http://dx.doi.org/10.18623/rvd.v23.n1.3914

COMPARATIVE PRODUCTIVITY ANALYSIS OF MARTINGALE AND LINEAR AVERAGING STRATEGIES IN LOCO LONDON GOLD ROLLING CONTRACTS (XUL10) WITHIN INDONESIA'S ALTERNATIVE TRADING SYSTEM

ANÁLISE COMPARATIVA DE PRODUTIVIDADE DAS ESTRATÉGIAS MARTINGALE E MÉDIA LINEAR EM CONTRATOS ROLANTES DE OURO LOCO LONDON (XUL10) NO ÂMBITO DO SISTEMA ALTERNATIVO DE NEGOCIAÇÃO DA INDONÉSIA

Article received on: 8/29/2025
Article accepted on: 11/28/2025

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The authors declare that there is no conflict of interest

Abstract
The high volatility of the derivative market—particularly in the Loco London Gold Rolling Contract (XUL10) traded within Indonesia's Alternative Trading System (ATS)—necessitates the use of adaptive and measurable position-management strategies. This study evaluates two contrasting averaging-down approaches: Martingale, based on exponential lot increments, and Linear Averaging, based on linear lot increments. The objective is to compare their effectiveness, measured through liquidity and recovery speed, and their efficiency, measured through initial capital endurance. A quantitative comparative method is applied through historical backtesting of XAU/USD price data from 2024 to mid-2025 using target iterations of 30, 40, and 50 points. Performance is assessed using multidimensional indicators such as Profit Factor (PF), Return on Margin (ROM), Efficiency Ratio

Resumo
A alta volatilidade do mercado de derivativos — especialmente no contrato Loco London Gold Rolling (XUL10), negociado no Sistema de Negociação Alternativa (ATS) da Indonésia — exige o uso de estratégias de gestão de posições que sejam adaptativas e mensuráveis. Este estudo avalia duas abordagens contrastantes de averaging down: Martingale, baseada no incremento exponencial de lotes, e Averaging Linear, baseada no incremento linear. O objetivo é comparar a eficácia dessas estratégias, medida pela velocidade de liquidez e recuperação, e sua eficiência, medida pela resistência do capital inicial. A pesquisa utiliza um método comparativo quantitativo por meio de backtesting com dados históricos de preços do XAU/USD entre 2024 e meados de 2025, empregando metas de 30, 40 e 50 pontos. O desempenho é analisado a partir de indicadores

(ER), and capital endurance analysis through margin-call (MC) risk mapping relative to key support levels (S1 and S2). The findings show that systematic strategies produce far more consistent productivity than speculative real-market practices and reveal a clear trade-off between effectiveness and efficiency. Martingale demonstrates higher effectiveness and superior liquidity speed due to its exponential leverage, achieving the highest net profit in scenarios such as the 40-point target in 2025. In contrast, Linear Averaging provides higher efficiency and stronger capital endurance, emerging as the safest and most consistent approach—particularly at the 30-point target—by keeping MC levels within the safe Support-2 zone, although with slower recovery. Overall, Martingale offers aggressive profit potential but carries significant margin-call risk that demands strict margin management, while Linear Averaging offers superior capital safety and long-term sustainability, making it the preferable model for traders with lower risk tolerance.

Keywords: Alternative Trading System. Derivatives Trading. Linear Averaging. Martingale.

multidimensionais, incluindo Profit Factor (PF), Return on Margin (ROM), Efficiency Ratio (ER) e análise de resistência do capital por meio do mapeamento de risco de margin call (MC) em relação aos níveis de suporte (S1 e S2). Os resultados demonstram que estratégias sistemáticas geram produtividade muito mais consistente do que práticas especulativas observadas no mercado real, revelando um claro equilíbrio entre eficácia e eficiência. A estratégia Martingale apresenta maior eficácia e velocidade de recuperação graças à sua alavancagem exponencial, alcançando o maior lucro líquido em cenários como a meta de 40 pontos em 2025. Em contraste, a estratégia de Averaging Linear oferece maior eficiência e melhor resistência do capital, emergindo como a abordagem mais segura e consistente — especialmente na meta de 30 pontos — ao manter os níveis de MC dentro da zona segura (Suporte 2), embora com recuperação mais lenta. Em síntese, a estratégia Martingale proporciona potencial de lucro agressivo, porém envolve riscos elevados de margin call, exigindo uma gestão de margem rigorosa; já a Averaging Linear oferece maior segurança e sustentabilidade no longo prazo, sendo mais adequada para traders com menor tolerância ao risco.

Palavras-chave: *Sistema de Negociação Alternativo, Negociação de Derivativos, Média Linear, Martingale.*

1 INTRODUCTION

Futures trading within the Alternative Trading System (ATS) has become an increasingly important instrument for investors and traders seeking to capitalize on market volatility (BAPPEBTI, 2018). Despite its potential, a substantial proportion of market participants still incur significant losses, largely due to inadequate position-management strategies and the inability to maintain discipline in varying market conditions, whether sideways or trending. This phenomenon highlights the need for more adaptive, systematic, and measurable approaches that can enhance capital recovery and improve the likelihood of achieving profitability within a shorter period.

Among the strategies frequently employed in averaging down are the Martingale and linear averaging methods. The Martingale strategy involves an exponential increase in position size (e.g., 1–2–4–8 lots) each time the price moves against the trader's

position, while the Linear strategy increases position size in a more moderate, linear progression (e.g., 1–2–3–4 lots). Although both approaches are used extensively in practice, empirical comparisons of their performance—particularly within regulated futures markets—remain limited.

This study aims to compare the effectiveness and efficiency of these two strategies when applied to the Loco London Gold Rolling Contract, traded on the Jakarta Futures Exchange (JFX) under the symbol XUL10. Effectiveness is defined as the strategy's ability to achieve recovery or generate profit within a relatively short timeframe, while efficiency refers to the extent to which the strategy utilizes capital in a proportional and non-excessive manner. The analysis is conducted using historical price data from 2024 through the first half of 2025, with performance evaluated across target recovery iterations of 30, 40, and 50 points.

By adopting a comparative quantitative approach, this research is expected to contribute to the development of more rational, data-driven trading strategies. The findings are not only relevant for individual traders but may also provide valuable insights for futures brokerage firms in designing educational materials on risk-sensitive strategy selection. Academically, this study adds to the limited literature on position-management techniques in derivative markets and promotes the adoption of disciplined, measurable, and risk-mitigated trading practices. Given the increasing public participation in futures trading, the need for strategies that balance aggressiveness with realism and sustainability has become more urgent than ever.

2 BRIEF THEORETICAL FOUNDATION

In today's increasingly digital and technology-driven financial landscape, investment has become an essential instrument for wealth accumulation and risk management (Switzer & Tahaoglu, 2015). However, high-risk products such as derivatives—particularly those operating within Indonesia's Commodity Futures Trading (CFT) ecosystem—require a deeper level of understanding that extends beyond basic financial literacy. The CFT industry, regulated by the Commodity Futures Trading Regulatory Agency (CoFTRA), is structured around two primary mechanisms: multilateral trading (exchange-traded derivatives/ETD) and bilateral trading conducted

over-the-counter (OTC), the latter formally known as the ATS (Castagnino, 2025; Koppenhaver, 2009; Ritchken, 1996).

Within this regulatory framework, the ATS facilitates off-exchange derivative transactions while maintaining guaranteed clearing, standardized reporting, and supervisory oversight. One of the most actively traded instruments in this environment is the Loco London Gold Rolling Contract (XUL10), whose valuation is linked to the international Loco London gold price. Due to its high liquidity and consistent volatility patterns, XUL10 serves as a suitable instrument for evaluating position-management strategies such as Martingale and linear averaging under both sideways and trending market conditions.

Martingale and linear averaging represent two contrasting approaches widely observed in speculative trading. The Martingale strategy, originating from 18th-century probability theory, involves doubling the position size after each adverse price movement (Ru et al., 2015). This mechanism reduces the average entry price, theoretically enabling a trader to recover losses and secure a profit once the price retraces favorably. Although Martingale is often associated with a theoretically perfect win probability, its primary limitation lies in the substantial capital required to withstand deep drawdowns (Dimitrov & Shafer, 2025). In contrast, Linear averaging follows a more conservative and incremental approach, adding positions using a constant or progressively linear lot size rather than an exponential sequence (Rizka, 2025). This method aims to moderate capital exposure while still improving the overall average entry price.

To evaluate the performance of these strategies in a systematic and measurable manner, this study employs three key productivity metrics. The Profit Factor (PF) measures the ratio of gross profit to gross loss, serving as an indicator of overall strategy robustness (Groette, 2025). The Return on Margin (ROM) assesses the relationship between net profit and total margin utilized, providing insight into capital-efficiency levels. Meanwhile, the Efficiency Ratio (ER) evaluates how effectively a strategy converts market movement into realized profit, reflecting operational efficiency within varying price dynamics (Groette, 2025). This analytical framework is grounded in financial engineering principles, which apply mathematical and quantitative models to the design and evaluation of innovative financial strategies, particularly within derivative markets (Srivastava, 2024).

Taken together, these theoretical and empirical foundations support the main objective of this study: comparing the productivity and practicality of Martingale and linear averaging strategies when applied to the XUL10 contract. The findings are expected to offer a more comprehensive and realistic guideline for market participants, particularly those operating within Indonesia's ATS-based commodity futures market.

3 METHODOLOGY

This study adopts a quantitative comparative research design to evaluate the performance of Martingale and linear averaging strategies applied to the Loco London Gold Rolling Contract (XUL10). The data used in this research consist of three components. First, historical price data of XAU/USD were obtained from the TradingView platform, covering the periods 2 January–18 December 2024 and 2 January–30 June 2025, which served as the basis for the backtesting simulations. Second, real transaction data were collected from two client accounts of PT Equityworld Futures (PT EWF) Semarang Branch (RFNMXXXX and RFNPXXXX), including records of Margin In, Margin Out, Total Settled Lots, and Profit/Loss. Third, institutional aggregate data in the form of fund withdrawal records from PT EWF Semarang Branch for the period January–December 2024 were used to provide additional context for profit realization behavior.

The model development began with the establishment of an initial capital of USD 200,000, applied equally across all simulation scenarios. Two position-management strategies—Martingale averaging and Linear averaging—were then operationalized within this framework. Backtesting simulations were conducted using the historical price datasets with target iterations of 30, 40, and 50 points for both the 2024 and 2025 periods. Each simulation generated outputs including net profit or loss, margin call occurrences, and capital utilization, enabling direct comparison of strategy performance under identical market conditions.

The analytical phase focused on three key productivity metrics: PF, defined as the ratio of total gross profit to total gross loss; ROM, calculated as net profit relative to total margin used to assess capital efficiency; and ER, which measures the effectiveness of converting price fluctuations into net profit. Risk assessment was conducted by mapping margin call (MC) points from each scenario onto historical price charts to observe capital

endurance, followed by technical evaluation of whether these points fell within key support areas identified through trendlines. Additionally, the recovery speed of each strategy was examined to compare how quickly Martingale and linear averaging methods could liquidate drawdown positions.

Finally, the results of the backtesting models were compared with real trading outcomes from the two PT EWF accounts to determine the extent to which simulated strategy behaviors align with practical trading dynamics in the ATS environment. This triangulation strengthened the validity of the findings and provided a realistic benchmark for evaluating the feasibility of both strategies in actual market conditions.

4 RESULTS

4.1 Withdrawal analysis

The investment fund position of PT Equityworld Futures (EWF), Semarang Branch, for the 2024 period is summarized in Table 1, which presents the monthly composition of Margin In, Margin Out, and the resulting Net Margin. The Margin In variable reflects the total investment funds deposited each month, with the highest inflow occurring in March 2024 at USD 1.95 million, far surpassing all other months. Meanwhile, Margin Out, which represents client fund withdrawals, reached its peak in July 2024 at USD 254 thousand, followed by another relatively high withdrawal level in January 2024 at USD 226 thousand; overall, withdrawals were most pronounced in mid-year before declining toward year-end. The Net Margin, calculated as the difference between Margin In and Margin Out, similarly showed its strongest performance in March 2024 (USD 1.906 million) and April 2024 (USD 1.150 million), reflecting the surge in deposited funds during these months. February 2024 recorded a negative Net Margin of approximately –USD 104 thousand due to withdrawals exceeding deposits. Following April, Net Margin values remained positive but exhibited a gradual downward trend.

Table 1

Total Investment for the Period January–December 2024

Period	Margin In (USD)	Margin Out (USD)	Net Margin (USD)
January	356,100.00	-226,465.00	129,635.00
February	79,100.00	-183,143.80	-104,043.80
March	1,950,649.05	-44,412.20	1,906,236.85
April	1,309,380.00	-158,952.85	1,150,427.15
May	632,260.00	-75,280.00	556,980.00
June	435,810.44	-209,077.00	226,733.44
July	705,250.12	-253,749.73	451,500.39
August	340,550.00	-126,758.73	213,791.27
September	296,203.00	-75,752.80	220,450.20
October	308,823.00	-72,233.40	236,589.60
November	308,908.00	-85,314.20	223,593.80
December	320,090.00	-46,368.86	273,721.14
TOTAL	**7,043,123.61**	**-1,557,508.57**	**5,485,615.04**

The next step involves calculating the productivity rate, expressed as the ratio of Margin Out to Margin In. Based on the data, the productivity value is obtained as follows: Productivity = (Margin Out / Margin In) × 100% = USD 1,557,508 / USD 7,043,123 × 100% = 22%. This 22 percent productivity rate can be interpreted in several ways. First, from the perspective of profit availability for clients, the figure suggests that for every 1 unit of capital deposited, approximately 0.22 units are withdrawn in the form of realized gains, indicating that a portion of invested capital successfully generates tangible outcomes rather than remaining idle. Second, in terms of fund resilience, the system maintains a consistently high Net Margin of about USD 5.49 million—equivalent to 78 percent of total Margin In—which reflects strong capital endurance and the ability to sustain ongoing investment and trading activities. Finally, this ratio also provides an indication of stability and client trust, as the withdrawal rate remains within a reasonable range for an ATS environment. Most funds continue to remain within the system, signaling that clients maintain confidence in the firm's performance and that the company is able to preserve operational stability and credibility.

4.2 Analysis of transaction patterns and risk exposure

This section analyzes transaction patterns and risk exposure for two accounts in 2024—RFNMXXXX and RFNPXXXX—each maintaining cumulative capital of at least

USD 200,000. The evaluation focuses on identifying behavioral trading trends, capital movements, and potential indications of exposure arising from client activity. Table 2 presents a sample of transaction histories selected using two criteria: (1) changes in the Previous Balance at every USD 100,000 increment, and (2) the client's most recent transaction date. This sampling approach allows for a representative overview of capital progression and trading dynamics, enabling a clearer assessment of how each account manages risk and responds to market conditions.

Table 2

Transaction History Based on Each USD 100,000 Change in Previous Balance

Account No.	Date	Previous Balance (USD)	Buy Open (Lot)	Sell Open (Lot)	Floating P/L (USD)
RFNMXXXX	20 May 2024	50,000.00	2	1	-4,955.00
	24 May 2024	108,735.00	9	6	-80,615.00
	19 June 2024	200,296.00	18	20	-173,970.00
	15 July 2024	249,756.70	24	24	-238,155.00
RFNPXXXX	1 March 2024	50,000.00	-	6	-10,895.00
	11 March 2024	102,832.55	17	15	-67,520.00
	15 March 2024	219,937.40	-	15	-78,625.00
	21 March 2024	300,599.45	-	20	-122,840.00
	3 April 2024	449,051.25	29	42	-380,970.00
	5 April 2024	513,509.00	36	41	-508,520.00
	22 April 2024	201,984.50	27	4	-145,945.00

Table 2 presents the transaction history of accounts RFNMXXXX and RFNPXXXX, captured at every USD 100,000 increment in the Previous Balance to illustrate the progression of trading positions relative to capital growth. The Buy Open and Sell Open columns provide a key indicator for identifying whether the trading behavior follows a structured approach. When both positions are opened simultaneously in significant volumes, the pattern suggests an unstructured or unmanaged trading strategy, as it typically reflects the absence of predefined profit targets (take profit/TP) and risk limits (stop loss/SL). The data for both accounts show repeated instances of large opposing positions accompanied by substantial floating losses, indicating exposure to high-risk averaging behavior rather than systematic risk management.

The overall performance of both accounts is summarized in Table 3. Account RFNMXXXX, with a total capital input of USD 200,000, recorded a moderate withdrawal of USD 20,000 and generated a net profit of USD 108,505 across 877 settled lots over 39 days, resulting in a relatively strong ROI of 54.25 percent. In contrast,

account RFNPXXXX operated with significantly larger capital injections amounting to USD 600,000 but experienced severe losses, ending with a negative profit/loss of –USD 526,180 across 632 settled lots. Despite operating over a similar duration of 42 days, this account produced an ROI of –87.70 percent. These contrasting outcomes highlight a substantial disparity in risk exposure and capital management between the two accounts, underscoring the impact of unstructured trading patterns and inconsistent position handling on overall account performance.

Table 3

Summary of Transaction Results

Account No.	Total Margin In (USD)	Total Margin Out (USD)	Total Settled (Lot)	Profit/Loss (USD)	Duration (Days)	ROI (%)
RFNMXXXX	200,000.00	20,000.00	877	108,505.00	39	54.25
RFNPXXXX	600,000.00	43,600.00	632	-526,180.00	42	-87.70

Based on the information presented in Tables 2 and 3, several important observations can be made. First, both accounts demonstrate unstructured trading patterns, as evidenced by the simultaneous presence of buy and sell open positions on the same trading dates. Instead of applying a systematic averaging strategy—where a trader adds to an existing buy position when prices decline—losses are instead "locked" through the opening of a sell position, a practice commonly referred to as "locking," which generally reflects reactive rather than strategic decision-making. Second, account RFNMXXXX appears more active, executing 877 settled lots despite having a total Margin In of only USD 200,000. This level of activity indicates higher exposure to loss risk and places the account within a highly speculative trading profile, even though it ultimately produced a profit. By contrast, account RFNPXXXX, which operated with a substantially larger capital base of USD 600,000 and executed 632 lots, failed to optimize the daily average gold price movement of 35.66 points and showed no evidence of structured or well-planned trading execution. Third, the ROI of both accounts diverges sharply, raising concerns about performance consistency and the sustainability of the applied trading strategies. While a high ROI can indicate strong short-term performance, it is not inherently healthy unless accompanied by controlled volatility and consistent risk management. A persistently high ROI may signal the presence of excessive leverage,

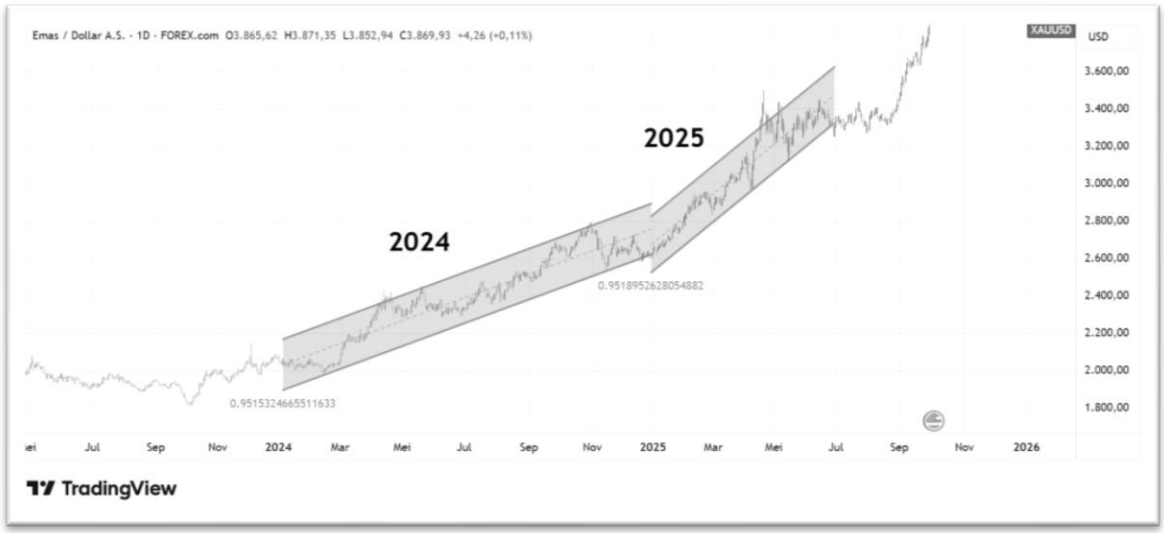
heavily influenced by the large number of lots traded, which can expose the account to substantial downside risk if market conditions shift unfavorably.

4.3 Identification of gold price movement patterns

Figure 1 presents the XAU/USD gold price trends for 2024 and the first half of 2025, generated through regression-based trend analysis on the TradingView platform. The 2024 price movement forms a clear upward channel with an estimated fluctuation range of approximately 225 points. This channel is characterized by a sequence of higher highs and higher lows, indicating sustained buyer dominance and a relatively stable bullish phase throughout the year. In contrast, the 2025 trend remains bullish but displays a noticeably steeper incline and a broader fluctuation range of around 270 points. The steeper trajectory reflects stronger upward momentum, driven by intensified buying pressure that pushes prices beyond the resistance levels established in 2024. Overall, both years exhibit trending (bullish) market conditions, with the primary difference lying in the slope and volatility of the trends: 2024 shows a steady and orderly upward progression, whereas 2025 reflects a more aggressive and accelerated bullish trend.

Figure 1

Gold Price Movement Pattern (XAU/USD) for 2024 and 2025 on TradingView



4.4 Backtesting of historical data (2024 & 2025)

Historical price simulations were conducted for the periods January 2–December 18, 2024, and January 2–June 30, 2025, using two strategy models—Linear Averaging and Martingale. Each simulation was executed with an initial capital of USD 200,000 and applied target profit levels of 30, 40, and 50 points. The results, summarized in Table 4, indicate that both strategies were capable of generating substantial profits under trending market conditions. In the 2025 period, which exhibited a stronger and steeper bullish trend, the Martingale model with a 40-point target produced the highest net profit, reaching USD 916,675.80. This outperformance reflects the model's ability to exploit directional price momentum when trends are well-defined. Nevertheless, the higher profits were accompanied by greater exposure to risk. Margin calls occurred in both the Martingale model with a 30-point target and the Linear Averaging model with a 40-point target, each triggered during periods of sharp downward price corrections in May 2025. These results demonstrate that while both strategies can yield considerable returns in strong trending environments, the associated drawdown levels and vulnerability to margin calls increase significantly when price volatility intensifies or when the averaging depth becomes too aggressive relative to available capital.

Table 4

Backtesting Results: Linear Averaging vs. Martingale (Exp.)

Period	Model	Target (Pts)	Last Open (Lot)	Settled (Lot)	Gross Profit (USD)	Floating Loss (USD)	Net Profit *** (USD)	Margin Call (USD/to z)
2024 (2 Jan - 18 Dec)	Linear	30	21	221	663,000.00	-45,000.00	738,560.00	2430.38
		40	15	93	372,100.00	-106,900.00	539,074.00	2389.85
		50	10	60	305,100.00	-65,000.00	235,280.00	2177.52
					1,340,200.00	-216,900.00	1,512,914.00	
	Exp	30	31	224	990,000.00	-264,000.00	700,798.50	2325.42
		40	31	168	648,000.00	-104,000.00	529,532.50	2400.67
		50	15	82	430,100.00	-55,000.00	366,729.50	2248.18
					2,068,100.00	-423,000.00	1,597,060.50	
2025 (2 Jan - 30 Jun)	Linear	30	36	307	993,400.00	-45,000.00	844,907.60	3008.75
		40	36	167	348,000.00	-336,000.00	-	3159.76 *
		50	15	114	552,000.00	-100,000.00	235,280.00	2861.16
					1,893,400.00	-481,000.00	1,080,187.60	
	Exp	30	31	150	411,000.00	-78,000.00	-	3222.37 **
		40	31	258	1,036,000.00	-110,200.00	916,675.80	2956.72
		50	31	165	825,000.00	-130,000.00	679,426.70	3005.31

2,272,000.00	-318,200.00	1,596,102.50	

Notes:
* Hit by a margin call and trading stopped on May 14, 2025, when the price dropped to $3,159.76/toz.
** Hit by a margin call and trading stopped on May 12, 2025, when the price dropped to $3,120.00/toz.
*** Net profit is calculated after all open positions (Last Open) have been liquidated.

4.5 Productivity analysis of linear averaging and martingale

A productivity evaluation was conducted using three key performance indicators—PF, ROM, and ER—to assess the comparative effectiveness of the Linear Averaging and Martingale strategies. The results presented in Table 5 show that most PF values exceed 1, confirming the profitability of both strategies across the majority of scenarios, except in cases where net profit is zero, which automatically renders both ROM and ER equal to zero despite PF potentially remaining above 1. ROM values are generally high due to the leverage inherent in the trading system, although this metric becomes highly sensitive to losses, dropping to zero when profitability is not achieved. The ER metric emerges as the most responsive among the three indicators; any failure to generate net profit results in an immediate decline to zero, reflecting ineffective conversion of price movement into realized gains.

Table 5

Calculation Results for the Productivity Metrics: PF, ROM, ER

Period	Model	Target (Pts)	PF	ROM (%)	ER	Short Remarks
2024 (2 Jan - 18 Dec)	Linear	30	14.73	334.19	1.04	The strategy is very stable and margin-efficient
		40	3.48	579.65	1.13	Fewer lots are used → highly efficient
		50	4.69	392.13	0.64	Still profitable. but efficiency declines and risk increases
	Exp	30	3.75	312.86	0.56	Profitable but less efficient than the Linear model
		40	6.23	315.2	0.70	Better performance than Linear
		50	7.82	447.23	0.78	Best performance of Martingale in 2024
2025 (2 Jan - 30 Jun)	Linear	30	22.08	275.14	0.83	Very strong and efficient performance
		40	1.04	0.00	0.00	The strategy failed to generate profit
		50	5.52	206.39	0.37	Profitable, but efficiency dropped sharply
	Exp	30	5.27	0.00	0.00	The strategy failed to generate profit
		40	9.25	355.47	0.80	Best performance of Martingale in 2025
		50	6.35	411.77	0.71	Solid performance. but lower than the 40-point target

Across both years, the Linear Averaging strategy with a 30-point target demonstrates the highest level of safety and consistency, delivering stable PF, ROM, and

ER values with minimal risk of margin calls. In contrast, the Martingale strategy with 40- and 50-point targets yields the strongest productivity outcomes—particularly the 40-point target in 2025, which records the best overall performance among Martingale configurations. Nonetheless, certain scenarios fail to deliver profitability, most notably the Linear Averaging model with a 40-point target in 2025 and the Martingale model with a 30-point target in the same period. These failed cases highlight the vulnerability of both strategies under conditions of unusually steep or prolonged trends, underscoring the need for careful calibration of averaging depth relative to capital capacity and market volatility.

4.6 Comparative study: real accounts vs. backtesting

A comparison between the real trading accounts (RFNMXXXX and RFNPXXXX) and the backtesting results highlights several important distinctions in productivity, risk exposure, and overall strategy quality. As summarized in Table 6, the real accounts exhibit highly inconsistent performance despite having substantial capital bases—USD 200,000 for RFNMXXXX and USD 600,000 for RFNPXXXX. The ROI outcomes diverge sharply, with one account generating a short-term gain of 54.25 percent while the other suffered a significant loss of –87.70 percent within a similar trading duration. These results are symptomatic of unstructured trading behavior characterized by simultaneous buy and sell positions ("locking"), excessive lot usage, and the absence of any identifiable risk management framework. Floating losses in both accounts were substantial, reflecting speculative decision-making and inefficient capital utilization, particularly in the account with the larger capital allocation.

Table 6

Comparison Between Real Client Accounts and Backtesting Results

Aspect	Real Account (Table 2 and Table 3)	Backtesting Results (Linear & Martingale)
Initial Capital	USD 200,000 (RFNMXXXX), USD 600,000 (RFNPXXXX)	USD 200,000 (standardized for all scenarios)
ROI / Productivity	RFNMXXXX: +54.25% (39 days), RFNPXXXX: –87.70% (42 days). ROI is inconsistent and tends to be speculative.	PF > 1 in almost all scenarios, ROM > 200%, ER positive (0.3–1.0). Productivity is more stable and measurable.
Transaction Pattern	No clear pattern, many simultaneous buy & sell positions (locking). Over-trading.	Structured pattern: Linear Averaging & martingale with 30–50 point targets.
Risk Management	No risk framework, large floating losses.	Defined risk parameters (lot size, target points). Margin call risks can be measured and simulated.

Aspect	Real Account (Table 2 and Table 3)	Backtesting Results (Linear & Martingale)
Result Consistency	ROI varies widely between clients (one profitable, one with heavy losses). Unpredictable outcomes.	Results are explainable: Linear performs better in sideways conditions, Martingale is more optimal in trending markets. Fail cases are transparent and measurable.
Capital Efficiency	Client with larger capital (USD 600k) suffered significant losses → inefficient capital use.	USD 200k capital can yield hundreds of percent ROM. High efficiency despite higher risk.
Strategy Characteristics	Speculative, emotional, unstructured, prone to large losses.	Systematic, model-based, and comparable in effectiveness.

In contrast, the backtesting simulations—conducted using Linear Averaging and Martingale models with standardized capital of USD 200,000—produce significantly more consistent and analytically interpretable outcomes. Productivity indicators such as Profit Factor (PF), Return on Margin (ROM), and Efficiency Ratio (ER) remain positive across most scenarios, demonstrating measurable and stable performance characteristics. The structured nature of these models allows risk parameters to be clearly defined, enabling transparent evaluation of margin call thresholds and failure scenarios. The differential performance between Linear Averaging and Martingale further reveals how each model behaves under varying market structures: Linear strategies are more resilient in moderate or sideways conditions, whereas Martingale strategies deliver superior productivity under strong trending environments, particularly with 40–50 point targets.

Overall, this comparison illustrates that systematic, model-based trading strategies not only enhance profitability potential but also reduce uncertainty and mitigate the high-risk behaviors commonly observed in real, discretionary trading practices. The findings emphasize the practical and academic importance of applying structured frameworks in futures trading, especially when dealing with leveraged instruments such as gold rolling contracts.

4.7 Capital endurance and liquidity/recovery speed analysis

4.7.1 Capital endurance analysis

In evaluating trading strategies in the futures market, initial capital is often viewed as a decisive factor for long-term performance. However, the simulation results indicate that capital size alone does not guarantee success. A more critical determinant is capital

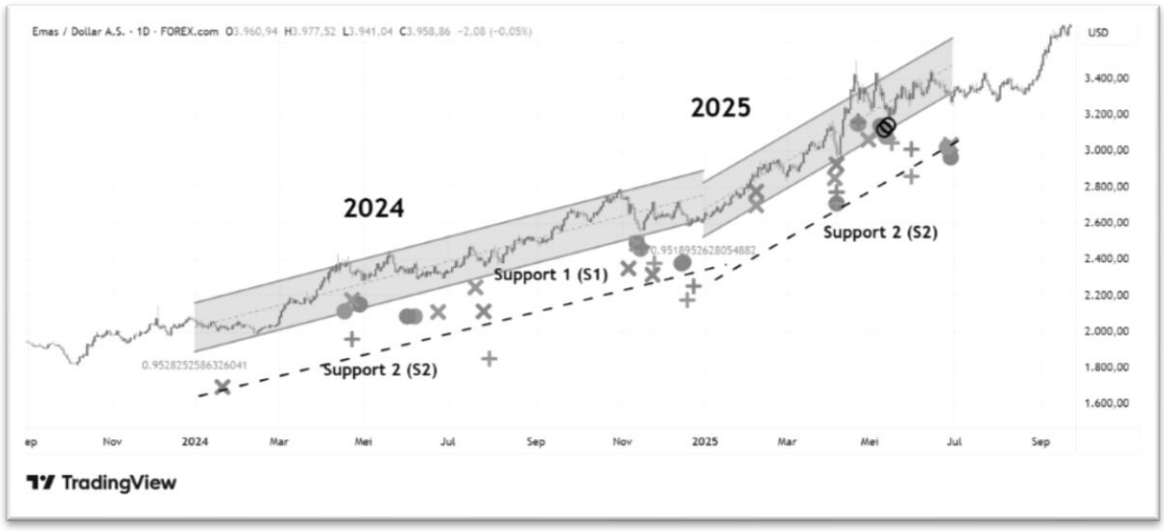
endurance—the ability of available funds to withstand temporary losses (drawdowns) when price movements deviate sharply from expectations.

To support this assessment, a price chart mapping of gold (XAU/USD) for the 2024 to mid-2025 period was constructed. The mapping aims to correlate estimated margin call (MC) levels with key technical price regions, particularly major support zones that act as benchmarks during adverse movements. This comparison helps determine whether an initial capital of USD 200,000 is realistically sufficient under actual market volatility.

Figure 2 illustrates the plotted MC levels derived from various total open-lot exposures, ranging from 6 lots to several dozen lots. The □ symbol marks the 30-point target for both Linear Averaging and Martingale strategies, the □ symbol denotes the 40-point target, and the □ symbol represents the 50-point target. The visualization clearly shows that as the number of open positions increases, the MC threshold moves closer to the current market price, signaling greater vulnerability and the need for heightened caution when holding large exposures.

Figure 2

Plotting of Margin Call Levels for Each Point Target



A lower channel line is drawn to represent support level 1 (S1), while a dashed line indicates support level 2 (S2), derived from the width of the Regression Trend Channel. When MC points cluster near S1 and the price continues to decline, traders should reassess capital resilience before adding or retaining large open positions.

Conversely, when MC zones fall near S2, the risk is relatively lower and the capital buffer is considered more adequate, allowing the trading strategy to operate with higher confidence.

4.7.2 Liquidity speed analysis based on transaction history

This section evaluates how quickly the market absorbs price movements and provides opportunities for profitable exits (see Table 7). In Martingale strategies, strong liquidity is demonstrated when larger-lot positions opened during deep drawdowns can be closed within a short timeframe.

Table 7

Liquidity Speed Comparison Matrix

Target (Pts)	Model	Avg Recovery Duration	Liquidity Category	Frequency	Key Findings
30	Linear	1–4 days	Fast	Frequent	Recovery is slightly slower than Martingale, but positions are more stable in sideways conditions. Less sensitive to minor price movements and more margin-efficient.
30	Exp	0–3 days	Very Fast	Very Frequent	Most positions are closed intraday or within ≤3 days. Small volatility quickly triggers a take-profit. Low floating risk. Suitable for day traders with high cash flow needs.
40	Linear	4–6 days	Moderate–Slow	Fairly Frequent	Positions tend to hold longer, especially during strong trends. The profit per cycle is more consistent, and the drawdown remains shallow. Suitable for less volatile markets.
40	Exp	3–5 days	Moderate	Frequent	Takes about 3–7 days to recover. Floating potential begins to appear but remains manageable. Still suitable for weekly swing traders.
50	Linear	7–12 days	Slow	Rare	Recovery speed is similar to Martingale, but the liquidation risk is lower as the lot size increases linearly. The strategy is more defensive and safer in prolonged trends.
50	Exp	5–10 days (sometimes >14 days)	Slow	Occasional	Many positions rely on an old-direction reversal. Liquidity is low, and floating exposure is high. Potential profit per position is large, but substantial capital is required.

Overall, Martingale delivers the fastest liquidity and recovery speed because its exponential lot increments accelerate profit realization once the market reverses. However, this comes with significantly higher floating losses and capital demands. Linear

Averaging, while slower, demonstrates better resilience during extended unidirectional trends due to its controlled lot progression.

Thus, traders with smaller capital or lower risk tolerance are better aligned with Linear Averaging, while more aggressive traders seeking faster cycle completions may consider Martingale—but only with strict and disciplined margin management. These insights offer valuable educational guidance for futures market participants, highlighting the inherent trade-off between liquidity speed and leverage-induced risk.

5 CONCLUSION

This study demonstrates that systematic position-management strategies—both Martingale and Linear Averaging—exhibit significantly higher consistency in trading productivity (as reflected by Profit Factor values greater than 1 across most scenarios) compared to the speculative, unstructured trading behavior commonly observed among real-market investors.

The comparative analysis highlights a fundamental trade-off between effectiveness and capital efficiency, summarized through the following key findings:

1. Effectiveness and Liquidity Recovery Speed: The Martingale strategy is shown to be more effective and superior in terms of liquidity recovery speed. Its exponential lot-doubling mechanism sharply reduces the average entry price, enabling rapid position recovery even with minimal price reversals. This dynamic allows Martingale to generate the highest net profits—such as the Martingale 40-point target in 2025—while closing positions faster than other models.

2. Efficiency and Capital Endurance: The Linear Averaging strategy proves to be more efficient and more resilient in terms of capital endurance. Its linear lot-scaling approach provides safer and more controlled risk exposure during prolonged trends, as evidenced by the stability of the Linear Averaging 30-point target (2024–2025). Although its recovery pace is slower, it consistently positions the margin call (MC) threshold within the safer Support 2 (S2) zone, making it a more realistic and sustainable option for traders with moderate or low risk tolerance.

In conclusion, Martingale offers higher potential profitability (high effectiveness) but comes with elevated margin call risks that demand strict margin management and strong liquidity buffers. Linear Averaging, by contrast, provides superior capital safety

and long-term endurance (high efficiency) amid market volatility, making it a safer and more sustainable strategy in the long run.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Widadi, I., Purwaningsih, R., Saptadi, S., Ulkhaq, M. M., & Faradis, I. COMPARATIVE PRODUCTIVITY ANALYSIS OF MARTINGALE AND LINEAR AVERAGING STRATEGIES IN LOCO LONDON GOLD ROLLING CONTRACTS (XUL10) WITHIN INDONESIA'S ALTERNATIVE TRADING SYSTEM. Veredas Do Direito, e233914. https://doi.org/10.18623/rvd.v23.n1.3914