Executive Summary

We valued an At-The-Money (ATM) Call Option on a 50/50 NVDA–MSFT basket with a $10,000,000 notional and ~0.47-year maturity. Using a Monte Carlo simulation and a properly scaled static-replication approach, the fair value of the option is estimated at **approximately ~12% of notional**. This corresponds to a pricing range of **~$1,200,000**, depending on realized volatility and correlation inputs.

Because a basket option cannot be perfectly hedged with linear instruments, we compute hedging-error residuals across simulation paths. Based on the 95th-percentile shortfall, we add a **risk premium buffer** to compensate for residual Gamma and correlation risk. The final recommended client price falls at the upper end of the fair-value range.

1. Product Parameters

- **Structure:** European ATM Call Option on a 50/50 NVDA–MSFT Basket
- **Notional:** $10,000,000
- **Strike:** $10,000,000 (ATM)
- **Maturity:** 0.47 years
- **Correlation:** ~0.63 between NVDA and MSFT

2. Methodology

Monte Carlo Simulation

We simulate correlated geometric Brownian motion paths to generate the basket terminal distribution.

Static Replication

We regress simulated payoffs on *properly scaled* hedging instruments (NVDA, MSFT, and their vanilla options). Regression coefficients are then converted back into actual hedge units to produce a feasible replicating portfolio.

This yields a fair-value estimate consistent with standard theoretical levels (~12% of notional).

Risk Premium

We compute hedge residuals across paths to quantify non-linear (Gamma) and correlation risk. A premium based on tail shortfalls is added to the fair value.

3. Final Price Recommendation

- **Fair Value Estimate:** ~$1.2M
- **Risk Premium:** Tail-risk adjustment
- **Recommended Client Price: Upper end of the fair-value range**

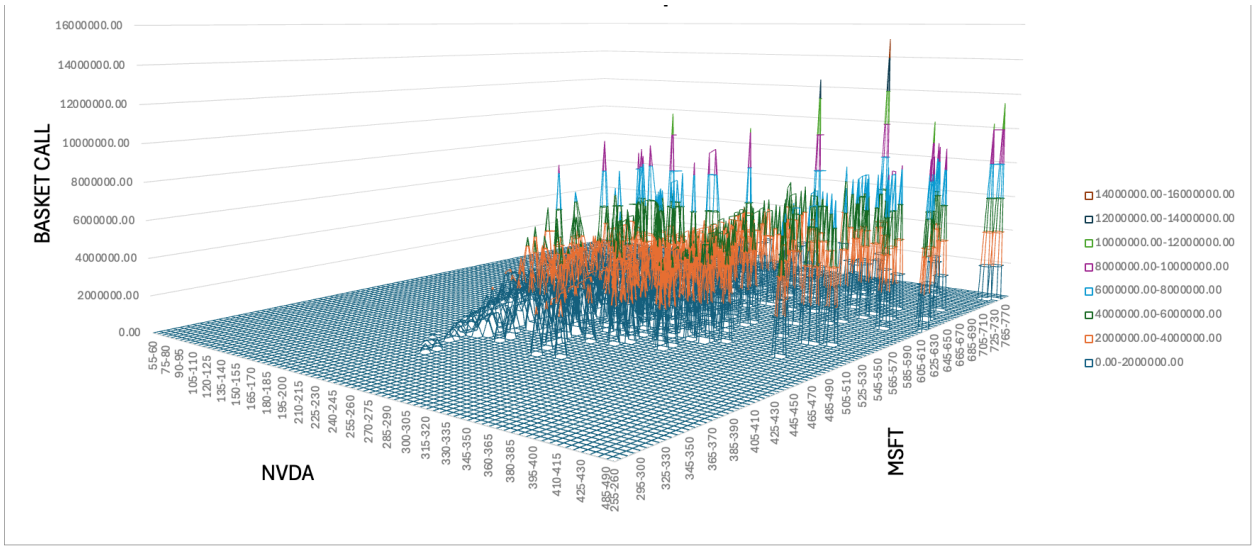

Figure 1: 3D Valuation Surface showing the "Hockey Stick" payoff profile accelerating as both underlying assets outperform.

Correlation Risk:

The valuation assumes the correlation between NVDA and MSFT remains stable (~0.63). The primary risk to the desk is decorrelation in a downside scenario (e.g., NVDA crashes but MSFT rallies). In this scenario, the Basket may still finish In-The-Money, but our hedge on NVDA would lose significant value, creating a tracking error captured by our premium buffer.