Tanami

Whitepaper

Smarter Portfolio Optimization:

How Tanami Leverages GARCH Modelling for Robust Investment Strategies

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Introduction

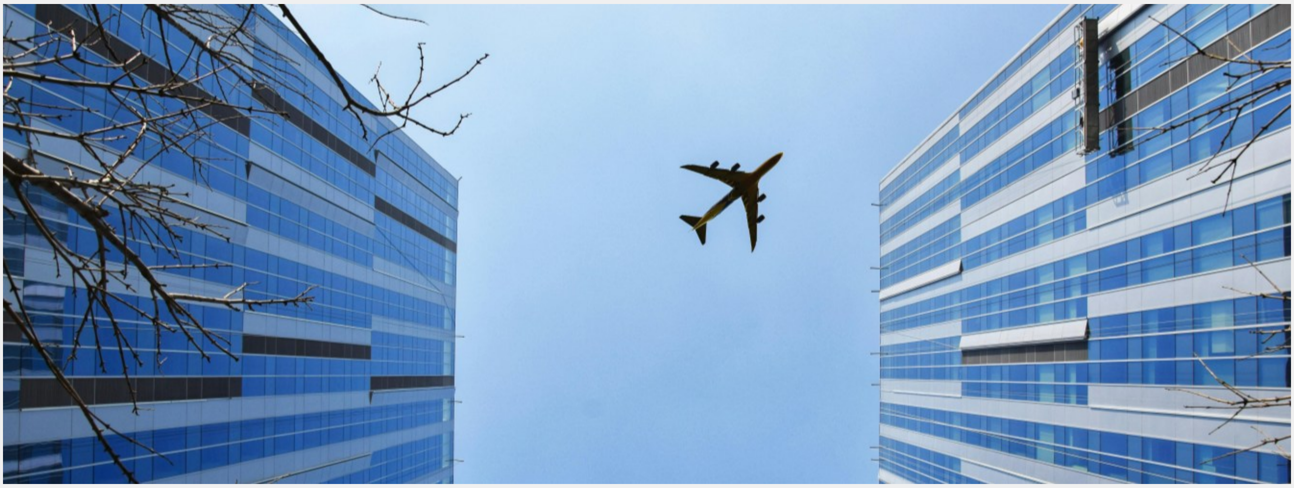
The limitations of traditional portfolio optimization

Modern portfolio theory (MPT), introduced by Markowitz (1952), revolutionized investment management by formalizing the trade-off between risk and return through diversification. MPT assumes that asset returns are normally distributed, and their correlations and volatilities remain constant over time. While this framework is foundational, its assumptions often fail under real-world conditions, especially during market turmoil.

Financial crises have repeatedly demonstrated that correlations between asset classes increase during stress periods, a phenomenon known as correlation breakdown (Longin & Solnik, 2001). Consequently, portfolios constructed using historical correlation matrices can become riskier just when stability is most needed. The financial map investors rely on turns obsolete, much like using an outdated road map in a rapidly changing city.

To address these shortcomings, Tanami employs a more dynamic and adaptive approach based on Generalized Autoregressive Conditional Heteroskedasticity (GARCH) modelling. Originally developed by Bollerslev (1986), GARCH enables the modelling of time-varying volatility, providing a more realistic representation of financial markets. In doing so, it aligns portfolio construction with evolving market conditions rather than static historical assumptions.

Understanding volatility and diversification in a dynamic context



a) Volatility is time-varying

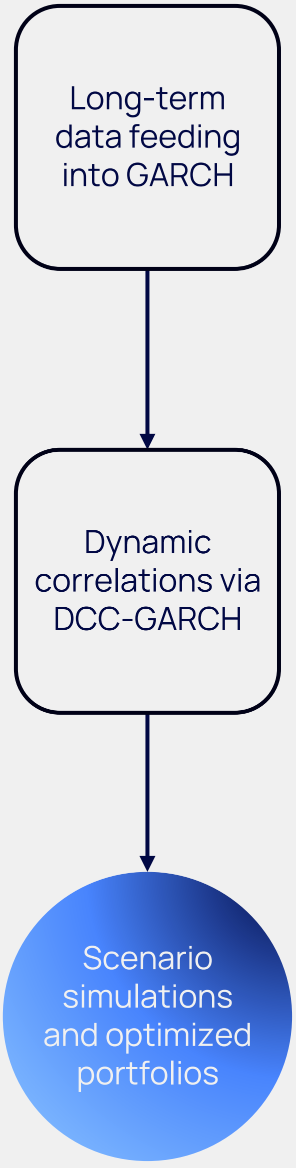
Volatility, or the degree of variation in asset prices, is a cornerstone of risk management. Traditional models often rely on historical averages to estimate future volatility, which can be misleading. For instance, during extended bull markets, such models may underestimate future risk due to recency bias.

GARCH models provide a statistically rigorous way to forecast volatility by accounting for past variances and residuals. Engle (2001) demonstrated that GARCH-type models capture clustering in volatility—periods of high volatility tend to be followed by more high volatility, and similarly for low volatility. This allows investors to anticipate and prepare for turbulence, much like a skilled pilot navigating through stormy weather.

b) Correlation is conditional

Diversification reduces risk by combining assets that do not move in lockstep. However, correlations between assets are not fixed. They tend to increase during financial crises, undermining the benefits of diversification exactly when they are most needed (Ang & Bekaert, 2002).

To navigate this challenge, Tanami employs Dynamic Conditional Correlation (DCC) models, an extension of GARCH introduced by Engle (2002). DCC-GARCH allows for time-varying correlations, enabling portfolios to maintain true diversification even under stress. This dynamic approach is critical for managing private market assets, which often exhibit nonlinear and regime-dependent relationships.



Tanami's GARCH-based portfolio optimization framework

Tanami's methodology integrates volatility forecasting and dynamic correlation modelling to construct resilient and forward-looking portfolios. The process consists of three interconnected steps:

Step 1: Measuring Volatility with Historical Depth

Tanami begins by calibrating GARCH models using both recent and long-term historical data. This enables the capture of diverse market regimes, including periods of inflation, monetary tightening, recessions, and geopolitical shocks. Incorporating data from episodes such as the 2008 Global Financial Crisis, the 2020 COVID crash, and the 2022 inflationary spike ensures the robustness of the model across a broad spectrum of conditions.

This historical perspective helps the model identify volatility trends and potential regime shifts. For example, volatility in private credit markets during 2022 resembled stress levels seen in earlier tightening cycles. Such insights are invaluable for anticipating risk rather than merely reacting to it.

Step 2: Modelling Dynamic Correlations Using DCC-GARCH

Once volatility forecasts are established, Tanami applies DCC-GARCH to model time-varying correlations between asset classes. For instance, under normal conditions, private equity and private infrastructure may exhibit low correlations. However, in a liquidity crisis, both can become exposed to valuation markdowns due to reduced investor appetite and tightening credit conditions.

DCC-GARCH helps to preemptively identify these shifts in co-movements, guiding the rebalancing of portfolios to preserve diversification. This is particularly vital in private markets, where traditional models often fail to capture latent risks due to sparse data and infrequent valuations.

Step 3: Scenario Analysis and Stress Testing

The third step involves scenario simulations based on GARCH and DCC-GARCH outputs. Tanami tests portfolio configurations against various macroeconomic shocks, including interest rate hikes, inflation surges, commodity price volatility, and liquidity freezes.

For example, rising interest rate environments—such as those in 1994, 2006, and 2022—are simulated to assess how different private market allocations respond. This stress-testing process reveals which asset mixes offer the best resilience, helping Tanami to design portfolios that are not only optimized for expected returns but also robust under adverse conditions.

Application

Portfolio design across economic regimes

a) Navigating Market Downturns

During systemic downturns, asset classes that once appeared uncorrelated can begin to move together. The 2008 crisis and early 2020 COVID shock revealed how private equity, real estate, and credit can simultaneously decline, especially when all are exposed to leverage or liquidity stress.

GARCH models provide early warning signals of rising systemic risk by identifying volatility clustering and converging asset behaviors. Tanami uses these signals to adjust allocations—shifting toward historically resilient assets such as core infrastructure or senior secured private credit.

b) Capitalizing on Growth Cycles

In growth phases, private equity and opportunistic real estate strategies often offer significant upside. However, such returns typically come with increased volatility. Rather than blindly chasing high returns, GARCH enables Tanami to quantify evolving risk-return tradeoffs, guiding clients toward allocations that align with their risk appetite and investment horizon.

This approach ensures that growth opportunities are pursued with precision, avoiding overexposure to high-beta strategies during periods when volatility is expected to spike.

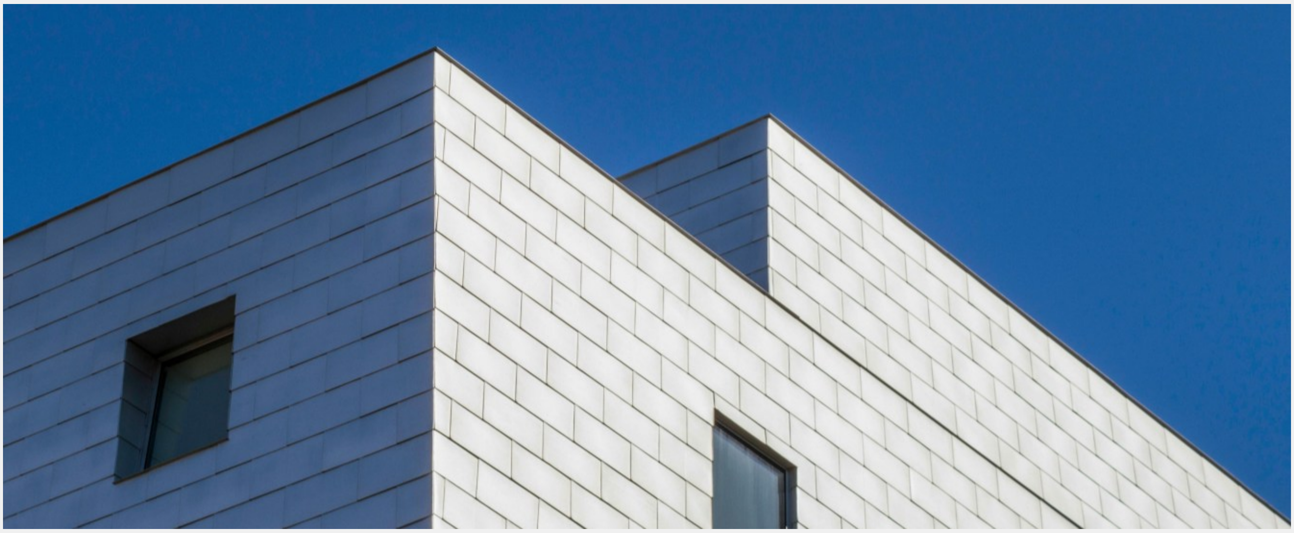
c) Adjusting for Interest Rate Cycles

Interest rate changes have outsized effects on private markets. Rising rates can compress real estate valuations and challenge leveraged buyouts, while floating-rate instruments such as private credit or inflation-linked infrastructure become more attractive.

Tanami uses GARCH-informed analysis of historical rate cycles to guide asset selection and portfolio tilts. For instance, during the 2022 tightening cycle, models suggested a reallocation from highly levered real estate to income-generating infrastructure and senior credit, preserving yield while managing duration risk.

Implications

Building forward-looking, resilient portfolios



a) Tailored, Data-Driven Allocation

Every investor has unique objectives—whether it's capital preservation, income generation, or long-term growth. Tanami's GARCH-based framework customizes portfolios to meet these goals by aligning asset exposures with dynamically evolving risk estimates.

By leveraging GARCH and DCC-GARCH models, Tanami avoids the pitfalls of one-size-fits-all advice. Instead, it offers personalized strategies rooted in empirical data and forward-looking analysis.

b) Proactive risk management

Traditional risk management approaches often respond to volatility after it has already materialized. Tanami's use of GARCH modelling enables a more anticipatory posture—tracking changes in market dynamics to better position portfolios before risks fully emerge.

This forward-looking capability is particularly useful in private markets, where asset pricing and liquidity characteristics differ from public markets. Rather than a limitation, these features offer opportunities for skilled managers to apply proactive strategies that enhance stability and performance.

c) Purpose-built for private markets

Private markets offer distinct advantages—such as access to specialized opportunities, long-term return potential, and diversification from public assets. However, they also present unique analytical requirements, including infrequent pricing and bespoke deal structures.

Tanami's GARCH-enhanced framework is designed to accommodate these nuances. By providing more refined volatility and correlation insights, it equips investors with better tools to understand and manage portfolio dynamics in private assets. This approach helps unlock the full potential of private markets through smarter, data-driven allocation decisions.

Conclusion

Financial markets evolve continuously through cycles of boom, bust, inflation, and policy intervention. Static portfolio strategies, built on backward-looking assumptions, struggle to keep pace with these changes.

Tanami's portfolio optimization framework—rooted in GARCH and DCC-GARCH modelling—represents a paradigm shift. It provides investors with a robust, adaptable, and empirically grounded approach to portfolio construction. By capturing time-varying volatility and correlations, simulating stress scenarios, and aligning strategies with future regimes, Tanami empowers smarter, more resilient investing.

Whether facing market turmoil, interest rate shifts, or long-term structural transitions, this methodology helps investors remain agile, informed, and ahead of the curve.

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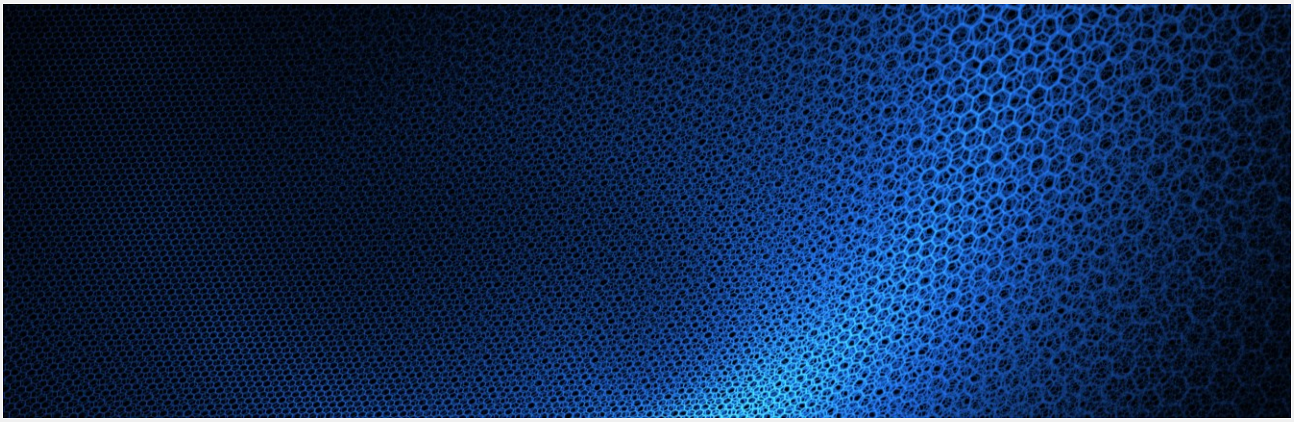

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