Nieuwe inzichten voor de Modern Portfolio Theory

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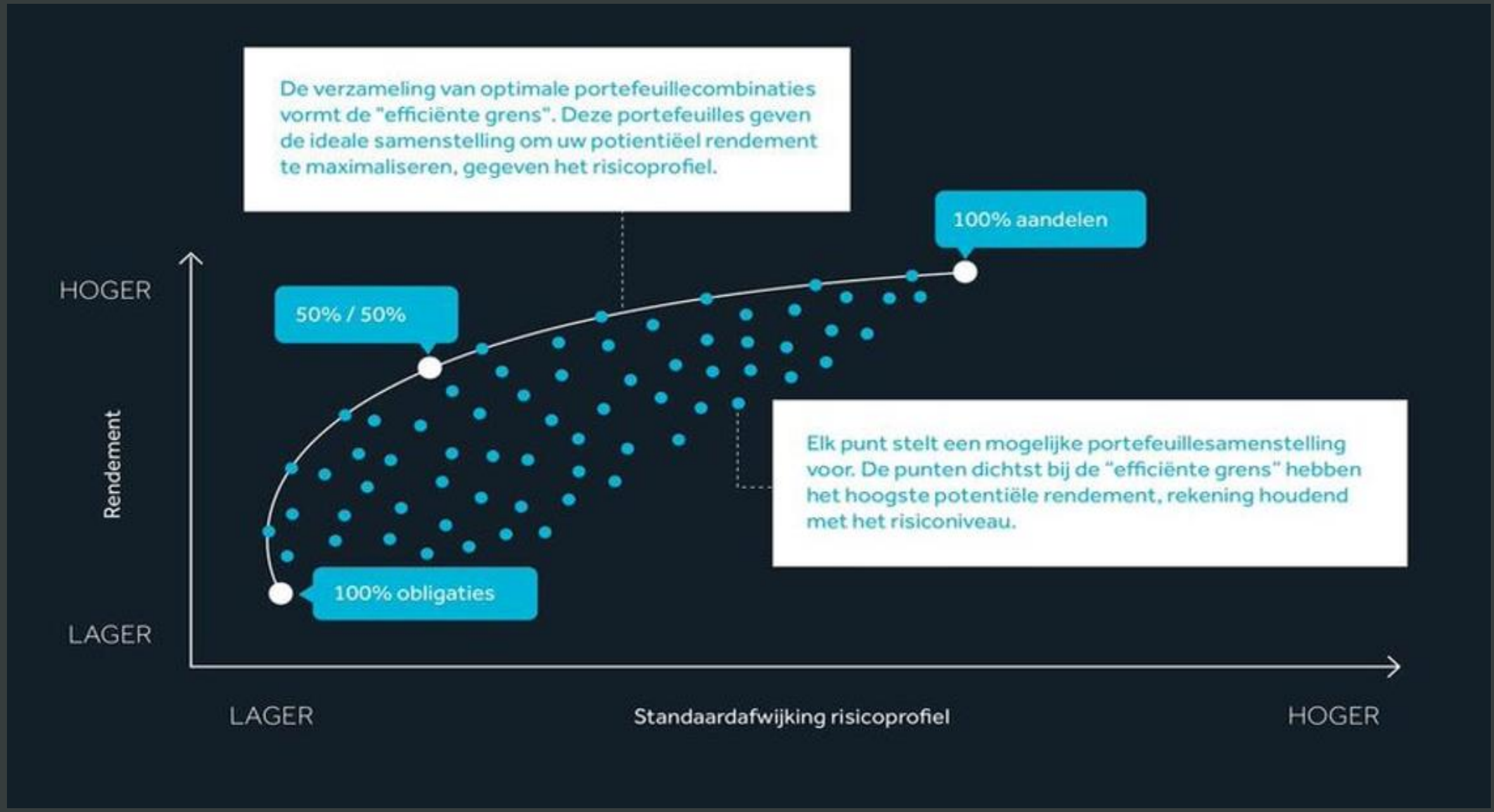
Overzicht

- Moderne portefeuilletheorie : korte introductie
- Gebruik van momentum om verwachte returns in te schatten
- Papers van Keller/Butler/Kipnis en Jan Loeys (JP Morgan)
- Praktische toepassing bij het beheer van Keyprivate


De verzameling van optimale portefeuillecombinaties vormt de "efficiënte grens". Deze portefeuilles geven de ideale samenstelling om uw potientiëel rendement te maximaliseren, gegeven het risicoprofiel.
100% aandelen
50% / 50%
HOGER
Rendement
Elk punt stelt een mogelijke portefeuillesamenstelling voor. De punten dichtst bij de "efficiënte grens" hebben het hoogste potentiële rendement, rekening houdend met het risiconiveau.
100% obligaties
LAGER
LAGER
Standaardafwijking risicoprofiel
HOGER

The optimal mean-variance portfolio is a complex function of estimated means, volatilities, and correlations of asset returns. There are many parameters to estimate. Optimized mean-variance portfolios can blow up when there are tiny errors in any of these inputs. .. ".

Bron : Keller/Butler/Kipnis

- **Kleine wijzigingen in expected returns kunnen voor een totaal andere portefeuillesamenstelling zorgen !**

Momentum

Momentum is a system of investing that buys and sells based upon recent returns. Momentum investors buy outperforming securities and avoid – or sell short – underperforming ones.

The notion is closely tied to physics. In physics, momentum is the product of the mass and velocity of an object. For example, a heavy truck moving at a high speed has large momentum. To stop the truck, we must apply either a large or a prolonged force against it.

Momentum investors apply a similar notion. They assume outperforming securities will continue to outperform in absence of significant headwinds.

Bron : Newfound Research

Relatief momentum

The phenomenon of relative momentum is also called cross-sectional momentum and relative strength.

Relative momentum investors compare securities against each other's performance. They favor buying outperforming securities and avoiding – or short-selling – underperforming securities.

Long-only relative momentum investors rotate between a subset of holdings within their investable universe. For example, a simple long-only relative strength system example is "best N of." At rebalance, this system sells its current holdings and buys the top N performing securities of a basket. In doing so, the strategy seeks to align the portfolio with the best performing securities in hopes they continue to outperform.

Bron : Newfound Research

Relatief momentum

BUY RULE

The system invests in the top X sectors. For Top 1, the system is 100% invested in the top ranked sector. For Top 2, the system is 50% invested in each of the top two sectors. For Top 3, the system is 33% invested in each of the top three sectors.

SELL RULE

Since the system is a simple ranking, the top X sectors are held and if a sector falls out of the top X sectors it is sold at the monthly rebalance and replaced with the sector in the top X.

Bron : Mebane Faber

Relatief momentum

Exhibit 4.3 – 6 Month Relative Strength Portfolios, 1928-2009

	Top1	Top2	Top3	Top4	Top5	Top6	Top7	Top8	Top9	EQ-Weight
CAGR	12.86%	14.10%	13.18%	12.60%	12.51%	11.72%	11.62%	11.01%	10.71%	10.28%
STDEV	21.60%	19.20%	18.29%	18.02%	17.87%	17.77%	17.87%	18.01%	18.24%	18.38%
SHARPE (3.81%)	0.42	0.54	0.51	0.49	0.49	0.45	0.44	0.40	0.38	0.35
MAXDD	(90.53%)	(84.30%)	(80.97%)	(76.81%)	(76.19%)	(77.68%)	(77.87%)	(78.86%)	(80.41%)	(81.67%)

Exhibit 4.4 – 9 Month Relative Strength Portfolios, 1928-2009

	Top1	Top2	Top3	Top4	Top5	Top6	Top7	Top8	Top9	EQ-Weight
CAGR	14.80%	14.17%	12.60%	12.28%	12.07%	11.80%	11.48%	11.13%	10.74%	10.28%
STDEV	22.21%	19.70%	19.00%	18.59%	18.36%	18.29%	18.06%	18.14%	18.22%	18.38%
SHARPE (3.81%)	0.50	0.53	0.46	0.46	0.45	0.44	0.42	0.40	0.38	0.35
MAXDD	(83.52%)	(75.94%)	(72.53%)	(75.26%)	(76.35%)	(76.86%)	(77.56%)	(79.10%)	(81.35%)	(81.67%)

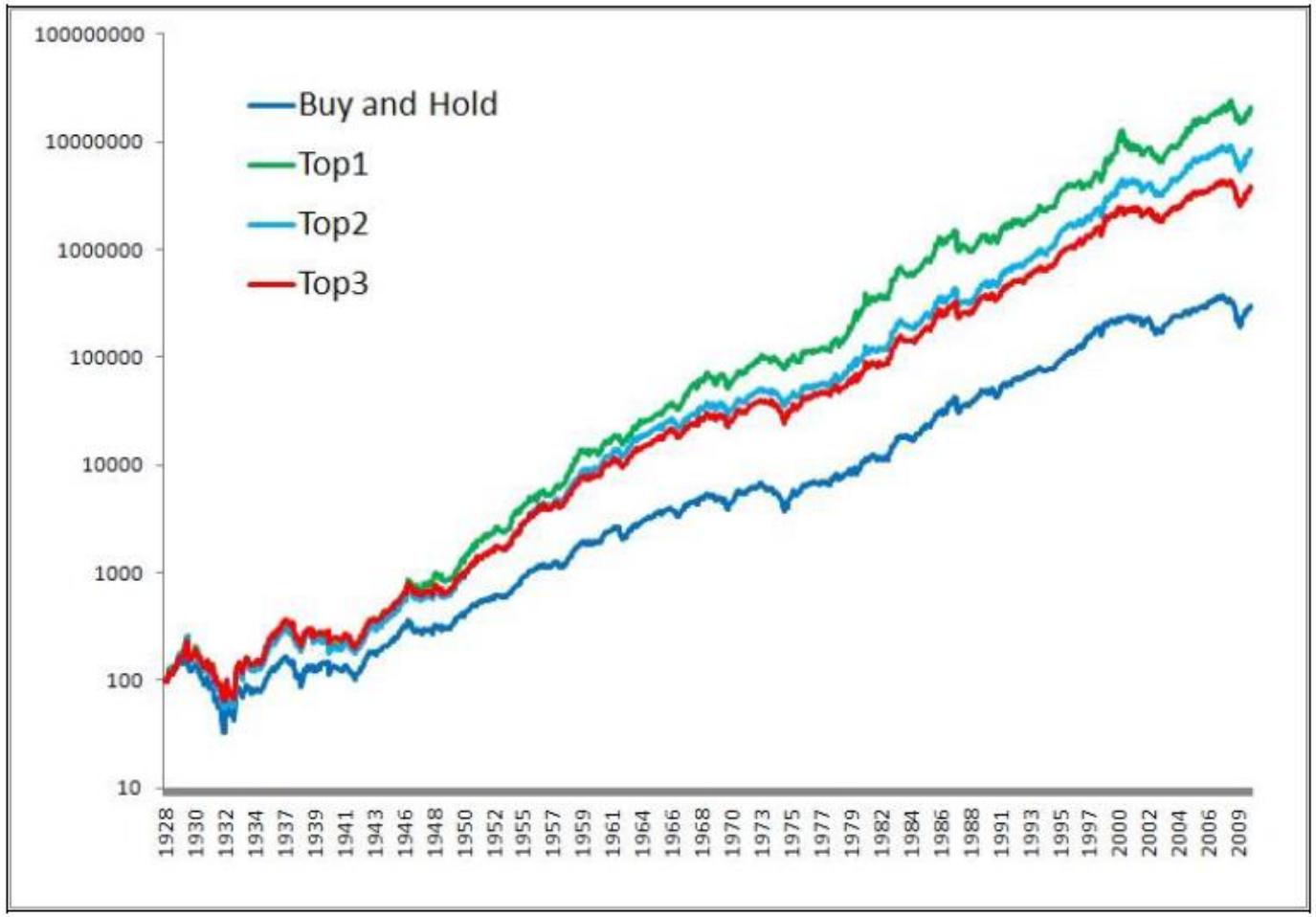
Exhibit 4.5 – 12 Month Relative Strength Portfolios, 1928-2009

	Top1	Top2	Top3	Top4	Top5	Top6	Top7	Top8	Top9	EQ-Weight
CAGR	16.05%	14.75%	13.94%	13.41%	12.96%	12.50%	11.67%	11.48%	10.82%	10.28%
STDEV	21.79%	19.57%	18.38%	18.18%	17.92%	17.87%	17.94%	18.16%	18.23%	18.38%
SHARPE (3.81%)	0.56	0.56	0.55	0.53	0.51	0.49	0.44	0.42	0.39	0.35
MAXDD	(76.91%)	(76.27%)	(71.29%)	(74.01%)	(74.18%)	(74.23%)	(77.70%)	(79.72%)	(81.07%)	(81.67%)

Bron : Mebane Faber

Relatief momentum

Exhibit 5 – Relative Strength Portfolios, 1928-2009



Bron : Mebane Faber

Absoluut momentum

Absolute momentum is also referred to as time-series momentum or trend following.

Absolute momentum investors compare a security against its own historical performance. The system buys positive returning securities and avoids, or sells short, negative returning securities.

The primary difference is that relative momentum makes no distinction about return direction. If all securities are losing value, relative momentum will seek to invest in those assets that are going down least. Absolute momentum will seek to avoid negative returning assets.

Bron : Newfound Research

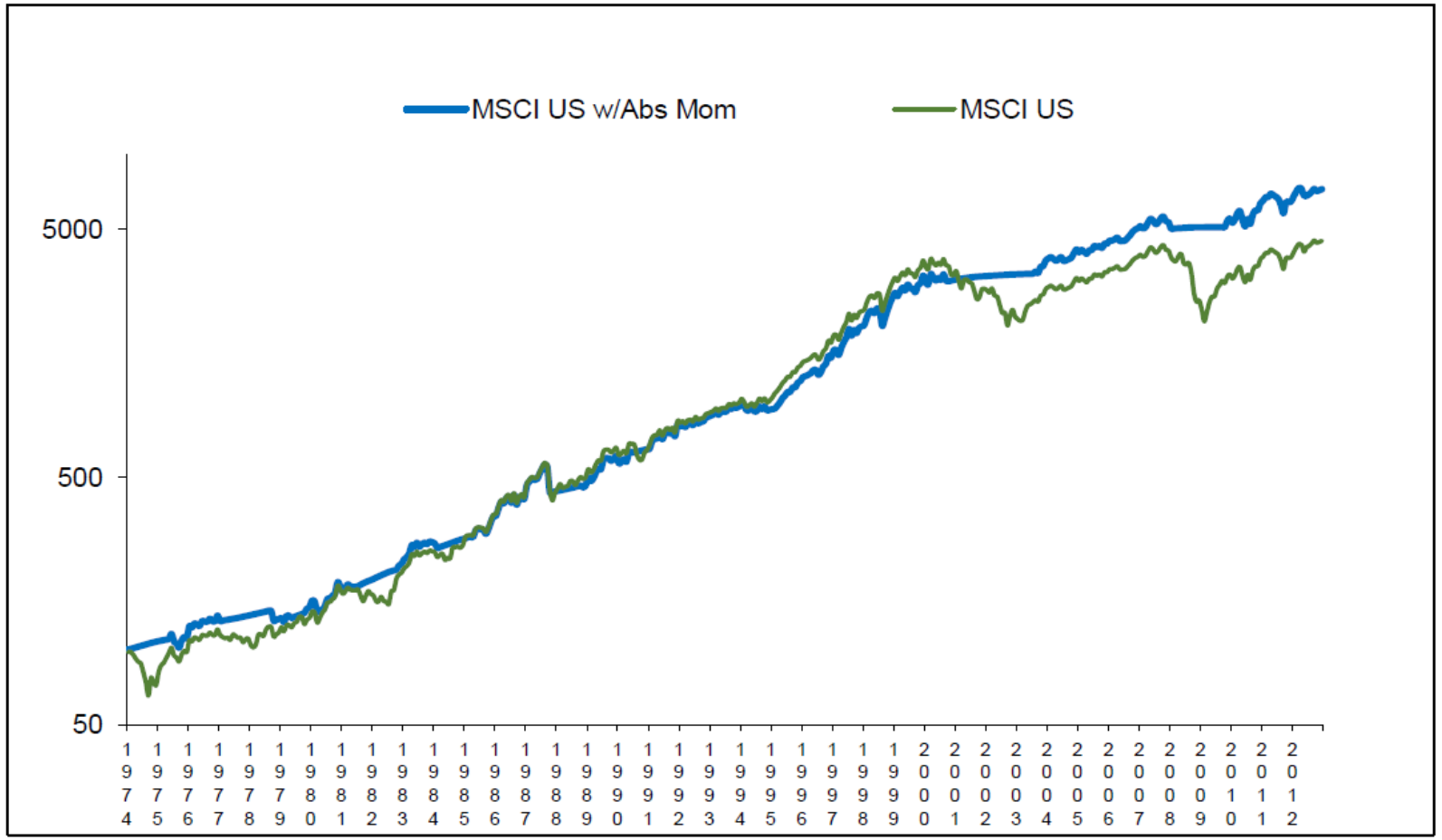
Absoluut momentum

our strategy simply defines absolute momentum as being positive when the excess return (asset return less the Treasury bill return) over the formation (look back) period is positive. We hold a long position in our selected assets during these times. When absolute momentum turns negative (i.e., an asset's excess return turns negative), our baseline strategy is to exit the asset and switch into 90-day U.S. Treasury bills until absolute momentum again becomes positive. Treasury bills are a safe harbor for us during times of market stress.

Bron : Gary Antonacci

Absoluut momentum

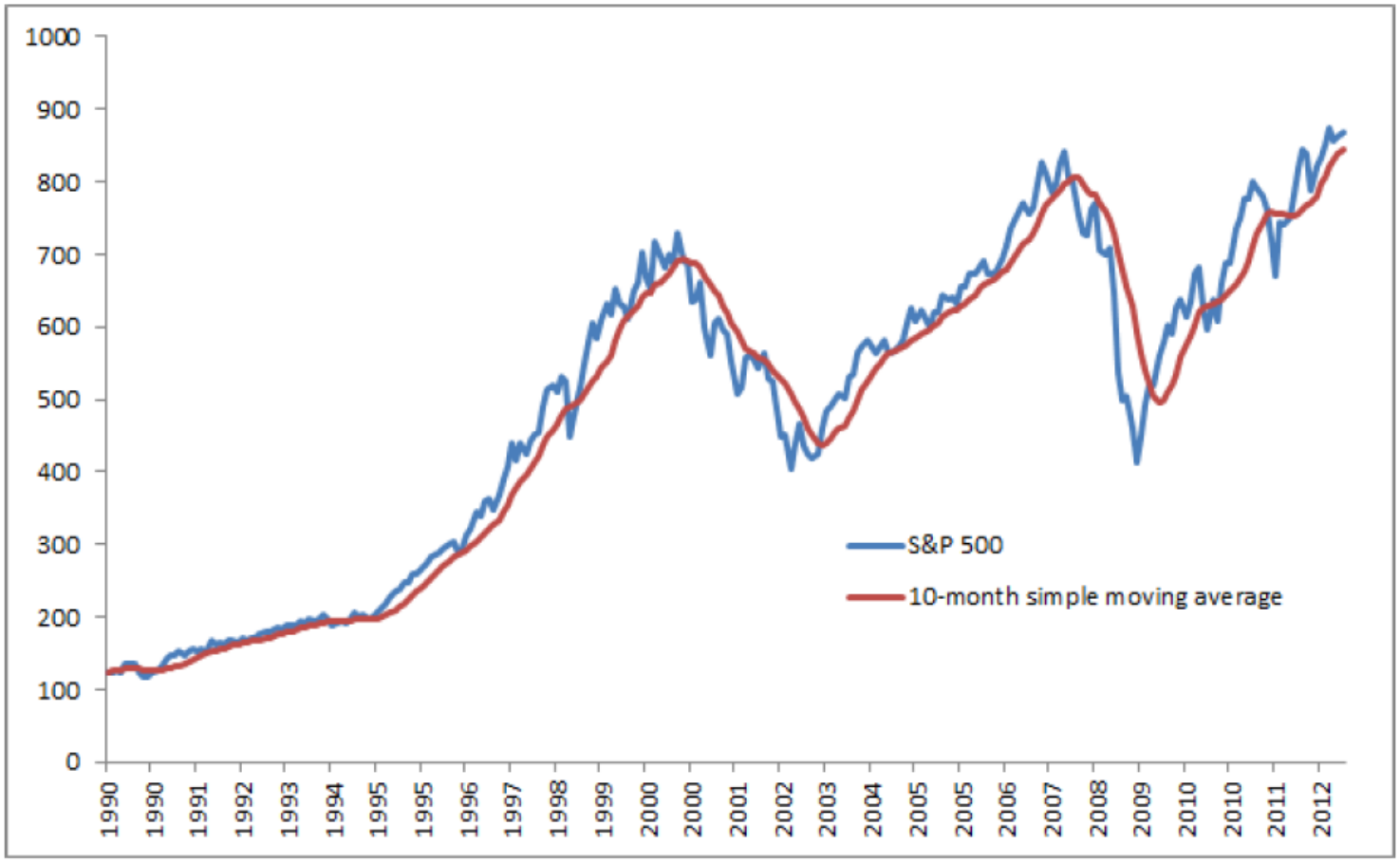
Figure 5 MSCI US 1974-2012



Bron : Gary Antonacci

Absoluut momentum

Figure 6 – S&P 500 vs. 10-Month Simple Moving Average, 1990-2012



BUY RULE

Buy when monthly price > 10-month SMA.

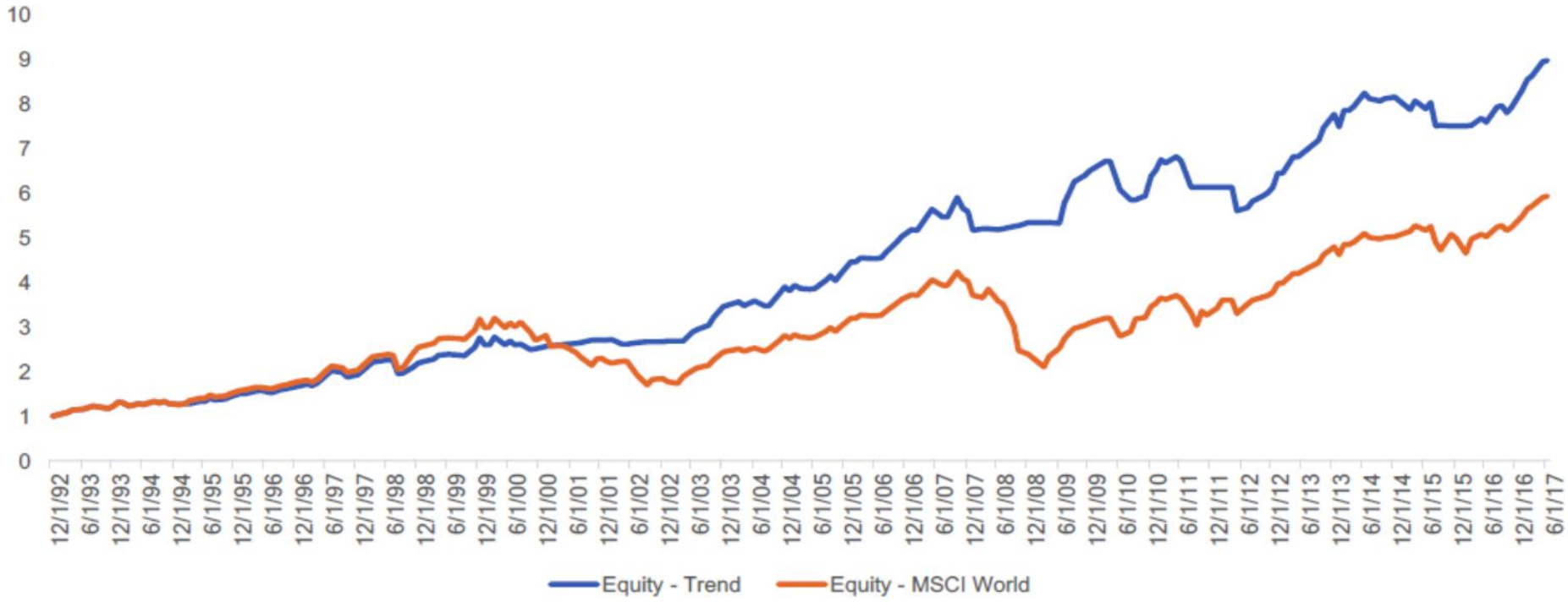
SELL RULE

Sell and move to cash when monthly price < 10-month SMA.

Bron : Mebane Faber

Absoluut momentum

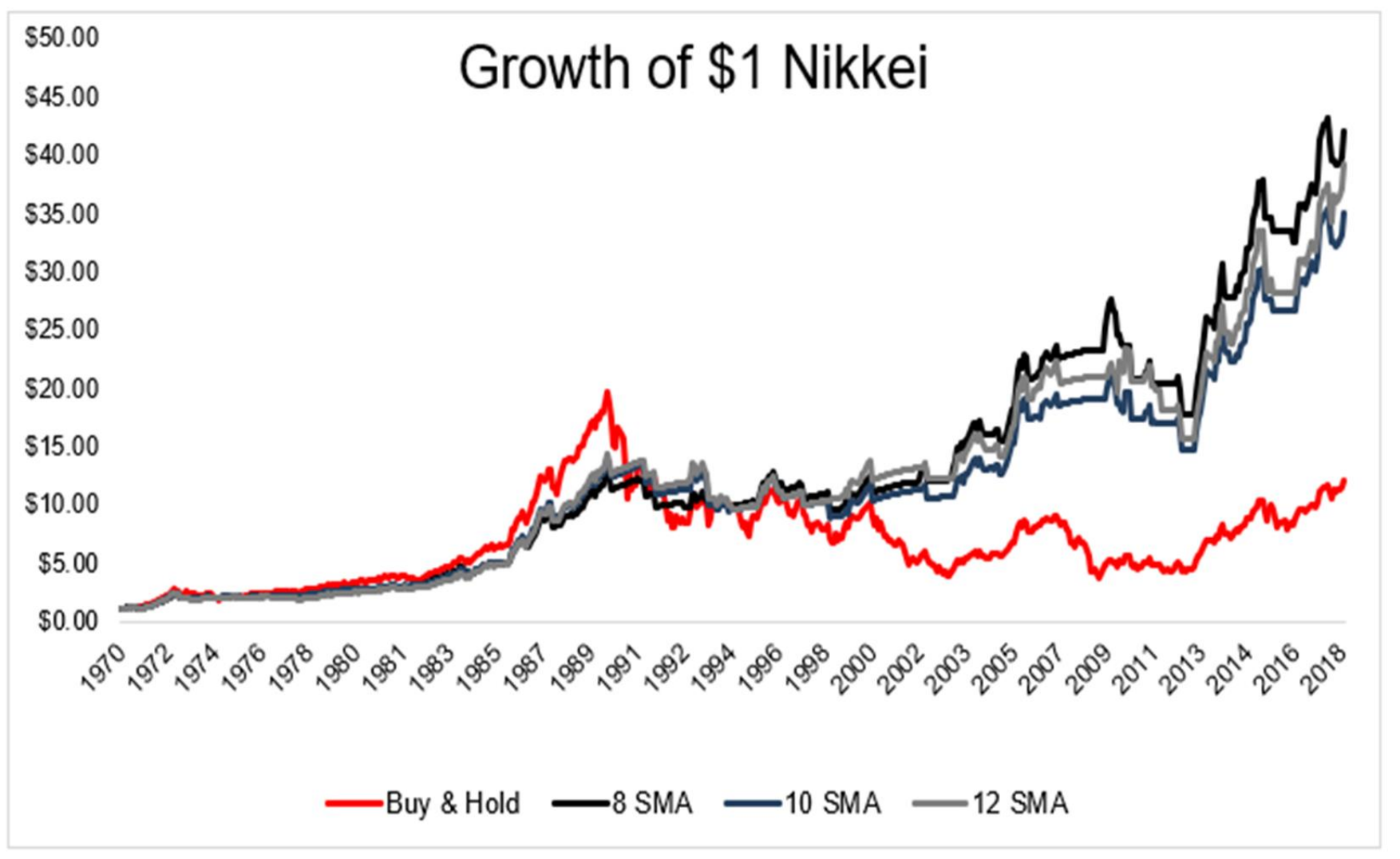
Equity - Trend strategies use time-series momentum approaches that seek to invest during positively trending market environments and retreat to safety (e.g. short-term U.S. Treasuries) otherwise.



Source: MSCI, St. Louis Federal Reserve. Calculations by Newfound Research. Performance is backtested and purely hypothetical. Past performance is not a guarantee of future results. Performance is gross of all fees. Returns include the reinvestment of dividends, capital gains, and other distributions. The Equity – Trend strategy is rebalanced monthly. The strategy invests in the MSCI World index when it is above its 10-month moving average and in a 1-year constant maturity U.S. Treasury index when it is below.

NEWFOUND RESEARCH

Absoluut momentum



Bron : Michael Batnick

Momentum and Markowitz : a Golden combination
Keller/Butler/Kipnis

Mean-Variance Optimization: Great in Theory, Bad in Practice?

For the uninitiated, Harry Markowitz's Mean-Variance Optimization (MVO) (aka "Modern Portfolio Theory", aka "The Efficient Frontier") forms part of the foundation of modern finance. It's a quantitative approach to allocating to a portfolio of assets, in order to maximize return for a given level of risk. The core concept underlying MVO is that an asset's risk and return cannot be assessed in isolation, but rather, by how it contributes to the portfolio's overall risk and return.

In practice however, MVO often fails to deliver. The authors discuss multiple reasons for that in their paper, but the most important takeaway is that, traditionally, investors use too long of a lookback when calculating MVO inputs. MVO requires two pieces of information for all assets: expected return and a covariance matrix. Investors often use three or five year average returns in order to forecast future returns, but historically, returns are mean-reverting over that timeframe. That means that MVO is overweighting assets likely to underperform, and underweighting assets likely to outperform.

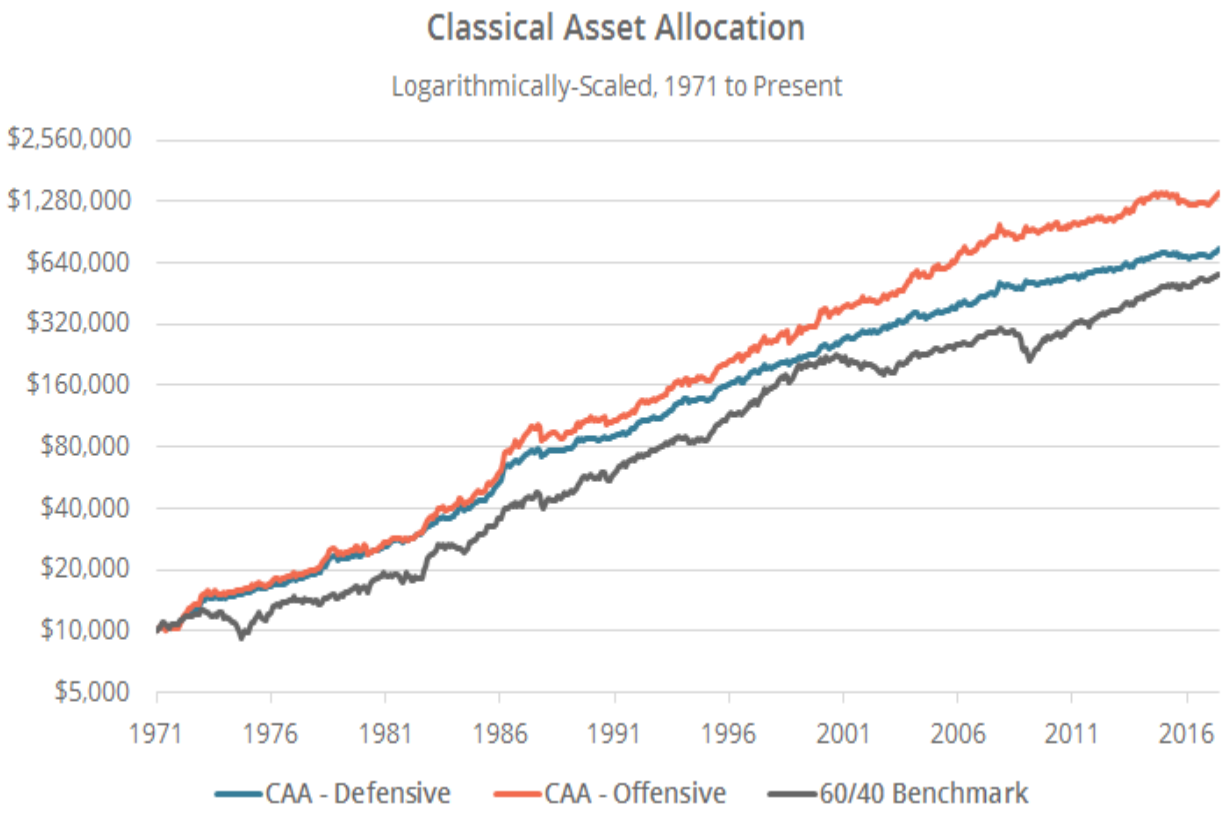
To combat this, the authors shorten the lookbacks used to calculate expected return to a momentum-friendly period between 1 and 12 months.

Momentum and Markowitz : a Golden combination
Keller/Butler/Kipnis

- At the close on the final trading day of each month, calculate expected return and a covariance matrix for all asset classes traded. We've tested the paper's N=8 universe: US equities (represented by SPY), US tech (QQQ), international equities (EFA), emerging market equities (EEM), Japan equities (EWJ), US high-yield bonds (HYG), intermediate-term US Treasuries (IEF) and US T-Bills (BIL).
- Expected return for each asset class is calculated by measuring returns over the previous 1, 3, 6, and 12 months, summing the results, and dividing by 22. This is the same approach employed by Keller and Butler's Elastic Asset Allocation strategy, and is designed to measure momentum over multiple momentum-friendly lookbacks from 1 to 12 months.
- The covariance matrix is calculated based on the previous year using month-end data.
- Determine the optimal portfolio allocation using Markowitz's "Critical Line Algorithm":
    - Long-only, without leverage.
    - All assets are capped at 25% of the portfolio, except for the two defensive assets, int-term US Treasuries (IEF) and US T-Bills (BIL), which are uncapped.
    - Determine the optimal portfolio allocation for a given target volatility level: 5% for the "defensive" variation of the strategy, or 10% for the "offensive" version.

Momentum and Markowitz : a Golden combination

Keller/Butler/Kipnis



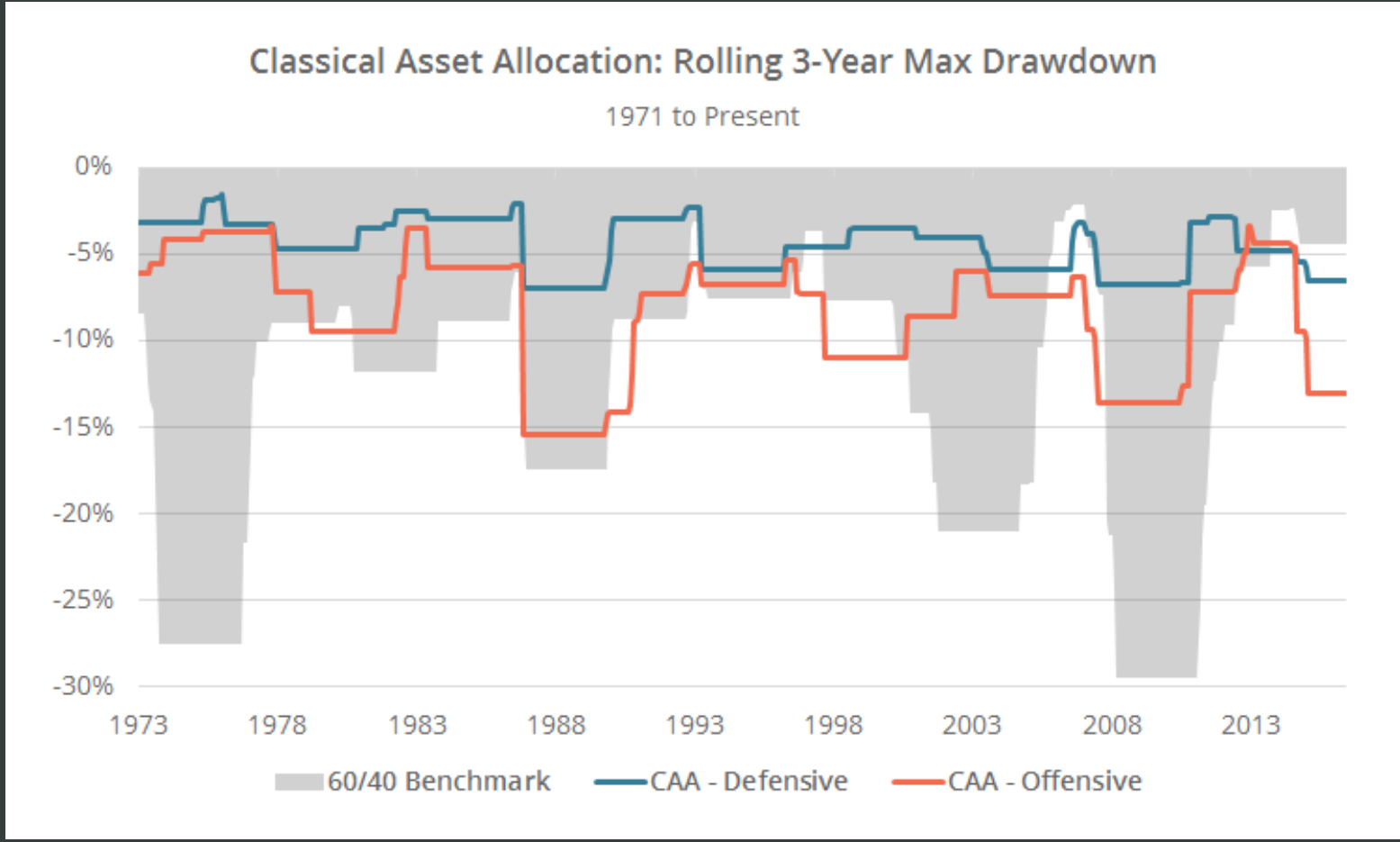
Summary Statistics

1971 to Present

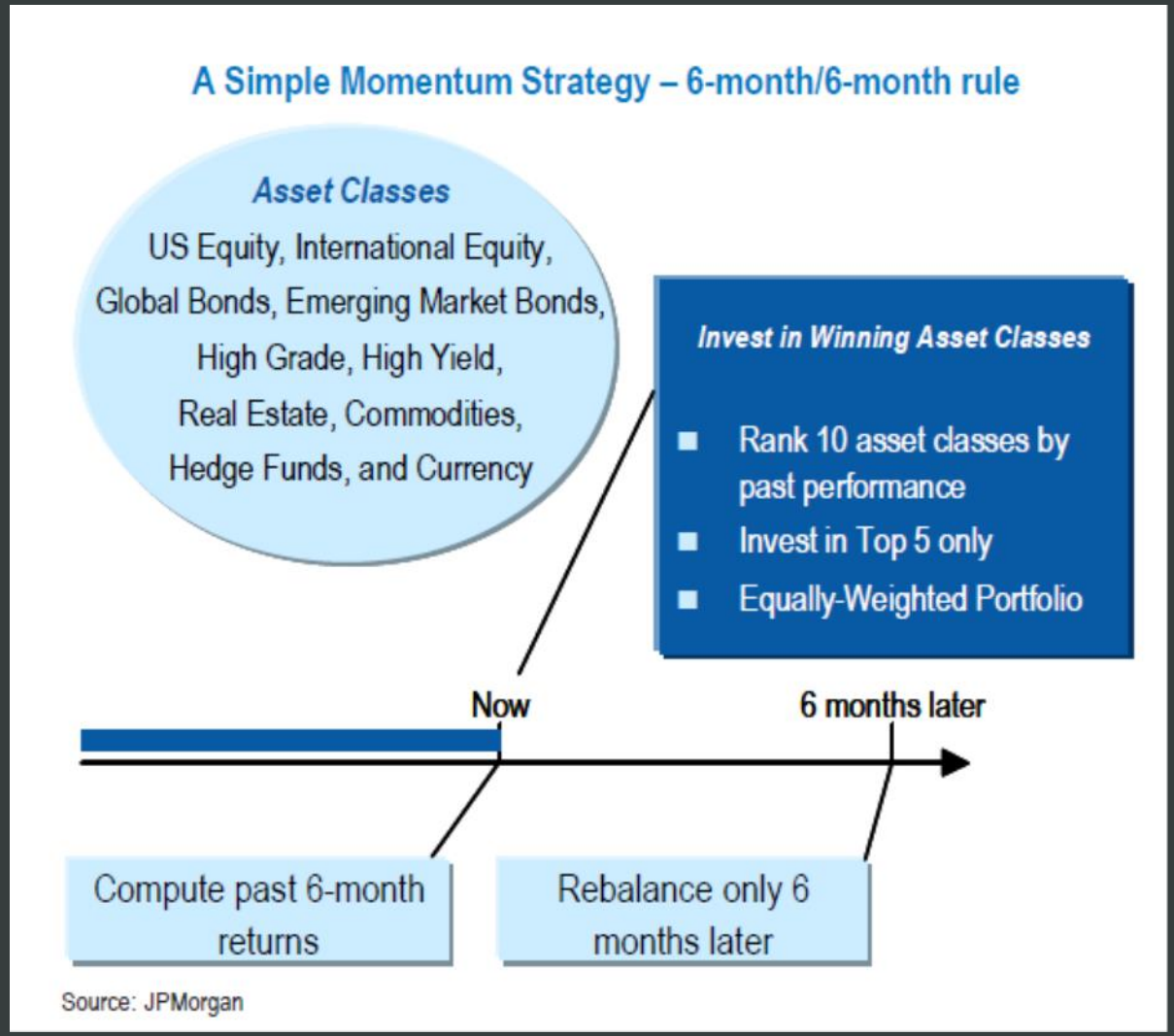
Statistic	Defensive	Offensive	Equal-Weight Benchmark	60/40 Benchmark
Annualized Return	9.7%	11.3%	10.0%	9.1%
Annualized Volatility	6.0%	9.5%	12.2%	9.8%
Sharpe Ratio	0.80	0.66	0.42	0.42
Max Drawdown (EOM)	-6.9%	-15.4%	-42.6%	-29.5%
Longest Drawdown	26 months	32 months	65 months	40 months
Ulcer Performance Index	2.72	1.56	0.47	0.68
% Profitable Months	73.2%	68.9%	65.2%	63.7%
Annual Turnover	249.7%	287.3%	17.7%	12.2%

Momentum and Markowitz : a Golden combination

Keller/Butler/Kipnis



Markowitz in tactical asset allocation
Loeys/Ribeiro (JPMorgan)



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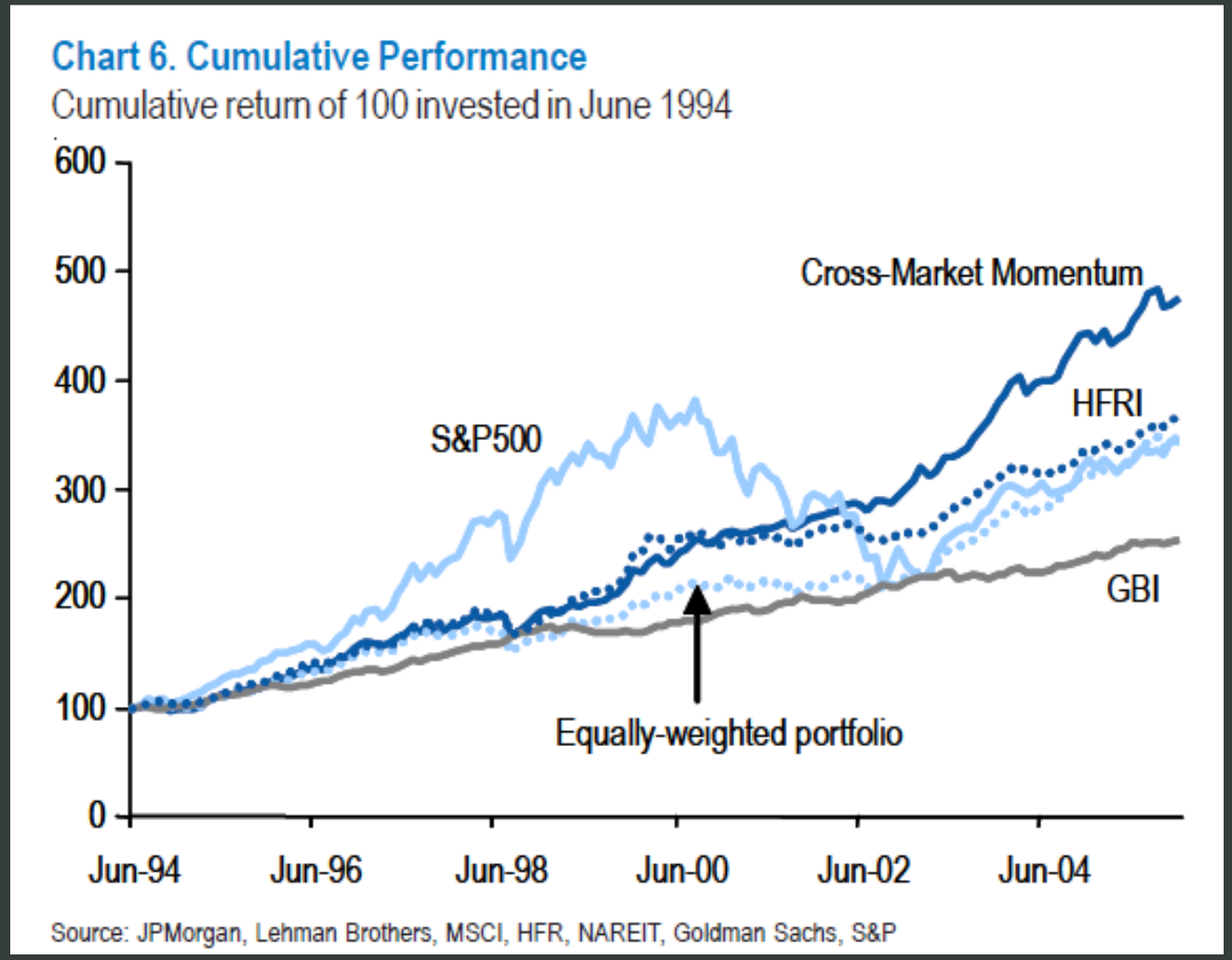


Markowitz in tactical asset allocation
Loeys/Ribeiro (JPMorgan)

Markowitz optimization involves calculating an efficient frontier of all possible portfolios that provide the highest expected return for each level of portfolio risk. In practice, investors do not make much use of mean variance optimization as they find the results too sensitive to inputs (See Box 1). When they use it, it is for long-term strategic asset allocation but never for shorter-term asset allocation around a given benchmark. We find here, to our satisfaction as economists, that **when combined with our momentum-based tactical asset allocation strategy, Markowitz optimization** does have **significant added value.**

Markowitz in tactical asset allocation
Loeys/Ribeiro (JPMorgan)

The Dynamic Markowitz strategy is based on two principles: **momentum and mean variance optimization**. The first exploits the empirically documented predictability of risk and return over medium-term horizons, executed in our base case by using returns and risks over the past 6 months (125 business days).

The second feature of our strategy is executed by calculating an efficient frontier of these 6-month rolling returns and risks, and picking a point along it at the 8% risk level .

Markowitz in tactical asset allocation
Loeys/Ribeiro (JPMorgan)

Table 4. Dynamic Markowitz – Basic Statistics for different lookbacks

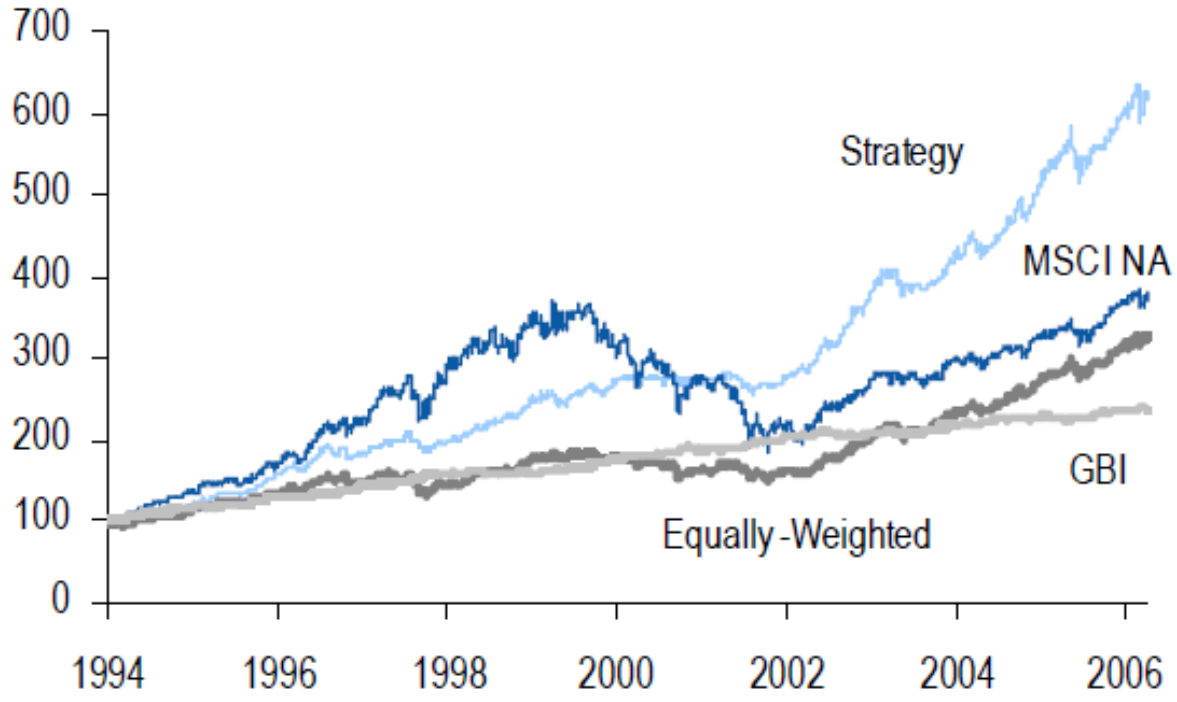
Statistics	125-day	185-day	250-day
Average Excess Return (over cash)	10.7%	8.7%	7.7%
Total Return – Geometric Average	15.6%	13.4%	12.5%
Standard Deviation	7.8%	7.9%	7.7%
Sharpe Ratio	1.37	1.10	1.00
Max (monthly)	6.0%	6.3%	6.8%
Min (monthly)	-9.4%	-7.3%	-7.4%

Source: JPMorgan. This table present basic statistics of the DM strategy when parameters are based on three distinct lookback periods.

MSCI North America – NDDUNA
MSCI Europe – NDDUE15
MSCI Asia Pacific – NDDUP
MSCI EM – NDUEEGF
Real Estate – GPRJPPLU
EMBI – JPEMCOMP
Commodities – DJAIGTR
Global GBI – JHDCGBIG
Cash – JPCAUS3M

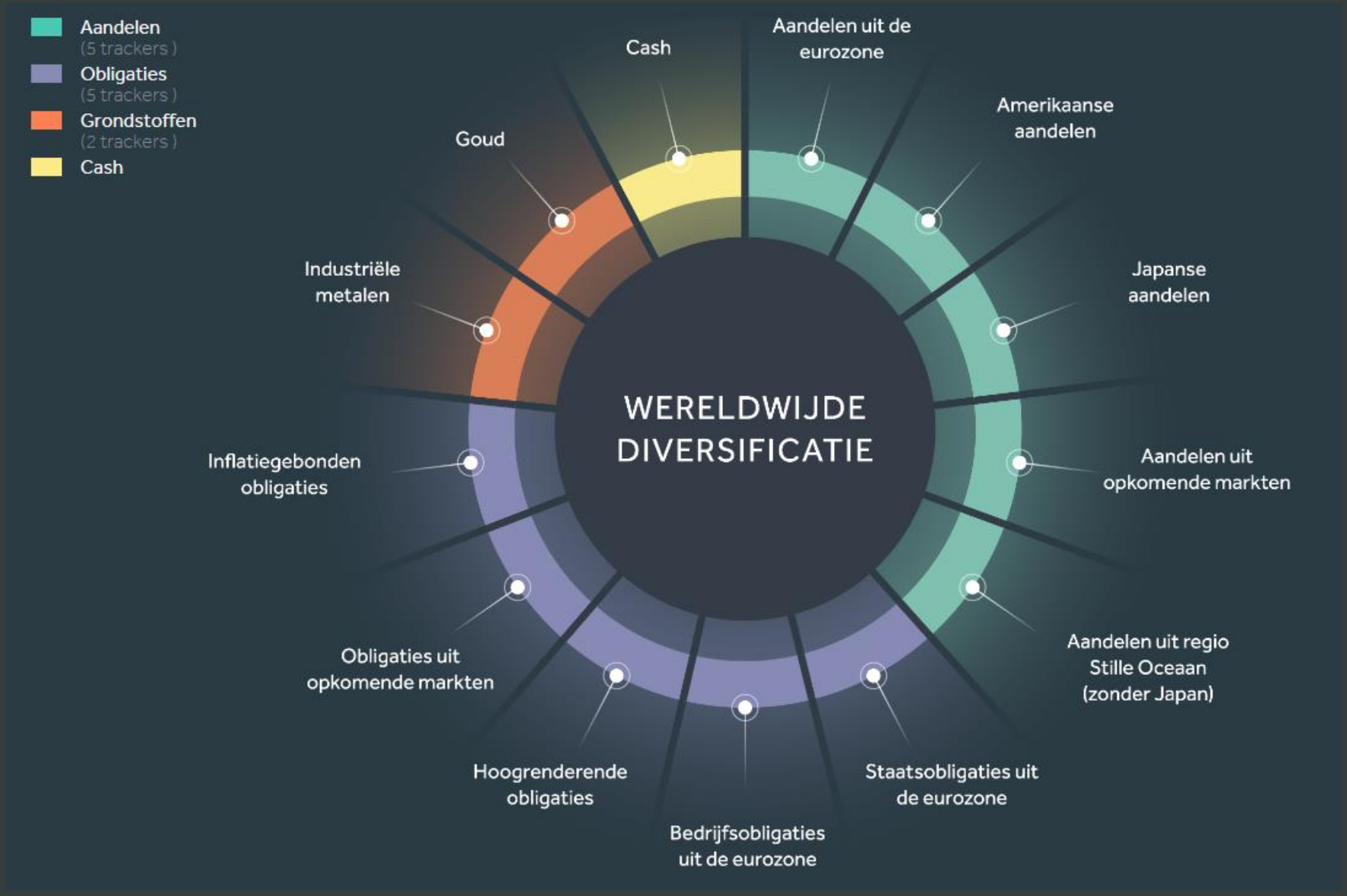
Source: JPMorgan.

Chart 1. Cumulative Performance of DM Strategy



Source: JPMorgan

Praktische toepassing binnen Keyprivate



Praktische toepassing binnen Keyprivate

Naam	Ticker	Return 6M (%)	Ranking
iShares Core S&P 500	CSPX	3,58	1
iShares Core MSCI Asia ex-Japan	CPXJ	-5,08	2
iShares Core MSCI Japan	IJPA	-6,07	3
iShares Core Euro Stoxx 50	CSX5	-6,08	
iShares Core MSCI EM	EMIM	-8,40	

Naam	Ticker	Return 6M (%)	Ranking
Amundi ETF Govt Bond IG	CB3	0,48	1
Amundi ETF Global EM Bonds	AGEB	0,24	2
Amundi ETF Euro High Yield	AHYE	0,10	3
Amundi ETF Euro Inflation	CI3	-0,60	
Amundi ETF Euro Corporates	CC4	-0,85	

Naam	Ticker	Return 6M (%)	Ranking
Gold Bullion Securities	GBS	-4,64	1
ETFS EUR Daily Hedged Industrial Metals	EIMT	-16,93	

Praktische toepassing binnen Keyprivate

Absolute momentum KP universe		
Naam	Ticker	Return 12M (%)
iShares Core S&P 500	CSPX	10,29
CASH		0,00
iShares Core MSCI Asia ex-Japan	CPXJ	-0,67
Gold Bullion Securities	GBS	-0,95
Amundi ETF Govt Bond IG	CB3	-1,09
Amundi ETF Euro High Yield	AHYE	-1,76
Amundi ETF Global EM Bonds	AGEB	-1,76
iShares Core MSCI Japan	IJPA	-2,25