■ Portfolio Analysis Report

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□ Production Mode: Standard charts disabled
Set PORTFOLIO_LEGACY_CHARTS=true for equity/drawdown/distribution charts
Focus on console text insights for decision making

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======================================================================
[SEARCH] PORTFOLIO TYPE ANALYSIS (Rule-Based Classification)
======================================================================

[DATE] REGIME DI MERCATO RILEVATO:
--------------------------------------------------
   [RED] Regime: Include Crisi Sistemica
   Periodo: 11.7 anni

   [DOWN] CRISI SISTEMICHE RILEVATE (con evidenza quantitativa):
      • China Deval / Oil Crash (2015-08-17 → 2016-02-11)
        Trigger: Post-hoc: Yuan -3% in 2 giorni, WTI $26, S&P -14%
      • Q4 2018 Selloff (2018-10-03 → 2018-12-24)
        Trigger: Post-hoc: Fed hawkish, S&P -20% in Q4
      • COVID Crash (2020-02-19 → 2020-03-23)
        Trigger: Post-hoc: S&P -34% in 33 giorni, VIX 82.69
      • Rate Tightening 2022 (2022-01-03 → 2022-10-12)
        Trigger: Post-hoc: Fed +425bps, S&P -25%, bonds -13%

   [CONF] SOGLIE APPLICATE (Normale vs Regime Attuale):
      Metrica                  Normale       Regime
      --------------------------------------------
      Min Sharpe                  0.55         0.20
      Max Drawdown                -30%         -55%

   [INFO] Le metriche osservate sono influenzate dalla presenza di regimi di stress sistemico (China Deval / Oil Crash, Q4 2018 Selloff, COV

[CHART] FASE 3: DECOMPOSIZIONE TEMPORALE
--------------------------------------------------

   [RED] PERFORMANCE DURANTE CRISI:
      China Deval / Oil Crash (2015-08-17 → 2016-02-11):
         Return:   -16.8%  Vol:  32.0%  MaxDD:   -19.5%
      Q4 2018 Selloff (2018-10-03 → 2018-12-24):
         Return:    -5.8%  Vol:  21.0%  MaxDD:    -6.6%
      COVID Crash (2020-02-19 → 2020-03-23):
         Return:   -32.8%  Vol:  56.7%  MaxDD:   -32.8%
      Rate Tightening 2022 (2022-01-03 → 2022-10-12):
         Return:   -29.4%  Vol:  20.0%  MaxDD:   -29.6%
   [GREEN] PERFORMANCE IN EXPANSION:
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      Periodo expansion: 10.1 anni
      CAGR expansion:     5.8%
      Volatility:    17.6%

   [CYCLE] RECOVERY ANALYSIS (Time-to-Recover):
      Post-China Deval / Oil Crash: 19 mesi per recuperare
         (Recovery CAGR:  30.1%)
      Post-Q4 2018 Selloff: 23 mesi per recuperare
         (Recovery CAGR:  15.6%)
      Post-COVID Crash: 8 mesi per recuperare
         (Recovery CAGR: 114.0%)
      Post-Rate Tightening 2022: 32 mesi per recuperare
         (Recovery CAGR:  16.2%)

   [UP] ROLLING METRICS (only if unstable):
      Sharpe 3Y: min=-0.42 (instability detected)
      Sharpe 5Y: min=-0.18 (instability detected)

   [DOWN] WORST PERIODS:
      Worst 12M:   -30.8%  (ended 2022-10-13)
      Worst 24M:   -34.3%  (ended 2020-03-23)

[TARGET] ROBUSTNESS SCORE (comparative ranking tool):
--------------------------------------------------
   [############........] 60/100 (60%)
   [WARN] NOTA: Score per confronto RELATIVO tra portafogli, non giudizio assoluto.

   Breakdown (criteri storici retrospettivi):
      • Recovery moderato: media 20 mesi (+15)
      • Rolling Sharpe 3Y modesto (min -0.42) (+15)
      • Worst 12M moderato (-31%) (+15)
      • CAGR moderato (5.0%) (+15)

[MEASURE] RESILIENCE vs EFFICIENCY (Two-Axis Evaluation):
--------------------------------------------------
   EFFICIENZA:  [##..................] 10/100 (LOW)
   RESILIENZA:  [##########..........] 50/100 (HIGH)

   Quadrante: [CHART] EQUITY_RESILIENT
   All-equity con buona resilienza storica - attenzione: resta esposto a equity risk

   Trade-off:
   Trade-off intrinseco: aumentare efficienza (più rischio) riduce tipicamente resilienza, e viceversa. La posizione ottimale dipende dagli o

[TAG]  TIPO IDENTIFICATO: [CHART] EQUITY CORE-DRIVEN
   World index dominante + satellite
   Confidence: 98%
   Motivazione: Core globale dominante: 70% in world index (VWCE.DE è All-World diversificato)

[CHART] COMPOSIZIONE PORTAFOGLIO:
--------------------------------------------------
   Core Globale:        70.0%  (VT, VWCE, IWDA)
   Core Regionale:       0.0%  (IVV, EWJ, VGK...)
   --- Emerging Markets ---
     EM Broad:          20.0%  (EEM, VWO...)
   Altro Equity:        10.0%  (non classificato)
   Bond:                 0.0%
--------------------------------------------------
   TOTALE EQUITY:      100.0%

■ SOGLIE PER TIPO 'EQUITY_CORE_DRIVEN':
--------------------------------------------------
   Max singola posizione:     85%
   Max top 3:                 95%
   Max satellite singolo:     10%
   Max satellite totale:      25%
   Max drawdown accettato:   -55%
   Min Sharpe atteso:        0.20
   → Equity Core-Driven - World Index dominante

[PIN] METRICHE PRIMARIE: sharpe, cagr
   (Queste metriche sono critiche per tipo EQUITY_CORE_DRIVEN)
   Secondarie: sortino, max_drawdown

[OK] TRADE-OFF CONSAPEVOLI (coerenti con il tipo):
--------------------------------------------------
   • Top 3 = 100.0%. Accettabile per tipo EQUITY_CORE_DRIVEN con core.

[ALERT] CRITICITÀ SEVERE:
--------------------------------------------------
   • INFERIOR vs benchmark same-category: Global Equity (VT), S&P 500 (SPY). Il portafoglio non giustifica la complessità rispetto ad alterna

[CHART] CONTESTO REGIME DI MERCATO:
--------------------------------------------------
   • Sortino Ratio 0.35 compresso per presenza crisi sistemica. Soglia regime-adjusted: 0.40.

======================================================================
[INFO] VERDETTO: [FAIL] DA RISTRUTTURARE
   Criticità severe non coerenti con tipo EQUITY_CORE_DRIVEN.
   Suggerimento: rivedi la composizione o considera un tipo diverso.
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          RISK INTENT ANALYSIS v3.1 (Framework Istituzionale)
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[INFO] RISK INTENT DICHIARATO: GROWTH
   Portafoglio orientato alla crescita, accetta volatilità di mercato
   Beta target: 0.8 - 1.0
   Beta min accettabile: 0.6
   Beta FAIL threshold: 0.4
   Benchmark: VT
   Max DD atteso: -35%

[TARGET] BETA GATING:
   Portfolio Beta: 0.64
   [OK] Beta 0.64 accettabile per risk intent GROWTH.

[CHART] CONFIDENCE: 97/100 (HIGH)

[DOWN] DRAWDOWN ATTRIBUTION:
   Tipo: STRUCTURAL_FRAGILITY
   Osservato: -37.6%
   Atteso (β-adj): -21.8%
   Excess DD: 15.7% [RED]
   → DD 15.7% oltre atteso - concentrazione o correlazioni problematiche

✓ VERDETTI (4 regole valutate):
   [OK] [V2]  [OK] CCR BILANCIATO: Nessun asset con risk leverage > 1.5x
   [OK] [V3]  [OK] DIVERSIFICATO: Correlazione media 0.03 < 0.70 (matric
   [OK] [V4]  [OK] DD ECCELLENTE: Drawdown migliore dell'atteso per beta
   [OK] [V5]  [OK] Beta 0.64 accettabile per risk intent GROWTH.

=====================================================================
              VERDETTO FINALE (Framework Istituzionale)
=====================================================================

   1. Risk Intent Dichiarato: GROWTH
   2. Coerenza Intent vs Dati: OK
   3. Coerenza Strutturale: OK

   Scores:
      Data Integrity:          97/100
      Structural Coherence:   100/100
      Efficiency:              50/100
      Tail Risk:               30/100
      ----------------------------
      AGGREGATE:               73/100

   4. VERDETTO: [OK] ACCEPTABLE - Trade-off ragionevoli documentati
      → Alcune aree ottimizzabili ma struttura solida

   Riepilogo: 4 OK, 0 Warning, 0 Structural, 0 Intent Mismatch
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======================================================================
        INVESTMENT COMMITTEE VALIDATOR (Gate System v4.3)
======================================================================

[INFO] GATE STATUS:
--------------------------------------------------
   [OK] Data Integrity Gate: PASS
   [OK] Intent Gate: PASS
   [OK] Structural Gate: PASS (no causal fragility detected)
   [i] Structure Type: GLOBAL_CORE (90% confidence)
   [i] Benchmark Gate: OPPORTUNITY_COST
   [i] Final Verdict: STRUCTURALLY_COHERENT_INTENT_MATCH
   [i] Prescriptive Actions: 0
   [i] CCR Warnings (Diagnostic): 0

[CHART] DATA INTEGRITY GATE:
   [OK] DATA_INTEGRITY: PASS (NaN ratio 0% ≤ 20%)

[TARGET] RISK INTENT GATE (3-state beta gating):
   [OK] INTENT_MATCH: Beta 0.64 ≥ 0.6 per GROWTH
   Beta state: [GREEN] PASS (beta ≥ 0.6)
   Beta window: 11.7y → Intent verdict: VALID

[PACKAGE] PORTFOLIO CLASSIFICATION (5-bucket):
   Core Global (world):          70.0%
   Core Regional (US/EU/EM...):  20.0%
   Satellite (classified):        0.0%
   Unclassified Equity:          10.0%
   Defensive (bond/gold):         0.0%
   ------------------------------------
   TOTAL:                       100.0%

   [TAG]  PORTFOLIO LABEL: Global Core + Equity Portfolio (Controlled-Beta)

   ■■  STRUCTURE TYPE: GLOBAL_CORE (90% confidence)
       Global core 70% ≥ 50% dominates structure
   [OK] Same-category benchmark: ALLOWED (≥95% equity, no tilts)

[UP] BENCHMARK GATE:
   [i] BENCHMARK_GATE: Nessun benchmark same-category (solo reference)
   Opportunity-cost only: GLOBAL_EQUITY, SP500, 60_40
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======================================================================
                      FINAL VERDICT
======================================================================

   [OK] STRUCTURALLY COHERENT - Struttura e Intent allineati

   [PIN] Why this verdict is not contradictory:
   Tutti i gate passati: data integrity OK, intent match OK, nessun problema strutturale critico rilevato. Note: CCR warnings (se presenti)

   [INFO] AZIONI CONSENTITE:
   [OK] Tutte le azioni di portafoglio consentite

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======================================================================
                      PORTFOLIO ANALYSIS REPORT
                   (Professional Diagnostic v3.1)
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[WARN]  METODOLOGIA E ASSUNZIONI
--------------------------------------------------
   • Metriche STORICHE: descrivono il passato, non predicono futuro
   • Returns finanziari: fat tails, volatility clustering
   • VaR/CVaR: storico (non parametrico), scaling annuale indicativo
   • Range plausibile*: variabilità campionaria (bootstrap)
   • Correlazioni: osservate, possono convergere in crisi
   • Monte Carlo: scenari ipotetici, non previsioni

[UP] PERFORMANCE
--------------------------------------------------
  Total ROI:                    77.54%
  CAGR (geometric):              5.05%
    Range plausibile*:    [-4.49%, 16.76%]
  Volatility (ann.):            19.43%

[CHART] RISK-ADJUSTED METRICS
--------------------------------------------------
  Sharpe Ratio:                   0.25
    Range plausibile*:    [-0.27, 0.68]
    Precision:           ±0.25 (11.7 yrs)
  Sortino Ratio:                  0.35
  Calmar Ratio:                   0.13
  Profit Factor:                  1.06
  Gain/Loss Ratio:                0.97

[DOWN] DRAWDOWN ANALYSIS
--------------------------------------------------
  Max Drawdown:                -37.58%
    Worst plausibile*:    [-64.1%, -23.7%]
    Peak Date:              2018-01-29
    Trough Date:            2020-03-23
  Avg Drawdown:                -12.23%
  Current Drawdown:             -1.59%

[WARN]  TAIL RISK (VaR storico, 95% confidence)
--------------------------------------------------
  VaR (daily):                   1.91%
  CVaR (daily):                  2.86%
  VaR (annual, indicative):     30.39%
  CVaR (annual, indicative):    45.44%
  [i]  Scaling annuale: sqrt(T), può sottostimare rischio ~20-40%

[DATE] MONTHLY STATISTICS
--------------------------------------------------
  Months Up:                    77 / 141 (54.6%)
  Months Down:                  64 / 141
  Best Month:                   10.83%
  Worst Month:                 -12.73%
  Avg Month:                     0.50%

■ YEARLY STATISTICS
--------------------------------------------------

  Years Up:                      9 / 13
  Years Down:                    4 / 13
  Best Year:                    30.81%
  Worst Year:                  -20.61%

[PIN] DAILY STATISTICS
--------------------------------------------------
  Days Up:                    1551 / 2960 (52.4%)
  Days Down:                  1409 / 2960
  Best Day:                      8.54%
  Worst Day:                   -11.30%

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RISK CONTRIBUTION (Component Contribution to Risk)
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Ticker	Weight	MCR	CCR	CCR%
VWCE.DE	70.00%	0.1941	0.1359	74.32%
IS3N.DE	20.00%	0.1539	0.0308	16.84%
IS3Q.DE	10.00%	0.1616	0.0162	8.84%

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------------------------------------------------
TOTAL         100.00%                0.1828    100.00%

------------------------------------------------
[CHART] CCR% NORMALE vs CRISI (come cambia in stress)
------------------------------------------------
Ticker          Normale      Crisi      Delta           Note
------------------------------------------------
VWCE.DE           74.5%      78.6%      +4.1%       ≈ stabile
IS3N.DE           16.8%      13.1%      -3.7%       ≈ stabile
IS3Q.DE            8.7%       8.3%      -0.4%       ≈ stabile
------------------------------------------------
   Giorni normali: 1618
   Giorni crisi: 41

======================================================================
INDIVIDUAL ASSET METRICS (annualized)
======================================================================
         Weight   CAGR    Vol  RiskContrib%
VWCE.DE  0.7000 0.1278 0.1760        0.7432
IS3N.DE  0.2000 0.0902 0.1972        0.1684
IS3Q.DE  0.1000 0.1264 0.1774        0.0884

======================================================================
CORRELATION MATRIX (Observed, RAW)
======================================================================

[WARN] SHRINKAGE MOLTO ALTO (96%)
   La matrice REGULARIZED è quasi-identità (costruzione numerica).
   Usare SOLO la matrice RAW per interpretare relazioni tra asset.
   La REG serve esclusivamente per stabilizzare calcoli di rischio.

   [i] Shrinkage intensity 96% → correlazioni regolarizzate
      non informative per diagnosi. Matrice RAW mostrata sotto.
      (REG usata internamente solo per calcoli numerici)

[CHART] CORRELAZIONI OSSERVATE (RAW, usate per diagnosi):
------------------------------------------------
Ticker   IS3N.DE  IS3Q.DE  VWCE.DE
Ticker

IS3N.DE     1.00     0.77     0.84
IS3Q.DE     0.77     1.00     0.98
VWCE.DE     0.84     0.98     1.00

======================================================================
[RANDOM] MONTE CARLO STRESS TEST
======================================================================

[CHART] SCENARIO NORMALE (distribuzione storica):
------------------------------------------------
   Median return 1Y:            12.1%
   Worst case 5%:              -27.2%

[WARN]  SCENARIO STRESS (crisi strutturale):
------------------------------------------------
   Median return 1Y:           -30.9%
   Worst case 5%:              -56.3%

■ TAKEAWAY:
   Stress peggior caso: -56% vs normale -27% (delta 29%)

======================================================================
[CHART] BENCHMARK COMPARISON (vs alternative passive)
======================================================================

[CONF]  METODOLOGIA: BENCHMARK_COMPARISON
   Confronto vs alternative passive. Distingue same-category vs opportunity-cost.

   [INFO] Rule 8 Parameters:
      Defensive allocation: 0.0%
      Has sector tilts: False

   vs Global Equity (VT) [[TARGET] SAME-CATEGORY]:
------------------------------------------------
      Benchmark CAGR:       9.81%
      Benchmark Vol:       16.89%
      Benchmark Sharpe:      0.52
      Benchmark MaxDD:     -34.2%

      Excess Return:       -4.76%
      Tracking Error:      17.40%
      Information Ratio:    -0.27
      Beta:                  0.64
      Alpha (Jensen):      -1.97%

      Verdict: INFERIOR
      Portfolio sottoperforma Global Equity (VT) - giustificare la scelta.

   vs S&P 500 (SPY) [[TARGET] SAME-CATEGORY]:
------------------------------------------------
      Benchmark CAGR:      13.20%
      Benchmark Vol:       17.48%
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      Benchmark Sharpe:      0.68
      Benchmark MaxDD:     -33.7%

      Excess Return:       -8.16%
      Tracking Error:      18.77%
      Information Ratio:    -0.43
      Beta:                  0.55
      Alpha (Jensen):      -3.14%

      Verdict: INFERIOR
      Portfolio sottoperforma S&P 500 (SPY) - giustificare la scelta.

   vs 60/40 Portfolio [[CHART] OPPORTUNITY-COST]:
--------------------------------------------------
      Benchmark CAGR:       9.19%
      Benchmark Vol:       10.90%
      Benchmark Sharpe:      0.68
      Benchmark MaxDD:     -21.8%

      Excess Return:       -4.14%
      Tracking Error:      17.27%
      Information Ratio:    -0.24
      Beta:                  0.86
      Alpha (Jensen):      -3.14%

      Verdict: ALTERNATIVE_STRATEGY
      60/40 Portfolio ha dato rendimento maggiore - ma è strategia diversa, non errore.

   [INFO] VERDETTO COMPLESSIVO (solo same-category): REVIEW_NEEDED
   Portfolio sottoperforma benchmark di categoria - rivedere.

======================================================================
                SECTOR ALLOCATION & TOP HOLDINGS
======================================================================

[PIN] SETTORI (allocazione portafoglio)
--------------------------------------------------
  technology             27.6%
  financial_services     18.0%
  consumer_cyclical      10.6%
  industrials             9.8%
  communication_services    8.9%
  healthcare              8.1%
  consumer_defensive      4.8%
  Other                   4.4%
  basic_materials         4.3%
  energy                  3.5%

[PIN] TOP HOLDINGS (Top 10 per ETF)
--------------------------------------------------

  VWCE.DE
      4.62%  NVDA - NVIDIA Corp
      4.20%  AAPL - Apple Inc
      3.80%  MSFT - Microsoft Corp
      2.34%  AMZN - Amazon.com Inc
      1.94%  GOOGL - Alphabet Inc Class A
      1.69%  AVGO - Broadcom Inc
      1.56%  GOOG - Alphabet Inc Class C
      1.53%  META - Meta Platforms Inc Class A
      1.34%  TSLA - Tesla Inc
      1.27%  2330.TW - Taiwan Semiconductor Manufacturing Co Ltd

  IS3N.DE
     10.29%  2330.TW - Taiwan Semiconductor Manufacturing Co Ltd
      4.17%  0700.HK - Tencent Holdings Ltd
      3.32%  005930.KS - Samsung Electronics Co Ltd
      2.67%  9988.HK - Alibaba Group Holding Ltd Ordinary Shares

      2.08%  000660.KS - SK Hynix Inc
      1.06%  HDFCBANK.NS - HDFC Bank Ltd
      0.89%  RELIANCE.NS - Reliance Industries Ltd
      0.80%  00939 - China Construction Bank Corp Class H
      0.78%  2317.TW - Hon Hai Precision Industry Co Ltd
      0.73%  1810.HK - Xiaomi Corp Class B

  IS3Q.DE
      5.24%  AAPL - Apple Inc
      5.07%  NVDA - NVIDIA Corp
      4.99%  MSFT - Microsoft Corp
      3.76%  V - Visa Inc Class A
      3.56%  META - Meta Platforms Inc Class A
      2.45%  LLY - Eli Lilly and Co
      2.32%  ASML.AS - ASML Holding NV
      2.15%  MA - Mastercard Inc Class A
      1.95%  GOOGL - Alphabet Inc Class A
      1.93%  TJX - TJX Companies Inc

======================================================================
         TOP HOLDINGS AGGREGATE (pesate per peso ETF)
======================================================================
  NVDA           3.74%  NVIDIA Corp
  AAPL           3.46%  Apple Inc
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  MSFT          3.16%  Microsoft Corp
  2330.TW       2.95%  Taiwan Semiconductor Manufacturing Co Ltd
  AMZN          1.64%  Amazon.com Inc
  GOOGL         1.55%  Alphabet Inc Class A
  META          1.42%  Meta Platforms Inc Class A
  AVGO          1.19%  Broadcom Inc
  GOOG          1.10%  Alphabet Inc Class C
  TSLA          0.94%  Tesla Inc

======================================================================
[INST]  SENIOR PORTFOLIO ARCHITECT ANALYSIS
    Framework Istituzionale (Vanguard Style)
======================================================================

[TAG]  CLASSIFICAZIONE ETF (deterministica, no metriche)
--------------------------------------------------
   VWCE.DE      70.0%  EQUITY_UNKNOWN       risk=UNKNOWN    (DEFAULT)
   IS3N.DE      20.0%  EQUITY_UNKNOWN       risk=UNKNOWN    (DEFAULT)
   IS3Q.DE      10.0%  EQUITY_UNKNOWN       risk=UNKNOWN    (DEFAULT)

[WORLD] ESPOSIZIONE GEOGRAFICA EFFETTIVA:
--------------------------------------------------
   (Calcolata considerando composizione interna ETF)

   [US] USA              47.0%  ##################
   [ASIA] Emergenti         29.4%  ###########
   [EU] Europa           12.5%  #####
   [GLOBAL] Altri DM           5.9%  ##
   [JP] Giappone          5.2%  ##
--------------------------------------------------
   Totale:                    100.0%

   [WARN] GEOGRAPHIC DATA MISSING:
      1 ticker (10.0% del portfolio) usano DEFAULT_GEO.
      Ticker: IS3Q.DE
      L'esposizione geografica per questi assume 60% USA (può essere impreciso).

[CONF]  ESPOSIZIONE PER FUNZIONE ECONOMICA:
--------------------------------------------------
   [UP] Core Growth (rendimento principale)     80.0%  ############################
   [ASIA] Esposizione Emergenti                   20.0%  #######


[RESEARCH] ANALISI CONCENTRAZIONE E OVERLAP:
--------------------------------------------------
   Max posizione singola:     70.0%
   Top 3 posizioni:          100.0%
   Top 5 posizioni:          100.0%
   HHI (concentrazione):      0.540  (più basso = più diversificato)
   N. effettivo posizioni:      1.9  (vs 3 nominali)

   ✓ Nessuna falsa diversificazione significativa rilevata


[STRONG] PUNTI DI FORZA STRUTTURALI:
--------------------------------------------------
   1. Esposizione USA bilanciata (47%), non eccessivamente concentrato né sottopesato
   2. Esposizione EM adeguata (29%) per catturare crescita mercati emergenti

======================================================================
[INFO] VERDETTO FINALE: [OK] STRUCTURALLY COHERENT (Score: 60/100)
   Struttura robusta e allineata al Risk Intent dichiarato

   [PIN] Tutti i gate passati: data integrity OK, intent match OK, nessun problema strutt...

   Motivazioni:
   • Portafoglio classificato come EQUITY_CORE_DRIVEN con struttura coerente rispetto agli obiettivi impliciti
   • Esposizione USA bilanciata (47%), non eccessivamente concentrato né sottopesato
   • Esposizione EM adeguata (29%) per catturare crescita mercati emergenti
   • Metriche di lungo periodo: CAGR 5.0%, Sortino 0.35, Max DD -38%
   • Criticità strutturali richiedono revisione prima di implementazione

----------------------------------------------------------------------
   Analisi condotta secondo framework Senior Portfolio Architect
   Standard: Vanguard/BlackRock Institutional Guidelines
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======================================================================
                        DATA QUALITY
======================================================================
FX converted: ['IS3N.DE', 'IS3Q.DE', 'VWCE.DE']
Survivorship confidence: LOW (55%)
Survivorship warning: Survivorship bias: confidenza LOW (55%). Red flags: 3. Bias moderato: metriche affidabili per core ETF, ma cautela su
Correlation shrinkage intensity: 96.4%

======================================================================
                  OPTIMIZATION ANALYSIS (Markowitz)
======================================================================
Current Sharpe:        0.641
Current Volatility:    14.52%
Current Exp. Return:   11.31%
Efficiency score vs. optimal: 65.8%
Sharpe gap: 0.333
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Volatility gap: 3.64%

Suggestions:
- Sharpe sub-ottimale: 0.64 vs 0.97 (gap 0.33)
- Volatilità riducibile: 14.5% vs 10.9% (gap 3.6%)

Key portfolios (CAGR/Vol/MaxDD/Sharpe | weights):
  min_variance CAGR=11.81%
    Vol=17.42% MaxDD=-33.94% Sharpe=0.60 | VWCE.DE:28.6%, IS3N.DE:35.5%, IS3Q.DE:35.9%
  max_sharpe   CAGR=11.99%
    Vol=17.40% MaxDD=-33.86% Sharpe=0.61 | VWCE.DE:23.4%, IS3N.DE:37.8%, IS3Q.DE:38.7%
  max_return   CAGR=12.72%
    Vol=17.59% MaxDD=-33.58% Sharpe=0.65 | VWCE.DE:0.1%, IS3N.DE:49.9%, IS3Q.DE:50.0%
  risk_parity  CAGR=11.73%
    Vol=17.44% MaxDD=-33.98% Sharpe=0.60 | VWCE.DE:31.0%, IS3N.DE:34.4%, IS3Q.DE:34.6%

Frontier points: 999 successful

======================================================================
                     INTEGRATION TEST RESULTS
======================================================================
Status: FAIL
Summary: exit_code=4
Duration: 0.25s

stdout (tail):
  ============================= test session starts ==============================
  platform linux -- Python 3.14.2, pytest-9.0.2, pluggy-1.6.0 -- /usr/bin/python3
  cachedir: .pytest_cache
  rootdir: /home/nic/Desktop/Developer/GitHub/analisiPortafogli
  configfile: pyproject.toml
  plugins: cov-7.0.0, anyio-4.12.1
  collecting ... collected 0 items
  ============================ no tests ran in 0.01s =============================

stderr (tail):
  ERROR: file or directory not found: tests/integration

[CHART] Placeholder grafico salvato: output/portfolio_analysis.png (legacy charts disabled)
```