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RESEARCH REPORT

OCTOBER 2026

# Gold DCA Optimization: 10-Year Leverage Study

## A 10-year study of leverage in gold DCA with monthly contributions of $250

STUDY SCOPE

| $250 | 10 years | 1X-5X |
| --- | --- | --- |
| Monthly DCA contribution | 120 contributions · Oct 2016-Sep 2026 | Leverage levels in the main test grid |

**Research objective**

To evaluate how different leverage levels change modeled returns, drawdown risk, and the capacity to remain above Maintenance Margin under a consistent set of assumptions.

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01 · Executive Summary

# Key Findings

This study models gold DCA with **$250 contributed monthly for 120 contributions**, for cumulative contributions of **$30,000**. Results are compared across 1X, 1.5X, 2X, 2.5X, 3X, 4X, and 5X leverage under the same assumptions, considering both modeled return and margin-related risk.

**$30,000**
cumulative contributions over 10 years

**23.73%**
Stress Benchmark used in the margin analysis

**2.5X**
Highest leverage in the Main Grid passing every MM scenario

**Primary finding:** Under the assumptions and criteria used in this study, **2.5X is the highest leverage level in the main test grid that passes the 23.73% Stress Benchmark across all Maintenance Margin scenarios tested: 8%, 10%, 12%, and 15%.** This does not mean that 2.5X is the safest leverage level or the mathematical maximum leverage possible.

### 2X: larger Safety Buffer

Model-based XIRR is approximately **23.74%**. At 15% MM, the Safety Buffer is approximately **+17.44 percentage points**, leaving materially more room above the Stress Benchmark than 2.5X.

### 2.5X: highest main-grid level passing all cases

Estimated terminal net portfolio value is approximately **$123,167**. It passes all four Maintenance Margin scenarios, while 3X fails the 15% MM case.

**Important limitation:** Terminal values, profits, and XIRR are **model-based Hybrid Monthly Estimates**. They are not a full daily historical backtest using licensed LBMA data and do not represent the realized return of any specific futures or leveraged product. Performance results should therefore be interpreted primarily as structural comparisons rather than forecasts.

## Higher modeled returns from leverage must be evaluated alongside a declining Margin Safety Buffer.

# Model Structure and Core Assumptions

The study models monthly DCA from October 2016 through September 2026, for 120 contributions, with the portfolio valued as of 7 October 2026. Total cumulative contributions equal $30,000.

## Dollar presentation and model basis

For this English edition, all displayed monetary values are normalized to a **$250 monthly contribution**. Because the model is linear in contribution size, monetary results are rebased proportionally while percentage returns, XIRR, Drawdown Tolerance, and margin-stress results remain unchanged. This is a presentation rebasing of the source model, not a new dollar-denominated daily spot-gold backtest. World Gold Council and LBMA materials are used to cross-check market context and document data limitations.

## Comparative leverage model

- **Static leverage per monthly tranche:** each $250 contribution creates exposure equal to $250 × leverage.
- The debt associated with each tranche remains fixed; gains from earlier tranches are not re-leveraged.
- Financing/carry is assumed at **4% per year** on exposure above 1X as a model assumption.
- Fees and slippage are set to zero in the primary performance table because the study does not represent a specific broker or contract.
- Maintenance Margin is tested at 8%, 10%, 12%, and 15% as **sensitivity scenarios**, not as margin rates claimed to apply to a particular broker, TFEX contract, or product.

$$\text{Drawdown Tolerance: } d^* = (1/L - m) / (1 - m)$$

**Definitions:** L = leverage at the start of the stress event, m = Maintenance Margin, and d* = the gold-price decline that reduces the equity ratio to the Maintenance Margin threshold under this theoretical model. In an actual DCA portfolio, leverage can change as prices, costs, and additional contributions change over time.

**Interpretation caution:** This equation does not replicate the margin-management rules of an actual broker or clearing house, which may change margin intraday, reduce positions, or liquidate before the theoretical threshold is reached.

## Stress Benchmark used in the analysis

The source study identifies a **23.73%** decline between two chronologically ordered historical observations in 2026. This English edition retains that percentage only as a stress magnitude for the margin equations; the source-price levels are not reproduced because the monetary presentation has been normalized to dollars.

**Stress Benchmark limitation:** The chronological order of these two observations can be verified from Gold Traders Association history, but this report does not use a complete 10-year daily series to establish that 23.73% was the maximum drawdown over the full study period. It is therefore described as a **Stress Benchmark** for margin analysis, not as the “10-year Maximum Drawdown.”

## 03 · Main Simulation Results

# Results for $30,000 of cumulative contributions across leverage levels

| Leverage | Cumulative DCA contributions | Terminal net value* | Modeled profit* | XIRR* | DD Tol. @ MM15% | Safety Buffer | Stress Test |
|---|---|---|---|---|---|---|---|
| **1X** | $30,000 | $70,908 | $40,908 | 16.36% | — | — | Baseline |
| **1.5X** | $30,000 | $88,328 | $58,328 | 20.42% | 60.78% | +37.05 pp | Pass 4/4 |
| **2X** | **$30,000** | **$105,747** | **$75,747** | **23.74%** | **41.18%** | **+17.44 pp** | **Pass 4/4** |
| **2.5X** | **$30,000** | **$123,167** | **$93,167** | **26.55%** | **29.41%** | **+5.68 pp** | **Pass 4/4** |
| **3X** | $30,000 | $140,586 | $110,586 | 29.00% | 21.57% | -2.17 pp | Pass 3/4 |
| **4X** | $30,000 | $175,425 | $145,425 | 33.10% | 11.76% | -11.97 pp | Fail 0/4 |
| **5X** | $30,000 | $210,264 | $180,264 | 36.47% | 5.88% | -17.85 pp | Fail 0/4 |

* Model-based Hybrid Monthly Estimate under the 4% annual carry assumption. Not a full daily historical backtest and not the realized return of a tradable product. XIRR depends on the assumed timing of cash flows in the model. · pp = percentage points. · "Pass 4/4" means the result passes the 8%, 10%, 12%, and 15% MM scenarios. These are nested conditions, not probabilities or four independent events.

**Dollar normalization:** Monetary values in this English edition are proportionally rebased to a $250 monthly contribution ($30,000 total). Percentage-based metrics are unchanged.

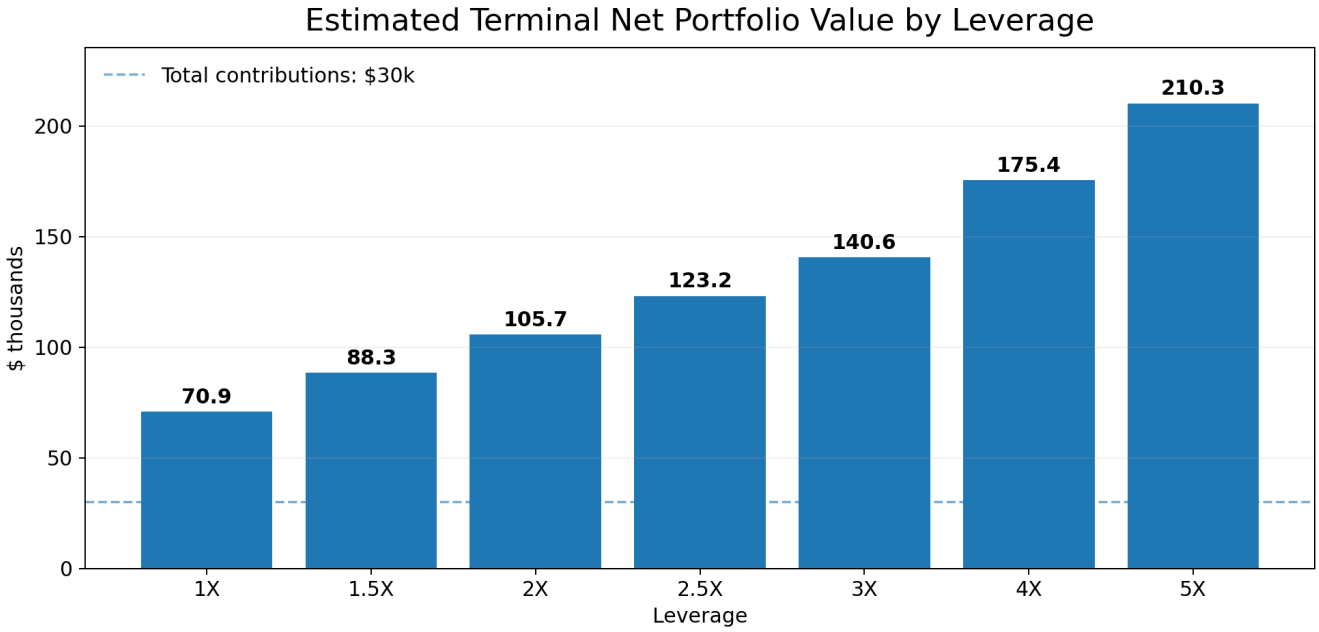



Figure 1 · Estimated terminal net value with the same $30,000 of cumulative DCA contributions. Higher leverage increases modeled terminal net value, but the result must be evaluated together with margin risk. · Source: DCAMaster calculations under the stated model assumptions.

## 04 · Return and Profit

# Modeled return rises as Margin Safety Buffer declines

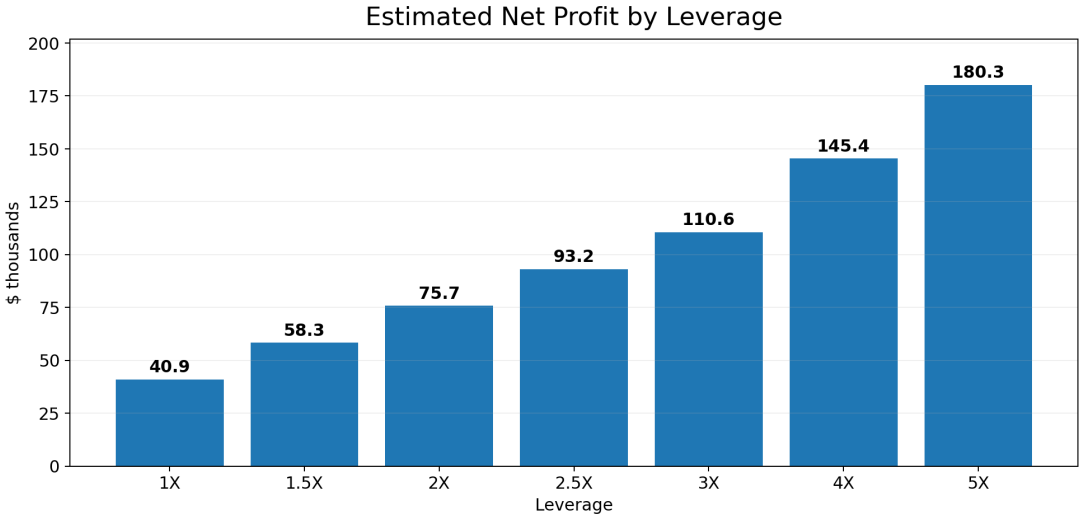



Figure 2 · Modeled profit rises approximately linearly with leverage because the model applies static leverage separately to each monthly tranche. · Source: DCAMaster calculations under the stated model assumptions.

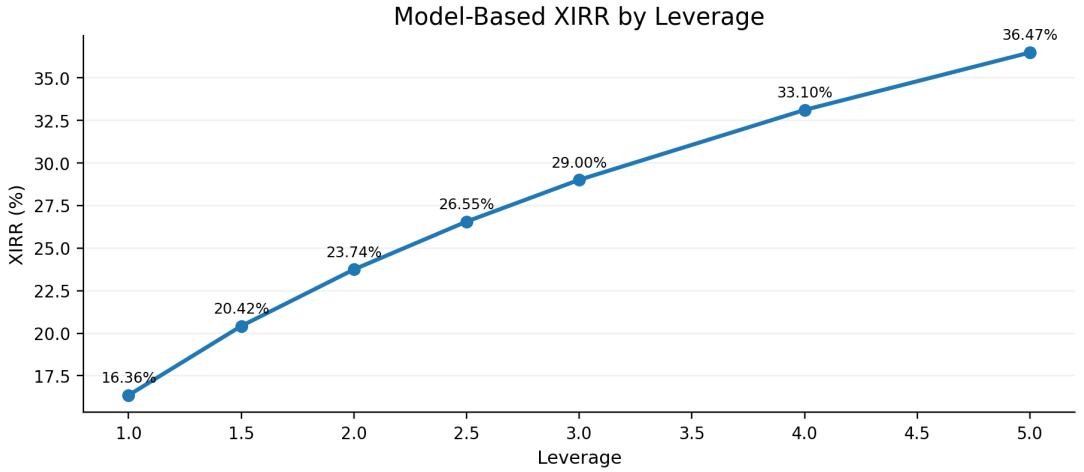



Figure 3 · XIRR is a money-weighted return measure suited to DCA cash flows more directly than the CAGR of a single lump-sum investment. In this report, however, XIRR is still derived from the Hybrid Monthly Estimate and depends on the cash-flow timing assumptions. · Source: DCAMaster calculations.

**Key trade-off:** Increasing leverage from 2X to 2.5X raises model-based XIRR from approximately **23.74% to 26.55%**, an increase of 2.81 percentage points, while the Safety Buffer at 15% MM falls from **17.44 to 5.68 percentage points**, a decline of 11.76 percentage points. This illustrates a clear trade-off between estimated return and margin headroom; the magnitudes of these two different metrics should not be compared directly.

## 05 · Margin Risk Stress Test

# Drawdown Tolerance and Safety Buffer at 15% MM

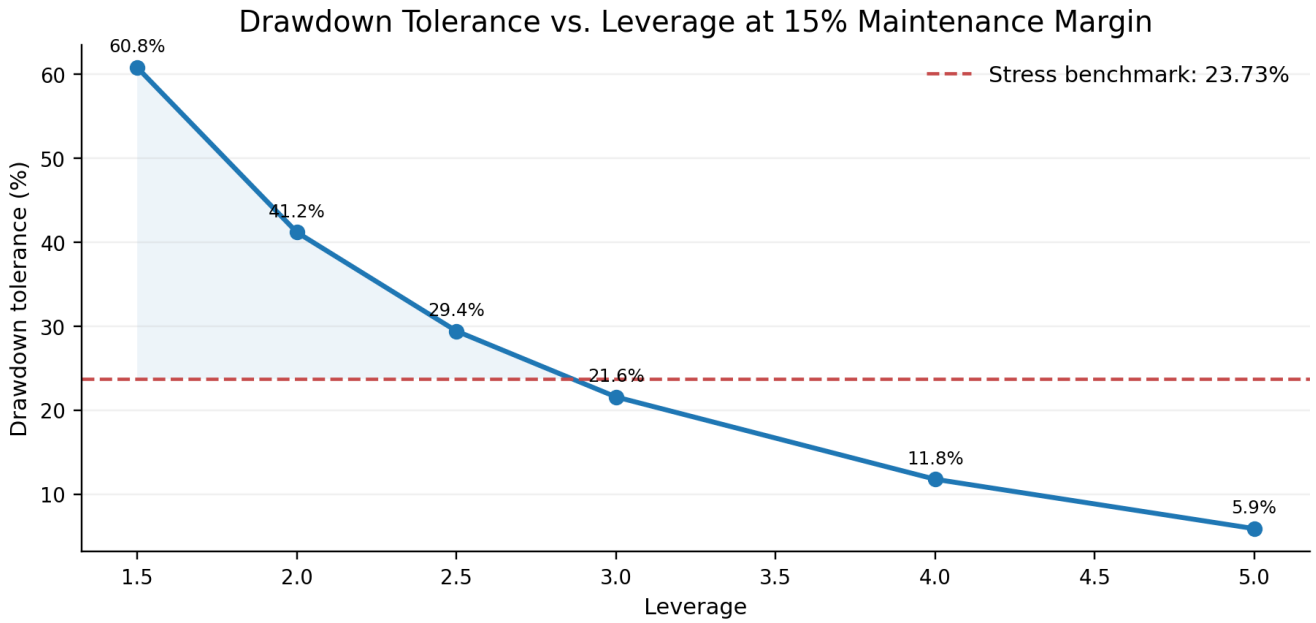



Figure 4 · The 23.73% reference line is the Stress Benchmark used in this study. At 15% MM, the 3X Drawdown Tolerance is below the benchmark and therefore fails this case. · Source: DCAMaster calculations from the stated margin equation.

### 2X

PASS Drawdown Tolerance ≈ 41.18%
Safety Buffer ≈ +17.44 percentage points

### 2.5X

PASS Drawdown Tolerance ≈ 29.41%
Safety Buffer ≈ +5.68 percentage points

### 3X

CONDITIONAL Drawdown Tolerance ≈ 21.57% at 15% MM, below the 23.73% Stress Benchmark.

### 4X-5X

FAIL Drawdown Tolerance is below the Stress Benchmark in every Maintenance Margin scenario tested.

**Interpretation:** A positive Safety Buffer means the model retains headroom above the Stress Benchmark before reaching Maintenance Margin. A negative value means the benchmark exceeds the modeled tolerance at that leverage level.

## 06 · Sensitivity Analysis

# Effect of Maintenance Margin on the leverage boundary

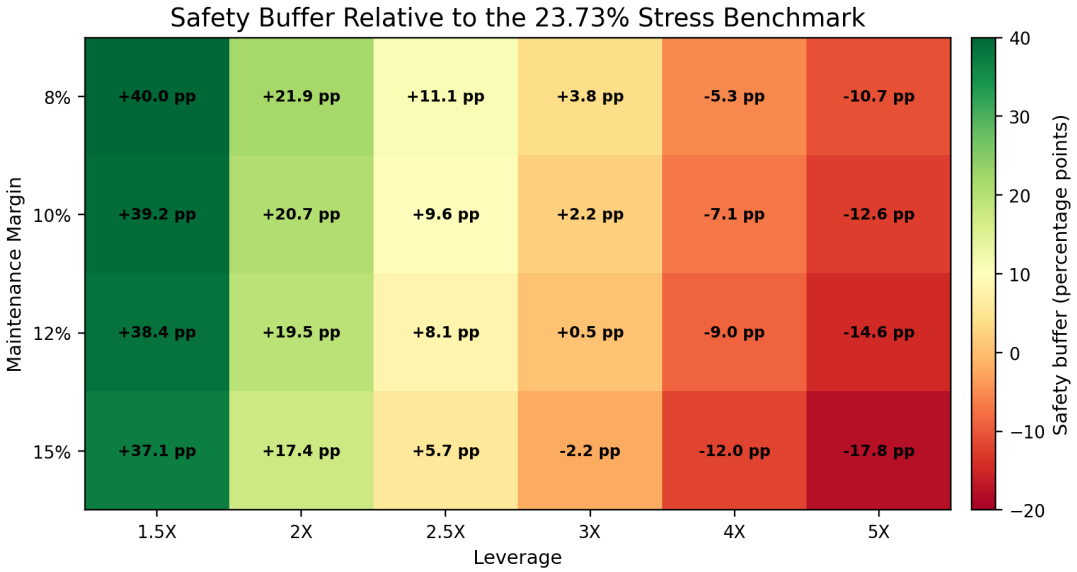



Figure 5 · Safety Buffer for each leverage × Maintenance Margin combination relative to the 23.73% Stress Benchmark. Positive values pass the theoretical threshold; negative values fail. · Source: DCAMaster calculations.

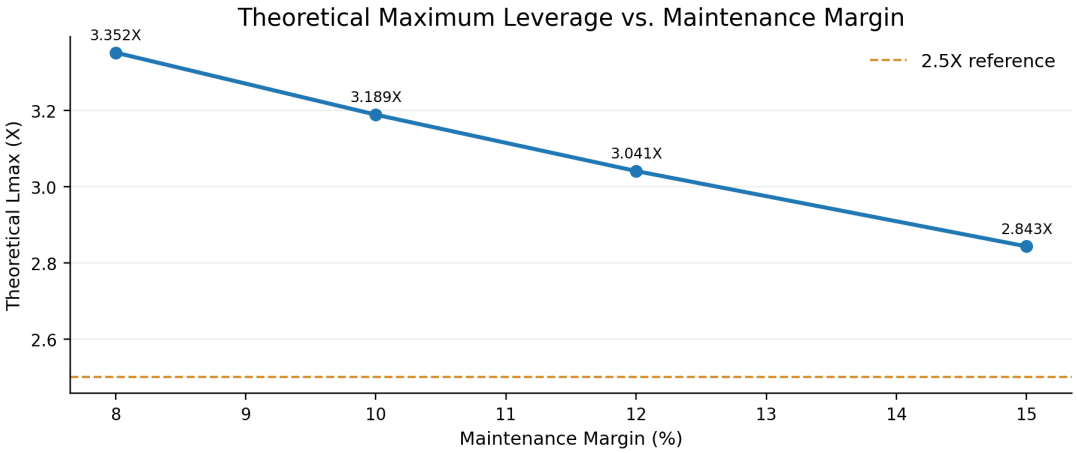
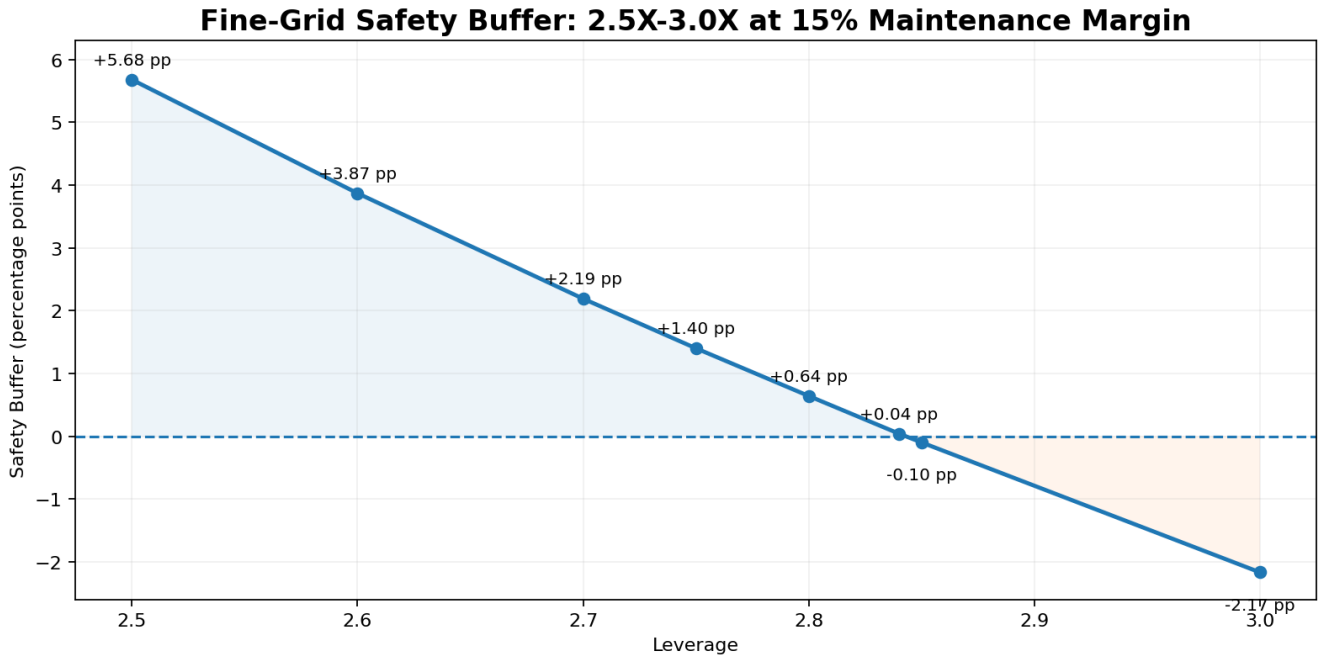



Figure 6 · As Maintenance Margin rises, the theoretical maximum leverage that can absorb the same Stress Benchmark falls. At 15% MM, the boundary is approximately 2.843X, the most restrictive case in this sensitivity set. · Source: DCAMaster calculations.

**Caution:** Theoretical Lmax is a boundary implied by the equation, not a leverage level that should be used directly. Operating too close to the boundary leaves little room for intraday moves, price gaps, slippage, margin hikes, or forced-liquidation rules in actual products.

## 07 · Fine-grid Analysis

# Detailed examination of the 2.5X-3.0X range




| Leverage | DD Tolerance @ MM15% | Buffer vs. 23.73% | Result |
|---|---|---|---|
| **2.50X** | **29.41%** | **+5.68 pp** | **Pass** |
| **2.60X** | 27.60% | +3.87 pp | Pass |
| **2.70X** | 25.93% | +2.19 pp | Pass |
| **2.75X** | 25.13% | +1.40 pp | Pass |
| **2.80X** | 24.37% | +0.64 pp | Pass |
| **2.84X** | 23.78% | +0.04 pp | Near boundary |
| **2.85X** | 23.63% | -0.10 pp | Fail |
| **3.00X** | 21.57% | -2.17 pp | Fail |

The fine-grid results show that 2.5X is not the mathematical ceiling. Under the model, 2.75X and 2.80X still pass the 23.73% Stress Benchmark at 15% MM. However, their Safety Buffers narrow to only 1.40 and 0.64 percentage points, respectively, leaving very little allowance for data error or risks not captured by a monthly model, including intraday moves, price gaps, slippage, or margin changes.

## 08 · Optimization Analysis

# Evaluating modeled return together with Margin Robustness

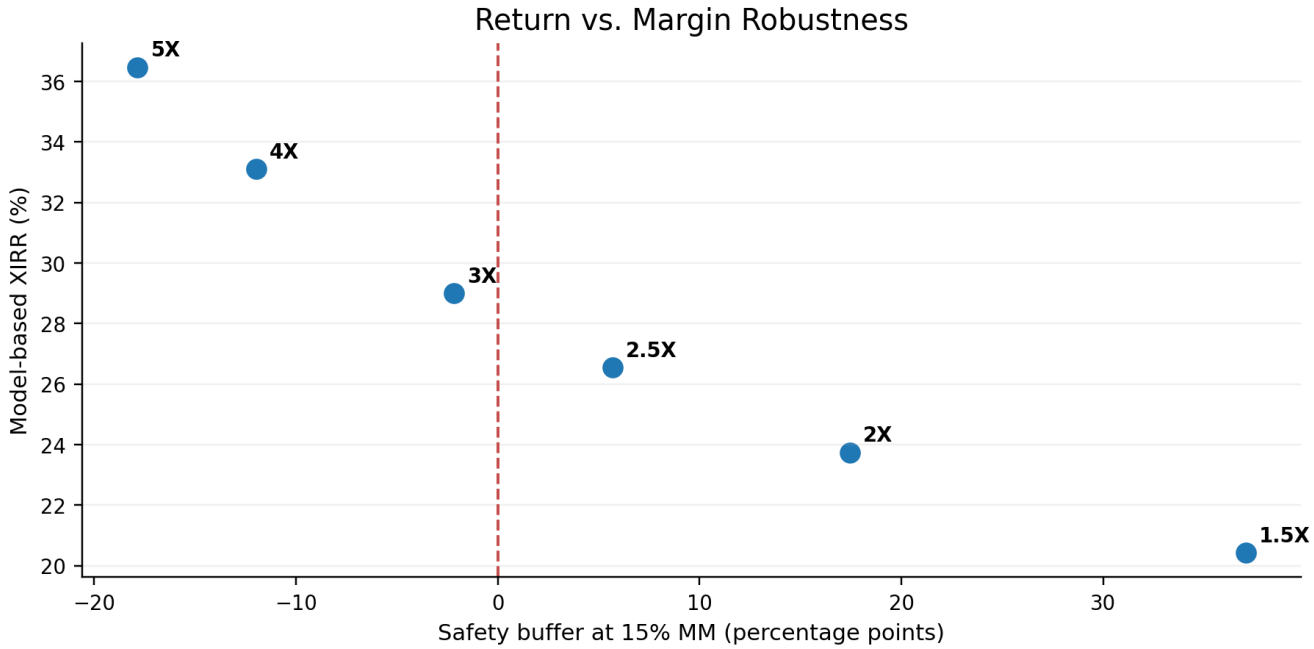



Figure 7 · Safety Buffer at 15% MM is used as a proxy for margin robustness, while model-based XIRR is used as a return proxy. Points with Safety Buffer below zero fail the 23.73% Stress Benchmark in this case. · Source: DCAMaster calculations.

### 1.5X-2X

**Lower-to-moderate leverage**
Increases exposure per DCA contribution relative to the baseline while retaining a larger Safety Buffer than the upper leverage levels.

### 2X-2.5X

**Clear trade-off zone in the Main Grid**
Modeled return increases and both 2X and 2.5X pass all specified MM scenarios, but Safety Buffer falls materially as leverage rises.

### 3X

**Higher-risk conditional level**
Modeled return increases further, but the 15% Maintenance Margin case fails.

### 4X-5X

**Fail the Stress Benchmark in this test set**
Both fail every Maintenance Margin scenario specified in the study.

**Study conclusion: 2.5X** is the highest leverage level in the Main Grid that passes every Maintenance Margin scenario. The **2X-2.5X** range displays the return-versus-margin-buffer trade-off clearly. Because the study does not pre-specify an objective function, it does not claim that a single leverage level is universally optimal.

09 · Interpretation of Results

# Points to consider when interpreting leverage

### Profit should not be viewed in isolation

4X-5X produce higher modeled profits, but they fail the Stress Benchmark used in the study. Profit alone is therefore insufficient to establish that these levels are more efficient.

### Safety Buffer is an important risk dimension

Safety Buffer measures the headroom between the Stress Benchmark and the Maintenance Margin boundary. The lower the buffer, the more sensitive the result becomes to events more severe than the historical example.

### 3X has a different risk profile from 2.5X

Moving from 2.5X to 3X does more than increase modeled return: the result changes from passing all 4/4 MM scenarios to passing only 3/4.

## Questions to check before applying the concept to a real product

- What are the actual Initial Margin and Maintenance Margin requirements, and can they be raised during volatile markets?
- Does mark-to-market and forced liquidation operate intraday or at the end of the day?
- What are the actual financing, basis, roll, commission, and slippage costs?
- How much reserve capital is available for Variation Margin or a Margin Call?
- How would the outcome change if a future drawdown were more severe than the Stress Benchmark used here?

**Application limitation:** Passing the Stress Test means passing only under the dataset, assumptions, and rules defined in this study. It is not a guarantee that Margin Calls or Forced Liquidation will be avoided in the future.

# Scope of the Findings

- **Not a full daily LBMA backtest:** historical benchmark data are subject to licensing and redistribution restrictions, so this report does not claim to replicate a complete licensed daily LBMA benchmark history.
- **Hybrid Monthly Estimate:** the performance table uses monthly data and proxies to study the scale of outcomes and trade-offs; it is not a transaction-level audit trail.
- **Path dependency:** a monthly model cannot fully capture intraday gaps, volatility clustering, or the exact timing of forced liquidation.
- **Margin requirements can change:** futures, CFDs, and leveraged products may raise Initial or Maintenance Margin during periods of high volatility.
- **Costs matter:** 4% annual carry is an assumption. Actual fees, slippage, roll/basis, and taxes may materially change outcomes.
- **Gold products differ structurally:** physical gold, futures, CFDs, and leveraged ETFs differ in basis, contract size, settlement, financing, and margin mechanics.
- **A 10-year window does not cover all tail risk:** passing the stress conditions observed in this sample cannot establish resilience to more severe future drawdowns.

**Appropriate use:** This study is intended to help explain the relationship between higher modeled returns from leverage and lower margin robustness. It should not be used as personalized investment advice or as an automatic rule for selecting a leverage level.

## Conclusion

**Under the criteria and assumptions of this study, 2.5X is the highest leverage level in the Main Test Grid that passes every specified Maintenance Margin scenario. The 2X-2.5X range clearly illustrates the trade-off between modeled return and Margin Buffer, but this is not evidence that the range is optimal for every objective.**

3X still produces a higher modeled return, but it fails the 15% Maintenance Margin case. 4X-5X fail the Stress Benchmark in every Maintenance Margin scenario tested. The findings therefore support evaluating leverage through Drawdown Tolerance and Safety Buffer together with modeled profit, rather than profit alone.

## 11 · Data Sources and Disclaimer

# Primary References

**Gold Traders Association** — historical gold prices and average gold prices
https://gtadmin.goldtraders.or.th/updatepricelist/

**World Gold Council — Gold Prices and Market Data**
https://www.gold.org/goldhub/data/gold-prices

**London Bullion Market Association (LBMA) — LBMA Gold Price**
https://www.lbma.org.uk/prices-and-data/lbma-gold-price

**London Bullion Market Association (LBMA) — Precious Metal Prices / Historical Data Access**
https://www.lbma.org.uk/prices-and-data/lbma-precious-metal-prices

## Data note

World Gold Council and LBMA are important reference sources for international gold pricing, but access to parts of historical LBMA Gold Price data is subject to benchmark licensing conditions. This report therefore states those limitations explicitly and does not claim that the performance table is a simulation of a full licensed daily LBMA dataset.

**Disclaimer**
This report is prepared solely for education and data analysis. It is not investment advice and is not a solicitation to buy or sell securities, futures contracts, or any other financial product. Leverage can amplify both gains and losses. Maintenance Margin and product requirements may change. Historical tests do not guarantee future results, and model-based estimates depend on the stated assumptions, which may differ materially from the outcome of an actual product.

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