ER2-1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.2	0.0	54.0
ER4-1.5	0.0	0.0	0.0	0.0	0.0	0.0	22.0	0.1	0.0	0.2	0.0	54.1
L2-R1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.0	67.9
FK½	22.2	100.0	73.7	100.0	0.8	84.9	100.0	1.7	54.0	1.6	0.0	79.0

A path is floored when the layer's or the holder's Bitcoin-equivalent is below 0.01 in any month from 120 to 168. Where the share is large (NO_REVERSION; BUF2 and FK½ in several worlds), G depends on the floor.

Table A4. SC99 by layer and world (%)

Layer	CALM_F	CALM_M	EUPH_F	EUPH_M	DECAY	WILD	UPSH	BASE	DAMP	FAD	BROK	NOREV
HOLD	85	100	90	110	80	90	120*	50	80	55	25	0*
BUF2	80	80	80	85	75	80	85	55	70	60	25	0*
ER2-2	85	100	105	120*	80	95	120*	55	85	55	25	0*
ER4-2	85	100	110	120*	80	95	115	55	85	55	25	0*
ER2-1.5	85	100	105	115	80	95	120*	55	85	55	25	0*
ER4-1.5	85	100	105	110	80	95	105	55	80	55	25	0*
L2-R1	85	100	110	120*	80	95	120*	55	85	60	25	0*
FK½	65	45	60	40	70	50	35	50	35	45	40	0*

- censored at the grid's edge (5% or 120%).

Table A5. Ruin at c* by layer and world (%)

Layer	CALM_F	CALM_M	EUPH_F	EUPH_M	DECAY	WILD	UPSH	BASE	DAMP	FAD	BROK	NOREV
HOLD	0.45	0.25	0.0	0.20	0.15	0.15	0.25	0.25	0.15	0.25	0.25	62.2
BUF2	15.4	100.0	44.0	100.0	8.9	33.7	100.0	0.10	6.2	0.25	0.15	60.4
ER2-2	0.45	0.25	0.0	0.0	0.15	0.05	0.40	0.15	0.15	0.20	0.25	61.5
ER4-2	0.45	0.25	0.0	0.0	0.15	0.05	3.4	0.10	0.15	0.20	0.25	60.2
ER2-1.5	0.10	0.20	0.0	0.0	0.15	0.0	0.35	0.20	0.15	0.25	0.20	61.5
ER4-1.5	0.10	0.20	0.0	0.65	0.15	0.0	37.2	0.15	0.15	0.20	0.15	60.0
L2-R1	0.45	0.25	0.0	0.0	0.15	0.05	0.05	0.05	0.10	0.10	0.20	58.4
FK½	92.8	100.0	97.0	100.0	39.1	99.8	100.0	0.40	93.3	8.6	0.0	69.4

Table A6. Scores, admissibility and the bootstrap

Layer	Admissible	S	S_cyc	S_stat	D	D (all worlds)	S - S_winner, 90%	Admissibility failures
HOLD	yes	0.000	0.000	0.000	0.00	0.00	-0.785 to -0.761	
BUF2	no	-1.124	-1.935	-0.313	-6.25	-7.86		ruin in 7, SC99 in 5, G in 9, p10 in 9 of 9 core worlds
ER2-2	yes	0.082	0.111	0.052	3.75	3.14	-0.703 to -0.679	
ER4-2	yes	0.059	0.056	0.062	4.17	3.14	-0.727 to -0.702	
ER2-1.5	yes	0.071	0.106	0.037	3.33	2.79	-0.714 to -0.689	
ER4-1.5	no	-0.069	-0.154	0.016	2.29	0.86		EUPH_M, DAMP: G in 2, p10 in 2
L2-R1	yes	0.773	0.435	1.111	4.79	4.00	0.000 to 0.000	
FK½	no	-1.619	-2.460	-0.778	-23.75	-26.14		ruin in 8, SC99 in 8, G in 9, p10 in 9 of 9 core worlds
ME:ER2-2	yes	0.074	0.105	0.043	3.12	2.64		
ME:ER4-2	yes	0.054	0.058	0.051	3.54	2.64		
ME:ER2-1.5	yes	0.060	0.088	0.031	2.71	2.29		
ME:ER4-1.5	no	-0.065	-0.143	0.013	2.29	1.21		EUPH_M: G in 1, p10 in 1
ME:L2-R1	yes	0.500	0.354	0.646	4.17	3.50		

Winner: **L2-R1**. Co-winners: L2-R1. Recommendation: **L2-R1**. Most spending: L2-R1. Scored worlds: CALM_FLOOR, CALM_MISS, EUPH_FLOOR, EUPH_MISS, DECAY, WILD, UPSHIFT, BASE, DAMPED, FADING, BROKEN. Rows marked ME: are the same layer with month-end fills. Admissibility failures name the core worlds and the gates failed (ruin, SC99, G or the 10th percentile p10), counting the core worlds in which each gate fails. D (all worlds) takes half from each family, with censored SC99 values at their bound.

Floor robustness: with the ruin floor at 0.1% the recommendation is L2-R1; at 10%, L2-R1.

Table A6b. World-model check: S with one scored world left out, and by family (reading, not registered)

Variant	Best admissible layer	Its S	Runner-up	Runner-up's S
without CALM_FLOOR	L2-R1	0.809	ER2-2	0.091
without CALM_MISS	L2-R1	0.809	ER2-2	0.091
without EUPH_FLOOR	L2-R1	0.740	ER2-2	0.065
without EUPH_MISS	L2-R1	0.746	ER2-2	0.074
without DECAY	L2-R1	0.809	ER2-2	0.091
without WILD	L2-R1	0.735	ER2-2	0.074

Variant	Best admissible layer	Its S	Runner-up	Runner-up's S
without UPSHIFT	L2-R1	0.763	ER2-2	0.086
without BASE	L2-R1	0.708	ER2-2	0.080
without DAMPED	L2-R1	0.876	ER2-2	0.085
without FADING	L2-R1	0.754	ER2-2	0.081
without BROKEN	L2-R1	0.754	ER2-2	0.080
cycle family only	L2-R1	0.435	ER2-2	0.111
statistical family only	L2-R1	1.111	ER4-2	0.062

With month-end fills and without BASE and BROKEN: HOLD 0.000, ME:ER2-2 0.070, ME:ER4-2 0.043, ME:ER2-1.5 0.053, ME:L2-R1 0.423.

Table A7. Checks

Check	Result
C1	passes
C2	passes
C3	passes
C4	FAILS
C5	passes
C6	passes

Table A8. Predictions

Prediction	Result
P1	supported
P2	supported
P3	not supported
P4	supported
P5	supported
P6	supported
P7	supported
P8	not supported

Table A9. Sweet-spot metrics at c*, every primary layer

World	Layer	Drawdown cover	Paths with a spell	Dry powder	Max real drawdown (median)	Bitcoin sold below the trend, 30 years (median)	Real wealth at month 96 (× start)
CALM_FLOOR	HOLD	—	0%	0%	69%	0.79	2.85
CALM_FLOOR	BUF2	31%	100%	81%	68%	0.10	1.50
CALM_FLOOR	ER2-2	21%	1%	0%	69%	0.79	2.85
CALM_FLOOR	ER4-2	54%	1%	0%	69%	0.79	2.85

World	Layer	Drawdown cover	Paths with a spell	Dry powder	Max real drawdown (median)	Bitcoin sold below the trend, 30 years (median)	Real wealth at month 96 (× start)
CALM_FLOOR	ER2-1.5	19%	96%	27%	68%	0.68	3.17
CALM_FLOOR	ER4-1.5	66%	96%	34%	67%	0.64	3.21
CALM_FLOOR	L2-R1	0%	0%	0%	69%	0.79	2.85
CALM_FLOOR	FK½	1%	100%	75%	100%	1.81	1.40
CALM_MISS	HOLD	—	0%	0%	55%	0.71	3.59
CALM_MISS	BUF2	67%	100%	1%	100%	0.03	0.35
CALM_MISS	ER2-2	33%	0%	0%	55%	0.71	3.59
CALM_MISS	ER4-2	65%	0%	0%	55%	0.71	3.59
CALM_MISS	ER2-1.5	39%	93%	2%	54%	0.62	3.77
CALM_MISS	ER4-1.5	71%	93%	32%	52%	0.59	3.61
CALM_MISS	L2-R1	0%	0%	0%	55%	0.71	3.59
CALM_MISS	FK½	3%	100%	5%	100%	1.18	0.25
EUPH_FLOOR	HOLD	—	0%	0%	83%	0.70	3.32
EUPH_FLOOR	BUF2	34%	100%	82%	82%	0.07	1.39
EUPH_FLOOR	ER2-2	28%	100%	12%	77%	0.51	4.25
EUPH_FLOOR	ER4-2	55%	100%	18%	71%	0.40	4.35
EUPH_FLOOR	ER2-1.5	23%	100%	35%	77%	0.44	4.04
EUPH_FLOOR	ER4-1.5	65%	100%	45%	70%	0.33	3.78
EUPH_FLOOR	L2-R1	0%	60%	0%	69%	0.70	6.69
EUPH_FLOOR	FK½	1%	100%	69%	100%	1.33	0.82
EUPH_MISS	HOLD	—	0%	0%	75%	0.65	4.03
EUPH_MISS	BUF2	81%	100%	22%	100%	0.00	0.00
EUPH_MISS	ER2-2	40%	100%	4%	68%	0.48	4.68
EUPH_MISS	ER4-2	63%	100%	19%	60%	0.39	4.40
EUPH_MISS	ER2-1.5	41%	100%	5%	68%	0.43	4.21
EUPH_MISS	ER4-1.5	71%	100%	45%	59%	0.34	3.39
EUPH_MISS	L2-R1	0%	58%	0%	55%	0.65	7.60
EUPH_MISS	FK½	2%	100%	51%	100%	0.91	0.00
DECAY	HOLD	—	0%	0%	58%	0.85	2.60
DECAY	BUF2	24%	100%	41%	57%	0.17	1.61
DECAY	ER2-2	—	0%	0%	58%	0.85	2.60
DECAY	ER4-2	—	0%	0%	58%	0.85	2.60
DECAY	ER2-1.5	—	0%	0%	58%	0.85	2.60
DECAY	ER4-1.5	—	0%	0%	58%	0.85	2.60
DECAY	L2-R1	—	0%	0%	58%	0.85	2.60
DECAY	FK½	2%	100%	77%	50%	2.51	1.74
WILD	HOLD	—	0%	0%	84%	0.63	4.36
WILD	BUF2	66%	100%	85%	85%	0.03	1.70

World	Layer	Drawdown cover	Paths with a spell	Dry powder	Max real drawdown (median)	Bitcoin sold below the trend, 30 years (median)	Real wealth at month 96 (× start)
WILD	ER2-2	54%	100%	50%	83%	0.43	5.11
WILD	ER4-2	82%	100%	65%	82%	0.35	5.06
WILD	ER2-1.5	56%	100%	67%	83%	0.35	4.97
WILD	ER4-1.5	87%	100%	79%	82%	0.29	4.55
WILD	L2-R1	0%	95%	0%	71%	0.63	7.69
WILD	FK½	1%	100%	67%	100%	1.27	0.94
UPSHIFT	HOLD	—	0%	0%	70%	0.56	5.08
UPSHIFT	BUF2	95%	100%	19%	100%	0.00	0.00
UPSHIFT	ER2-2	87%	80%	5%	68%	0.43	5.73
UPSHIFT	ER4-2	100%	80%	30%	68%	0.42	4.98
UPSHIFT	ER2-1.5	82%	99%	17%	68%	0.36	5.23
UPSHIFT	ER4-1.5	100%	99%	83%	69%	0.34	3.11
UPSHIFT	L2-R1	0%	49%	0%	59%	0.56	8.90
UPSHIFT	FK½	1%	100%	22%	100%	0.92	0.00
BASE	HOLD	—	0%	0%	95%	0.43	6.54
BASE	BUF2	60%	100%	79%	95%	0.09	5.74
BASE	ER2-2	54%	100%	53%	95%	0.33	6.83
BASE	ER4-2	80%	100%	79%	94%	0.28	6.88
BASE	ER2-1.5	56%	100%	62%	95%	0.31	6.72
BASE	ER4-1.5	82%	100%	85%	94%	0.26	6.59
BASE	L2-R1	0%	84%	0%	76%	0.43	17.24
BASE	FK½	0%	100%	100%	41%	3.87	3.85
DAMPED	HOLD	—	0%	0%	72%	0.59	5.24
DAMPED	BUF2	57%	100%	11%	73%	0.13	2.60
DAMPED	ER2-2	49%	97%	5%	71%	0.53	5.44
DAMPED	ER4-2	74%	97%	33%	70%	0.50	5.43
DAMPED	ER2-1.5	51%	100%	6%	71%	0.47	5.31
DAMPED	ER4-1.5	77%	100%	46%	70%	0.43	5.05
DAMPED	L2-R1	0%	64%	0%	56%	0.59	6.98
DAMPED	FK½	3%	100%	38%	100%	1.47	1.33
FADING	HOLD	—	0%	0%	83%	0.45	6.39
FADING	BUF2	56%	100%	49%	82%	0.08	5.32
FADING	ER2-2	47%	99%	28%	82%	0.35	6.74
FADING	ER4-2	70%	99%	60%	80%	0.31	6.68
FADING	ER2-1.5	49%	100%	33%	82%	0.33	6.56
FADING	ER4-1.5	73%	100%	68%	80%	0.28	6.34
FADING	L2-R1	0%	66%	0%	62%	0.45	14.58
FADING	FK½	23%	100%	99%	41%	2.45	3.14

World	Layer	Drawdown cover	Paths with a spell	Dry powder	Max real drawdown (median)	Bitcoin sold below the trend, 30 years (median)	Real wealth at month 96 (× start)
BROKEN	HOLD	—	0%	0%	97%	0.57	2.70
BROKEN	BUF2	34%	100%	88%	97%	0.35	2.73
BROKEN	ER2-2	31%	86%	67%	97%	0.50	2.85
BROKEN	ER4-2	46%	86%	80%	97%	0.43	2.94
BROKEN	ER2-1.5	32%	92%	76%	97%	0.48	2.86
BROKEN	ER4-1.5	47%	92%	88%	97%	0.39	2.94
BROKEN	L2-R1	0%	51%	0%	95%	0.57	6.36
BROKEN	FK½	0%	100%	100%	76%	44.34	5.18
NO_REVERSION	HOLD	—	0%	0%	100%	0.94	0.53
NO_REVERSION	BUF2	42%	97%	83%	100%	0.57	0.90
NO_REVERSION	ER2-2	45%	43%	60%	100%	0.91	0.69
NO_REVERSION	ER4-2	62%	43%	78%	100%	0.87	0.88
NO_REVERSION	ER2-1.5	46%	47%	69%	100%	0.89	0.70
NO_REVERSION	ER4-1.5	63%	46%	87%	100%	0.83	0.91
NO_REVERSION	L2-R1	0%	25%	0%	100%	0.96	0.98
NO_REVERSION	FK½	0%	97%	99%	100%	1.61	1.18

Drawdown cover: share of below-trend spells (at least 6 month-ends, starting with cash) paid without selling Bitcoin; the sweet spot also needs such a spell on at least half the paths. L2-R1's pool is redeployed at the trend on the way down, so its cover is zero by construction. Dry powder: share of floor-zone entries with a year of spending in cash.

Table A9b. Bitcoin, wealth and spending at c*, every primary layer

World	Layer	Bitcoin-equivalent at month 144 (median)	share at or above 1	at month 360 (median)	share at or above 1	Real wealth at month 360 (× start, median)	share at or above the start	Real spending over 10 years (median, in years of first-year spending)	over 30 years
CALM_FLOOR	HOLD	0.23	0%	0.14	0%	24.60	99%	10.0	30.0
CALM_FLOOR	BUF2	0.10	0%	0.03	0%	5.21	79%	10.0	30.0
CALM_FLOOR	ER2-2	0.23	0%	0.14	0%	24.64	99%	10.0	30.0
CALM_FLOOR	ER4-2	0.23	0%	0.14	0%	24.66	99%	10.0	30.0
CALM_FLOOR	ER2-1.5	0.28	0%	0.19	0%	33.64	100%	10.0	30.0
CALM_FLOOR	ER4-1.5	0.28	0%	0.20	0%	34.07	100%	10.0	30.0
CALM_FLOOR	L2-R1	0.23	0%	0.14	0%	24.86	99%	10.0	30.0
CALM_FLOOR	FK½	0.05	0%	0.00	0%	0.00	5%	10.0	17.6
CALM_MISS	HOLD	0.23	0%	0.15	0%	32.72	100%	10.0	30.0

World	Layer	Bitcoin-equivalent at month 144 (median)	share at or above 1	at month 360 (median)	share at or above 1	Real wealth at month 360 (× start, median)	share at or above the start	Real spending over 10 years (median, in years of first-year spending)	over 30 years
CALM_MISS	BUF2	0.00	0%	0.00	0%	0.00	0%	9.2	9.2
CALM_MISS	ER2-2	0.23	0%	0.15	0%	32.72	100%	10.0	30.0
CALM_MISS	ER4-2	0.23	0%	0.15	0%	32.72	100%	10.0	30.0
CALM_MISS	ER2-1.5	0.25	0%	0.17	0%	38.17	100%	10.0	30.0
CALM_MISS	ER4-1.5	0.23	0%	0.15	0%	33.53	100%	10.0	30.0
CALM_MISS	L2-R1	0.23	0%	0.15	0%	32.74	100%	10.0	30.0
CALM_MISS	FK½	0.00	0%	0.00	0%	0.00	0%	8.8	8.8
EUPH_FLOOR	HOLD	0.28	0%	0.18	0%	32.35	100%	10.0	30.0
EUPH_FLOOR	BUF2	0.08	0%	0.01	0%	1.00	50%	10.0	30.0
EUPH_FLOOR	ER2-2	0.38	0%	0.28	0%	51.14	100%	10.0	30.0
EUPH_FLOOR	ER4-2	0.40	0%	0.30	0%	53.29	100%	10.0	30.0
EUPH_FLOOR	ER2-1.5	0.37	0%	0.28	0%	50.23	100%	10.0	30.0
EUPH_FLOOR	ER4-1.5	0.34	0%	0.25	0%	44.71	100%	10.0	30.0
EUPH_FLOOR	L2-R1	0.66	2%	0.57	1%	97.70	100%	10.0	30.0
EUPH_FLOOR	FK½	0.00	0%	0.00	0%	0.00	2%	10.0	11.7
EUPH_MISS	HOLD	0.26	0%	0.16	0%	37.33	100%	10.0	30.0
EUPH_MISS	BUF2	0.00	0%	0.00	0%	0.00	0%	7.0	7.0
EUPH_MISS	ER2-2	0.32	0%	0.22	0%	50.30	100%	10.0	30.0
EUPH_MISS	ER4-2	0.30	0%	0.20	0%	45.00	100%	10.0	30.0
EUPH_MISS	ER2-1.5	0.28	0%	0.19	0%	43.96	100%	10.0	30.0
EUPH_MISS	ER4-1.5	0.21	0%	0.12	0%	26.10	99%	10.0	30.0
EUPH_MISS	L2-R1	0.57	1%	0.48	1%	106.57	100%	10.0	30.0
EUPH_MISS	FK½	0.00	0%	0.00	0%	0.00	0%	7.2	7.2
DECAY	HOLD	0.23	0%	0.13	0%	20.64	100%	10.0	30.0
DECAY	BUF2	0.13	0%	0.05	0%	7.36	88%	10.0	30.0
DECAY	ER2-2	0.23	0%	0.13	0%	20.64	100%	10.0	30.0
DECAY	ER4-2	0.23	0%	0.13	0%	20.64	100%	10.0	30.0
DECAY	ER2-1.5	0.23	0%	0.13	0%	20.64	100%	10.0	30.0
DECAY	ER4-1.5	0.23	0%	0.13	0%	20.64	100%	10.0	30.0
DECAY	L2-R1	0.23	0%	0.13	0%	20.64	100%	10.0	30.0
DECAY	FK½	0.11	0%	0.01	0%	1.50	54%	10.0	30.0
WILD	HOLD	0.32	0%	0.23	0%	52.38	100%	10.0	30.0
WILD	BUF2	0.08	0%	0.01	0%	3.15	62%	10.0	30.0
WILD	ER2-2	0.40	0%	0.33	0%	72.35	100%	10.0	30.0
WILD	ER4-2	0.39	0%	0.32	0%	69.63	100%	10.0	30.0

World	Layer	Bitcoin-equivalent at month 144 (median)	share at or above 1	at month 360 (median)	share at or above 1	Real wealth at month 360 (× start, median)	share at or above the start	Real spending over 10 years (median, in years of first-year spending)	over 30 years
WILD	ER2-1.5	0.39	0%	0.32	0%	70.52	100%	10.0	30.0
WILD	ER4-1.5	0.33	0%	0.26	0%	56.77	100%	10.0	30.0
WILD	L2-R1	0.75	32%	2.41	83%	561.34	100%	10.0	30.0
WILD	FK½	0.00	0%	0.00	0%	0.00	0%	10.0	12.2
UPSHIFT	HOLD	0.22	0%	0.19	0%	537.04	100%	10.0	30.0
UPSHIFT	BUF2	0.00	0%	0.00	0%	0.00	0%	4.7	4.7
UPSHIFT	ER2-2	0.23	0%	0.19	0%	525.44	100%	10.0	30.0
UPSHIFT	ER4-2	0.17	0%	0.11	0%	320.32	97%	10.0	30.0
UPSHIFT	ER2-1.5	0.21	0%	0.17	0%	464.15	100%	10.0	30.0
UPSHIFT	ER4-1.5	0.07	0%	0.02	0%	41.07	62%	10.0	30.0
UPSHIFT	L2-R1	0.34	3%	0.04	0%	106.56	100%	10.0	30.0
UPSHIFT	FK½	0.00	0%	0.00	0%	0.00	0%	6.6	6.6
BASE	HOLD	0.56	0%	0.50	0%	99.93	100%	10.0	30.0
BASE	BUF2	0.48	0%	0.44	0%	88.04	100%	10.0	30.0
BASE	ER2-2	0.60	0%	0.55	0%	108.61	100%	10.0	30.0
BASE	ER4-2	0.61	0%	0.56	0%	110.12	100%	10.0	30.0
BASE	ER2-1.5	0.59	0%	0.54	0%	106.69	100%	10.0	30.0
BASE	ER4-1.5	0.58	0%	0.53	0%	104.01	100%	10.0	30.0
BASE	L2-R1	2.27	79%	29.90	98%	7616.47	100%	10.0	30.0
BASE	FK½	0.28	5%	0.23	8%	51.26	100%	10.0	30.0
DAMPED	HOLD	0.38	0%	0.31	0%	66.87	100%	10.0	30.0
DAMPED	BUF2	0.16	0%	0.09	0%	18.58	93%	10.0	30.0
DAMPED	ER2-2	0.40	0%	0.33	0%	70.93	100%	10.0	30.0
DAMPED	ER4-2	0.39	0%	0.33	0%	69.32	100%	10.0	30.0
DAMPED	ER2-1.5	0.39	0%	0.32	0%	68.95	100%	10.0	30.0
DAMPED	ER4-1.5	0.36	0%	0.29	0%	62.68	100%	10.0	30.0
DAMPED	L2-R1	0.59	20%	1.28	61%	305.53	100%	10.0	30.0
DAMPED	FK½	0.03	0%	0.00	0%	0.00	4%	10.0	15.2
FADING	HOLD	0.53	0%	0.48	0%	110.74	100%	10.0	30.0
FADING	BUF2	0.43	0%	0.38	0%	86.77	100%	10.0	30.0
FADING	ER2-2	0.57	0%	0.52	0%	118.91	100%	10.0	30.0
FADING	ER4-2	0.57	0%	0.52	0%	117.80	100%	10.0	30.0
FADING	ER2-1.5	0.55	0%	0.51	0%	116.31	100%	10.0	30.0
FADING	ER4-1.5	0.54	0%	0.49	0%	110.79	100%	10.0	30.0
FADING	L2-R1	1.65	71%	2.86	84%	648.97	100%	10.0	30.0

World	Layer	Bitcoin-equivalent at month 144 (median)	share at or above 1	at month 360 (median)	share at or above 1	Real wealth at month 360 (× start, median)	share at or above the start	Real spending over 10 years (median, in years of first-year spending)	over 30 years
FADING	FK½	0.17	1%	0.02	0%	5.01	84%	10.0	30.0
BROKEN	HOLD	0.62	0%	0.42	0%	5.20	97%	10.0	30.0
BROKEN	BUF2	0.63	0%	0.44	0%	5.44	98%	10.0	30.0
BROKEN	ER2-2	0.66	0%	0.47	0%	5.66	98%	10.0	30.0
BROKEN	ER4-2	0.71	0%	0.52	0%	6.20	98%	10.0	30.0
BROKEN	ER2-1.5	0.67	0%	0.47	0%	5.72	98%	10.0	30.0
BROKEN	ER4-1.5	0.71	0%	0.52	0%	6.32	98%	10.0	30.0
BROKEN	L2-R1	1.77	70%	2.03	70%	27.75	98%	10.0	30.0
BROKEN	FK½	1.82	86%	22.83	100%	341.29	100%	10.0	30.0
NO_REVERSION	HOLD	0.00	0%	0.00	0%	0.00	37%	10.0	10.8
NO_REVERSION	BUF2	0.04	0%	0.00	0%	0.00	38%	10.0	12.5
NO_REVERSION	ER2-2	0.00	0%	0.00	0%	0.00	38%	10.0	11.6
NO_REVERSION	ER4-2	0.06	0%	0.00	0%	0.00	39%	10.0	12.9
NO_REVERSION	ER2-1.5	0.00	0%	0.00	0%	0.00	38%	10.0	11.6
NO_REVERSION	ER4-1.5	0.08	0%	0.00	0%	0.00	39%	10.0	13.4
NO_REVERSION	L2-R1	0.00	12%	0.00	10%	0.00	41%	10.0	13.3
NO_REVERSION	FK½	0.00	5%	0.00	4%	0.00	28%	10.0	15.0

Ruined paths count as zero. Real spending is in years of the first year's amount: 10.0 and 30.0 mean every payment was made on the median path. NO_REVERSION runs at 50% coverage, where most paths are ruined before year 30.

Table A10-TREND. Decision rule from TREND (statistical worlds)

Layer	Admissible	S_stat	D_stat	BASE	DAMP	FAD	BROK	NOREV
HOLD	yes	0.000	0.00	1.00	1.00	1.00	1.00	1.00
BUF2	no	0.009	7.50	1.09	0.82	1.06	1.10	1.09
ER2-2	yes	0.062	0.00	1.08	1.05	1.07	1.06	1.02
ER4-2	yes	0.065	0.00	1.08	1.02	1.05	1.12	1.10
ER2-1.5	yes	0.045	0.00	1.06	1.00	1.05	1.07	1.03
ER4-1.5	no	0.003	0.00	1.03	0.89	0.99	1.13	1.13
L2-R1	yes	1.158	3.75	4.67	1.78	3.54	3.50	0.49
FK½	no	-0.398	-5.00	0.74	0.12	0.52	4.29	0.42

HOLD's SC99: BASE 60%, DAMPED 95%, FADING 65%, BROKEN 25%, NO_REVERSION 0%. Winner L2-R1; co-winners L2-R1; best layer L2-R1.

Table A10-PEAK. Decision rule from PEAK (statistical worlds)

Layer	Admissible	S_stat	D_stat	BASE	DAMP	FAD	BROK	NOREV
HOLD	yes	0.000	0.00	1.00	1.00	1.00	1.00	1.00
BUF2	yes	0.168	16.25	1.25	1.13	1.22	1.13	1.11
ER2-2	yes	0.186	15.00	1.26	1.20	1.25	1.12	1.10
ER4-2	no	0.193	27.50	1.29	1.11	1.25	1.21	1.27
ER2-1.5	yes	0.179	15.00	1.25	1.18	1.23	1.12	1.10
ER4-1.5	no	0.176	28.75	1.26	1.07	1.23	1.22	1.28
L2-R1	yes	1.664	31.25	7.83	3.02	6.00	5.47	0.40
FK½	no	0.705	37.50	1.80	0.82	1.32	8.57	0.39

HOLD's SC99: BASE 70%, DAMPED 110%, FADING 75%, BROKEN 25%, NO_REVERSION 0%. Winner L2-R1; co-winners L2-R1; best layer L2-R1.

Table A11. Paper 16's engines, reflection on and off (P16-NR)

Quantity	Reflection on (published)	Reflection off
Hold: 99% boundary, 3%, 30y	103.6%	46.1%
Hold: 95% boundary, 3%, 30y	114.8%	65.6%
Hold: 99% boundary, 6%, 30y	90.9%	below 40% (off the grid)
Hold: 95% boundary, 6%, 30y	100.5%	57.4%
Hold: 99% boundary, 3%, 50y	102.1%	45.3%
Hold: 95% boundary, 3%, 50y	112.7%	65.0%
Hold: 99% boundary, 6%, 50y	87.4%	below 40% (off the grid)
Hold: 95% boundary, 6%, 50y	96.7%	55.6%
Playbook: 99% boundary, 3%, 30y	175.7%	176.1%
Playbook: 99% boundary, 6%, 30y	155.9%	155.9%
Uplift at 99%, 3%	72.1 points	129.9 points
Uplift at 99%, 6%	65.0 points	undefined: holding is below the grid (more than 116 points)
Hold 80%, 3%, 30y: ruin	0.00%	12.33%
Hold 80%, 6%, 30y: ruin	0.045%	22.64%
Hold 80%, 3%, 50y: ruin	0.002%	13.18%
Hold 100%, 3%, 30y: ruin	0.46%	30.09%
Hold 100%, 6%, 30y: ruin	4.32%	49.23%
Playbook 150%, 3%: ruin	0.06%	0.06%
Playbook 200%, 3%: ruin	4.35%	4.05%
Playbook 200%, 6%: ruin	8.67%	8.98%
Battery at 150%: APR 15%, 3% inflation, 30 years	0.08%	0.07%

Quantity	Reflection on (published)	Reflection off
Battery at 150%: APR 15%, 6% inflation, 30 years	0.50%	0.53%
Battery at 150%: APR 20%, 3% inflation, 30 years	0.07%	0.09%
Battery at 150%: APR 20%, 6% inflation, 30 years	0.56%	0.63%
Battery at 150%: baseline, 3% inflation, 30 years	0.06%	0.06%
Battery at 150%: baseline, 6% inflation, 30 years	0.48%	0.47%
Battery at 150%: slope decay, 3% inflation, 30 years	0.09%	0.08%
Battery at 150%: slope decay, 6% inflation, 30 years	0.71%	0.71%
Battery at 150%: bootstrap 95th percentile, 3% inflation, 30 years	0.24%	0.23%
Battery at 150%: bootstrap 95th percentile, 6% inflation, 30 years	0.86%	0.82%
Battery at 150%: peaks capped at 2x, 3% inflation, 30 years	0.07%	0.038%
Battery at 150%: peaks capped at 2x, 3% inflation, 50 years	0.05%	0.036%
Battery at 150%: peaks capped at 2x, 6% inflation, 30 years	0.45%	0.36%
Battery at 150%: peaks capped at 2x, 6% inflation, 50 years	0.42%	0.35%

C5.3, playbook at 150%, 3%, 30y: borrowing spells cleared at the first close at or above trend: 641,302 of 641,308 (reflection on); 547,948 of 547,958 (off). Spells still open at year 30: 15,246 and 20,186. Median terminal debt among survivors: $0 and $0. Median Bitcoin left among survivors: 178.3 and 84.9.

Table A12. Paper 16's tiers from the trend in F011's worlds (registered analysis A3)

Boundaries in F011's coverage units (multiply by 0.972 for Paper 16's). PB16 on Paper 16's terms. Uplift in coverage points.

World, reflection, inflation	Hold: 99% boundary	95% boundary	grid SC99 / SC95	PB16: 99% boundary	grid SC99 / SC95	Uplift at 99% (points)
BASE-CAL, no refl., 3%	75	86	75 / 85	161	160 / 175	86
BASE-CAL, no refl., 6%	65	75	65 / 70	139	135 / 155	74
BASE-CAL, no refl., CPI paths	73	86	70 / 85	161	160 / 175	87
BASE-CAL, refl., 3%	94	102	90 / 100	160	160 / 175	66
BASE-CAL, refl., 6%	82	88	80 / 85	138	135 / 155	56
BASE-CAL, refl., CPI paths	93	101	90 / 100	159	155 / 170	66

World, reflection, inflation	Hold: 99% boundary	95% boundary	grid SC99 / SC95	PB16: 99% boundary	grid SC99 / SC95	Uplift at 99% (points)
BASE, no refl., 3%	63	74	60 / 70	171	170 / 190	107
BASE, no refl., 6%	55	65	55 / 65	151	150 / 170	95
BASE, no refl., CPI paths	62	74	60 / 70	170	170 / 190	108
BASE, refl., 3%	95	102	95 / 100	166	165 / 185	71
BASE, refl., 6%	83	89	80 / 85	145	145 / 165	63
BASE, refl., CPI paths	93	101	90 / 100	164	160 / 185	71
DAMPED, no refl., 3%	99	107	95 / 105	144	140 / 150	45
DAMPED, no refl., 6%	86	93	85 / 90	125	125 / 130	39
DAMPED, no refl., CPI paths	97	107	95 / 105	143	140 / 150	46
DAMPED, refl., 3%	101	108	100 / 105	144	140 / 150	43
DAMPED, refl., 6%	87	94	85 / 90	125	120 / 130	37
DAMPED, refl., CPI paths	99	108	95 / 105	143	140 / 150	44
FADING, no refl., 3%	69	80	65 / 80	158	155 / 175	89
FADING, no refl., 6%	61	71	60 / 70	133	130 / 150	72
FADING, no refl., CPI paths	68	79	65 / 75	157	155 / 175	89
FADING, refl., 3%	94	101	90 / 100	156	155 / 170	62
FADING, refl., 6%	82	88	80 / 85	132	130 / 150	50
FADING, refl., CPI paths	93	101	90 / 100	156	155 / 170	64

Table A12b. Paper 16's tiers from the trend in F011's worlds: ruin at the tiers

Coverage in F011's units; 82.3% is Paper 16's 80%. PB16 on Paper 16's terms, except the insolvency column (net wealth below zero at a payment).

World, reflection, inflation	Hold ruin: 80%	82.3%	100%	120%	PB16 ruin: 150%	150%, APR 15%	150%, APR 20%	150%: insolvent on net wealth	200%
BASE-CAL, no refl., 3%	2.1%	3.2%	17.0%	44.4%	0.10%	0.20%	0.40%	13.7%	16.7%
BASE-CAL, no refl., 6%	9.7%	12.1%	39.6%	69.7%	2.50%	3.00%	3.85%	19.7%	32.5%
BASE-CAL, no refl., CPI paths	2.5%	3.1%	17.6%	44.5%	0.15%	0.20%	0.50%	14.1%	17.4%
BASE-CAL, refl., 3%	0.0%	0.0%	3.7%	31.1%	0.15%	0.15%	0.40%	0.30%	19.4%
BASE-CAL, refl., 6%	0.30%	0.8%	23.5%	61.0%	3.00%	3.75%	4.90%	5.0%	36.0%
BASE-CAL, refl., CPI paths	0.0%	0.0%	4.2%	31.1%	0.15%	0.35%	0.55%	0.35%	20.5%
BASE, no refl., 3%	8.9%	10.4%	28.6%	53.1%	0.10%	0.10%	0.15%	21.1%	7.9%
BASE, no refl., 6%	19.9%	23.8%	50.7%	74.5%	0.90%	1.40%	1.85%	25.9%	17.4%
BASE, no refl., CPI paths	8.6%	10.3%	29.0%	53.1%	0.10%	0.10%	0.10%	21.6%	8.3%

World, reflection, inflation	Hold ruin: 80%	82.3%	100%	120%	PB16 ruin: 150%	150%, APR 15%	150%, APR 20%	150%: insolvent on net wealth	200%
BASE, refl., 3%	0.0%	0.0%	3.1%	30.0%	0.10%	0.10%	0.20%	0.15%	11.4%
BASE, refl., 6%	0.25%	0.8%	21.9%	58.1%	1.50%	1.85%	2.55%	2.5%	22.9%
BASE, refl., CPI paths	0.0%	0.0%	3.8%	30.1%	0.05%	0.05%	0.20%	0.15%	11.7%
DAMPED, no refl., 3%	0.0%	0.0%	1.1%	19.9%	3.10%	4.10%	5.50%	5.1%	68.3%
DAMPED, no refl., 6%	0.0%	0.15%	13.6%	59.2%	26.20%	29.35%	34.35%	30.1%	85.3%
DAMPED, no refl., CPI paths	0.0%	0.0%	1.8%	20.3%	3.75%	4.90%	6.70%	6.2%	68.8%
DAMPED, refl., 3%	0.0%	0.0%	0.5%	19.4%	3.20%	4.20%	5.55%	4.3%	68.7%
DAMPED, refl., 6%	0.0%	0.0%	12.8%	58.8%	26.00%	29.25%	34.30%	29.3%	85.2%
DAMPED, refl., CPI paths	0.0%	0.0%	1.1%	19.6%	3.70%	5.05%	6.70%	5.3%	69.0%
FADING, no refl., 3%	4.9%	6.7%	21.3%	45.6%	0.50%	0.55%	0.75%	15.8%	15.6%
FADING, no refl., 6%	12.7%	15.0%	40.8%	66.9%	3.60%	4.30%	5.85%	21.9%	31.1%
FADING, no refl., CPI paths	5.3%	6.7%	22.4%	45.6%	0.50%	0.65%	0.95%	16.2%	16.3%
FADING, refl., 3%	0.0%	0.0%	3.7%	31.4%	0.40%	0.50%	0.65%	0.5%	18.7%
FADING, refl., 6%	0.15%	0.9%	23.4%	59.6%	4.90%	5.90%	7.00%	5.7%	35.5%
FADING, refl., CPI paths	0.0%	0.0%	4.5%	31.2%	0.50%	0.60%	0.80%	0.7%	19.1%

Table A13. Leverage arm from today (F011's terms)

World	Rule	SC99	HOLD SC99	G at c*	Margin calls	Median peak debt / Bitcoin value (month-ends, after the payment)	Ruin at c*	Median debt at ruin ($, ruined paths at c*)
CALM_FLOOR	LEV	115%	85%	2.28	0.0%	0.23	0.0%	—
CALM_FLOOR	LEV at 15% APR	115%	85%	2.22	0.0%	0.23	0.0%	—
CALM_FLOOR	LEV at 20% APR	115%	85%	2.17	0.0%	0.24	0.0%	—
CALM_FLOOR	LEV, credit freeze	115%	85%	2.19	0.0%	0.22	0.0%	—
CALM_FLOOR	PB16 (F011's terms)	120%	85%	2.73	0.0%	0.23	0.0%	—
CALM_MISS	LEV	120%	100%	1.78	0.0%	0.22	0.0%	—
CALM_MISS	LEV at 15% APR	120%	100%	1.74	0.0%	0.22	0.0%	—
CALM_MISS	LEV at 20% APR	120%	100%	1.71	0.0%	0.23	0.0%	—

World	Rule	SC99	HOLD SC99	G at c*	Margin calls	Median peak debt / Bitcoin value (month-ends, after the payment)	Ruin at c*	Median debt at ruin ($, ruined paths at c*)
CALM_MISS	LEV, credit freeze	120%	100%	1.76	0.0%	0.22	0.0%	—
CALM_MISS	PB16 (F011's terms)	120%	100%	2.08	0.0%	0.22	0.0%	—
EUPH_FLOOR	LEV	120%	90%	1.94	0.0%	0.20	0.0%	—
EUPH_FLOOR	LEV at 15% APR	120%	90%	1.90	0.0%	0.21	0.0%	—
EUPH_FLOOR	LEV at 20% APR	120%	90%	1.87	0.0%	0.21	0.0%	—
EUPH_FLOOR	LEV, credit freeze	120%	90%	1.86	0.0%	0.19	0.0%	—
EUPH_FLOOR	PB16 (F011's terms)	120%	90%	4.69	0.0%	0.15	0.0%	—
EUPH_MISS	LEV	120%	110%	1.60	0.0%	0.18	0.0%	—
EUPH_MISS	LEV at 15% APR	120%	110%	1.58	0.0%	0.18	0.0%	—
EUPH_MISS	LEV at 20% APR	120%	110%	1.56	0.0%	0.19	0.0%	—
EUPH_MISS	LEV, credit freeze	120%	110%	1.58	0.0%	0.18	0.0%	—
EUPH_MISS	PB16 (F011's terms)	120%	110%	3.95	0.0%	0.15	0.0%	—
DECAY	LEV	115%	80%	2.41	0.0%	0.23	0.0%	—
DECAY	LEV at 15% APR	110%	80%	2.35	0.0%	0.24	0.0%	—
DECAY	LEV at 20% APR	110%	80%	2.28	0.0%	0.24	0.0%	—
DECAY	LEV, credit freeze	110%	80%	2.31	0.0%	0.22	0.0%	—
DECAY	PB16 (F011's terms)	115%	80%	2.45	0.0%	0.23	0.0%	—
WILD	LEV	120%	90%	1.72	0.0%	0.20	0.0%	—
WILD	LEV at 15% APR	120%	90%	1.70	0.0%	0.21	0.0%	—
WILD	LEV at 20% APR	120%	90%	1.67	0.0%	0.21	0.0%	—
WILD	LEV, credit freeze	120%	90%	1.66	0.0%	0.19	0.0%	—
WILD	PB16 (F011's terms)	120%	90%	5.53	0.0%	0.19	0.0%	—
UPSHIFT	LEV	120%	120%	1.85	0.0%	0.25	0.0%	—
UPSHIFT	LEV at 15% APR	120%	120%	1.81	0.0%	0.25	0.0%	—
UPSHIFT	LEV at 20% APR	120%	120%	1.78	0.0%	0.25	0.0%	—
UPSHIFT	LEV, credit freeze	120%	120%	1.83	0.0%	0.25	0.0%	—
UPSHIFT	PB16 (F011's terms)	120%	120%	3.08	0.0%	0.24	0.0%	—

World	Rule	SC99	HOLD SC99	G at c*	Margin calls	Median peak debt / Bitcoin value (month-ends, after the payment)	Ruin at c*	Median debt at ruin ($, ruined paths at c*)
BASE	LEV	50%	50%	1.33	5.7%	0.21	0.45%	242
BASE	LEV at 15% APR	50%	50%	1.28	7.8%	0.22	0.7%	137
BASE	LEV at 20% APR	45%	50%	1.22	10.7%	0.23	1.2%	161
BASE	LEV, credit freeze	55%	50%	1.17	1.2%	0.12	0.20%	312
BASE	PB16 (F011's terms)	55%	50%	5.49	2.9%	0.18	0.35%	117
DAMPED	LEV	105%	80%	1.54	0.0%	0.21	0.0%	—
DAMPED	LEV at 15% APR	100%	80%	1.49	0.05%	0.22	0.0%	—
DAMPED	LEV at 20% APR	95%	80%	1.44	0.45%	0.23	0.0%	—
DAMPED	LEV, credit freeze	100%	80%	1.50	0.0%	0.20	0.0%	—
DAMPED	PB16 (F011's terms)	105%	80%	2.61	0.0%	0.21	0.0%	—
FADING	LEV	55%	55%	1.38	4.2%	0.20	0.30%	164
FADING	LEV at 15% APR	55%	55%	1.32	6.0%	0.21	0.5%	198
FADING	LEV at 20% APR	55%	55%	1.27	8.3%	0.22	1.0%	161
FADING	LEV, credit freeze	60%	55%	1.22	0.7%	0.13	0.05%	16
FADING	PB16 (F011's terms)	60%	55%	4.24	1.6%	0.19	0.20%	18
BROKEN	LEV	15%	25%	1.13	59.1%	0.43	7.1%	145
BROKEN	LEV at 15% APR	15%	25%	1.03	73.7%	0.46	14.0%	157
BROKEN	LEV at 20% APR	10%	25%	0.92	82.3%	0.48	22.7%	130
BROKEN	LEV, credit freeze	25%	25%	1.05	3.5%	0.10	0.9%	190
BROKEN	PB16 (F011's terms)	15%	25%	4.05	26.8%	0.30	5.1%	143
NO_REVERSION	LEV	0%	0%	0.97	71.0%	0.54	64.5%	191
NO_REVERSION	LEV at 15% APR	0%	0%	0.94	71.9%	0.54	65.0%	195
NO_REVERSION	LEV at 20% APR	0%	0%	0.92	72.5%	0.54	66.1%	198
NO_REVERSION	LEV, credit freeze	0%	0%	1.00	57.8%	0.50	62.7%	182
NO_REVERSION	PB16 (F011's terms)	0%	0%	0.87	68.7%	0.54	61.8%	191

Peak debt is read at month-ends, so it misses the daily closes at which margin calls fire. Debt at ruin: — where no path is ruined at c*.

Table A14. B0, V and the reserve variants from today

World, variant	Rule	c*	SC99 under this rule	G at c*	Ruin at c*	Bonuses per 48 months (months 0 to 168)	Up-years per 48 months (months 0 to 168)	Lowest year's real spending / first year (median)	V: Bitcoin sold, years 1-5	years 26-30
CALM_FLOOR, B0	ER4-2	85%	95%	1.00	0.0%	0.00	0.00	0.46	—	—
CALM_FLOOR, B0	L2-R1	85%	95%	1.00	0.0%	0.00	0.00	0.46	—	—
CALM_FLOOR, B0	HOLD	85%	95%	1.00	0.0%	0.00	0.00	0.46	—	—
CALM_FLOOR, V	ER4-2	85%	≥120%	1.00	0.0%	0.00	0.00	1.00	0.579	0.016
CALM_FLOOR, V	L2-R1	85%	≥120%	1.00	0.0%	0.00	0.00	1.00	0.579	0.016
CALM_FLOOR, V	HOLD	85%	≥120%	1.00	0.0%	0.00	0.00	1.00	0.579	0.016
CALM_FLOOR, reserve variants	ER4-2-B	85%	85%	1.00	0.45%	0.00	0.00	1.00	—	—
CALM_FLOOR, reserve variants	ER4-2-B (bonus 0.25 yr)	85%	85%	1.00	0.45%	0.00	0.00	1.00	—	—
CALM_FLOOR, reserve variants	ER4-2-B (bonus 1 yr)	85%	85%	1.00	0.45%	0.00	0.00	1.00	—	—
CALM_FLOOR, reserve variants	ER4-2-D	85%	85%	1.00	0.45%	0.00	0.00	1.00	—	—
CALM_FLOOR, reserve variants	HOLD	85%	85%	1.00	0.45%	0.00	0.00	1.00	—	—
CALM_MISS, B0	ER4-2	100%	110%	1.00	0.0%	0.00	0.00	0.46	—	—
CALM_MISS, B0	L2-R1	100%	110%	1.00	0.0%	0.00	0.00	0.46	—	—
CALM_MISS, B0	HOLD	100%	110%	1.00	0.0%	0.00	0.00	0.46	—	—
CALM_MISS, V	ER4-2	100%	≥120%	1.00	0.0%	0.00	0.00	0.95	0.581	0.018
CALM_MISS, V	L2-R1	100%	≥120%	1.00	0.0%	0.00	0.00	0.95	0.581	0.018
CALM_MISS, V	HOLD	100%	≥120%	1.00	0.0%	0.00	0.00	0.95	0.581	0.018
CALM_MISS, reserve variants	ER4-2-B	100%	100%	1.00	0.25%	0.00	0.00	1.00	—	—
CALM_MISS, reserve variants	ER4-2-B (bonus 0.25 yr)	100%	100%	1.00	0.25%	0.00	0.00	1.00	—	—
CALM_MISS, reserve variants	ER4-2-B (bonus 1 yr)	100%	100%	1.00	0.25%	0.00	0.00	1.00	—	—

World, variant	Rule	c*	SC99 under this rule	G at c*	Ruin at c*	Bonuses per 48 months (months 0 to 168)	Up-years per 48 months (months 0 to 168)	Lowest year's real spending / first year (median)	V: Bitcoin sold, years 1-5	years 26-30
CALM_MISS, reserve variants	ER4-2-D	100%	100%	1.00	0.25%	0.00	0.00	1.00	—	—
CALM_MISS, reserve variants	HOLD	100%	100%	1.00	0.25%	0.00	0.00	1.00	—	—
EUPH_FLOOR, B0	ER4-2	90%	≥120%	1.30	0.0%	0.00	0.00	0.46	—	—
EUPH_FLOOR, B0	L2-R1	90%	≥120%	2.07	0.0%	0.00	0.00	0.46	—	—
EUPH_FLOOR, B0	HOLD	90%	105%	1.00	0.0%	0.00	0.00	0.46	—	—
EUPH_FLOOR, V	ER4-2	90%	≥120%	1.20	0.0%	0.00	0.57	1.00	0.293	0.019
EUPH_FLOOR, V	L2-R1	90%	≥120%	1.55	0.0%	0.00	0.57	0.98	0.606	0.025
EUPH_FLOOR, V	HOLD	90%	≥120%	1.00	0.0%	0.00	0.29	1.00	0.543	0.016
EUPH_FLOOR, reserve variants	ER4-2-B	90%	110%	1.38	0.0%	0.29	0.29	1.00	—	—
EUPH_FLOOR, reserve variants	ER4-2-B (bonus 0.25 yr)	90%	110%	1.40	0.0%	0.29	0.29	1.00	—	—
EUPH_FLOOR, reserve variants	ER4-2-B (bonus 1 yr)	90%	110%	1.35	0.0%	0.29	0.29	1.00	—	—
EUPH_FLOOR, reserve variants	ER4-2-D	90%	≥120%	1.89	0.0%	0.00	0.00	1.00	—	—
EUPH_FLOOR, reserve variants	HOLD	90%	90%	1.00	0.0%	0.00	0.00	1.00	—	—
EUPH_MISS, B0	ER4-2	110%	≥120%	1.07	0.0%	0.00	0.00	0.46	—	—
EUPH_MISS, B0	L2-R1	110%	≥120%	1.94	0.0%	0.00	0.00	0.46	—	—
EUPH_MISS, B0	HOLD	110%	≥120%	1.00	0.0%	0.00	0.00	0.46	—	—
EUPH_MISS, V	ER4-2	110%	≥120%	1.07	0.0%	0.00	0.57	0.94	0.364	0.018
EUPH_MISS, V	L2-R1	110%	≥120%	1.50	0.0%	0.00	0.57	0.91	0.576	0.026
EUPH_MISS, V	HOLD	110%	≥120%	1.00	0.0%	0.00	0.29	0.97	0.556	0.017
EUPH_MISS, reserve variants	ER4-2-B	110%	115%	1.09	0.0%	0.29	0.29	1.00	—	—
EUPH_MISS, reserve variants	ER4-2-B (bonus 0.25 yr)	110%	≥120%	1.11	0.0%	0.29	0.29	1.00	—	—
EUPH_MISS, reserve variants	ER4-2-B (bonus 1 yr)	110%	115%	1.04	0.0%	0.29	0.29	1.00	—	—

World, variant	Rule	c*	SC99 under this rule	G at c*	Ruin at c*	Bonuses per 48 months (months 0 to 168)	Up-years per 48 months (months 0 to 168)	Lowest year's real spending / first year (median)	V: Bitcoin sold, years 1-5	years 26-30
EUPH_MISS, reserve variants	ER4-2-D	110%	≥120%	1.14	0.0%	0.00	0.00	1.00	—	—
EUPH_MISS, reserve variants	HOLD	110%	110%	1.00	0.20%	0.00	0.00	1.00	—	—
DECAY, B0	ER4-2	80%	90%	1.00	0.0%	0.00	0.00	0.46	—	—
DECAY, B0	L2-R1	80%	90%	1.00	0.0%	0.00	0.00	0.46	—	—
DECAY, B0	HOLD	80%	90%	1.00	0.0%	0.00	0.00	0.46	—	—
DECAY, V	ER4-2	80%	≥120%	1.00	0.0%	0.00	0.00	1.00	0.580	0.016
DECAY, V	L2-R1	80%	≥120%	1.00	0.0%	0.00	0.00	1.00	0.580	0.016
DECAY, V	HOLD	80%	≥120%	1.00	0.0%	0.00	0.00	1.00	0.580	0.016
DECAY, reserve variants	ER4-2-B	80%	80%	1.00	0.15%	0.00	0.00	1.00	—	—
DECAY, reserve variants	ER4-2-B (bonus 0.25 yr)	80%	80%	1.00	0.15%	0.00	0.00	1.00	—	—
DECAY, reserve variants	ER4-2-B (bonus 1 yr)	80%	80%	1.00	0.15%	0.00	0.00	1.00	—	—
DECAY, reserve variants	ER4-2-D	80%	80%	1.00	0.15%	0.00	0.00	1.00	—	—
DECAY, reserve variants	HOLD	80%	80%	1.00	0.15%	0.00	0.00	1.00	—	—
WILD, B0	ER4-2	90%	105%	1.14	0.0%	0.00	0.00	0.46	—	—
WILD, B0	L2-R1	90%	105%	2.31	0.0%	0.00	0.00	0.46	—	—
WILD, B0	HOLD	90%	100%	1.00	0.0%	0.00	0.00	0.46	—	—
WILD, V	ER4-2	90%	≥120%	1.24	0.0%	0.00	0.86	0.99	0.386	0.012
WILD, V	L2-R1	90%	≥120%	2.00	0.0%	0.00	0.86	0.98	0.547	0.107
WILD, V	HOLD	90%	≥120%	1.00	0.0%	0.00	0.57	1.00	0.534	0.021
WILD, reserve variants	ER4-2-B	90%	95%	1.18	0.05%	0.29	0.29	1.00	—	—
WILD, reserve variants	ER4-2-B (bonus 0.25 yr)	90%	95%	1.19	0.05%	0.29	0.29	1.00	—	—
WILD, reserve variants	ER4-2-B (bonus 1 yr)	90%	95%	1.17	0.05%	0.29	0.29	1.00	—	—
WILD, reserve variants	ER4-2-D	90%	95%	1.39	0.0%	0.00	0.00	1.00	—	—
WILD, reserve variants	HOLD	90%	90%	1.00	0.15%	0.00	0.00	1.00	—	—

World, variant	Rule	c*	SC99 under this rule	G at c*	Ruin at c*	Bonuses per 48 months (months 0 to 168)	Up-years per 48 months (months 0 to 168)	Lowest year's real spending / first year (median)	V: Bitcoin sold, years 1-5	years 26-30
UPSHIFT, B0	ER4-2	120%	≥120%	0.83	0.0%	0.00	0.00	0.46	—	—
UPSHIFT, B0	L2-R1	120%	≥120%	1.63	0.0%	0.00	0.00	0.46	—	—
UPSHIFT, B0	HOLD	120%	≥120%	1.00	0.0%	0.00	0.00	0.46	—	—
UPSHIFT, V	ER4-2	120%	≥120%	0.76	0.0%	0.00	1.14	0.90	0.565	0.004
UPSHIFT, V	L2-R1	120%	≥120%	1.42	0.0%	0.00	1.14	0.86	0.614	0.000
UPSHIFT, V	HOLD	120%	≥120%	1.00	0.0%	0.00	0.57	0.91	0.621	0.006
UPSHIFT, reserve variants	ER4-2-B	120%	115%	0.74	3.9%	0.29	0.29	1.00	—	—
UPSHIFT, reserve variants	ER4-2-B (bonus 0.25 yr)	120%	115%	0.75	3.5%	0.29	0.29	1.00	—	—
UPSHIFT, reserve variants	ER4-2-B (bonus 1 yr)	120%	115%	0.70	5.0%	0.29	0.29	1.00	—	—
UPSHIFT, reserve variants	ER4-2-D	120%	115%	0.77	3.4%	0.00	0.00	1.00	—	—
UPSHIFT, reserve variants	HOLD	120%	≥120%	1.00	0.25%	0.00	0.00	1.00	—	—
BASE, B0	ER4-2	50%	60%	1.05	0.0%	0.00	0.00	0.46	—	—
BASE, B0	L2-R1	50%	60%	4.37	0.0%	0.00	0.00	0.46	—	—
BASE, B0	HOLD	50%	60%	1.00	0.0%	0.00	0.00	0.46	—	—
BASE, V	ER4-2	50%	≥120%	1.13	0.0%	0.00	1.71	1.00	0.314	0.016
BASE, V	L2-R1	50%	≥120%	4.06	0.0%	0.00	1.71	1.00	0.414	1.065
BASE, V	HOLD	50%	≥120%	1.00	0.0%	0.00	1.71	1.00	0.374	0.033
BASE, reserve variants	ER4-2-B	50%	55%	1.05	0.15%	0.57	0.57	1.00	—	—
BASE, reserve variants	ER4-2-B (bonus 0.25 yr)	50%	55%	1.06	0.10%	0.57	0.57	1.00	—	—
BASE, reserve variants	ER4-2-B (bonus 1 yr)	50%	55%	1.03	0.15%	0.57	0.57	1.00	—	—
BASE, reserve variants	ER4-2-D	50%	55%	1.12	0.10%	0.00	0.00	1.00	—	—
BASE, reserve variants	HOLD	50%	50%	1.00	0.25%	0.00	0.00	1.00	—	—
DAMPED, B0	ER4-2	80%	90%	1.01	0.0%	0.00	0.00	0.46	—	—
DAMPED, B0	L2-R1	80%	95%	1.61	0.0%	0.00	0.00	0.46	—	—
DAMPED, B0	HOLD	80%	90%	1.00	0.0%	0.00	0.00	0.46	—	—

World, variant	Rule	c*	SC99 under this rule	G at c*	Ruin at c*	Bonuses per 48 months (months 0 to 168)	Up-years per 48 months (months 0 to 168)	Lowest year's real spending / first year (median)	V: Bitcoin sold, years 1-5	years 26-30
DAMPED, V	ER4-2	80%	≥120%	1.05	0.0%	0.00	0.86	1.00	0.489	0.017
DAMPED, V	L2-R1	80%	≥120%	1.54	0.0%	0.00	0.86	1.00	0.495	0.074
DAMPED, V	HOLD	80%	≥120%	1.00	0.0%	0.00	0.57	1.00	0.497	0.026
DAMPED, reserve variants	ER4-2-B	80%	85%	1.02	0.15%	0.00	0.00	1.00	—	—
DAMPED, reserve variants	ER4-2-B (bonus 0.25 yr)	80%	85%	1.02	0.15%	0.00	0.00	1.00	—	—
DAMPED, reserve variants	ER4-2-B (bonus 1 yr)	80%	80%	1.01	0.15%	0.00	0.00	1.00	—	—
DAMPED, reserve variants	ER4-2-D	80%	85%	1.03	0.15%	0.00	0.00	1.00	—	—
DAMPED, reserve variants	HOLD	80%	80%	1.00	0.15%	0.00	0.00	1.00	—	—
FADING, B0	ER4-2	55%	65%	1.03	0.05%	0.00	0.00	0.46	—	—
FADING, B0	L2-R1	55%	65%	3.33	0.0%	0.00	0.00	0.46	—	—
FADING, B0	HOLD	55%	60%	1.00	0.05%	0.00	0.00	0.46	—	—
FADING, V	ER4-2	55%	≥120%	1.09	0.0%	0.00	1.71	1.00	0.346	0.033
FADING, V	L2-R1	55%	≥120%	3.09	0.0%	0.00	1.71	1.00	0.437	0.162
FADING, V	HOLD	55%	≥120%	1.00	0.0%	0.00	1.71	1.00	0.400	0.031
FADING, reserve variants	ER4-2-B	55%	55%	1.03	0.20%	0.57	0.29	1.00	—	—
FADING, reserve variants	ER4-2-B (bonus 0.25 yr)	55%	55%	1.04	0.20%	0.57	0.29	1.00	—	—
FADING, reserve variants	ER4-2-B (bonus 1 yr)	55%	55%	1.02	0.20%	0.57	0.29	1.00	—	—
FADING, reserve variants	ER4-2-D	55%	60%	1.10	0.15%	0.00	0.00	1.00	—	—
FADING, reserve variants	HOLD	55%	55%	1.00	0.25%	0.00	0.00	1.00	—	—
BROKEN, B0	ER4-2	25%	30%	1.10	0.0%	0.00	0.00	0.46	—	—
BROKEN, B0	L2-R1	25%	30%	3.32	0.0%	0.00	0.00	0.46	—	—
BROKEN, B0	HOLD	25%	30%	1.00	0.0%	0.00	0.00	0.46	—	—
BROKEN, V	ER4-2	25%	20%	1.21	1.2%	0.00	1.71	0.37	0.219	0.025
BROKEN, V	L2-R1	25%	20%	3.05	1.2%	0.00	1.71	0.81	0.334	0.058
BROKEN, V	HOLD	25%	20%	1.00	1.2%	0.00	1.71	0.27	0.278	0.019
BROKEN, reserve variants	ER4-2-B	25%	25%	1.12	0.25%	0.29	0.29	1.00	—	—

World, variant	Rule	c*	SC99 under this rule	G at c*	Ruin at c*	Bonuses per 48 months (months 0 to 168)	Up-years per 48 months (months 0 to 168)	Lowest year's real spending / first year (median)	V: Bitcoin sold, years 1-5	years 26-30
BROKEN, reserve variants	ER4-2-B (bonus 0.25 yr)	25%	25%	1.12	0.25%	0.29	0.29	1.00	—	—
BROKEN, reserve variants	ER4-2-B (bonus 1 yr)	25%	25%	1.11	0.25%	0.29	0.29	1.00	—	—
BROKEN, reserve variants	ER4-2-D	25%	25%	1.13	0.25%	0.00	0.00	1.00	—	—
BROKEN, reserve variants	HOLD	25%	25%	1.00	0.25%	0.00	0.00	1.00	—	—
NO_REVERSION, B0	ER4-2	50%	<5%	1.12	57.1%	0.00	0.00	0.00	—	—
NO_REVERSION, B0	L2-R1	50%	<5%	0.66	55.4%	0.00	0.00	0.00	—	—
NO_REVERSION, B0	HOLD	50%	<5%	1.00	58.8%	0.00	0.00	0.00	—	—
NO_REVERSION, V	ER4-2	50%	<5%	1.01	57.5%	0.00	1.14	0.00	0.564	0.000
NO_REVERSION, V	L2-R1	50%	<5%	0.58	57.5%	0.00	0.86	0.00	0.647	0.000
NO_REVERSION, V	HOLD	50%	<5%	1.00	57.5%	0.00	0.86	0.00	0.607	0.000
NO_REVERSION, reserve variants	ER4-2-B	50%	<5%	1.10	60.3%	0.00	0.00	0.00	—	—
NO_REVERSION, reserve variants	ER4-2-B (bonus 0.25 yr)	50%	<5%	1.11	60.2%	0.00	0.00	0.00	—	—
NO_REVERSION, reserve variants	ER4-2-B (bonus 1 yr)	50%	<5%	1.09	60.4%	0.00	0.00	0.00	—	—
NO_REVERSION, reserve variants	ER4-2-D	50%	<5%	1.08	60.7%	0.00	0.00	0.00	—	—
NO_REVERSION, reserve variants	HOLD	50%	<5%	1.00	62.2%	0.00	0.00	0.00	—	—

c* is the world's registered comparison spending: HOLD's SC99 under B1 (50% in NO_REVERSION). G, ruin and the spending columns are at c*; SC99 is each rule's own (≥120% and <5% are the grid's edges). An up-year is a year with real spending at least 10% above the year before; for the bonus variants it counts years lifted by a bonus.

Table A15. Decision under the sensitivities (month-end condition not re-applied)

Sensitivity	Winner	Co-winners	Recommendation	S by layer
intramonth swings x0.75	L2-R1	L2-R1	L2-R1	HOLD 0.00, BUF2 -1.12, ER2-2 0.08, ER4-2 0.06, ER2-1.5 0.07, ER4-1.5 -0.07, L2-R1 0.64, FK½ -1.62
intramonth swings x1.25	L2-R1	L2-R1	L2-R1	HOLD 0.00, BUF2 -1.12, ER2-2 0.09, ER4-2 0.06, ER2-1.5 0.08, ER4-1.5 -0.07, L2-R1 0.94, FK½ -1.62
cash 2.65%	L2-R1	L2-R1	L2-R1	HOLD 0.00, BUF2 -1.17, ER2-2 0.08, ER4-2 0.05, ER2-1.5 0.06, ER4-1.5 -0.09, L2-R1 0.75, FK½ -1.54
matched refit lines	L2-R1	L2-R1	L2-R1	HOLD 0.00, BUF2 -1.45, ER2-2 0.07, ER4-2 -0.01, ER2-1.5 0.03, ER4-1.5 -0.31, L2-R1 0.82, FK½ -1.40
BASE-CAL in place of BASE	L2-R1	L2-R1	L2-R1	HOLD 0.00, BUF2 -1.14, ER2-2 0.08, ER4-2 0.06, ER2-1.5 0.07, ER4-1.5 -0.07, L2-R1 0.74, FK½ -1.68

Table A16. Sensitivity runs: SC99, and G at c* by layer

World, start, variant	SC99: HOLD	L2-R1	ER4-2	G at c*: L2-R1	ER4-2	ER2-2	FK½	BUF2
BASE, 2.5x trend, reflection	100%	≥120%	≥120%	8.97	1.28	1.35	1.48	1.30
BASE, 2.5x trend, opposite start convention	70%	80%	75%	5.82	1.15	1.13	—	—
BASE, today, BASE-CAL (history's spread)	60%	65%	65%	3.41	1.06	1.06	0.32	0.75
BASE, today, cash 2.65%	50%	55%	55%	4.30	1.06	1.06	0.50	0.86
BASE, today, CPI + 1 point	50%	55%	50%	4.54	1.08	1.07	0.50	0.88
BASE, today, matched refit lines	50%	55%	50%	3.51	1.01	1.04	0.27	0.83
BASE, today, reflection	90%	90%	90%	5.24	1.09	1.14	0.14	0.24
BASE, today, intramonth swings x0.75	50%	55%	55%	3.45	1.06	1.06	—	—
BASE, today, intramonth swings x1.25	50%	55%	55%	6.19	1.07	1.06	—	—
BROKEN, 2.5x trend, opposite start convention	25%	30%	30%	4.16	1.13	1.07	—	—
BROKEN, today, cash 2.65%	25%	25%	25%	3.36	1.11	1.06	3.07	1.02

World, start, variant	SC99: HOLD	L2-R1	ER4-2	G at c*: L2-R1	ER4-2	ER2-2	FK½	BUF2
BROKEN, today, matched refit lines	25%	30%	25%	4.92	1.15	1.08	1.37	1.04
BROKEN, today, intramonth swings x0.75	25%	25%	25%	2.63	1.11	1.06	—	—
BROKEN, today, intramonth swings x1.25	25%	25%	25%	4.60	1.13	1.07	—	—
CALM_FLOOR, today, cash 2.65%	85%	85%	85%	1.00	1.00	1.00	0.29	0.40
CALM_FLOOR, today, CPI + 1 point	80%	80%	80%	1.00	1.00	1.00	0.25	0.53
CALM_FLOOR, today, matched refit lines	85%	90%	85%	1.37	1.12	1.11	0.53	0.13
CALM_FLOOR, today, intramonth swings x0.75	85%	85%	85%	1.00	1.00	1.00	—	—
CALM_FLOOR, today, intramonth swings x1.25	85%	85%	85%	1.01	1.01	1.00	—	—
CALM_MISS, today, cash 2.65%	100%	100%	100%	1.00	1.00	1.00	0.04	0.04
CALM_MISS, today, CPI + 1 point	95%	95%	95%	1.00	1.00	1.00	0.04	0.05
CALM_MISS, today, matched refit lines	100%	100%	100%	1.07	1.00	1.02	0.10	0.04
CALM_MISS, today, intramonth swings x0.75	100%	100%	100%	1.00	1.00	1.00	—	—
CALM_MISS, today, intramonth swings x1.25	100%	100%	100%	1.01	1.00	1.00	—	—
DAMPED, 2.5x trend, opposite start convention	110%	115%	110%	2.02	1.06	1.08	—	—
DAMPED, today, cash 2.65%	80%	85%	85%	1.61	1.02	1.03	0.10	0.37
DAMPED, today, matched refit lines	80%	85%	80%	1.61	0.95	1.01	0.23	0.25
DAMPED, today, intramonth swings x0.75	80%	85%	85%	1.46	1.02	1.03	—	—
DAMPED, today, intramonth swings x1.25	80%	85%	85%	1.97	1.03	1.04	—	—
DECAY, today, cash 2.65%	80%	80%	80%	1.00	1.00	1.00	0.60	0.51
DECAY, today, CPI + 1 point	75%	75%	75%	1.00	1.00	1.00	0.54	0.63
DECAY, today, matched refit lines	80%	80%	80%	1.00	1.00	1.00	0.81	0.25
DECAY, today, intramonth swings x0.75	80%	80%	80%	1.00	1.00	1.00	—	—
DECAY, today, intramonth swings x1.25	80%	80%	80%	1.00	1.00	1.00	—	—
EUPH_FLOOR, today, cash 2.65%	90%	110%	110%	2.25	1.38	1.35	0.08	0.24
EUPH_FLOOR, today, CPI + 1 point	85%	105%	105%	2.26	1.38	1.34	0.07	0.37
EUPH_FLOOR, today, matched refit lines	90%	≥120%	105%	2.51	1.33	1.34	0.23	0.13
EUPH_FLOOR, today, intramonth swings x0.75	90%	110%	110%	2.17	1.41	1.37	—	—

World, start, variant	SC99: HOLD	L2-R1	ER4-2	G at c*: L2-R1	ER4-2	ER2-2	FK½	BUF2
EUPH_FLOOR, today, intramonth swings x1.25	90%	110%	110%	2.52	1.41	1.37	—	—
EUPH_MISS, today, cash 2.65%	110%	≥120%	115%	2.10	1.10	1.21	0.04	0.04
EUPH_MISS, today, CPI + 1 point	105%	≥120%	110%	2.13	1.13	1.21	0.04	0.04
EUPH_MISS, today, matched refit lines	110%	≥120%	110%	2.07	0.96	1.14	0.05	0.04
EUPH_MISS, today, intramonth swings x0.75	110%	≥120%	≥120%	2.04	1.13	1.22	—	—
EUPH_MISS, today, intramonth swings x1.25	110%	≥120%	≥120%	2.34	1.13	1.22	—	—
FADING, 2.5x trend, opposite start convention	75%	80%	80%	4.43	1.12	1.12	—	—
FADING, today, cash 2.65%	55%	60%	55%	3.29	1.04	1.05	0.34	0.82
FADING, today, matched refit lines	55%	60%	55%	2.77	0.98	1.03	0.20	0.77
FADING, today, intramonth swings x0.75	55%	60%	55%	2.70	1.05	1.05	—	—
FADING, today, intramonth swings x1.25	55%	60%	55%	4.50	1.05	1.06	—	—
NO_REVERSION, 2.5x trend, opposite start convention	<5%	<5%	<5%	0.37	1.13	1.04	—	—
NO_REVERSION, today, cash 2.65%	<5%	<5%	<5%	0.65	1.10	1.03	0.43	1.01
NO_REVERSION, today, matched refit lines	<5%	<5%	<5%	0.65	1.12	1.04	0.34	1.01
NO_REVERSION, today, intramonth swings x0.75	<5%	<5%	<5%	0.62	1.10	1.03	—	—
NO_REVERSION, today, intramonth swings x1.25	<5%	<5%	<5%	0.77	1.13	1.04	—	—
UPSHIFT, today, cash 2.65%	≥120%	≥120%	115%	1.65	0.74	1.05	0.05	0.05
UPSHIFT, today, matched refit lines	≥120%	≥120%	110%	2.37	0.46	0.99	0.05	0.05
UPSHIFT, today, intramonth swings x0.75	≥120%	≥120%	115%	1.54	0.77	1.04	—	—
UPSHIFT, today, intramonth swings x1.25	≥120%	≥120%	115%	2.04	0.77	1.08	—	—
WILD, today, cash 2.65%	90%	95%	95%	2.38	1.18	1.22	0.06	0.22
WILD, today, CPI + 1 point	85%	90%	90%	2.42	1.19	1.21	0.06	0.34
WILD, today, matched refit lines	90%	100%	95%	2.68	1.11	1.22	0.17	0.10
WILD, today, intramonth swings x0.75	90%	95%	95%	2.25	1.19	1.22	—	—
WILD, today, intramonth swings x1.25	90%	95%	95%	2.76	1.21	1.23	—	—

≥120% and <5% are the grid's edges. — : the layer was not part of that run.

Table A16b. FK½ with gold or stocks (statistical worlds, today)

World, returns	Rule	SC99	HOLD SC99	G at c*	Ruin at c*
BASE, sample partner returns	FK½	50%	50%	0.51	0.40%
BASE, sample partner returns	FK½-G	45%	50%	0.49	1.5%
BASE, sample partner returns	FK½-S	55%	50%	0.58	0.0%
BASE, cut partner returns	FK½	50%	50%	0.51	0.40%
BASE, cut partner returns	FK½-G	45%	50%	0.44	1.7%
BASE, cut partner returns	FK½-S	40%	50%	0.27	5.3%
BROKEN, sample partner returns	FK½	40%	25%	3.21	0.0%
BROKEN, sample partner returns	FK½-G	40%	25%	3.15	0.0%
BROKEN, sample partner returns	FK½-S	40%	25%	4.53	0.0%
BROKEN, cut partner returns	FK½	40%	25%	3.21	0.0%
BROKEN, cut partner returns	FK½-G	40%	25%	2.94	0.0%
BROKEN, cut partner returns	FK½-S	40%	25%	2.83	0.0%
DAMPED, sample partner returns	FK½	35%	80%	0.08	93.3%
DAMPED, sample partner returns	FK½-G	30%	80%	0.06	91.8%
DAMPED, sample partner returns	FK½-S	40%	80%	0.04	95.5%
DAMPED, cut partner returns	FK½	35%	80%	0.08	93.3%
DAMPED, cut partner returns	FK½-G	25%	80%	0.06	95.0%
DAMPED, cut partner returns	FK½-S	25%	80%	0.03	99.9%
FADING, sample partner returns	FK½	45%	55%	0.34	8.6%
FADING, sample partner returns	FK½-G	35%	55%	0.32	15.1%
FADING, sample partner returns	FK½-S	50%	55%	0.40	1.2%
FADING, cut partner returns	FK½	45%	55%	0.34	8.6%
FADING, cut partner returns	FK½-G	35%	55%	0.29	20.0%
FADING, cut partner returns	FK½-S	35%	55%	0.16	44.1%
NO_REVERSION, sample partner returns	FK½	0%	0%	0.45	69.4%
NO_REVERSION, sample partner returns	FK½-G	0%	0%	0.48	68.1%
NO_REVERSION, sample partner returns	FK½-S	0%	0%	0.62	52.1%
NO_REVERSION, cut partner returns	FK½	0%	0%	0.45	69.4%
NO_REVERSION, cut partner returns	FK½-G	0%	0%	0.45	70.1%
NO_REVERSION, cut partner returns	FK½-S	0%	0%	0.39	70.6%

Table A17. World diagnostics (month-end closes)

World	Months below the floor	Longest stay, median (months)	90th percentile	1st percentile of price / trend	5th percentile
CALM_FLOOR	3.2%	3	5	0.40	0.43
CALM_MISS	0.08%	0	1	0.48	0.59

World	Months below the floor	Longest stay, median (months)	90th percentile	1st percentile of price / trend	5th percentile
EUPH_FLOOR	3.2%	3	5	0.40	0.43
EUPH_MISS	0.07%	0	1	0.52	0.60
DECAY	4.3%	4	9	0.39	0.42
WILD	2.4%	3	8	0.39	0.45
UPSHIFT	0.07%	0	1	0.50	0.67
BASE	16.3%	19	37	0.21	0.29
DAMPED	0.8%	0	6	0.43	0.50
FADING	5.2%	8	23	0.29	0.42
BROKEN	78.0%	132	213	0.02	0.03
NO_REVERSION	49.2%	104	337	0.00	0.00
BASE-CAL (sensitivity)	10.4%	12	27	0.27	0.35

History 2012–2026: 2.2% of months below the floor; longest stay 66 days (about 2 months); 1st and 5th percentiles of P/T 0.40x and 0.44x (Paper 21 Section 2.7).

Table A18. History (walk-forward lines): highest coverage survived to 2026-10, and Bitcoin-equivalent left at 80%

Start	HOLD	BUF2	ER2-2	ER4-2	ER2-1.5	ER4-1.5	L2-R1	FK½	LEV	PB16 (F011's terms)
2012-11 (flagged)	145% / 0.46	20% / 0.00	70% / 0.00	45% / 0.00	55% / 0.00	35% / 0.00	65% / 0.00	55% / 0.00	170% / 0.63	95% / 0.10
2013-11 (flagged)	85% / 0.11	150% / 0.47	165% / 0.52	135% / 0.43	155% / 0.49	130% / 0.39	185% / 1.34	175% / 0.27	100% / 0.29	145% / 1.41
2016-07	110% / 0.28	45% / 0.00	100% / 0.21	80% / 0.02	85% / 0.09	65% / 0.00	110% / 0.32	70% / 0.00	140% / 0.51	145% / 0.76
2017-12	155% / 0.49	175% / 0.56	210% / 0.62	165% / 0.52	200% / 0.61	160% / 0.51	≥300% / 1.64	240% / 0.59	180% / 0.59	≥300% / 1.88
2020-05	140% / 0.44	90% / 0.15	160% / 0.50	135% / 0.43	140% / 0.44	115% / 0.31	145% / 0.49	85% / 0.04	155% / 0.56	155% / 0.60
2021-10	115% / 0.31	175% / 0.58	180% / 0.56	175% / 0.55	180% / 0.56	175% / 0.55	150% / 0.62	185% / 0.75	130% / 0.50	180% / 0.93
2024-04	250% / 0.68	215% / 0.67	250% / 0.68	250% / 0.68	250% / 0.68	250% / 0.68	250% / 0.68	225% / 0.64	245% / 0.69	250% / 0.69
2025-07	≥300% / 0.78	≥300% / 0.91	≥300% / 0.78	≥300% / 0.78	≥300% / 0.78	≥300% / 0.78	≥300% / 0.78	≥300% / 1.12	≥300% / 0.78	≥300% / 0.78

Each cell: highest coverage survived / Bitcoin-equivalent left at 80% coverage. Months and start multiples are in Table 11.

Table A18b. History at 80% coverage: lowest real wealth against the start, and largest real drawdown

Start	HOLD	BUF2	ER2-2	ER4-2	ER2-1.5	ER4-1.5	L2-R1	FK½	LEV	PB16 (F011's terms)
2012-11 (flagged)	0.95 / 83%	ruined	ruined	ruined	ruined	ruined	ruined	ruined	0.95 / 83%	0.95 / 88%
2013-11 (flagged)	0.10 / 90%	0.22 / 78%	0.22 / 78%	0.35 / 74%	0.22 / 78%	0.35 / 74%	0.32 / 68%	0.47 / 53%	0.08 / 92%	0.18 / 82%
2016-07	0.85 / 79%	ruined	0.85 / 74%	0.85 / 77%	0.85 / 74%	ruined	0.85 / 68%	ruined	0.85 / 79%	0.85 / 63%
2017-12	0.20 / 80%	0.30 / 74%	0.30 / 74%	0.40 / 71%	0.30 / 74%	0.40 / 71%	0.46 / 67%	0.59 / 43%	0.20 / 80%	0.49 / 63%
2020-05	0.92 / 80%	0.72 / 71%	0.92 / 73%	0.92 / 65%	0.92 / 73%	0.92 / 63%	0.92 / 73%	0.24 / 85%	0.92 / 81%	0.92 / 71%
2021-10	0.19 / 81%	0.30 / 70%	0.30 / 70%	0.42 / 58%	0.30 / 70%	0.42 / 58%	0.26 / 74%	0.51 / 49%	0.18 / 82%	0.27 / 73%
2024-04	0.68 / 56%	0.71 / 48%	0.68 / 56%	0.68 / 56%	0.68 / 56%	0.68 / 56%	0.68 / 56%	0.67 / 40%	0.67 / 57%	0.67 / 57%
2025-07	0.42 / 58%	0.52 / 48%	0.42 / 58%	0.42 / 58%	0.42 / 58%	0.42 / 58%	0.42 / 58%	0.63 / 37%	0.41 / 59%	0.41 / 59%

Each cell: lowest real wealth as a multiple of the start / largest real drawdown. The other sweet-spot measures at 80% are saved in `analysis/f011_history.json`; those read at month 144 or 360 do not apply to windows shorter than that.