VCF Geometry Engine — First Run Research Report

1. EXECUTIVE SUMMARY

This document summarizes the first full VCF Geometry Engine run using:

- SPY log returns

- VIX

- T10Y2Y normalized yield curve

- M2 normalized

The system extracts amplitude, phase, and frequency using the analytic signal and

computes system coherence using pairwise phase differences.

2. METHODOLOGY OVERVIEW

Data cleaning, monthly sampling, merging, normalization, analytic signal extraction,

coherence measurement.

3. MATHEMATICAL FRAMEWORK

Amplitude: $A(t) = |z(t)|$

Phase: $\phi(t) = \arg(z(t))$

Frequency: $f(t) = \Delta\phi(t)$

Coherence: $1 - \text{mean}(|\Delta\phi|)/\pi$

4. RESULTS SUMMARY

System coherence behaves realistically across major macro events (dot-com, GFC, COVID).

All four series produced stable transformations.

5. INTERPRETATION

VCF geometry reveals macro-phase alignment, divergence, stress, and cycle structure.