



# Beyond Factors: Learning Residual Alpha in Digital Asset Markets

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## Abstract

We study systematic alpha and market-neutral returns through statistical arbitrage in digital-asset markets. Factor decomposition separates observed returns into a component associated with shared market and economic exposures and a residual component not explained by those exposures. This distinction provides a foundation for investigating asset-specific behaviour, while recognising that unexplained returns are not, by themselves, evidence of an opportunity. Our quantitative research explores whether information beyond common factors can support systematic strategies designed to diversify market and factor risk. We emphasise empirical validation, risk discipline, and economic relevance after trading costs and liquidity constraints. This overview introduces the research motivation and framework.

**Keywords:** Digital assets, residual alpha, factor decomposition, quantitative research, systematic strategies, risk diversification.

# 1 Introduction

Digital-asset markets bring together a broad universe of assets with substantial shared variation and changing market conditions. Understanding these common movements is an important starting point for quantitative research. Prior work documents common return factors in cryptocurrency markets (Liu et al., 2022), while further evidence suggests that observable factors may not fully capture the shared variation across assets (Jung and Park, 2024). These findings motivate a central question: what information remains once common sources of risk have been accounted for?

Factor decomposition provides a framework for addressing this question. Observed returns are separated into a systematic component associated with estimated exposures to common factors and a residual component that the model does not explain. This helps distinguish participation in broad market movements from behaviour specific to an asset. The distinction is model-dependent: a residual may also reflect omitted exposures, estimation uncertainty, or changes in market structure. Removing estimated common exposures therefore does not establish that the remaining return is alpha or that all systematic risk has been eliminated.

Residual-based research has an established place in statistical arbitrage (Avellaneda and Lee, 2010). In digital assets, interpreting residual behaviour requires particular care. Unexplained movements can arise from asset-specific information, changes in liquidity, or noise. Market fragmentation and limits to arbitrage further complicate the relationship between a statistical observation and an economically meaningful opportunity (Makarov and Schoar, 2020). We approach residual behaviour as a research question requiring evidence.

At Kopto, we provide systematic alpha and market-neutral returns through statistical arbitrage in digital-asset markets. Our research studies residual opportunities beyond common risk factors and develops strategies designed to capture relative-value signals while managing exposure to broad market movements and common factor risks. Factor decomposition provides a foundation for assessing the sources of returns and the risks that accompany them. Our research incorporates position sizing, transaction costs, liquidity, and risk constraints to connect findings with practical execution.

We encourage interested readers to schedule a call with us to discuss onboarding Kopto as a quantitative trading pod or accessing our trading software. The discussion offers an opportunity to review our research results and live trading performance, including Sharpe ratios, drawdowns, realised factor exposures, and the measurement periods and costs underlying those figures. To explore how Kopto could complement your trading activities and discuss onboarding, contact [info@kopto.co.uk](mailto:info@kopto.co.uk) to arrange a call.

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