



A Macro Risk-Based Approach to Alternative Risk Premia

Allocation
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Overview & Literature Review



∟ **Background**

- Alternative risk premia (ARP) are encountering growing interest from investors

∟ **A zoo of alternative risk premia:**

- Equity factors: Fama and French (1993), Piotroski (2000), Novy-Marx (2013)
- Time-series/momentum strategies: Carhart (1997), Jegadeesh and Titman (1993), Baltas and Kosowski (2013); Baltas (2015); Hurst et al. (2013); Moskowitz et al. (2012); Lemperiere et al. (2014)
- Carry strategies: Hansen and Hodrick (1980); Meese and Rogoff (1983); Lustig et al. (2014), Koijen et al. (2017), Baltas (2017)

∟ **Risk premia sensitivity to economic cycles:**

- For traditional assets, evidence of a dependency on business cycle measures; e.g. Ang and Bekaert (2004); Kritzman et al. (2012), Ilmanen et al. (2014)
- For ARPs, some evidence: Wang and Xu (2010) for equity momentum, Asness et al. (2000) for the value growth factor, Ahmerkamp et al. (2012) for carry and momentum, Cooper et al. (2016) for value and momentum ;
at the opposite, Asness et al. (2013) find limited evidence on the impact of macro variables

∟ **Few attempts to analyze allocation across ARP:**

- Gnedenko and Yelnik (2014): dynamic allocation model between carry, value and momentum based on recent performance
- Carhart et al. (2014): beyond momentum, carry, valuation and sensitivity to risk-aversion events

Our contribution: Focus on the asset allocation across risk premia



- ∨ **Analysis of the drivers of ARP returns:**
 - Estimation of the sensitivity of alternative risk premia to a set of economic and market regimes
 - Contribution of the carry component
- ∨ **Asset allocation framework – Macro Risk-Based:**
 - Combine strategic risk allocation with active views
 - Active allocation based on point-in-time macro nowcasters and carry
- ∨ **Empirical application:**
 - Diversified range of twelve cross-asset alternative risk premia strategies
 - Sample period January 1999 – December 2016

KEY TAKE- AWAYS

- 1 Analysis of the drivers of ARP returns such as economic and market conditions and carry
- 2 Application to a dynamic risk allocation framework based on carry and nowcasters

Alternative risk premia definition (1/2)



- ∨ ARP: Long-short, leveraged, systematic strategies with specific objectives
- ∨ Universe of assets: Equities (MSCI World universe), FX, Rates, Credit, Volatility
- ∨ Individually scaled to 10% ex-ante volatility
- ∨ Monthly rebalancing

	Strategy	Investment universe	Criteria	Implementation
Equity Factors	Equity Quality	MSCI World	Profitability (ROE, EBITDA margin, accruals) and safety (Debt/EBITDA, asset leverage)	Long first quintile/short bottom quintile
	Equity Momentum		1-year excluding 1-month mean-reversion; adjusted for volatility	
	Equity Size		Market capitalization, enterprise value, total assets	
	Equity Value		Dividend yield, EV/EBITDA, Price/Book, Price/Sales, Price/FFO	

Alternative risk premia definition (2/2)



	Strategy	Investment universe	Criteria	Implementation
Yield capture	Bonds Carry	Major Developed Markets	Long High Carry/Short Low Carry	Bonds futures
	Credit Carry	CDS indices (Europe and North America)	Long HY/Short IG	CDS indices
	DM FX Carry	G10	Long High Carry/Short Low Carry	FX Futures and forwards
	EM FX Carry	Emerging countries	Long High Carry/Short Low Carry	FX forwards
	Dividends Carry	EuroStoxx 50	Long 1-yr SX5E Dividend/ Short SX5E Index	Dividends and equity index futures
	Volatility Carry	S&P 500	Long/Short VIX vs S&P 500 futures depending on VIX curve	VIX futures, S&P 500 futures
Macro directional	Trend Following	Long term rates, credit indices, equity indices, FX	Long Positive Trend/ Short Negative Trend; Trend = average of 1y and 3m past return.	Futures, CDS indices, FX futures and forwards
	FX Value	G10 FX	Long/Short based on PPP valuation metrics	FX Futures

Descriptive statistics (1/2)



Alternative risk premia descriptive statistics

	Trend Following	FX Value	Bonds Carry	Credit Carry	DM FX Carry	EM FX Carry	Dividends Carry	Volatility Carry	Equity Quality	Equity Size	Equity Momentum	Equity Value
Excess return p.a.	7.7%	5.2%	7.1%	6.4%	4.2%	7.5%	2.7%	7.1%	2.2%	6.0%	4.2%	7.4%
Volatility	11.3%	10.6%	10.5%	12.3%	10.2%	12.7%	11.3%	12.7%	8.5%	10.2%	10.8%	10.5%
Sharpe ratio	0.69	0.48	0.68	0.52	0.41	0.59	0.24	0.56	0.26	0.59	0.38	0.70
Max. Drawdown	13.2%	20.8%	17.4%	39.6%	33.7%	41.5%	29.2%	21.7%	24.5%	25.2%	26.7%	19.1%
Calmar ratio	0.59	0.25	0.41	0.16	0.12	0.18	0.09	0.33	0.09	0.24	0.16	0.39
Skewness	0.16	0.07	-0.09	0.77	-0.45	-0.36	-3.27	0.69	-0.20	-0.39	0.29	0.54

Note: The Table displays the descriptive statistics for the different alternative risk premia based on monthly USD returns. The sample starts in January 1999 for the alternative risk premia with the exception of Credit Carry (November 2005), Dividends Carry (August 2008) and Volatility Carry (June 2006). The sample ends in December 2016 for all alternative risk premia. Past performance is not indicative of future performance. Please refer to the important information on performance at the end of this document.

Descriptive statistics (2/2)



Alternative and traditional risk premia correlation matrix

	Trend Following	FX Value	Bonds Carry	Credit Carry	DM FX Carry	EM FX Carry	Dividends Carry	Volatility Carry	Equity Quality	Equity Size	Equity Momentum	Equity Value	MSCI AC	Global Treasury
Trend Following	1.00	-0.18	0.15	-0.02	0.03	0.03	-0.12	0.06	0.09	0.06	0.30	-0.10	-0.10	0.40
FX Value	-0.18	1.00	0.00	-0.07	0.07	-0.01	-0.06	0.17	0.00	-0.04	-0.10	0.05	-0.18	0.03
Bonds Carry	0.15	0.00	1.00	-0.08	0.14	0.05	-0.07	0.03	-0.05	0.13	0.05	0.11	0.00	0.20
Credit Carry	-0.02	-0.07	-0.08	1.00	0.11	0.11	0.54	-0.07	-0.39	0.34	-0.12	0.14	0.33	-0.10
DM FX Carry	0.03	0.07	0.14	0.11	1.00	0.50	0.36	-0.01	-0.22	0.13	-0.05	0.16	0.46	-0.15
EM FX Carry	0.03	-0.01	0.05	0.11	0.50	1.00	0.20	0.16	-0.17	0.15	-0.07	0.18	0.42	-0.03
Dividends Carry	-0.12	-0.06	-0.07	0.54	0.36	0.20	1.00	-0.30	-0.39	0.30	-0.30	0.26	0.42	0.06
Volatility Carry	0.06	0.17	0.03	-0.07	-0.01	0.16	-0.30	1.00	0.01	-0.13	0.14	0.10	0.00	0.00
Equity Quality	0.09	0.00	-0.05	-0.39	-0.22	-0.17	-0.39	0.01	1.00	-0.32	0.28	-0.46	-0.36	0.12
Equity Size	0.06	-0.04	0.13	0.34	0.13	0.15	0.30	-0.13	-0.32	1.00	-0.02	0.25	0.05	0.05
Equity Momentum	0.30	-0.10	0.05	-0.12	-0.05	-0.07	-0.30	0.14	0.28	-0.02	1.00	-0.27	-0.22	0.14
Equity Value	-0.10	0.05	0.11	0.14	0.16	0.18	0.26	0.10	-0.46	0.25	-0.27	1.00	0.07	-0.04
MSCI AC	-0.10	-0.18	0.00	0.33	0.46	0.42	0.42	0.00	-0.36	0.05	-0.22	0.07	1.00	-0.25
Global Treasury	0.40	0.03	0.20	-0.10	-0.15	-0.03	0.06	0.00	0.12	0.05	0.14	-0.04	-0.25	1.00

Note. The Table displays the correlation matrix for the group of alternative risk premia and two major traditional risk premia. Calculations are based on monthly USD returns. The sample starts in January 1999 with the exception of Credit Carry (November 2005), Dividends Carry (August 2008) and Volatility Carry (June 2004). The sample ends in December 2016 for all time-series. For illustrative purposes only.

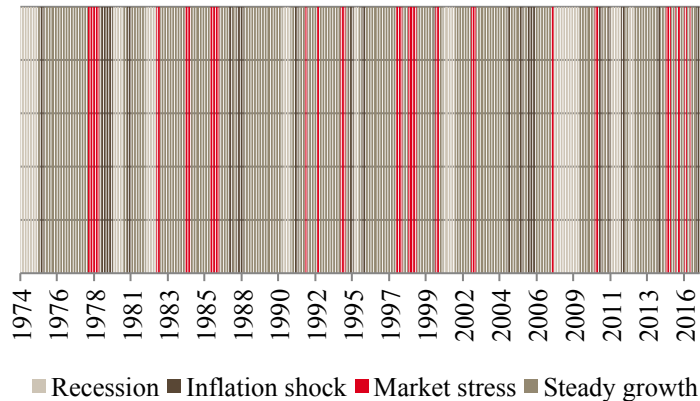
Four macro regimes: recession, inflation, market stress and steady growth



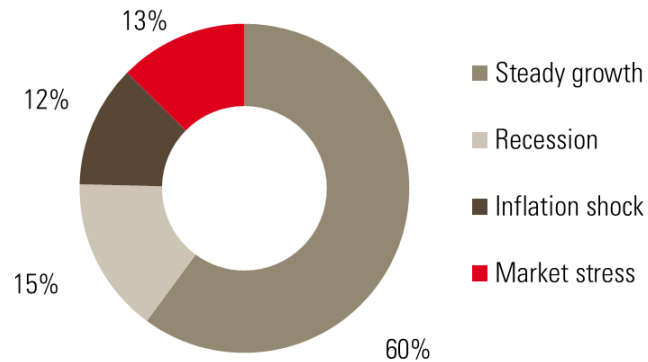
Regimes dating

- Based on Markov Switching models on OECD economic activity index, OECD inflation surprises and MSCI World Index
- Imposition of a sequence: Recession, inflation surprise, market stress. If none, Steady Growth

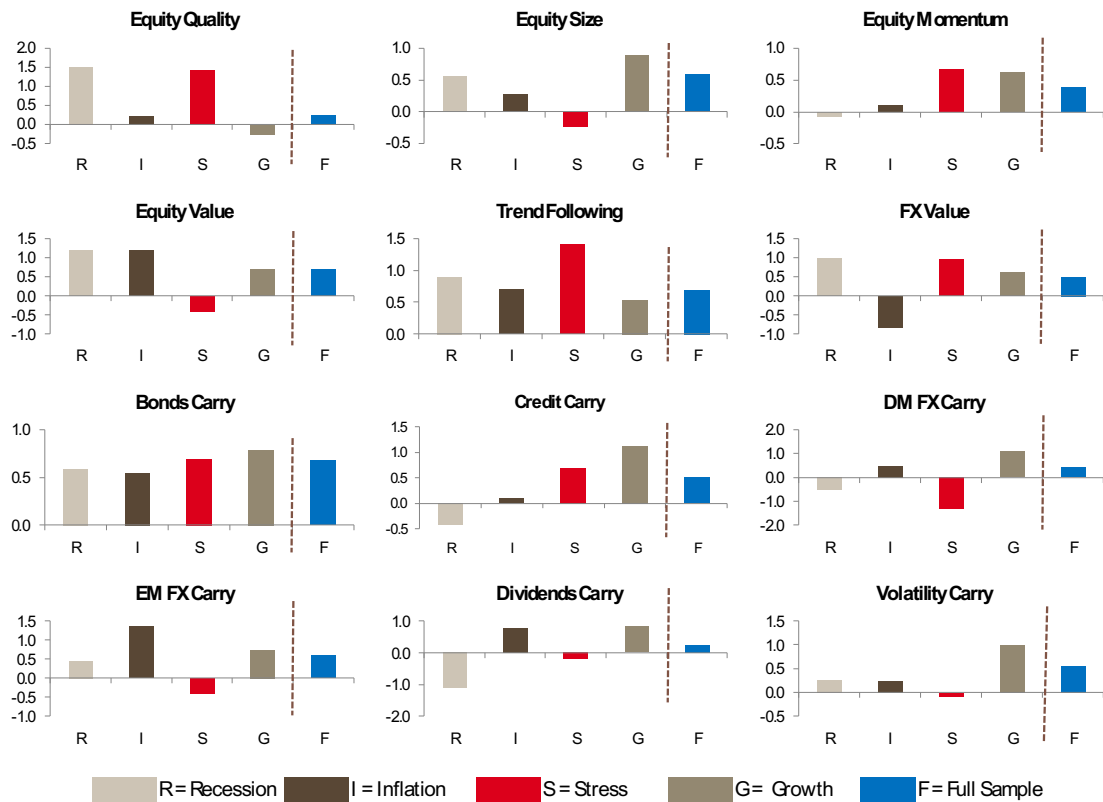
Dating macro regimes



Economic regimes long-term probabilities



Sensitivity of ARP to macro regimes: Sharpe ratios



Macro risk-based asset allocation framework: Methodology

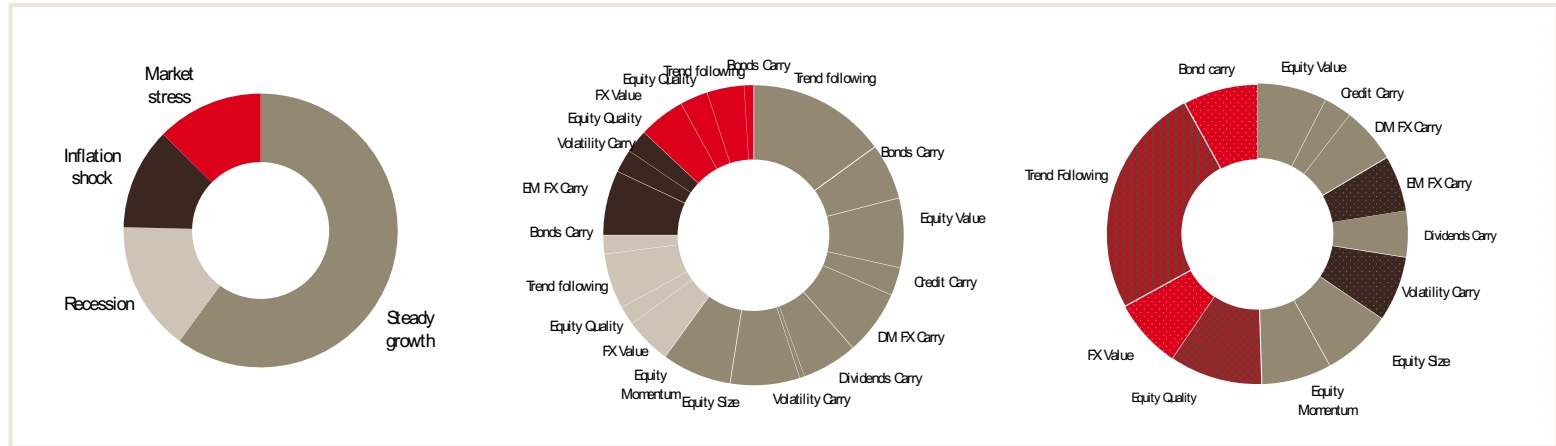
(1/2)



Strategic allocation



- ↳ Rather than ERC, we pick an “All-Weather” type of approach:
 - 1) Align strategic risk budget with unconditional frequency of macroeconomic regimes
 - 2) Map ARP with economic regimes (macro baskets)
 - 3) Penalize for extreme risk (skewness, kurtosis, downside correlation)
 - 4) Scale global portfolio to target a 5% ex-ante volatility



Macro risk-based asset allocation framework: Methodology

(2/2)



Dynamic allocation

Strategic Allocation

Dynamic Allocation

\ Methodology based on Jurczenko and Teiletche (2017): Combining a pure risk-based approach with a set of views in a Black-Litterman framework

- Step 1: Translate the strategic allocation into implied returns μ_{SAA}
- Step 2: Create active returns based on z-scores Z (IC : Information Coefficient):

$$(\mu_{VIEW} - \mu_{SAA}) = IC \Omega^{1/2} Z$$

- Step 3: Determine active portfolio deviations calibrated to deliver 5% volatility and 2% tracking error on average (c: confidence in the views)

$$w_{ACT} = c \left(\frac{\sigma_T}{SR_{SAA}} \right) \Omega^{-1} (\mu_{VIEW} - \mu_{SAA})$$

\ Application - Our active “views” are based on two types of point-in-time indicators:

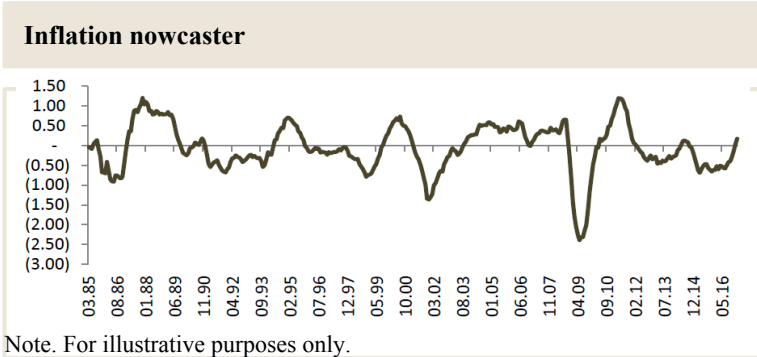
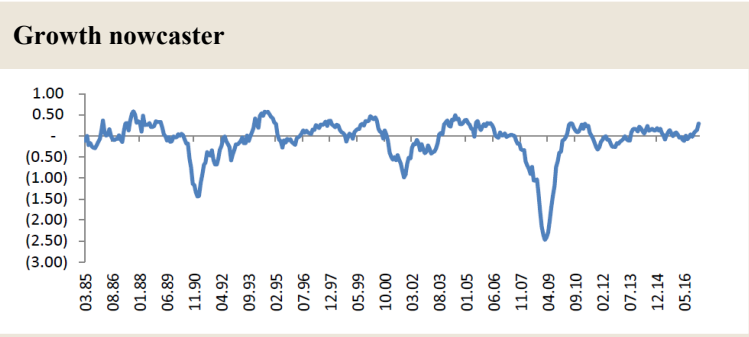
1. Nowcasted probabilities of the macro regimes (modulated by individual sensitivity)
2. Current carry (z-score relative to own history)

Nowcasting indicators

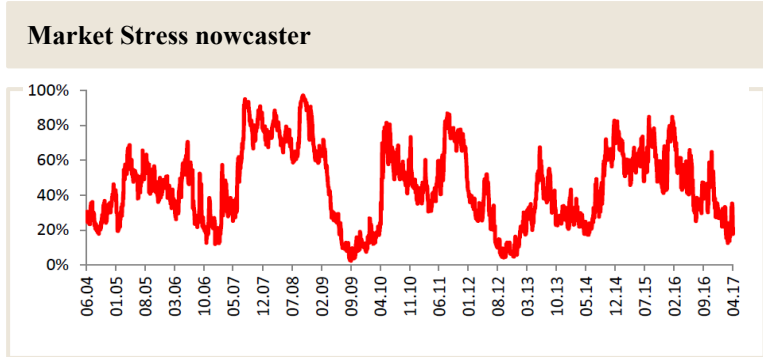


- Real-time “model-free” nowcasters (following Beber, Brandt and Luiz (2015) methodology)
- Three main macro risks:
 - Growth: DM and EM (~85% of world GDP) across all sectors of the economy (housing, consumption, investment, employment, business surveys...)
 - Inflation: DM-only (imported, input, wage, supply-side, surveys...)
 - Market stress: liquidity, spreads, and volatility (15 indicators)

Strategic Allocation **Dynamic Allocation**



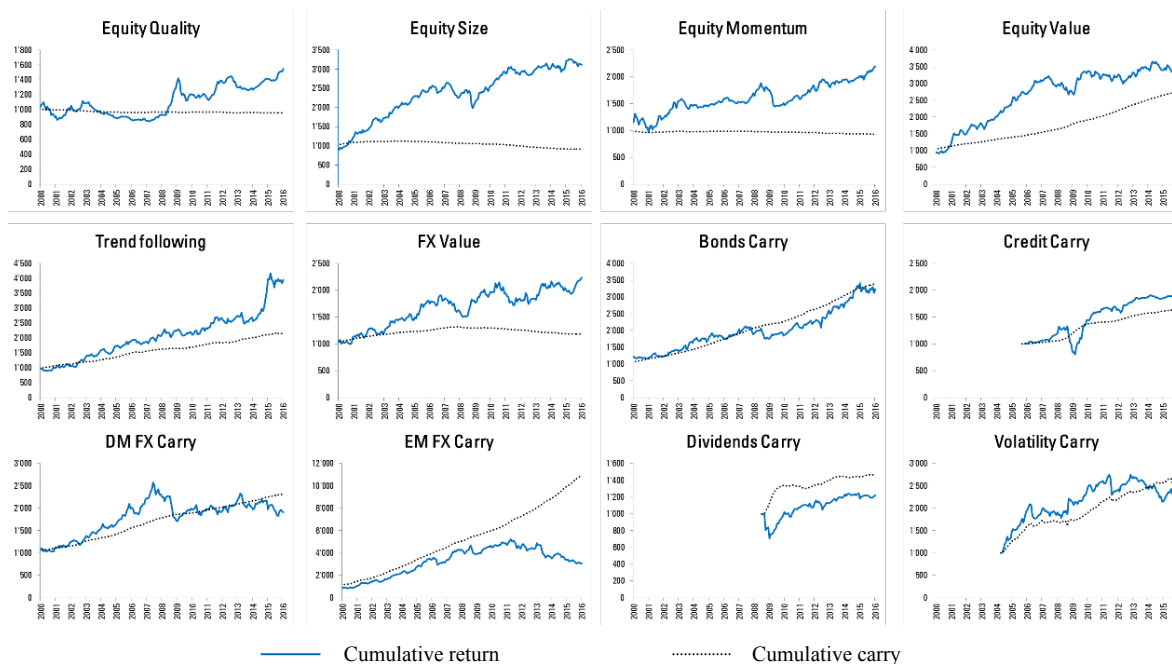
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The importance of carry

Alternative risk premia cumulative excess returns and cumulative carry



Note. The Figure represents the cumulative excess returns (plain blue line) and the cumulative real carry (dotted black line) associated to each alternative risk premia. Past performance is not indicative of future performance. Please refer to the important information on performance at the end of this document.

Strategic vs dynamic allocation to ARP (1/2)



Risk and returns over the full sample

	Strategic	Dynamic		
		Carry signal only	Nowcasters signal only	Both signals combined
Annualized returns	10.0%	10.6%	11.1%	11.9%
Annualized volatility	5.6%	5.7%	5.6%	5.7%
Sharpe ratio	1.42	1.49	1.60	1.73
Maximum drawdown	9.7%	12.8%	8.1%	8.7%
Calmar ratio	0.81	0.66	1.11	1.13
Tracking error	–	2.0%	1.5%	2.2%
Information ratio	–	0.32	0.76	0.89

Note. The table displays descriptive statistics from four different simulations. “Strategic” represents the simulation based on a fixed strategic risk budgets as displayed in Table 5. “Carry”, “Nowcasters”, and “Combination” are simulations using the dynamic allocation process described in Section 4, with expected returns estimated respectively with “Carry” signal only, “Nowcasters” signal only, and a combination of both. Tracking error and information ratios are computed relatively to the “Strategic” simulation as benchmark. Calculations are based on USD monthly returns net of transaction costs. The sample starts in January 2005 and ends in December 2016 for all simulations. Past performance is not indicative of future performance. Please refer to the important information on performance at the end of this document.

Strategic vs dynamic allocation to ARP (2/2)



Correlations between strategic and dynamic portfolios

	Strategic	Carry active returns	Nowcasters active returns	Combination active returns
Strategic	1.00	-0.08	-0.20	-0.21
Carry – active returns	-0.08	1.00	-0.30	0.80
Nowcasters – active returns	-0.20	-0.30	1.00	0.28
Combination – active returns	-0.21	0.80	0.28	1.00

Note. The table displays the historical correlations between returns from the strategic portfolio simulation, and the active returns delivered by the “Carry”, “Nowcasters”, and “Combination” signals. Calculations are based on USD monthly returns net of transaction costs. The sample starts in January 2005 and ends in December 2016 for all simulations.

Strategic vs dynamic portfolios: Sharpe ratio by regime

	Strategic	Dynamic		
		Carry signal only	Nowcasters signal only	Both signals combined
Recession	0.94	0.82	1.60	1.64
Inflation	1.42	1.50	1.35	1.44
Market Stress	1.89	2.04	1.82	1.97
Steady Growth	1.93	2.07	1.95	2.09

Note. The table displays the Sharpe ratio of the four simulations under different economic regimes. Calculations are based on USD monthly returns net of transaction costs. The sample starts in January 2005 and ends in December 2016 for all simulations. Past performance is not indicative of future performance. Please refer to the important information on performance at the end of this document.

Key take-aways



- ∖ Differentiated reaction of cross-asset alternative risk premia in major macroeconomic regimes
- ∖ Macro risk-based allocation with dynamic tilts:
 - Nowcasting indicators of macroeconomic regimes
 - Current carry
- ∖ Overall results: Improvement of static portfolios, particularly during bad times such as recessions
- ∖ Extensions:
 - Additional risk premia (commodities...)
 - Additional allocation signals: momentum, valuation,....
 - Macro factor-mimicking assets

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