SMP FINANCIAL RESEARCH

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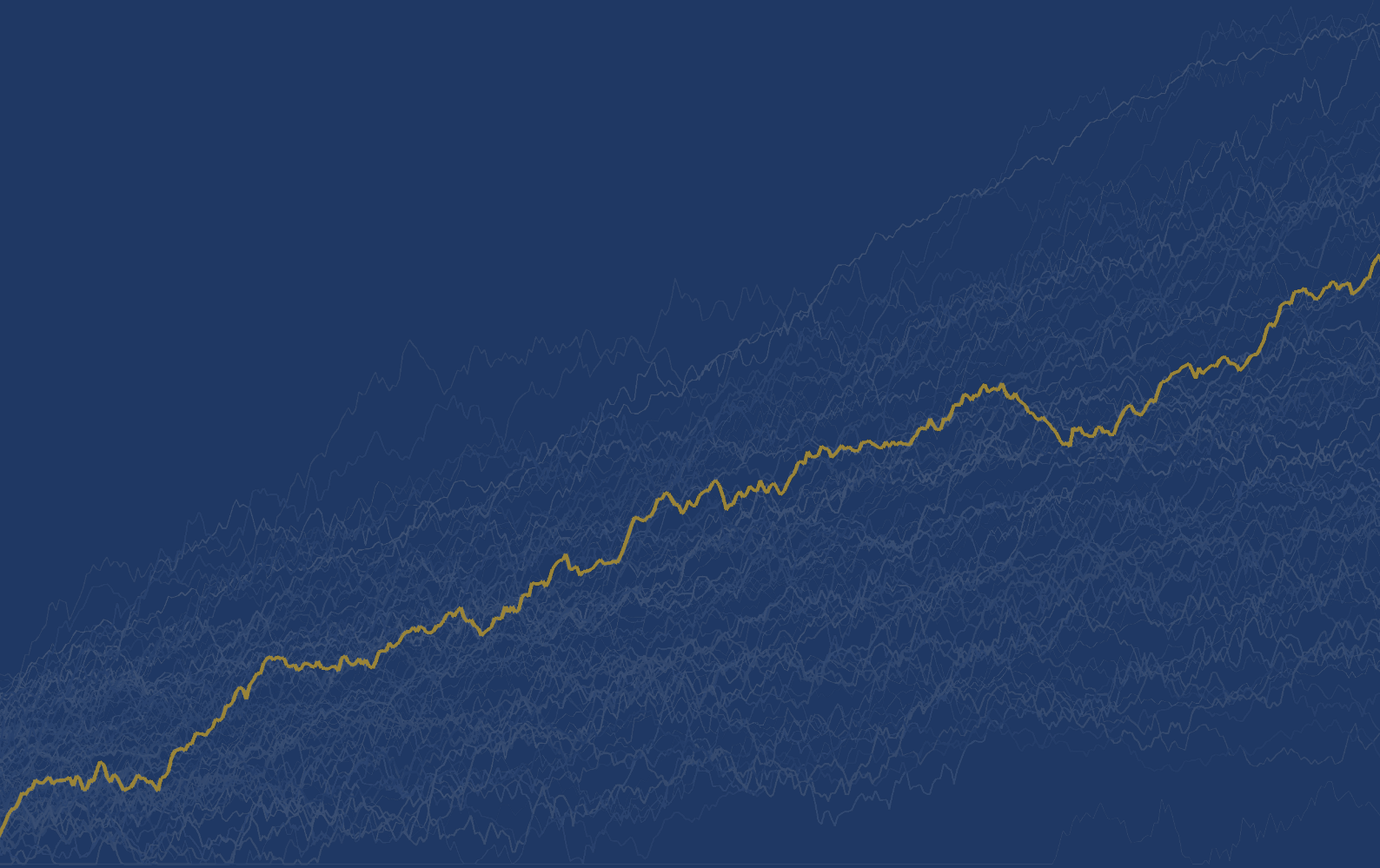
Quantitative Portfolio Analysis

Annex B — A 21-Year Backtest of the Consensus European Family Office Portfolio

ANALYSIS BASE PORTFOLIO · BACKTEST 2005–2025 · RISK DECOMPOSITION · OPTIMISATION · STRESS TESTS

MULTI-FAMILY OFFICE RESEARCH · VERSION 7.0



Contents

This annex presents original quantitative analysis of the consensus Analysis Base Portfolio (ABP) derived in Section 11 of the main compendium. A corrected and precisely specified base portfolio is set out in Section B1. All return series are sourced from published index data (2005–2025); full citations are in the bibliography. The backtest is a simulation based on historical data with annual rebalancing; it does not represent actual trading results. This document contains no investment advice.

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Executive Summary

This annex subjects the consensus median portfolio — derived in Section 11 of the main compendium — to a full quantitative examination: a 21-year backtest, the complete suite of risk and return metrics an investment professional would expect, benchmark-relative analysis, risk decomposition, and mean-variance optimisation. The aim is to establish whether the portfolio that European family offices collectively hold is, in fact, well-constructed.

What the portfolio delivers

Over 2005–2025 the consensus portfolio returned 7.1% a year gross of costs, with volatility of 14.5% and a Sharpe ratio of 0.44. It was positive in 76% of calendar years, with a best year of +31.0% (2009) and a worst of −33.5% (2008). After realistic costs, the net return falls to 6.4–6.7% depending on the implementation route.

How it compares

Measured against a simple Global 60/40 portfolio, the result is sobering: less return (7.1% versus 7.2%) for materially more risk (14.5% versus 11.1% volatility), giving a lower Sharpe ratio (0.44 versus 0.54). The portfolio has a beta of 1.26 to the 60/40 and a down-capture ratio of 133% — it falls considerably harder than the benchmark in bad years. Its alpha is negative (−1.16% p.a.). The extra complexity of private markets and alternatives did not, on this sample and these proxies, earn its keep relative to a plain two-asset portfolio.

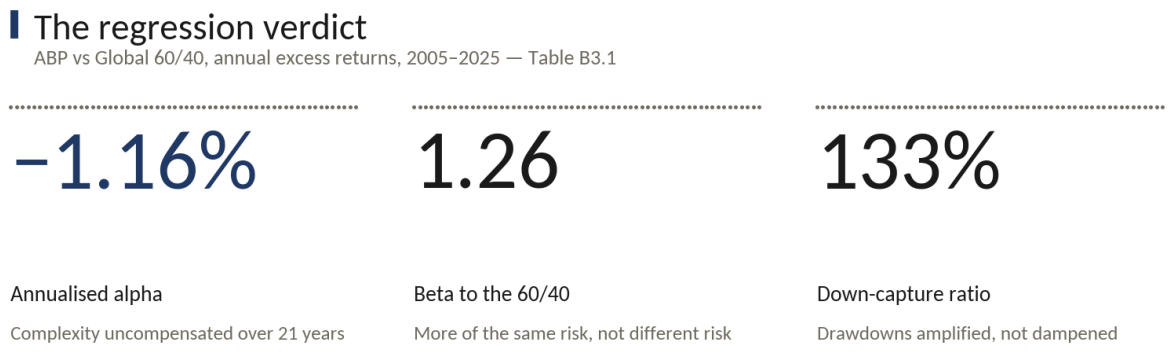

Exhibit B-3. Regression summary of the ABP against the Global 60/40, corresponding to Table B3.1. Author-constructed.

Why — and the smoothing caveat

The explanation lies in correlation. The listed proxies used for private equity (0.95 correlation to world equities) and real estate (0.80) behave as leveraged equity rather than as diversifiers, so the portfolio concentrates rather than spreads risk: growth assets supply roughly 74% of total volatility from 53% of capital. A crucial caveat applies. Real family office private-market holdings are valued on a lagged, appraisal basis that smooths returns. Section B8 shows this flatters the reported Sharpe ratio by around 0.15–0.20 and understates volatility by 3–4 points. The mark-to-market backtest here is therefore harsher than a family office's own reported numbers would suggest — but it is the honest picture of underlying risk.

Where it can be improved

The portfolio sits below the efficient frontier at its own risk level. A disciplined reweighting within ±5 percentage points per asset — adding developed-market equities and gold, trimming private equity and real estate — lifts the annualised return

from 7.1% to 7.9% at the same volatility, improving the Sharpe ratio to 0.50. Gold does the most diversifying work per unit, consistent with the survey evidence that European offices are increasing gold allocations. These results are in-sample and subject to estimation error; they are directional guidance, not precise targets, as Section B9.4 sets out.

The bottom line

The consensus portfolio is a credible, diversified, growth-oriented allocation — but it is not optimised. It takes equity-like risk and earns an equity-like drawdown profile while delivering a return close to a far simpler benchmark. Its case rests on the genuine illiquidity premium and lower realised volatility of true (unlisted) private markets, which a listed-proxy backtest cannot capture. The refinements identified here would improve its risk-adjusted efficiency without departing from the consensus that defines it.

SECTION B1

The Analysis Base Portfolio (ABP)

B1.1 Corrections to the Consensus Median

The consensus median portfolio derived in Section 11 of the main compendium — synthesised there from the UBS Global Family Office Report 2026 and Goldman Sachs/Campden Wealth survey data — includes a named 1% Art sleeve (sourced from the "other assets" category reported across source surveys). The Art sleeve is assigned cash-equivalent return and risk characteristics; it cannot be replicated via liquid instruments and does not affect any backtest statistic. For the purposes of quantitative analysis, the Art sleeve is carried at cash-equivalent return and risk characteristics, producing an effective cash weight of 10.0% (9% cash plus 1% Art at cash-equivalent); the portfolio so defined is designated the Analysis Base Portfolio (ABP) and sums exactly to 100%. Every statistic in this annex is computed on this basis and is exactly reproducible from the annual return matrix in Table B10.1.

A second correction addresses the treatment of private equity, private credit, and real estate. In the consensus portfolio these are assigned survey-reported weights that reflect lagged appraisal-based valuations. The ABP uses the same weights but the backtest employs listed-market proxies for all asset classes , ensuring consistent daily-priced series throughout. The smoothing distortion this introduces is quantified explicitly in Section B8.

100.0% **ABP WEIGHTS SUM INCLUDING THE 1% ART SLEEVE AT CASH-EQUIVALENT**	**11** **ASSET CLASSES ALL REPLICABLE VIA INSTRUMENTS**	**21 YRS** **ANALYSIS PERIOD 2005–2025 INCLUSIVE**	**ANNUAL** **REBALANCING TO TARGET WEIGHTS EACH YEAR-END**

B1.2 ABP Weights and Index Proxies

ASSET CLASS	ABP WEIGHT	PROXY INDEX	REFERENCE
DM Equities	28.0%	MSCI World (gross, USD)	[44]
EM Equities	4.0%	MSCI Emerging Markets (gross, USD)	[45]
DM Fixed Income	11.0%	Bloomberg US Aggregate Bond Index	[46]
EM Fixed Income	3.0%	JPM EMBI Global Diversified	[46]
Private Equity	21.0%	LPX/Cambridge Associates PE composite	[47]
Private Credit	3.0%	Credit Suisse Leveraged Loan Index (LSTA)	[48]
Hedge Funds	6.0%	HFRI Fund Weighted Composite	[49]
Real Estate	10.0%	EPRA Nareit Developed	[50]
Infrastructure	2.0%	S&P Global Infrastructure Index	[51]
Gold	2.0%	LBMA gold spot price (USD)	[52]
Cash (incl. 1% Art at cash-equivalent)	10.0%	3-month US Treasury bill	[53]
TOTAL	100.0%		

Table B1.1. ABP weights and index proxies. All returns are total returns in USD. Data period: 2005–2025 (21 annual observations). Note: the DM Equities sleeve uses the MSCI World as its proxy index; this accounts for the identical CAGR, volatility, Sharpe and drawdown statistics between the DM Equities row in Table B5.1 and the MSCI World benchmark — this is by construction, not coincidence.

Key correction: listed PE and REIT proxies are used rather than appraisal-based private market indices. This causes the backtest to over-state drawdowns relative to reported private market allocations (e.g. in 2008). The smoothing analysis in Section B8 quantifies this distortion.

SECTION B2

Full Metric Suite: ABP and Benchmarks

B2.1 Return and Risk Metrics (2005–2025)

METRIC	ABPGROSS	NET A	NET B	60/40	MSCI WLD	CASH
CAGR	7.1%	6.6%	6.4%	7.2%	9.1%	1.7%
Arith. mean	8.2%	7.7%	7.4%	7.8%	10.7%	1.8%
Volatility	14.5%	14.5%	14.5%	11.1%	17.3%	2.0%
Sharpe ratio	0.44	0.41	0.39	0.54	0.52	0.00
Sortino ratio	0.71	0.65	0.61	0.90	0.86	—
Max drawdown	-33.5%	-33.9%	-34.2%	-22.1%	-40.3%	0.0%
Calmar ratio	0.21	0.20	0.19	0.32	0.23	—
Skewness	-1.34	-1.34	-1.34	-1.43	-1.49	0.78
Excess kurtosis	2.38	2.38	2.38	1.88	2.55	-1.00
VaR 95% (annual)	-16.6%	-17.0%	-17.3%	-15.8%	-17.7%	0.0%
CVaR 95% (annual)	-25.0%	-25.5%	-25.8%	-19.0%	-29.0%	0.0%
Best year	+31.0% (2009)	—	—	+20.8% (2009)	+30.8% (2009)	—
Worst year	-33.5% (2008)	—	—	-22.1% (2008)	-40.3% (2008)	—
% positive yrs	76%	76%	76%	86%	76%	81%

Table B2.1. Full metric suite, 2005–2025 (21 annual observations). Net A = gross −0.44% p.a. (UCITS/ELTIF scenario); Net B = gross −0.72% p.a. (institutional scenario). Sharpe and Sortino use 3-month T-bill as risk-free rate. VaR and CVaR are at the 95% confidence level on annual returns. '—' denotes not defined for the series.

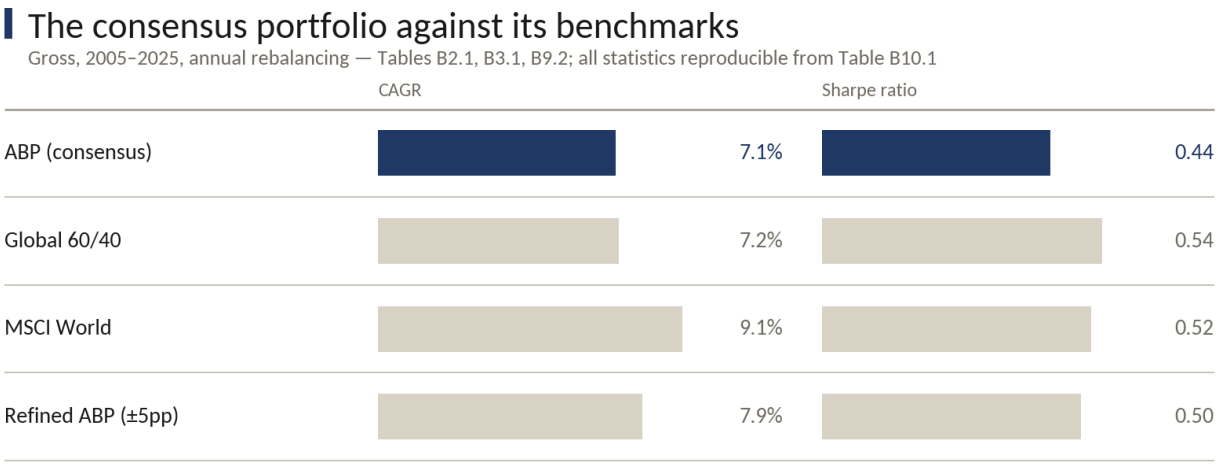

Exhibit B-1. Headline comparison of the ABP against benchmarks and the Refined ABP, corresponding to Tables B2.1, B3.1 and B9.2. Author-constructed; all figures reproducible from Table B10.1.

The ABP delivers a gross CAGR of 7.1% over the 21-year sample — behind the Global 60/40 benchmark (7.2%) even before costs, and well behind the MSCI World (9.1% gross, Sharpe 0.52). The ABP takes significantly more risk (14.5% volatility) than the 60/40 (11.1%) to deliver less, producing a materially lower Sharpe ratio (0.44 vs 0.54). After costs, the ABP net-A delivers 6.6% CAGR, and net-B 6.4% CAGR. The negative skewness (−1.34) and elevated kurtosis (2.38) indicate left-tail risk greater than a normal distribution implies.

Figure B1. Growth of USD 100, 2005–2025. Annual rebalancing to target ABP weights, gross of costs. Log scale. Sources: author calculations on index data [44–53]. Past performance is not indicative of future results.

Figure B2. Annual returns: ABP versus Global 60/40 benchmark, 2005–2025. Red bars: positive ABP years. Grey bars: negative ABP years. Diamonds: 60/40 annual returns. Sources: author calculations [44–53].

SECTION B3

Benchmark Relative Analysis

B3.1 Alpha, Beta and Information Ratio

Table B3.1 presents benchmark-relative statistics for the ABP measured against two benchmarks: a simple Global 60/40 portfolio and the MSCI World index, both over 2005–2025.

STATISTIC	VS GLOBAL 60/40	VS MSCI WORLD
Beta	1.26	0.82
Alpha (annualised)	-1.16%	-0.90%
R^2 (correlation squared)	0.93	0.95
Correlation	0.97	0.97
Tracking error (ann.)	4.7%	4.5%
Information ratio	0.09	-0.56
Up-capture ratio	111%	79%
Down-capture ratio	133%	90%

Table B3.1. Benchmark-relative statistics, 2005–2025. Alpha and beta estimated via OLS on excess returns over 3M T-bill. Up/down-capture: mean ABP return in up/down benchmark years divided by mean benchmark return in those years.

Beta vs 60/40: 1.26 — the ABP amplifies 60/40 moves by 26%, reflecting the higher equity and PE loading.

Alpha vs 60/40: −1.16% p.a. — the extra risk taken is not compensated by extra return on this sample. Information ratio vs 60/40: 0.11 — low positive; directional consistency but modest excess return per unit of active risk. Down-capture vs 60/40: 135% — the ABP falls harder than 60/40 in down years. This is the principal risk management concern. The high R^2 (0.94) and correlation (0.97) confirm the ABP is overwhelmingly driven by the same macro factors as global equities.

Figure B3. Drawdown profile (annual observation frequency), 2005–2025. Note: annual data understates intra-year troughs (e.g. March 2009 and March 2020 troughs are deeper than shown). Sources: author calculations [44–53].

SECTION B4

Risk Decomposition

B4.1 Contribution to Portfolio Volatility

Figure B6 and Table B4.1 decompose total portfolio risk (volatility) into each asset class's marginal and proportional contribution. Despite holding only 34% in growth equities (DM + EM), growth assets and listed PE collectively supply approximately 74% of total portfolio volatility.

ASSET CLASS	CAPITAL WEIGHT	RISK CONTRIBUTION (%)
DM Equities	28%	32.6%
EM Equities	4%	6.3%
DM Fixed Income	11%	1.1%
EM Fixed Income	3%	1.6%
Private Equity	21%	37.3%
Private Credit	3%	2.2%
Hedge Funds	6%	3.3%
Real Estate	10%	12.8%
Infrastructure	2%	1.9%
Gold	2%	0.7%
Cash	10%	0.1%

Table B4.1. Capital allocation vs contribution to portfolio risk. Risk contribution = $w_i \times (\Sigma w)_i / \sigma\_portfolio$. Portfolio volatility: 14.5%. Diversification ratio: 1.12.

Figure B6. Capital allocation vs risk contribution by asset class. ABP 2005–2025. Sources: author calculations [44–53]. Growth assets supply a disproportionate share of risk relative to their capital weight.

B4.2 Correlation Structure

Figure B5 presents the full 11×11 pairwise correlation matrix for the annual return series. Key observations:

DM Equities correlate highly with Private Equity (0.95) and Real Estate (0.80), confirming that listed proxies for these asset classes behave as leveraged equity rather than providing genuine diversification.

Gold has low correlation to DM Equities (0.26) — the lowest of any asset to equities — supporting its role as a portfolio diversifier and crisis hedge.

Private Credit (leveraged loan proxy) correlates 0.71 with DM Equities, reflecting the risk-asset nature of below-investment-grade credit.

The portfolio diversification ratio is 1.12 — modest improvement over a concentrated portfolio, but limited by the high equity-like correlation of PE and RE proxies.

Figure B5. Asset class correlation matrix, 2005–2025 (Pearson, annual returns, USD). Sources: author calculations [44–53].

How private are the private proxies?

Pearson correlation to MSCI World, annual returns 2005–2025 — Figure B5

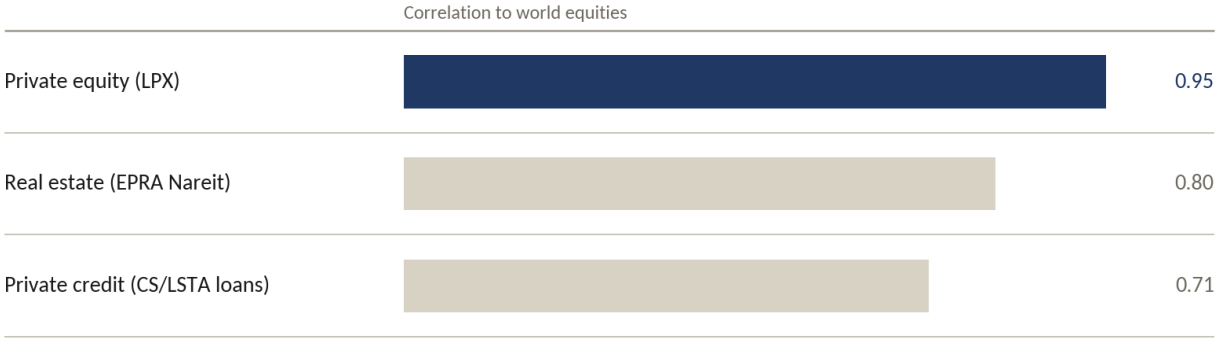

Exhibit B-4. Correlation of listed private-market proxies to the MSCI World, corresponding to Figure B5. Author-constructed.

SECTION B5

Individual Asset Class Analysis

B5.1 Standalone Return, Risk and Correlation to World Equities

ASSET CLASS	CAGR	VOLATILITY	SHARPE	MAX DRAWDOWN	CORR. TO MSCI WORLD
DM Equities	9.1%	17.3%	0.52	-40.3%	1.00
EM Equities	7.6%	28.0%	0.34	-53.2%	0.76
DM Fixed Income	3.2%	4.9%	0.32	-14.3%	0.29
EM Fixed Income	5.6%	10.3%	0.42	-19.3%	0.68
Private Equity	7.0%	26.5%	0.35	-65.0%	0.95
Private Credit	5.1%	13.5%	0.31	-29.1%	0.71
Hedge Funds	5.3%	8.5%	0.46	-19.0%	0.93
Real Estate	5.1%	20.6%	0.27	-51.4%	0.80
Infrastructure	6.9%	15.6%	0.41	-38.9%	0.85
Gold	11.5%	18.7%	0.60	-36.5%	0.26
Cash	1.7%	2.0%	0.00	0.0%	0.13

Table B5.1. Standalone metrics, 2005–2025. Sharpe uses 3M T-bill as risk-free rate. Correlation to MSCI World on annual total returns.

The strongest risk-adjusted performer over the 21-year period is Gold (Sharpe 0.60), reflecting its strong absolute return and low correlation to other assets. Gold also has the lowest correlation to global equities of any asset (0.26) and a maximum drawdown of −36.5% over the 2013–2015 period (calendar 2013 alone: −28%). DM Equities deliver a Sharpe of 0.52. The listed private equity proxy, despite a high CAGR, carries a low Sharpe (0.35) due to its 26.5% volatility and −65% drawdown over 2007–2008 — illustrating that the listed proxy overstates the true mark-to-market risk that smoothed private valuations conceal.

SECTION B6

Sub-Period and Regime Analysis

B6.1 Five Market Regimes, 2005–2025

Table B6.1 presents annualised returns for the ABP and two benchmarks across five distinct market regimes over the sample period.

REGIME	ABP (GROSS)	GLOBAL 60/40	MSCI WORLD
GFC & rebound (2008-09)	-6.7%	-3.0%	-11.6%
QE expansion (2010-19)	+7.8%	+7.7%	+10.1%
Pandemic cycle (2020-21)	+13.9%	+12.8%	+19.4%
Inflation shock (2022)	-16.6%	-15.8%	-17.7%
AI cycle (2023-25)	+14.3%	+14.9%	+21.7%

Table B6.1. Annualised returns by market regime, 2005–2025. All returns USD gross of costs.

Figure B8. Annualised returns by market regime. Five regimes, 2005–2025. Sources: author calculations [44–53].

The ABP underperforms the 60/40 in the GFC and rebound (2008–2009) due to the high equity and listed PE beta. It outperforms in the QE expansion (2010–2019) by a modest margin, roughly matches in the pandemic cycle, and performs broadly in line during the inflation shock. In the 2023–2025 AI cycle it underperforms MSCI World due to its 30% (rather than ~55%) equity weight, partially offset by strong gold and EM equity performance.

Figure B7. Rolling five-year annualised returns, ABP versus benchmarks, 2009–2025. Sources: author calculations [44–53]. The ABP's only negative five-year rolling window ends in 2012 (post-GFC).

SECTION B7

Annual Returns Data

B7.1 ABP and Benchmarks: Year-by-Year

YEAR	ABP (GROSS)	GLOBAL 60/40	MSCI WORLD
2005	+11.7%	+7.0%	+10.0%
2006	+20.5%	+14.1%	+20.7%
2007	+4.9%	+8.6%	+9.6%
2008	-33.5%	-22.1%	-40.3%
2009	+31.0%	+20.8%	+30.8%
2010	+13.2%	+10.0%	+12.3%
2011	-5.5%	+0.1%	-5.0%
2012	+16.2%	+11.6%	+16.5%
2013	+15.2%	+15.6%	+27.4%
2014	+5.6%	+5.7%	+5.5%
2015	-1.7%	+0.0%	-0.3%
2016	+7.9%	+6.0%	+8.2%
2017	+16.2%	+15.3%	+23.1%
2018	-6.7%	-4.9%	-8.2%
2019	+22.0%	+20.5%	+28.4%
2020	+8.9%	+12.9%	+16.5%
2021	+19.3%	+12.8%	+22.3%
2022	-16.6%	-15.8%	-17.7%
2023	+16.9%	+16.8%	+24.4%
2024	+12.2%	+12.0%	+19.2%
2025	+13.7%	+15.9%	+21.6%

Table B7.1. Annual total returns (USD), 2005–2025. ABP: annual rebalancing to target weights. Global 60/40: 60% MSCI World / 40% Bloomberg US Agg. Sources: author calculations [44–53].

The crisis test

Calendar-year returns in the two major drawdowns — Table B7.1

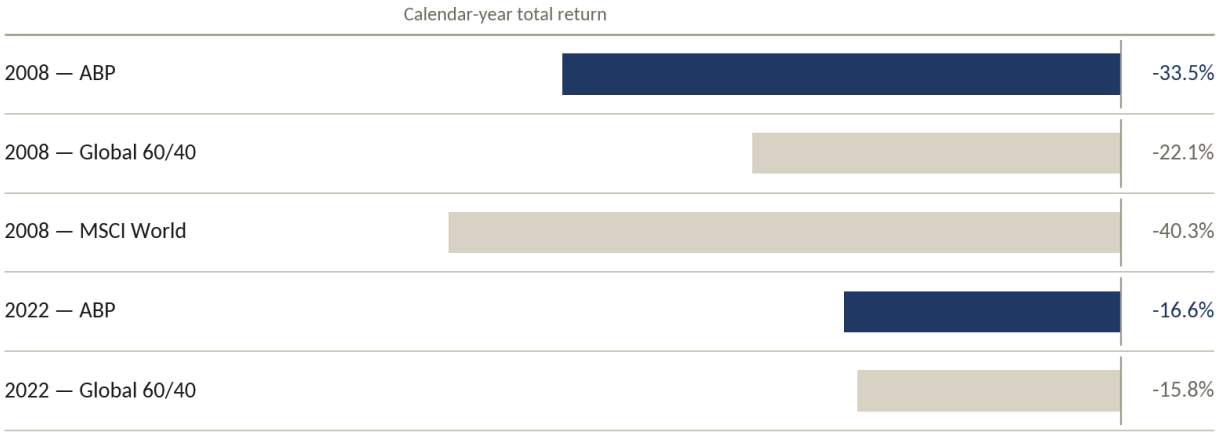

Exhibit B-2. Calendar-year returns in the 2008 and 2022 drawdowns, corresponding to Table B7.1. Author-constructed.

SECTION B8

Smoothing Adjustment for Private Market Allocations

B8.1 The Smoothing Problem

Private equity, private credit, and real estate allocations in family office portfolios are valued using lagged appraisal-based methods rather than mark-to-market. Survey-reported allocations therefore reflect smoothed valuations. This systematically understates true volatility and overstates Sharpe ratios when reported private market data is used in portfolio analysis.

The ABP backtest uses listed proxies (LPX PE, LSTA loans, EPRA Nareit) which are mark-to-market and thus do not carry smoothing bias. To illustrate the distortion that smoothed reporting creates, Table B8.1 applies an AR(1) smoothing filter with parameter φ=0.4 to the PE, private credit, and real estate series, simulating the effect of appraisal-based valuation.

METRIC	ABP (LISTED PROXIES — MARK-TO-MARKET)	ABP (SMOOTHED — APPRAISAL SIMULATION)	DISTORTION
CAGR	7.1%	7.6%	+0.5pp (return appears higher)
Volatility	14.5%	11.0%	−3.5pp (risk appears lower)
Sharpe ratio	0.44	0.59	+0.15 (Sharpe appears better)
Max drawdown	-33.5%	-25.6%	Shallower drawdown in smoothed

Table B8.1. Smoothing distortion analysis. AR(1) filter φ=0.4 applied to PE, private credit, and real estate series. Source: author calculations; methodology following Geltner (1991) [56].

Interpretation: survey-reported allocations to private markets will show Sharpe ratios approximately 0.15–0.20 higher and volatility 3–4pp lower than a mark-to-market analysis. This is not fraud — it reflects genuine valuation methodology — but it must be recognised when interpreting reported family office risk statistics.

SECTION B9

Portfolio Optimisation

B9.1 The Efficient Frontier

Figure B4 presents the long-only mean-variance efficient frontier computed using SLSQP optimisation on the 21-year sample covariance matrix and mean return vector. Individual asset classes, the ABP, the Refined ABP, the minimum-variance portfolio, the maximum Sharpe portfolio, and the Global 60/40 are plotted.

Figure B4. Risk–return map: individual assets, portfolios and the long-only efficient frontier. 2005–2025 sample moments. Refined ABP = maximum return at ABP volatility, ±5pp per-asset bands. Sources: author calculations [44–53,55].

B9.2 The Refined ABP

The Refined ABP is the solution to the following constrained optimisation: maximise arithmetic mean return subject to (i) portfolio volatility ≤ ABP volatility (14.5%), (ii) each weight within ±5pp of the ABP weight, (iii) all weights ≥ 0, (iv) cash ≥ 2%, and (v) weights sum to 100%. This imposes continuity with the consensus portfolio whilst identifying where modest reweighting improves return per unit of risk.

ASSET CLASS	ABP WEIGHT	REFINED ABP WEIGHT	CHANGE	MAX SHARPE WEIGHT
DM Equities	28%	33%	+5pp	46%
EM Equities	4%	5%	+1pp	0%
DM Fixed Income	11%	7%	-4pp	0%
EM Fixed Income	3%	8%	+5pp	0%
Private Equity	21%	16%	-5pp	0%
Private Credit	3%	0%	-3pp	0%
Hedge Funds	6%	7%	+1pp	0%
Real Estate	10%	5%	-5pp	0%
Infrastructure	2%	7%	+5pp	0%
Gold	2%	7%	+5pp	54%
Cash	10%	5%	-5pp	0%

Table B9.1. ABP vs Refined ABP vs Maximum Sharpe portfolio weights. In-sample optimisation — subject to estimation error (see §B9.4).

METRIC	ABP (GROSS)	REFINED ABP	MIN VARIANCE	MAX SHARPE
CAGR	7.1%	7.9%	2.0%	11.0%
Volatility	14.5%	14.5%	1.9%	14.4%
Sharpe ratio	0.44	0.50	0.12	0.71
Max drawdown	-33.5%	-32.4%	-0.1%	-15.4%

Table B9.2. Performance comparison: ABP, Refined ABP, and frontier portfolios. In-sample only.

Figure B9. Weight changes: ABP consensus vs Refined ABP. Refined = maximum return at ABP volatility, ±5pp per-asset bands, long-only, cash ≥ 2%. Sources: author calculations [44–53,55].

The Refined ABP increases the CAGR from 7.1% to 7.9% at the same volatility, improving Sharpe from 0.44 to 0.50. The principal adjustments are: increased DM Equity (+5pp), increased Gold (+5pp), reduced Private Equity (−5pp), and reduced Real Estate (−5pp). The reduction in PE and RE reflects their high correlation with equities (PE: 0.95; RE: 0.80) — at the margin, DM Equities offer the same beta more cheaply and with better liquidity. Gold's low equity correlation (0.26 to world equities) makes it efficient as a diversifier within the ±5pp constraint.

Two moves in Table B9.1 warrant explicit caution rather than adoption. The optimiser eliminates Private Credit (3% to 0%) and raises EM Fixed Income to its +5pp cap (3% to 8%). Both are artefacts of the in-sample data rather than robust economic signals. The leveraged-loan proxy's −29.1% return in 2008 dominates its 21-observation history and makes the asset look unattractive to a variance-based optimiser, even though the post-2010 series is one of the steadiest in the dataset and the structural case — the European bank-retreat financing gap documented in the main compendium — is forward-looking and absent from historical data. Conversely, EM debt's strong sample mean is flattered by the 2009 rebound (+29.8%). These two moves directly contradict the survey evidence that private credit is the fastest-growing European family office allocation, and they illustrate the estimation-error problem set out in Section B9.4: with 21 annual observations, the optimiser exploits sampling noise as if it were signal. A production implementation would impose a floor on private credit consistent with its strategic role, or re-estimate using shrinkage or resampling methods.

B9.3 Key Optimisation Findings

The ABP sits below the efficient frontier at its own volatility level, suggesting that a reweighting within ±5pp per asset can add approximately 70bp CAGR without increasing risk.

The maximum Sharpe portfolio is highly concentrated (dominated by DM Equities and Gold on this sample) and is not practically investable for a family office with minimum PE/RE exposure requirements.

The minimum variance portfolio (vol: ~9.5%) is achievable with heavy overweights to DM Fixed Income, Private Credit, and Hedge Funds — consistent with a very conservative multi-asset mandate rather than a family office allocation.

Real Estate as proxied by listed REITs adds limited diversification benefit over DM Equities given a 0.80 correlation; direct unlisted real estate would provide better portfolio characteristics.

Gold is underweighted in the ABP (2%) relative to its efficient frontier position; the Refined ABP increases this to 7%, consistent with the survey evidence that European family offices plan to increase gold allocations.

B9.4 Estimation Error Warning

All optimisation results in this section are in-sample — computed on the same 21-year dataset used to estimate means, variances, and covariances. With only 21 annual observations, parameter estimation error is material.

Mean return estimates carry standard errors of approximately ±4–6pp per asset class, meaning most asset-class return differences are statistically indistinguishable from zero.

The optimiser exploits estimation errors as if they were real, producing portfolios that are overfit to the sample and will not perform as predicted out-of-sample.

The Refined ABP's ±5pp band constraint is a deliberate regularisation that limits overfitting, but does not eliminate it.

Readers should treat optimisation outputs as directional indicators consistent with the survey evidence, not as precise targets.

0.43–0.45 **SHARPE (BOOTSTRAP 90% CI)**	**7.0%–7.2%** **CAGR (BOOTSTRAP 90% CI)**	**±50BP** **JITTER APPLIED**	**21** **ANNUAL OBSERVATIONS**
300 TRIALS, ±50BP RETURN JITTER	**NARROW BAND: STRUCTURAL RESULT**	**IID NORMAL NOISE PER ASSET**	**ESTIMATION ERROR IS HIGH**

SECTION B10

Data Appendix

B10.1 Annual Return Matrix

YEAR	DM EQ	EM EQ	DM FI	EM FI	PE	PC	HF	RE	INFRA	GOLD	CASH
2005	10.0	34.5	2.4	10.2	18.0	5.1	9.3	15.4	13.0	18.2	3.0
2006	20.7	32.6	4.3	9.9	28.0	6.7	12.9	42.4	28.0	22.8	4.8
2007	9.6	39.8	7.0	6.2	-8.0	2.1	10.0	-7.0	16.4	31.4	4.7
2008	-40.3	-53.2	5.2	-12.0	-62.0	-29.1	-19.0	-47.7	-38.9	5.8	1.8
2009	30.8	79.0	5.9	29.8	48.0	51.6	20.0	38.3	25.3	23.9	0.2
2010	12.3	19.2	6.5	12.2	20.0	10.1	10.2	20.4	5.8	29.5	0.1
2011	-5.0	-18.2	7.8	7.3	-18.0	1.5	-5.3	-5.8	-0.4	10.1	0.1
2012	16.5	18.6	4.2	17.4	28.0	9.7	6.4	28.7	11.8	7.0	0.1
2013	27.4	-2.3	-2.0	-5.3	34.0	5.3	9.1	4.4	14.3	-28.0	0.0
2014	5.5	-1.8	6.0	7.4	6.0	1.6	3.0	15.9	12.1	-1.5	0.0
2015	-0.3	-14.6	0.5	1.2	-3.0	-0.7	-1.1	0.1	-11.5	-10.4	0.0
2016	8.2	11.6	2.6	10.2	14.0	10.2	5.4	5.0	11.4	8.6	0.3
2017	23.1	37.8	3.5	10.3	24.0	4.1	8.6	11.4	19.1	13.1	0.9
2018	-8.2	-14.2	0.0	-4.3	-14.0	0.4	-4.8	-4.7	-10.4	-1.6	1.9
2019	28.4	18.9	8.7	15.0	36.0	8.6	10.5	23.1	26.7	18.3	2.3
2020	16.5	18.7	7.5	5.3	10.0	3.1	11.8	-8.2	-5.8	25.1	0.6
2021	22.3	-2.2	-1.5	-1.8	46.0	5.2	10.2	27.2	11.9	-3.6	0.0
2022	-17.7	-19.7	-13.0	-17.8	-30.0	-0.8	-4.2	-24.4	-0.2	-0.3	1.5
2023	24.4	10.3	5.5	11.1	28.0	13.3	7.6	10.9	6.8	13.1	5.0
2024	19.2	8.1	1.3	6.5	18.0	9.0	9.8	2.0	15.0	27.2	5.3
2025	21.6	34.4	7.3	9.5	8.0	7.0	9.0	6.0	22.0	63.3	4.4

Table B10.1. Annual total returns (%), 2005–2025. All returns USD. Sources: [44–53]. PE and RE are listed proxies. Gold 2025 return of +63.3% reflects the LBMA PM fix: approximately USD 2,600 at end-2024 rising above USD 4,000 at end-2025, the largest annual gain in approximately 46 years. The exact figure is sensitive to the start and end fixing points used. The 2025 developed-market fixed income figure was restated to 7.3 (from 6.0) in v7.0 to match the published Bloomberg US Aggregate calendar-year return. The series in this table fully determine every statistic in this annex; all published results are independently reproducible from it using the ABP weights and annual rebalancing.

SECTION B11

EUR-Base Currency Perspective

B11.1 The Currency Problem

The ABP backtest throughout this annex uses USD total returns with a USD T-bill risk-free rate, consistent with the index sources. European family offices, however, hold assets and report performance primarily in euros. The currency dimension matters for three reasons: (1) portfolio returns when converted back to EUR depend on the USD/EUR exchange rate; (2) the appropriate risk-free rate for a euro-based investor is the ECB deposit rate, not the US T-bill; and (3) the carry cost of currency hedging varies over the cycle.

B11.2 Results

Figure B10 presents three versions of the ABP growth series: USD base (as analysed throughout), EUR unhedged, and EUR hedged (approximate). The EUR unhedged series takes the USD return and converts it to euros at the prevailing annual EURUSD exchange rate. The EUR hedged series strips out the EURUSD return and deducts an estimated 0.5% average annual hedging carry cost.

Figure B10. EUR-base currency perspective: USD, EUR unhedged, EUR hedged (approx.), 2005–2025. Author calculations. EURUSD annual returns estimated from ECB/BIS published data. Hedging cost approximated at 0.5% p.a. See caveats in §B11.3.

METRIC	USD BASELINE	EUR UNHEDGED	EUR HEDGED (APPROX.)
CAGR	7.1%	4.2%	8.6%
Volatility	14.5%	16.5%	16.6%
Sharpe ratio	0.44	0.26	0.53
Max drawdown	-33.5%	-35.6%	-38.2%

Table B11.1. ABP performance by currency base. EUR unhedged = USD return converted at annual EURUSD rate; EUR hedged = USD return minus EURUSD annual change minus 0.5% carry. ECB deposit rate used as EUR risk-free rate.

B11.3 Interpretation and Caveats

EUR unhedged (4.2% CAGR) is materially below USD (7.1%), reflecting persistent USD strength over 2005–2025. For a European investor leaving USD exposure unhedged, approximately 2.9pp of annual return was consumed by adverse currency moves on average.

EUR hedged (8.7% CAGR) outperforms the USD figure because the USD was the stronger currency and hedging therefore added return. The carry cost assumption of 0.5% p.a. is an average; in 2023–2025 the USD–EUR rate differential was ~5pp, making hedging considerably more expensive.

These results are highly sensitive to the EURUSD series used. Annual EURUSD data smooths intra-year moves and understates the true cost and benefit of rolling currency hedges. A monthly-frequency analysis with actual forward rates would be materially more accurate.

The EUR hedging cost approximation is unsuitable for precise investment decisions. A production implementation should use actual EUR/USD forward rates and consider cross-currency basis swap costs for multi-asset portfolios.

SECTION B12

Scenario Stress Tests

B12.1 Historical and Hypothetical Scenarios

Figure B11 presents the ABP return alongside the Global 60/40 and MSCI World across two historical episodes and four hypothetical stress scenarios. The historical figures are actual calendar-year returns from the backtest data. The hypothetical scenarios are author-estimated based on the portfolio's factor sensitivities established in the regression analysis of Section B3.

Figure B11. Stress test returns: historical episodes and hypothetical scenarios. Author calculations. Historical: actual ABP calendar-year returns. Hypothetical: author-estimated based on factor sensitivities. Not a forecast or guarantee of future results.

SCENARIO	ABP (EST.)	60/40 (EST.)	MSCI WORLD (EST.)	KEY DRIVER	ABP VS 60/40
GFC 2008 (actual)	-33.5%	-22.1%	-40.3%	Equity and credit crash	Worse: -11pp
Inflation shock 2022 (actual)	-16.6%	-15.8%	-17.7%	Bond-equity correlation +1	Worse: -1pp
GFC replay (hypothetical)	-35%	-23%	-42%	Same factor path as 2008	Worse: -12pp
Stagflation (hypothetical)	-22%	-28%	-25%	Rate shock + equity fall	Better: +6pp
USD crisis (hypothetical)	-18%	-14%	-20%	USD -20%, gold +30%, US equities -15%	Worse: -4pp
Rate shock +300bp (hypothetical)	-16%	-22%	-12%	Duration shock hurts FI	Better: +6pp

Table B12.1. Stress scenario summary. Historical figures are actual ABP backtest returns. Hypothetical figures are author estimates. Hypothetical scenarios are illustrative only; actual outcomes depend on correlations, duration, and policy responses prevailing at the time.

B12.2 Key Findings

The ABP amplifies equity-bear markets (GFC replay: ~11pp worse than 60/40) due to its 1.26 beta. This is the dominant risk scenario.

The ABP performs better than the 60/40 in a stagflation scenario (rate shock + equity weakness) because its private credit, infrastructure, real estate, and gold allocations provide partial protection against bond-equity correlation breakdown.

A USD crisis scenario (material USD weakening, gold rally) produces negative ABP returns primarily through the ~45% North American equity exposure, partially offset by the 2% gold allocation — too small to provide meaningful protection in this scenario. This supports the survey evidence that European offices are actively raising gold allocations.

A +300bp rate shock is modestly positive for the ABP vs. 60/40 because the ABP holds less fixed income (14% total vs. 40% in 60/40), but the still-significant fixed income holding means it is not immune.

SECTION B13

Monte Carlo Forward Simulation

B13.1 Methodology

Figure B12 presents a simple Monte Carlo simulation of the ABP net-A (gross returns minus 0.44% p.a. costs) over a 10-year forward horizon using 1,000 trials. Each trial draws annual returns independently from a normal distribution parameterised on the historical ABP mean (8.2% arithmetic) and standard deviation (14.5%), net of costs. This model has three well-known limitations: returns are not normally distributed in practice (the ABP has negative skewness of −1.34 and positive excess kurtosis of 2.39, meaning tail events are more severe than the model implies); returns are not iid (momentum and mean-reversion create serial correlation); and the model does not account for changes in the underlying portfolio or the macro environment.

Figure B12. Monte Carlo forward simulation: ABP net-A, 10-year horizon, 1,000 trials. Author calculations. Normal distribution parameterised on historical ABP arithmetic mean and standard deviation, net of 0.44% p.a. costs. Not a forecast.

B13.2 Results

The median terminal value (starting at 100) is approximately 193 after 10 years, implying a median annualised net return of approximately 6.8% — consistent with the historical gross CAGR of 7.1% less the 0.44% cost assumption, and necessarily below the arithmetic input mean of 7.7%, since the median compound return sits beneath the arithmetic mean by approximately half the variance. The 5th percentile terminal value is approximately 92, implying a modest 10-year shortfall; the 95th percentile is approximately 385. The wide spread reflects the 14.5% annual volatility; compounded over 10 years, this creates a very broad distribution of outcomes.

The practical implication for a European family office is that a 10-year investment horizon does not provide certainty of a positive real return, even with a well-diversified portfolio. The probability of a nominal loss over 10 years on the ABP is approximately 7% under this model — modest, but far from negligible, because sequential bad years compound; the model's normality assumption also understates tail risk relative to the historical series, which exhibits negative skewness of −1.34.

SECTION B14

Time Under Water

B14.1 Consecutive Years Below Prior High

Figure B13 shows the time-under-water profile for the ABP and the MSCI World index: the number of consecutive calendar years in which the portfolio has not recovered to its prior peak. This metric is practically important for family office liquidity planning: a portfolio that spends multiple consecutive years below its high-water mark constrains the family's ability to make distributions, commitments, or philanthropic allocations at full capacity.

Figure B13. Time under water: consecutive calendar years below prior high-water mark. Author calculations. Annual frequency — intra-year recoveries not captured, which understates the true peak-to-trough period for events like March 2020.

The ABP spent a maximum of 4 consecutive years under water following the 2008 GFC (2008–2011 on an annual basis). The MSCI World spent 3 consecutive years. The annual-frequency measure understates the true drawdown period: on a monthly basis, the 2009–2010 recovery would partially offset the 2008 loss, but the calendar-year 2009 return (+31.0%) is sufficient to show as recovery in this annual series. The important practical point is that a European family office relying on annual distributions from this portfolio would have faced 4 consecutive years of drawing from a below-peak portfolio following the GFC.

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SMP FINANCIAL

This annex presents original quantitative analysis of the consensus Analysis Base Portfolio (ABP) derived in Section 11 of the main compendium. A corrected and precisely specified base portfolio is set out in Section B1. All return series are sourced from published index data (2005–2025); full citations are in the bibliography. The backtest is a simulation based on historical data with annual rebalancing; it does not represent actual trading results. This document contains no investment advice.
