MarketDesk

Weekly Quant Pack

May 9, 2025

Table of Contents

2. Overview of Indicators
3. Model Signals
4. Current Takeaways
5. Asset Allocation Indicators
10. U.S. Equity Indicators
16. U.S. Economic Indicators
24. Credit Indicators
28. Technical Analysis Indicators
36. Global Economic Indicators

Introduction

The Quant Pack is a collection of proprietary indicators and risk-management tools designed to simplify investment decisions. The indicators decrease market noise by focusing on 100% data-driven signals to guide core asset allocation. Refer to each page for how to use the indicator, the latest reading, and implied forward guidance.

Overview of Indicators

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Overview			Key Details			Reading		Forecast
Page	**Indicator**	**Identifier**	**Forecast**	**Frequency**	**As of Date**	**Prior**	**Current**	**Status**
Asset Allocation								
6	Simple Asset Allocation Framework	SAAF	12 Months	Mo	May-1	Phase 4	Phase 4	**Neutral**
8	U.S. Macro Regime Indicator	USMRI	12 Months	Mo	May-1	+0.6	+0.6	**Positive**
U.S. Equities								
11	S&P 500 Earnings Indicator	USEPS	12 Months	Mo	May-1	+13%	+10%	**Positive**
12	S&P 500 Price Target Model	USPTM	Real-Time	Wk	May-8	3,548	3,533	**Negative**
15	S&P 500 10Yr Annualized Return Forecast	SP10YR	10 Years	Qtr	May-1	-6.5%	-6.9%	**Negative**
U.S. Economics								
17	U.S. Business Cycle Indicator	USBCY	Real-Time	Mo	May-1	Expansion	Slowdown	**Neutral**
18	U.S. PMI Momentum Indicator	USPMI	12 Months	Mo	May-1	+4.7	+4.7	**Positive**
19	U.S. CPI Leading Indicator	USCPI	3 Months	Mo	May-1	2.2%	2.6%	**Positive**
21	U.S. Home Price Indicator	USHPI	12 Months	Mo	May-1	+1%	+1%	**Neutral**
22	U.S. Unemployment Indicator	USURI	12 Months	Mo	May-1	5.9%	6.1%	**Negative**
23	U.S. Consumer Health Indicator	USCHI	Real-Time	Mo	May-1	49%	47%	**Neutral**
U.S. Credit								
25	U.S. Net Liquidity Indicator	USNLI	Real-Time	Wk	May-8	75%	70%	**Positive**
26	U.S. Lending Standards Indicator	USLSI	12 Months	Mo	May-1	-3%	-5%	**Neutral**
27	U.S. Financial Conditions Index	USFCI	Real-Time	Mo	May-1	-0.4	-0.4	**Positive**
Technical Analysis Indicators								
29	U.S. Investor Sentiment Indicator	USSI	Real-Time	Wk	May-8	29%	26%	**Negative**
30	U.S. Risk Demand Indicator	USRDI	Real-Time	Wk	May-8	-0.90	-0.70	**Negative**
31	U.S. Breadth Indicator	USBI	Real-Time	Wk	May-8	33	36	**Negative**
32	U.S. Technical Indicator	USTI	Real-Time	Wk	May-8	+1.4	+1.1	**Negative**
33	U.S. Capitulation Indicator	USCAP	Real-Time	Wk	May-8	-1.5	-1.7	**Neutral**
34	U.S. Bear Market Probability	USBMP	12 Months	Wk	May-8	82%	81%	**Negative**
35	International Risk Demand Indicator	IRDI	Real-Time	Wk	May-8	-0.4	-0.1	**Neutral**
Global Economics								
37	USD Technical Indicator	USDTI	3 Months	Mo	May-1	6.0%	1.1%	**Neutral**

Status Legend

Positive	Forecasts a positive development for future asset prices, macro conditions, & economic activity not currently priced into markets
Neutral	Forecast inline with historical average with no clear positive or negative future impact
Negative	Forecasts a negative development for future asset prices, macro conditions, & economic activity not currently priced into markets

Month-End Model Signals

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Overview

The Model Signals in the table below translate Quant Pack Leading Indicators into asset allocation insights. Green shade represents each indicator's current portfolio exposure signal (i.e., Risk-On vs Risk-Off). Not every indicator has a model signal because some indicators, such as the U.S. Business Cycle, are built to objectively describe the current environment rather than predict the forward environment. Click the report links in the right column to see each model's historical performance statistics since 2000.

Page	Quant Pack Indicator * = Real Time Indicator	Sector Rotation		Credit Rotation		Stock / Bond Rotation		Historical Model Signal Performance & Statistics
		Risk-Off	Risk-On	Risk-Off	Risk-On	Risk-Off	Risk-On	
Asset Allocation								
6	Simple Asset Allocation Framework *	Defensives	Cyclicals	High Quality	Low Quality	Bonds	Stocks	View Primer ►
8	U.S. Macro Regime Indicator	Defensives	Cyclicals	High Quality	Low Quality	Bonds	Stocks	View Primer ►
U.S. Equities								
11	S&P 500 Earnings Indicator	Defensives	Cyclicals	High Quality	Low Quality	Bonds	Stocks	View Printout ►
12	S&P 500 Price Target Model *	Defensives	Cyclicals	High Quality	Low Quality	Bonds	Stocks	View Printout ►
U.S. Economics								
18	U.S. PMI Momentum Indicator	Defensives	Cyclicals	High Quality	Low Quality	Bonds	Stocks	View Printout ►
U.S. Credit								
25	U.S. Net Liquidity Indicator *	Defensives	Cyclicals	High Quality	Low Quality	*Not Applicable*		View Printout ►
27	U.S. Financial Conditions Index *	Defensives	Cyclicals	High Quality	Low Quality	*Not Applicable*		View Printout ►
Tactical Trading Tools								
30	U.S. Risk Demand Indicator *	Defensives	Cyclicals	High Quality	Low Quality	Bonds	Stocks	View Printout ►
34	U.S. Bear Market Probability	Defensives	Cyclicals	High Quality	Low Quality	Bonds	Stocks	View Printout ►
35	International Risk Demand Indicator *	Defensives	Cyclicals	High Quality	Low Quality	*Not Applicable*		View Printout ►

Quant Pack Signal Count	4 of 10	6 of 10	4 of 10	6 of 10	3 of 7	4 of 7
– Leading Indicators (4)	1 of 4	3 of 4	1 of 4	3 of 4	1 of 4	3 of 4
– Real Time Indicators (6)	3 of 6	3 of 6	3 of 6	3 of 6	2 of 3	1 of 3

Note: Click **here** for an in-depth discussion of how to interpret the different types of model signals.

Current Takeaways & Market Implications

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Overview

The Current Takeaways discussed in the table below highlight potential market implications based on each indicator's latest reading. The takeaways primarily focus on timing, including when the indicators might reach key levels or turning points. Refer to the page number in the left column for the current reading and additional context about each indicator.

Page	Indicator	Current Takeaway & Implications for each Indicator
Asset Allocation		
6	Simple Asset Allocation Framework	Currently in Phase 4 driven by falling the U.S. Risk Demand Indicator (USRDI); See next page for positioning ideas
8	U.S. Macro Regime Indicator	Currently "Risk-On' with 4 of the 5 categories positive; 12-month forecast suggests macro will stay "Risk-On" into 2025
U.S. Equities		
11	S&P 500 Earnings Indicator	The indicator's 15 macro inputs suggests earnings growth will accelerate throughout 2025 and peak in 1Q 2026
12	S&P 500 Price Target Model	Unattractive risk / reward setup when fair value below S&P 500; Model prefers owning risk-free yields in bonds at current levels
15	S&P 500 10Yr Annualized Return	The model's macro inputs forecast below average returns for the S&P 500 over the next decade
U.S. Economics		
17	U.S. Business Cycle Indicator	U.S. economic data has entered the "Slowdown" phase with forward looking data suggesting economic growth will slow
18	U.S. PMI Momentum Indicator	Macro data suggests manufacturing should see structural strength, but growth is being hampered by tariffs and policy uncertainty
19	U.S. CPI Leading Indicator	Commodities & Energy are pushing the indicator CPI forecast higher in the near-term; Continuing to monitor incoming data
21	U.S. Home Price Indicator	Macro data suggest national home prices will move sideways in 2025
22	U.S. Unemployment Indicator	Macro inputs suggests weakness however ~5 million workers leaving labor force will keep a ceiling on unemployment this cycle
23	U.S. Consumer Health Indicator	Consumer health has been a source of strength for markets; Recent trends suggest data is normalizing to pre-pandemic levels
U.S. Credit		
25	U.S. Net Liquidity Indicator	Market liquidity has risen above the key 50% threshold supporting equity and credit markets
26	U.S. Lending Standards Indicator	Macro inputs suggest bank lending standards will normalize in 2025 = More bank lending and future economic growth
27	U.S. Financial Conditions Index	Loose financial conditions were a tailwind for equity markets in 2024, however conditions have tightened since the initial rate cut
Tactical Trading Tools		
29	U.S. Investor Sentiment Indicator	Investor sentiment remains weak driven by survey data, call/put ratio, treasury bond futures, and a volatile VIX
30	U.S. Risk Demand Indicator	USRDI turned "Risk-Off" on February 26th (i.e., decrease portfolio risk); The average Risk-Off regime last 10 months
31	U.S. Breadth Indicator	A reading above (below) 50 suggests the upward trend in the S&P 500 is stable and healthy (weak and deteriorating)
32	U.S. Technical Indicator	A reading above +1.0 (below -1.0) suggests markets overbought (oversold) over the near-term horizon of 1-2 months
33	U.S. Capitulation Indicator	Market selling reached it lowest level in recent years on March 13th (-2std) supporting the recent market bounce
34	U.S. Bear Market Probability	Drawdown risk remains elevated; Doesn't mean markets will fall, but suggests assets are priced for perfection
35	International Risk Demand Indicator	Investors' appetites have turned negative for international regions and factors
Global Economics		
37	USD Technical Indicator	Indicator's macro inputs suggest USD could surprise to the upside over next three months

Asset Allocation Indicators

MarketDesk Quant Pack

Page 6 **Simple Asset Allocation Framework (SAAF)**
Asset Allocation Framework Based on Macro and Price Indicators

Page 8 **U.S. Macro Regime Indicator (USMRI)**
Asset Allocation Framework Based only on Macro Indicators

MarketDesk Simple Asset Allocation Framework (SAAF)

Asset Allocation

Asset Allocation Framework Based on Macro and Price Indicators

Current Takeaway Currently in Phase 4 driven by falling the U.S. Risk Demand Indicator (USRDI); See next page for positioning ideas

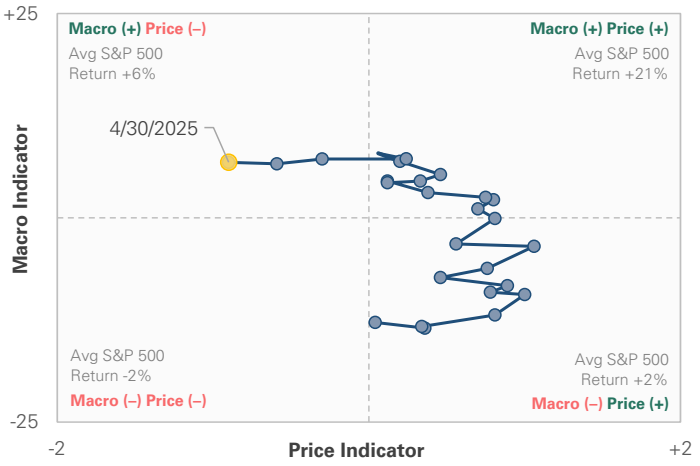
Indicator Definition

The Simple Asset Allocation Framework (SAAF) was developed by MarketDesk to identify the current market regime and simplify asset allocation. The SAAF is based on two MarketDesk indicators: the U.S. PMI Momentum Indicator (USPMI) and the U.S. Risk Demand Indicator (USRDI). USPMI and USRDI naturally create a four-phase framework that informs both fundamental and technical views. When both indicators are above zero, markets are in Phase 1. When both indicators are below zero, markets are in Phase 3. Phases 2 and 4 occur when one indicator is positive and one is negative. While markets can move in any direction, historically they have moved clockwise throughout the SAAF. **Click here** to read the SAAF primer.

How to Use

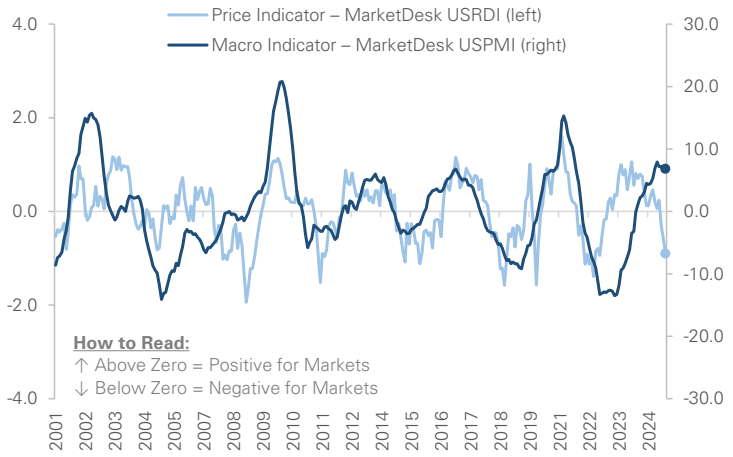
There are two primary groups of investors: (1) macro and (2) price. Macro investors use fundamental and economic data to inform their investment decisions. Price investors (i.e., technical analysts) use price action, momentum, volume, and behavioral trends to inform their investment views. The two investor groups employ different investment frameworks, but they come together to form the market. Sometimes the two groups agree, and sometimes they disagree. The SAAF is designed to monitor the investment preferences of each group, which can be split into four distinct phases. Markets behave differently across all four phases but exhibit similarities across history (i.e., Phase 3 in 2022 was similar to Phase 3 in 2001). Refer to the next page for positioning ideas for each SAAF phase.

Figure 1 – MarketDesk SAAF (24-Month Path & Current Reading)



Source: MarketDesk Quant Pack. **Click Here** to read more about the SAAF.

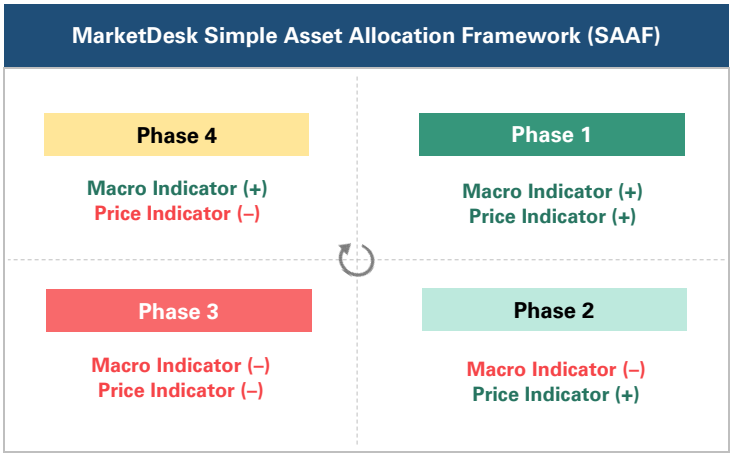
Figure 2 – SAAF is Comprised to Two Data-Driven Indicators



Source: MarketDesk Quant Pack.

Figure 3 – Understanding the Four Phases of the SAAF Quadrant

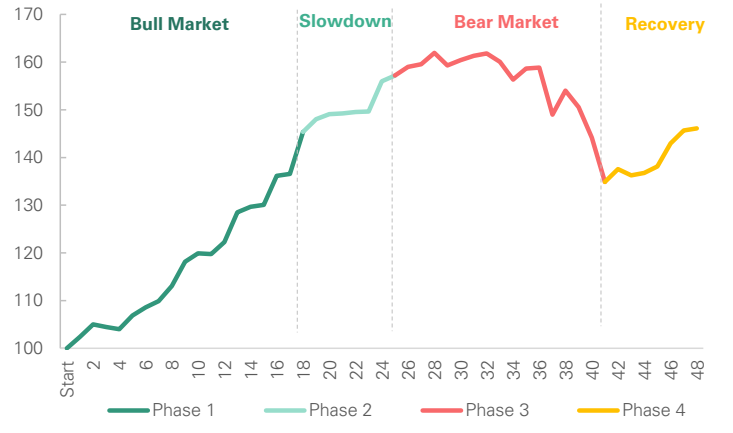
All four phases and the underlying indicator inputs



Source: MarketDesk Quant Pack. Framework historically moves clockwise.

Figure 4 – S&P 500 Average Return Path Across Each SAAF Phase

Based on monthly datapoints since 1990



Source: MarketDesk Quant Pack

MarketDesk SAAF (Cont.)

Asset Class Performance During Each SAAF Phase

Asset Allocation

Figure 5 – Asset Class Performance During Each SAAF Phase

Historical Returns Since January 1990

Market Segment	Risk-On Regimes		Phase 1		Phase 2		Phase 3		Phase 4	
	Average	% Positive	Average	% Positive	Average	% Positive	Average	% Positive	Average	% Positive
Equity Styles										
S&P 500	11.2%	-	16.6%	-	10.0%	-	1.9%	-	17.7%	-
Small Cap	11.6%	50%	19.8%	90%	6.6%	20%	-1.3%	60%	19.9%	60%
Value	10.1%	47%	15.3%	30%	5.9%	10%	2.6%	50%	16.7%	50%
Growth	12.3%	53%	18.4%	60%	14.0%	90%	0.9%	70%	18.5%	40%
Low Beta	10.7%	48%	11.8%	20%	6.2%	40%	7.7%	70%	17.5%	60%
High Beta	13.9%	50%	28.1%	70%	7.2%	40%	-7.7%	30%	28.6%	40%
Momentum	13.3%	59%	18.2%	50%	10.9%	80%	5.5%	60%	19.3%	70%
High Quality	12.6%	53%	16.5%	60%	12.5%	70%	4.9%	70%	17.9%	50%
High Div. Yield	12.4%	52%	14.9%	40%	8.2%	30%	7.1%	60%	19.3%	50%
U.S. Sectors										
Comm Svcs	8.4%	48%	10.5%	33%	10.9%	40%	1.5%	40%	16.5%	38%
Cons Disc	12.6%	54%	18.2%	33%	10.3%	50%	1.3%	60%	23.1%	50%
Cons Stpls	10.8%	48%	10.7%	22%	7.3%	60%	10.0%	70%	12.8%	38%
Energy	11.6%	47%	17.4%	33%	6.4%	40%	5.9%	50%	15.1%	50%
Financials	11.7%	52%	20.1%	67%	4.2%	50%	-1.1%	30%	22.6%	63%
Health Care	12.0%	49%	12.5%	33%	6.7%	40%	9.0%	80%	19.8%	75%
Industrials	11.8%	49%	17.4%	67%	10.7%	40%	0.9%	30%	20.1%	50%
Materials	10.7%	47%	16.0%	44%	11.2%	30%	-0.3%	30%	19.5%	50%
Real Estate	10.8%	50%	17.5%	29%	2.2%	38%	3.7%	78%	23.1%	60%
Tech	15.9%	52%	23.2%	67%	17.2%	70%	3.4%	60%	22.2%	50%
Utilities	9.0%	47%	8.1%	0%	4.7%	60%	8.3%	80%	16.7%	50%
Credit										
Bond Aggregate	4.9%	-	3.7%	-	2.2%	-	5.5%	-	8.7%	-
+10Y US Treasuries	6.5%	52%	2.8%	30%	1.3%	40%	10.9%	80%	10.6%	70%
1-5Y US Treasuries	3.8%	39%	2.6%	70%	2.7%	90%	5.0%	30%	4.8%	10%
High Yield	8.2%	60%	10.6%	70%	5.8%	40%	-0.1%	20%	20.9%	60%
Corp IG	5.9%	58%	5.7%	50%	2.4%	20%	4.1%	40%	13.5%	90%
Fallen Angels	9.1%	64%	12.6%	75%	6.2%	44%	-0.1%	30%	29.6%	43%
Municipals	4.9%	54%	3.0%	70%	3.5%	70%	4.8%	70%	11.0%	70%
MBS	4.7%	51%	3.5%	60%	2.2%	60%	5.8%	60%	7.4%	30%
TIPs	4.8%	53%	4.8%	88%	3.7%	56%	3.2%	20%	10.6%	71%
Convertibles	10.2%	59%	17.8%	80%	8.0%	80%	-2.2%	70%	18.8%	60%
International Equity										
Emerging	16.7%	54%	24.1%	40%	17.0%	40%	0.5%	40%	27.4%	40%
Developed	7.0%	45%	10.4%	30%	8.1%	30%	-1.1%	40%	12.8%	50%
FX										
U.S. Dollar	1.0%	40%	-2.7%	20%	-1.6%	50%	4.5%	50%	2.8%	30%
Commodities										
Broad Cmdty.	1.4%	41%	10.1%	40%	-2.4%	30%	-6.6%	40%	2.0%	30%
Gold	3.2%	42%	0.8%	20%	5.5%	60%	3.5%	50%	8.9%	50%
Crude Oil	9.6%	52%	19.6%	60%	8.2%	50%	-8.7%	40%	36.1%	50%

Source: MarketDesk Quant Pack. We have included a column titled "All Periods" to allow for a comparison of how each asset class typically performs. **Average** = Average annualized total return during each SAAF phase. The return is calculated as the average monthly total return multiplied by 12. **% Positive** = The percentage of regimes each Equity, FX, and Commodity category outperformed the S&P 500 Index, and each Credit category outperformed the Bloomberg Bond Aggregate Index during each respective regime (% positive based on price returns).

MarketDesk U.S. Macro Regime Indicator (USMRI)

Asset Allocation Framework Based only on Macro Indicators

Asset Allocation

Current Takeaway	Currently "Risk-On' with 4 of the 5 categories positive; 12-month forecast suggests macro will stay "Risk-On" into 2025

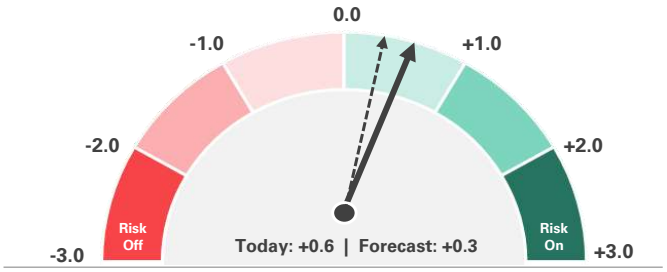
Indicator Definition

The MarketDesk U.S. Macro Regime Indicator (USMRI) aggregates 20+ Quant Pack indicators across economics, equities, and credit and distills them into one straightforward signal. The goal of the USMRI is to identify shifts in the broader macro regime and manage portfolio betas appropriately to produce superior risk-adjusted returns. The USMRI provides both a current macro reading and a 12-month forecast. Note – "Risk-Off" does not necessarily forecast doom and gloom or favor a bearish stance. Instead, it indicates the risk / reward setup is unfavorable for risk-taking, such as owning cyclical sectors or lower quality credits. **Click here** to read the USMRI primer.

How to Use

A current reading above (below) zero signals a risk-on (risk-off) regime and indicates investors should increase (decrease) overall portfolio risk. The USMRI's 12-month forecast is calibrated so that investors should start to increase (decrease) portfolio risk two months prior to the indicator crossing above (below) zero. For example, if the USMRI forecasts the signal will cross above zero in April, investors should start to increase portfolio risk in February. The bottom right figure graphs the results of this process since 2000 using a simple sector ETF model that rotates between cyclical sectors (USMRI above zero = "Risk-On") and defensive sectors (USMRI below zero = "Risk-Off").

Figure 6 – MarketDesk U.S. Macro Regime Indicator (USMRI)

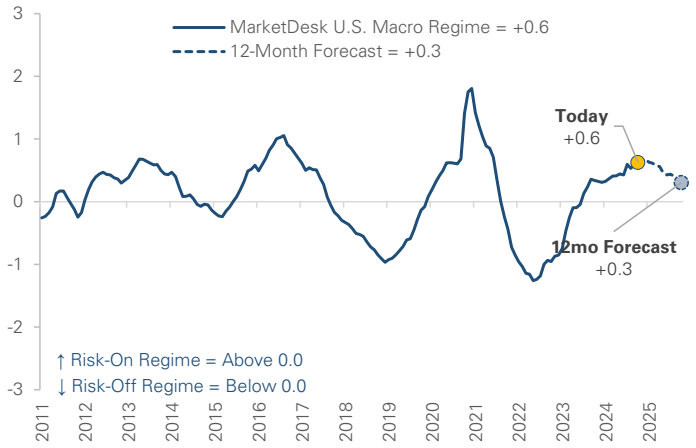


Indicator Components	Reading	Status
Business & Consumer Demand	0.53	Risk-On
Manufacturing Activity	1.66	Risk-On
Corporate Earnings	1.92	Risk-On
Labor Market	0.80	Risk-On
Interest Rates	-0.57	Risk-Off

Source: MarketDesk Quant Pack.

Figure 7 – Historical U.S. Macro Regime Indicator (USMRI)

Historical USMRI Since 1980 and Next 12-Month Forecast



Source: MarketDesk Quant Pack. See the next page for key dates of each regime. See the fully history of the U.S. Macro Regime Indicator in the **Full Primer**.

Figure 8 – Market Segments to Own During Each Regime

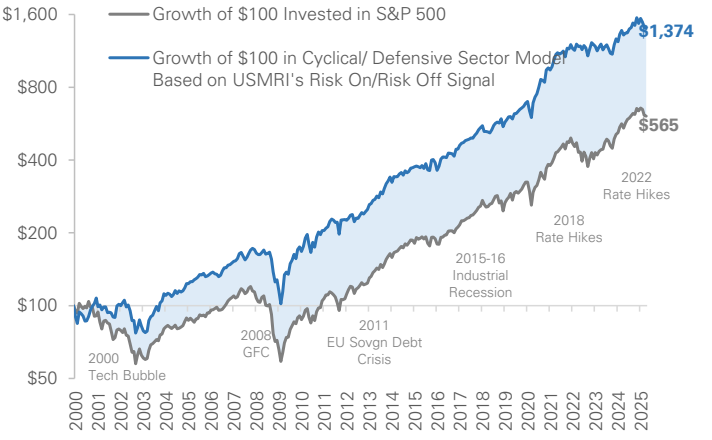
Equity factors, sectors, credit, and international positioning ideas

Asset Classes	Risk-On Regimes Shortlist of Areas to Own	Risk-Off Regimes Shortlist of Areas to Own
U.S. Equity Style Boxes	SMID Cap Growth Cyclical Sectors High Beta Operating Leverage	High Quality Low Volatility High Dividend Yield Strong Balance Sheets
U.S. Sectors	Consumer Discretionary Industrials & Materials Financials	Consumer Staples Health Care Utilities
Credit	High Yield Fallen Angels Convertibles	Long-Duration Municipals MBS
International	Emerging Markets Asia / Latin America	Developed Markets Low Volatility

Source: MarketDesk Quant Pack

Figure 9 – Defensive / Cyclical Sector Model Based on USMR Indicator

Performance of simple sector rotation model using the U.S. Macro Regime Indicator



Source: MarketDesk Quant Pack. Assumes you own Defensive Sector ETFs during "Risk-Off" Regimes (XLU, XLV, XLP) and Cyclical Sector ETFs during "Risk-On" Regimes (XLB, XLI, XLY). The portfolio is rebalanced monthly.

MarketDesk USMRI (Cont.)

Asset Allocation Framework Based only on Macro Indicators

Figure 10 – Table of Historical Regime Dates Since January 1980

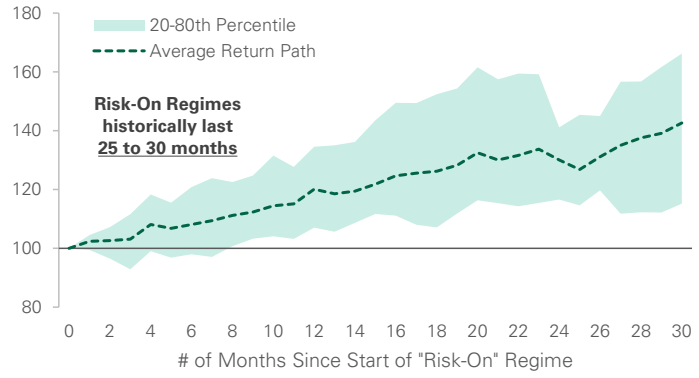
Risk-On vs Risk-Off Regime Dates

Risk-On Regimes			Risk-Off Regimes		
Start	Mos.	Return %	Start	Mos.	Return %
Jan-83	25	25%	Feb-85	8	5%
Oct-85	32	44%	Jun-88	23	32%
May-90	60	42%	Apr-95	15	24%
Jul-96	50	137%	Jul-00	16	-20%
Oct-01	35	4%	Aug-04	52	-19%
Nov-08	24	32%	Nov-10	10	-4%
Sep-11	4	16%	Jan-12	4	0%
May-12	31	57%	Dec-14	11	1%
Oct-15	27	36%	Jan-18	27	3%
Apr-20	21	55%	Jan-22	26	16%
Average	**31mo**	**45%**	**Average**	**21mo**	**0%**

Source: MarketDesk Quant Pack. Italicized indicates the current regime.

Figure 12 – Average S&P 500 Return Path During 'Risk-On' Regimes

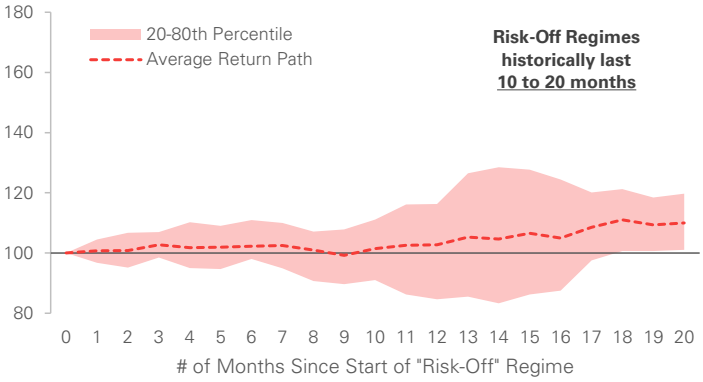
Price Return Path Indexed to 100 for all "Risk-On" Regimes Since 1980



Source: MarketDesk Quant Pack

Figure 13 – Average S&P 500 Return Path During 'Risk-Off' Regimes

Price Return Path Indexed to 100 for all "Risk-Off" Regimes Since 1980



Source: MarketDesk Quant Pack

Figure 11 – Asset Class Performance During 'Risk-On' & 'Risk-Off' Regimes

Historical Returns Since January 1990

Market Segment	Risk-On Regimes		Risk-Off Regimes	
	Average	% Positive	Average	% Positive
Equity Styles				
S&P 500	15.5%	-	2.7%	-
Small Cap	15.8%	50%	1.8%	30%
Value	13.9%	20%	2.8%	30%
Growth	17.6%	70%	2.2%	70%
Low Beta	12.2%	14%	8.8%	75%
High Beta	25.3%	100%	-5.3%	13%
Momentum	17.8%	50%	5.1%	80%
High Quality	16.4%	50%	5.1%	90%
High Div. Yield	15.3%	50%	7.0%	63%
U.S. Sectors				
Comm Svcs	12.2%	0%	-0.3%	50%
Cons Disc	18.0%	57%	1.1%	63%
Cons Stpls	12.1%	14%	9.5%	88%
Energy	13.4%	43%	8.0%	38%
Financials	17.2%	86%	0.2%	38%
Health Care	15.2%	29%	7.5%	100%
Industrials	15.8%	86%	3.2%	38%
Materials	14.1%	71%	3.1%	38%
Real Estate	15.1%	50%	5.6%	50%
Tech	22.3%	71%	3.5%	50%
Utilities	9.8%	0%	8.0%	75%
Credit				
Bond Aggregate	5.9%	-	3.8%	-
+10Y US Treasuries	7.5%	38%	5.6%	78%
1-5Y US Treasuries	4.1%	40%	3.9%	30%
High Yield	12.0%	88%	1.3%	22%
Corp IG	8.2%	90%	2.5%	50%
Fallen Angels	14.1%	100%	2.3%	0%
Municipals	5.6%	86%	4.2%	63%
MBS	5.5%	56%	4.2%	56%
TIPs	6.3%	83%	3.0%	29%
Convertibles	15.6%	100%	-0.2%	56%
International Equity				
Emerging	24.5%	33%	5.8%	33%
Developed	8.9%	50%	0.8%	50%
FX				
U.S. Dollar	0.0%	10%	1.7%	70%
Commodities				
Broad Cmdty.	4.5%	29%	-3.6%	38%
Gold	0.8%	20%	6.2%	60%
Crude Oil	18.5%	50%	-2.5%	20%

Source: MarketDesk Quant Pack. **Average** = Annualized total return for each market segment during "Risk On" and "Risk Off" periods. The return is calculated as the average monthly total return multiplied by 12. **% Positive** = The percentage of regimes each Equity, FX, and Commodity category outperformed the S&P 500 Index, and each Credit category outperformed the Bloomberg Bond Aggregate Index during each respective regime (% positive based on price returns).

U.S. Equity Indicators

MarketDesk Quant Pack

Page 11 **S&P 500 Earnings Indicator (USEPS)**
Forecasting Next 12-Month Earnings Growth Rate

Page 12 **S&P 500 Real-Time Price Target Model (USPTM)**
Implied Upside / Downside from Current Market Levels

Page 13 **S&P 500 Fair Value Indicator #1 (USFV1)**
Based on Equity Risk Premium Analysis

Page 14 **S&P 500 Fair Value Indicator #2 (USFV2)**
Based on Cost of Capital Analysis

Page 15 **S&P 500 10-Year Annualized Return Forecast (SP10YR)**
Forecasting the S&P 500's Annualized Return Over the Decade

MarketDesk S&P 500 Earnings Indicator (USEPS)

Forecasting Next 12-Month Earnings Growth Rate

Earnings

Current Takeaway The indicator's 15 macro inputs suggests earnings growth will accelerate throughout 2025 and peak in 1Q 2026

Indicator Definition

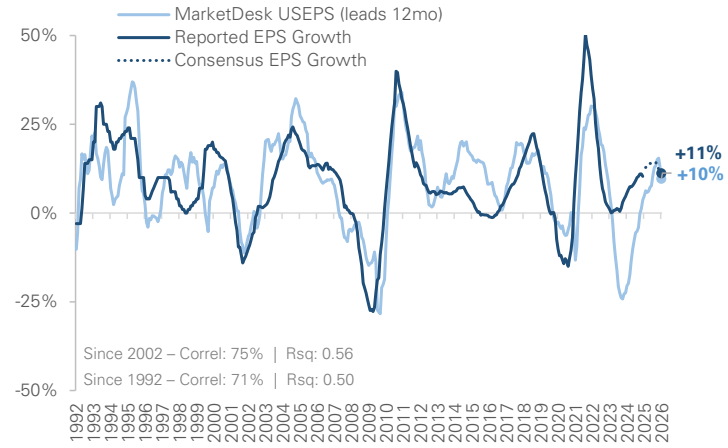
The MarketDesk S&P 500 Earnings Indicator (USEPS) is a macro-based earnings model that provides a 12-month forecast of the direction and magnitude of corporate earnings growth. USEPS is based on a combination of 15 macro inputs that historically exhibit a high statistical correlation with future S&P 500 earnings growth. The model uses historical lead times and correlations to forecast the most probable path for forward earnings growth. Note: The indicator is not built to forecast the exact per-share dollar amount of S&P 500 earnings, but rather the directional path of S&P 500 earnings growth over the next 12 months.

How to Use

The earnings growth rate is an important input into equity market valuations. The S&P 500 Earnings Indicator is built to forecast and spot key 'turning points' in S&P 500 earnings throughout economic cycles. There are two model outputs to focus on: (1) the direction of earnings growth over the next 12 months, and (2) the gap between the indicator estimate and current NTM consensus estimates. One historical trend to note is that markets are forward-looking and equity prices historically bottom 6-12 months before actual EPS bottoms. This bottoming process is important to consider when tilting portfolios risk-off (risk-on) ahead of earnings peaks (troughs).

Figure 14 – Actual Earnings Growth vs MarketDesk Indicator

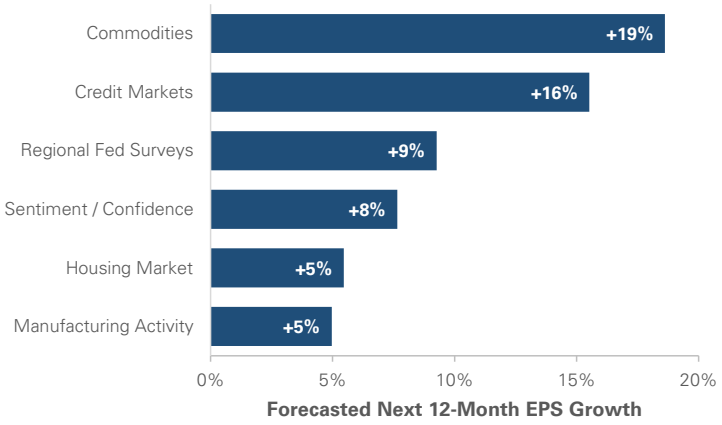
Relationship Between MarketDesk Earnings Model and Actual Earnings Growth



Source: MarketDesk Quant Pack

Figure 15 – MarketDesk USEPS Input Categories

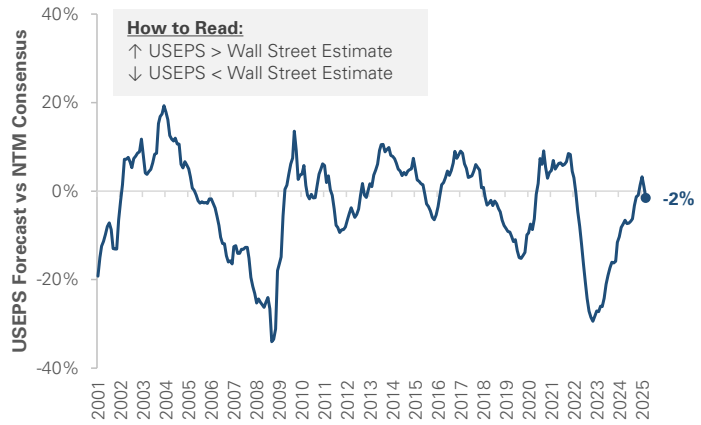
Forecasted Next 12-Month EPS Growth by USEPS Input Category



Source: MarketDesk Quant Pack

Figure 16 – NTM Consensus vs MarketDesk USEPS 12-Month Forecast

Historical Gap Between Wall Street and the MarketDesk Earnings Model



Source: MarketDesk Quant Pack. Consensus estimate as of most recent month end.

Figure 17 – Forward Performance Based on Gap (USEPS vs Wall Street)

Historical Forward S&P 500 Returns (%) Since 2000

USEPS vs. Wall Street Gap		3 Months		6 Months		9 Months		12 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
EPS Rising	> 15%	2.4	67%	1.1	50%	3.2	83%	7.0	100%
	10% to 15%	4.5	70%	9.1	100%	10.1	100%	13.4	100%
	5% to 10%	2.3	78%	4.2	76%	6.0	73%	8.5	75%
	0% to 5%	2.4	68%	5.2	76%	8.5	81%	10.1	79%
All Past Events		2.3	69%	4.7	74%	7.2	78%	9.7	79%
EPS Falling	**-5% to 0%**	**1.4**	**57%**	**3.9**	**69%**	**8.0**	**86%**	**10.6**	**91%**
	-10% to -5%	3.6	74%	6.8	79%	7.9	76%	9.0	71%
	-15% to -10%	0.5	55%	0.3	52%	-1.6	45%	-0.8	45%
	-20% to -15%	4.1	78%	5.2	56%	9.6	72%	8.5	67%
	-25% to -20%	-6.5	27%	-6.4	36%	-10.0	36%	-9.6	36%
	< -25%	-4.0	47%	-6.2	59%	-3.8	65%	2.6	65%

Source: MarketDesk Quant Pack

MarketDesk S&P 500 Real-Time Price Target Model (USPTM)

Valuation

Implied Upside / Downside from Current Market Levels

Current Takeaway Unattractive risk / reward setup when fair value below S&P 500; Model prefers owning risk-free yields in bonds at current levels

Indicator Definition

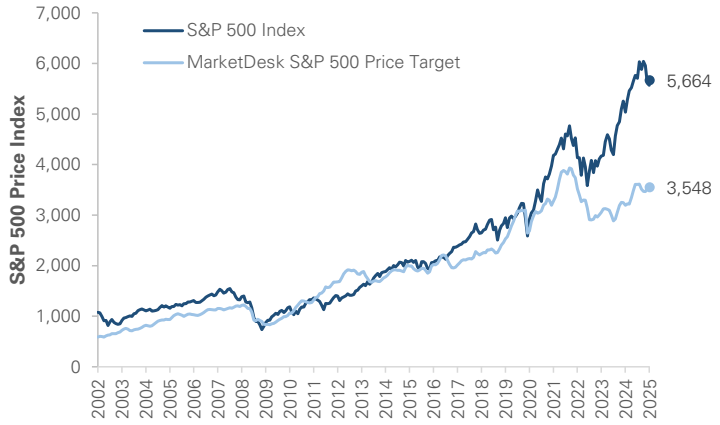
The MarketDesk S&P 500 Real-Time Price Target Model (USPTM) combines two well-known fair value frameworks: (1) equity risk premium, and (2) cost of capital. The USPTM price target is calculated as the average of the equity risk premium (USFV1) and cost of capital (USFV2) price targets. Refer to the following two pages to learn more about each methodology.

How to Use

The bottom right table compares forward S&P 500 returns when the Real-Time Price Target Model is above and below the S&P 500's current price. It shows the S&P 500's median and average forward returns are stronger with higher win rates when the fair value is above the S&P 500. In addition, the average risk / reward is significantly more attractive when the fair value is above the current price level, which we attribute to a lower average loss. The takeaway is that when the Real-Time Price Target is above the current price, the S&P 500 historically produces strong risk-adjusted returns.

Figure 18 – S&P 500 vs MarketDesk Real-Time Price Target

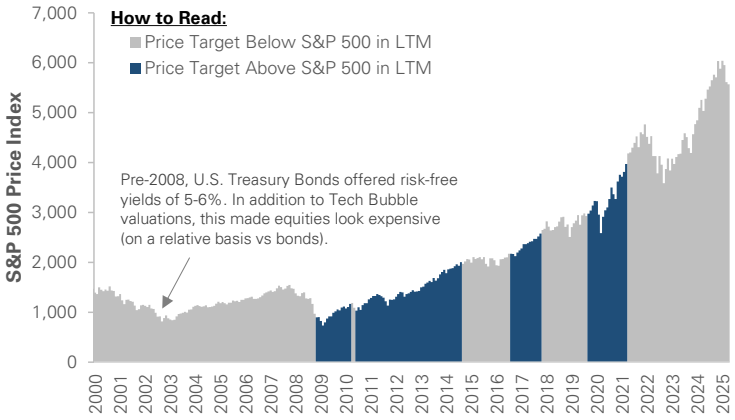
MarketDesk Price Target = Average of MFV1 and MFV2 (see next pages)



Source: MarketDesk Quant Pack

Figure 19 – Historical Relationship of S&P 500 Price & Price Target

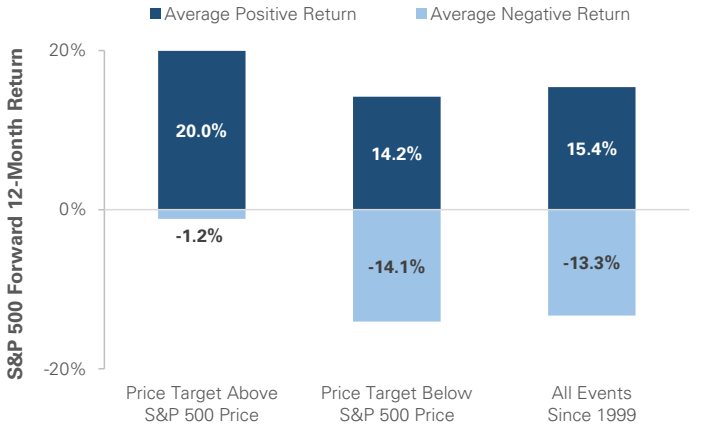
Analysis Below Assumes You Own S&P 500 for NTM when MarketDesk PT > Price



Source: MarketDesk Quant Pack. LTM = last 12-months. Graphic above assumes you own S&P 500 for next 12 months whenever the MarketDesk Price Target is above the S&P 500 Index

Figure 20 – S&P 500 Average NTM Upside / Downside Based on Fair Value

S&P 500 Average Next 12-month Return Based on Fair Value Category



Source: MarketDesk Quant Pack. Based on month end datapoint since 1999.

Figure 21 – Historical Performance of S&P 500 Based on Fair Value

S&P 500 Next 12-Month Performance Statistics Based on Fair Value Category

Statistics	Price Target Above S&P 500 Price	Price Target Below S&P 500 Price	All Events Since 1999
Average	**18.6%**	**7.9%**	**9.8%**
Median	17.3%	10.1%	11.8%
# of Events	47	217	264
% Positive	**94%**	**78%**	**81%**
% Negative	6%	22%	19%
Avg Positive	20.0%	14.2%	15.4%
Avg Negative	-1.2%	-14.1%	-13.3%
Risk / Reward	**17.3**	**1.0**	**1.2**
Max Positive	53.7%	43.6%	53.7%
Max Negative	-2.6%	-44.8%	-44.8%
Risk / Reward	**20.7**	**1.0**	**1.2**

Source: MarketDesk Quant Pack. Based on month end datapoint since 1999. Risk / Reward is the ratio of positive returns to negative returns.

MarketDesk S&P 500 Fair Value Indicator #1 (USFV1)

Equity Risk Premium Analysis

Valuation

Current Takeaway Unattractive risk / reward setup when fair value below S&P 500; Model prefers owning risk-free yields in bonds at current levels

Indicator Definition

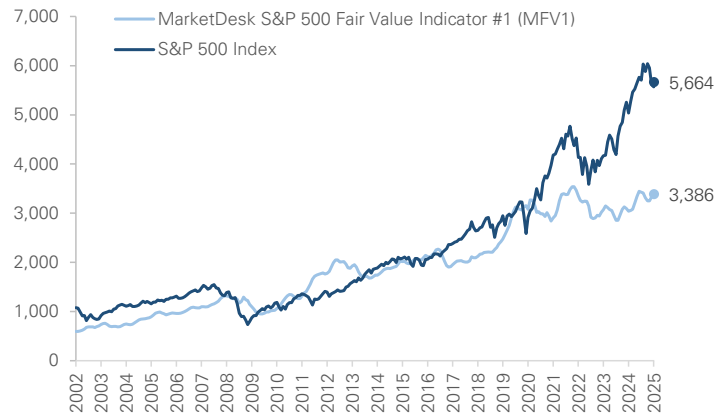
The Equity Risk Premium methodology (USFV1) is based on the theory that investors require a risk premium as compensation for investing in equities, which are inherently riskier than bonds. The first step is to forecast the appropriate equity risk premium (ERP), which is then added to the risk free rate to arrive at an earnings yield. The second step divides the market's current S&P 500 NTM EPS estimate by the earnings yield to arrive at a fair value. MarketDesk's ERP estimate is based on a regression of historical ISM Manufacturing PMIs and ERPs. (Note: Our ERP methodology tends to be more contrarian due to the formula used to forecast the ERP.)

How to Use

Fair value estimates are not meant to be automatic buy or sell indicators. Instead, we use them to determine reasonable buy and sell prices. We prefer to buy and position more risk-on when the S&P 500's fair value estimate is above the current market price, because it provides a margin of safety in case the fair value estimate is too optimistic. In contrast, we prefer to sell and are more cautious when the S&P 500's fair value estimate is below the current market price.

Figure 22 – Historical Relationship of S&P 500 vs MFV1

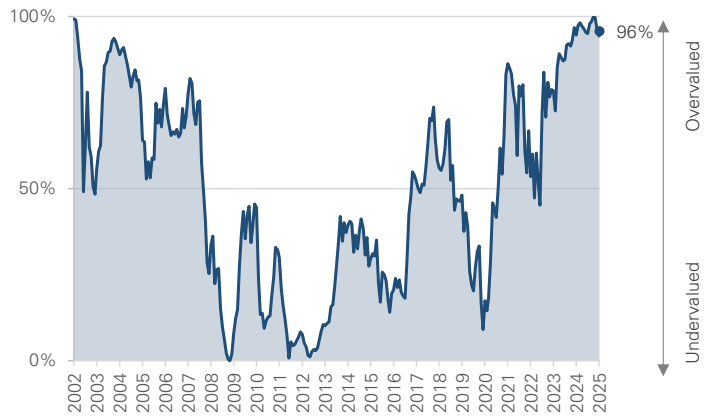
Equity Risk Premium Fair Value = NTM EPS Estimate / (ERP minus 10Y Yield)



Source: MarketDesk Quant Pack

Figure 23 – Historical Percentile of Premium / Discount to Fair Value

Based on Monthly Price Gap Data Since 1999 (S&P 500 vs MFV1)



Source: MarketDesk Quant Pack

Figure 24 – S&P 500 Fair Value Matrix (Equity Risk Premium Analysis)

Use the range of inputs in the matrix on the 10-Year Treasury and NTM EPS to see how the price target would change.

10-Year Treasury Yield (3-Month Average)	S&P 500 Next 12-Month Earnings Per Share									
	$260	$265	$270	$275	$276	$285	$290	$295	$300	$305
3.70%	3,391	3,457	3,522	3,587	3,600	3,717	3,783	3,848	3,913	3,978
3.80%	3,348	3,412	3,476	3,541	3,554	3,670	3,734	3,798	3,863	3,927
3.90%	3,305	3,369	3,432	3,496	3,509	3,623	3,686	3,750	3,814	3,877
4.00%	3,264	3,326	3,389	3,452	3,465	3,577	3,640	3,703	3,766	3,828
4.10%	3,223	3,285	3,347	3,409	3,422	3,533	3,595	3,657	3,719	3,781
4.19%	3,189	3,250	3,312	3,373	**3,386**	3,496	3,557	3,618	3,680	3,741
4.30%	3,145	3,206	3,266	3,327	3,339	3,448	3,508	3,569	3,629	3,690
4.40%	3,108	3,167	3,227	3,287	3,299	3,406	3,466	3,526	3,586	3,645
4.50%	3,071	3,130	3,189	3,248	3,260	3,366	3,425	3,484	3,543	3,602
4.60%	3,035	3,093	3,152	3,210	3,222	3,327	3,385	3,444	3,502	3,560
4.70%	3,000	3,058	3,115	3,173	3,185	3,288	3,346	3,404	3,462	3,519

Source

.

MarketDesk S&P 500 Fair Value Indicator #2 (USFV2)

Cost of Capital Analysis

Valuation

Current Takeaway Unattractive risk / reward setup when fair value below S&P 500; Model prefers owning risk-free yields in bonds at current levels

Indicator Definition

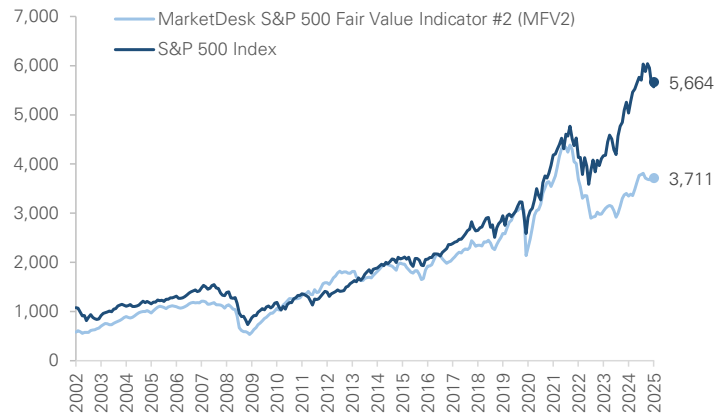
The Cost of Capital methodology (USFV2) values the S&P 500 based on the blended cost of equity and debt capital. Put simply, it measures the cost that a business incurs to finance its operations and future growth. The first step estimates the cost of capital, which is based on U.S. interest rates, corporate bond yields, and dividend yields. The second step divides the market's current S&P 500 NTM EPS estimate by the cost of capital to arrive at a fair value.

How to Use

Fair value estimates are not meant to be automatic buy or sell indicators. Instead, we use them to determine reasonable buy and sell prices. We prefer to buy and position more risk-on when the S&P 500's fair value estimate is above the current market price, because it provides a margin of safety in case the fair value estimate is too optimistic. In contrast, we prefer to sell and are more cautious when the S&P 500's fair value estimate is below the current market price.

Figure 25 – Historical Relationship of S&P 500 vs MFV2

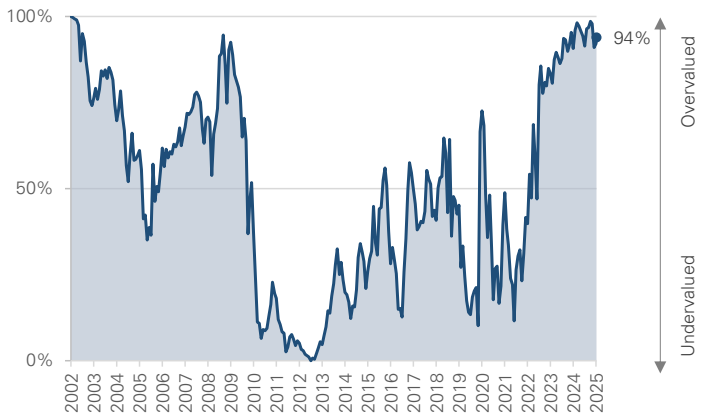
Cost of Capital Fair Value = NTM EPS Estimate / Cost of Capital



Source: MarketDesk Quant Pack

Figure 26 – Historical Percentile of Premium / Discount to Fair Value

Based on Monthly Price Gap Data Since 1999 (S&P 500 vs MFV2)



Source: MarketDesk Quant Pack

Figure 27 – S&P 500 Fair Value Matrix (Cost of Capital Analysis)

Use the range of inputs in the matrix on the WACC and NTM EPS to see how the price target would change.

Cost of Capital (WACC) 3-Month Average	S&P 500 Next 12-Month Earnings Per Share									
	$260	$265	$270	$275	$276	$285	$290	$295	$300	$305
6.4%	4,063	4,141	4,219	4,297	4,313	4,453	4,531	4,609	4,688	4,766
6.6%	3,939	4,015	4,091	4,167	4,182	4,318	4,394	4,470	4,545	4,621
6.8%	3,824	3,897	3,971	4,044	4,059	4,191	4,265	4,338	4,412	4,485
7.0%	3,714	3,786	3,857	3,929	3,943	4,071	4,143	4,214	4,286	4,357
7.2%	3,611	3,681	3,750	3,819	3,834	3,958	4,028	4,097	4,167	4,236
7.4%	3,495	3,563	3,630	3,697	**3,711**	3,831	3,899	3,966	4,033	4,100
7.6%	3,421	3,487	3,553	3,618	3,632	3,750	3,816	3,882	3,947	4,013
7.8%	3,333	3,397	3,462	3,526	3,539	3,654	3,718	3,782	3,846	3,910
8.0%	3,250	3,313	3,375	3,438	3,450	3,563	3,625	3,688	3,750	3,813
8.2%	3,171	3,232	3,293	3,354	3,366	3,476	3,537	3,598	3,659	3,720
8.4%	3,095	3,155	3,214	3,274	3,286	3,393	3,452	3,512	3,571	3,631

Source

.

MarketDesk S&P 500 10-Year Annualized Return Forecast (SP10YR)

Annualized Returns

Forecasting the S&P 500's Annualized Return Over the Next Decade

Current Takeaway The model's macro inputs forecast below average returns for the S&P 500 over the next decade

Indicator Definition

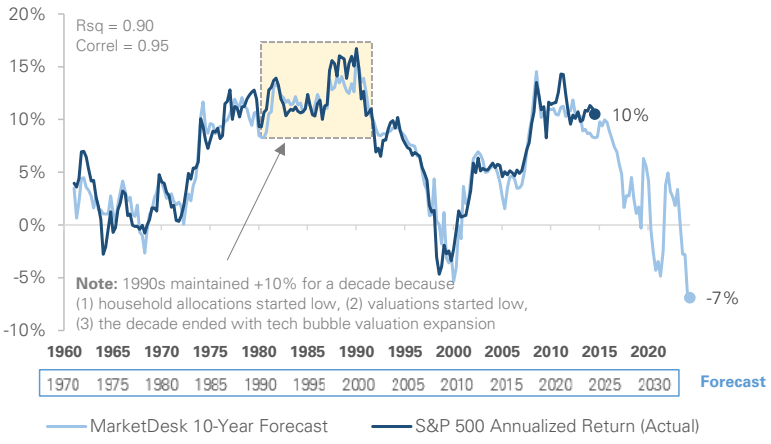
The MarketDesk S&P 500 10-Year Annualized Return Forecast (SP10YR) is a macro-based capital market assumptions model that provides a long-term return forecast for U.S. large cap stocks. SP10YR uses a combination of four macro inputs that historically exhibit a high statistical correlation with future returns: shareholder yield, household allocation to corporate equities, equity market valuations, and trailing recession data. The model uses historical lead times and correlations to forecast the statistically most likely path for forward the S&P 500. Note: The indicator is not built to forecast the exact S&P 500 price level, but rather the directional path of the S&P 500 over the next 10 years. Refer to the **Report Primer** for a more in-depth discussion of the indicator.

How to Use

The indicator is best used to guide long-term strategic allocations, not short-term tactical decisions. The indicator has a strong track record in forecasting the next 10-year annualized return with a 0.90 R-squared and a 0.95 correlation. However, it's important to distinguish the long-term forecast from short-term results. The bottom left figure graphs the correlation of the S&P 500's actual annualized returns for various time periods against the indicator's 10-year forecast. The 10Y bar shows the indicator's longer term accuracy, but the remaining bars show the path is often bumpy, with lower correlations over shorter periods (i.e., major events such as the dot-com bubble, the 2008 financial crisis, and the COVID pandemic can't be predictable ten years in advance).

Figure 28 – Historical Annualized Returns vs MarketDesk Indicator

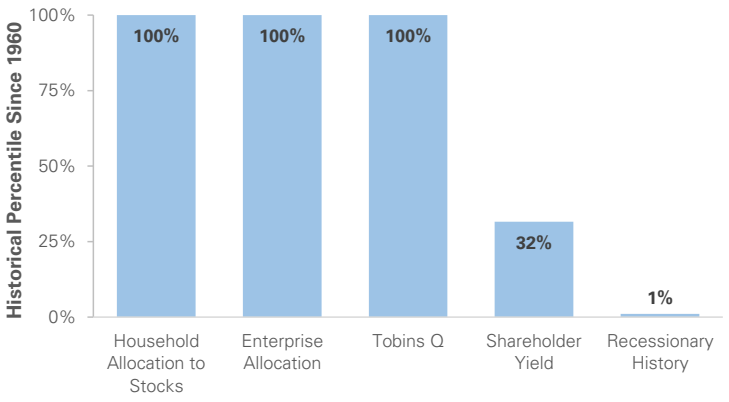
Relationship Between MarketDesk SP10YR and Actual Performance



Source: MarketDesk Quant Pack

Figure 29 – MarketDesk SP10YR Input Categories

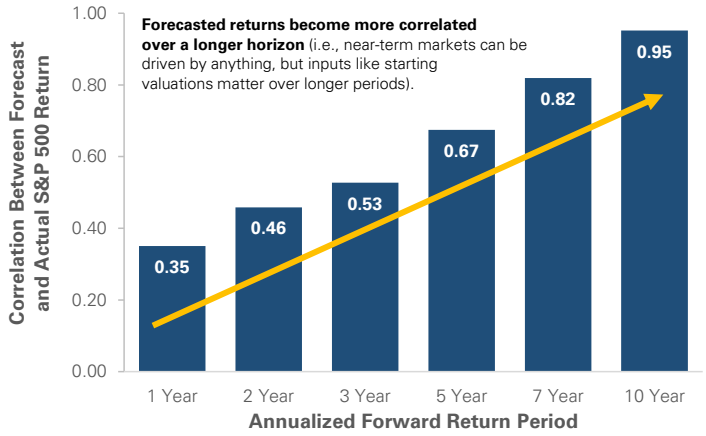
Historical Percentile Since 1960 of each SP10YR Input (100th = Highest in History)



Source: MarketDesk Quant Pack. Tobin's Q is the ratio between a physical asset's market value and its replacement value. It was first introduced in a 1966 academic paper.

Figure 30 – Actual Annualized S&P 500 Returns Based on SP10YR's Forecast

Short-Term Results Often Diverge from the Long-Term Forecast



Source: MarketDesk Quant Pack

Figure 31 – Historical Asset Class Implications

Based on Quarterly Returns Since 1960

S&P 500 vs	When SP10YR < +5%	When SP10YR > +5%
Small Cap Stock (Russell 2000)	**Small Outperforms** +4% Median / 99% +ve	Small Inline with Large +0% Median / 50% +ve
International (ACWI ex US)	**Intl. Outperforms** +3% Median / 77% +ve	**International Underperforms** -6% Median / 15% +ve
Bonds (U.S. Bond Agg.)	**Bonds Outperform** +8% Median / 97% +ve	**Bonds Underperform** -2% Median / 40% +ve
Commodities (Bloomberg Index)	**Cmdty Outperforms** +3% Median / 65% +ve	**Cmdty. Underperforms** -1% Median / 42% +ve
Gold (LBMA Index)	**Gold Outperforms** +16% Median / 100% +ve	Gold Inline with Large +2% Median / 66% +ve

Source: MarketDesk Quant Pack, Fama French Data. "**+ve**" = % of Positive Events

U.S. Economic Indicators

MarketDesk Quant Pack

Page 17 **U.S. Business Cycle Indicator (USBCY)**
Composite of Leading Consumer and Business Cycle Data Points

Page 18 **PMI Momentum Indicator (USPMI)**
12-Month Forecast of the Y/Y Change in the ISM Manufacturing PMI

Page 19 **U.S. Inflation Indicator (UCPI)**
Forecasting U.S. Inflation Trends

Page 21 **U.S. Home Price Indicator (USHPI)**
12-Month Forecast of the Y/Y Change in the U.S. National Home Price Index

Page 22 **U.S. Unemployment Indicator (USURI)**
12-Month Forecast of the U.S. Unemployment Rate

Page 23 **U.S. Consumer Health Indicator (USCHI)**
Economic Pulse of Consumer Behavior

MarketDesk U.S. Business Cycle Indicator (USBCY)

Economics

Composite of Leading Consumer and Business Cycle Data Points

Current Takeaway U.S. economic data has entered the "Slowdown" phase with forward looking data suggesting economic growth will slow

Indicator Definition

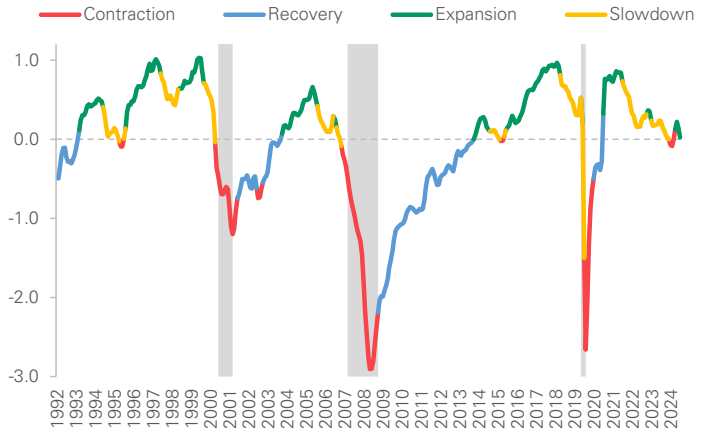
The MarketDesk U.S. Business Cycle Indicator (USBCY) aggregates key macro data points to identify the current stage of the economic cycle. USBCY is an equal weighted composite of eight macro inputs that historically coincide with the business cycle. The indicator classifies the environment into one of four business cycle stages: Early Cycle (Recovery), Mid Cycle (Expansion), Late Cycle (Slowdown), and End of Cycle (Contraction).

How to Use

Defining the current stage of the business cycle is a crucial step to developing an asset allocation framework. The indicator is best used to identify the overall macro environment and associated investment themes and preferred positioning, such as cyclical vs. defensive, credit quality, and equity factor. The indicator's data-driven approach objectively identifies the current stage of the business cycle and allows you to create a short list of asset classes that will benefit from macro tailwinds and avoid macro headwinds.

Figure 32 – MarketDesk U.S. Business Cycle Indicator

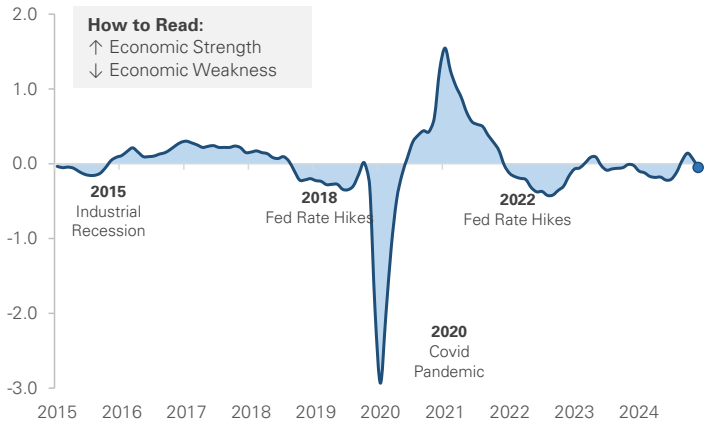
Composite Indicator & Historical Recession Periods



Source: MarketDesk Quant Pack. Grey shaded areas represent NBER recession periods.

Figure 33 – Rolling 6-Month Change in Business Cycle Indicator

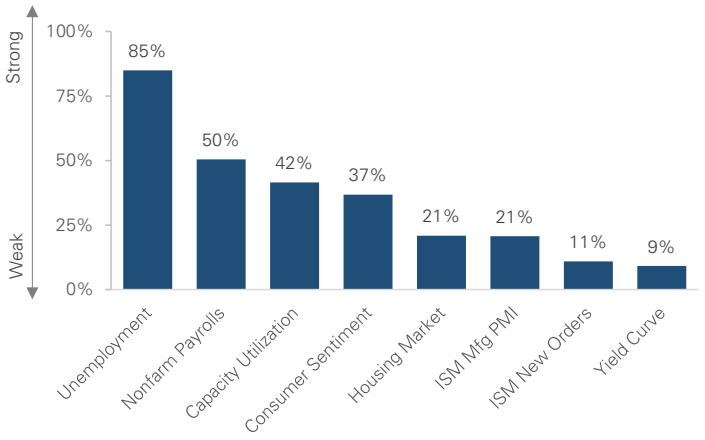
Measuring Near-term Economic Momentum



Source: MarketDesk Quant Pack

Figure 34 – Business Cycle Composite Inputs

Historical percentiles based on monthly data since 1980



Source: MarketDesk Quant Pack

Figure 35 – Asset Class Performance by Business Cycle Stage

Next 12-month Price Return vs the Historical NTM Average Price Return since 1990

U.S. Equities	Contraction	Recovery	Expansion	Slowdown
S&P 500	-8.9%	2.0%	1.5%	1.7%
S&P 500 - Growth	-9.6%	1.7%	1.1%	3.6%
S&P 500 - Value	-8.8%	4.2%	1.5%	-1.1%
Global Equities				
MSCI EAFE	-8.6%	2.6%	1.6%	-1.1%
MSCI EM	-1.0%	8.5%	-9.1%	0.4%
FX				
U.S. Dollar	-1.4%	-0.7%	1.3%	-1.4%
U.S. Bonds				
Trsy Bonds (5-10Y)	-1.2%	-1.2%	0.6%	1.2%
Trsy Bonds (+10Y)	-2.7%	0.6%	0.0%	0.7%
Corp Bonds (IG)	1.7%	-0.4%	-0.9%	0.5%
Corp Bonds (HY)	5.2%	2.0%	-3.2%	-1.2%

Source: MarketDesk Quant Pack

MarketDesk PMI Momentum Indicator (USPMI)

12-Month Forecast of the Y/Y Change in the ISM Manufacturing PMI

Economics

Current Takeaway Macro data suggests manufacturing should see structural strength, but growth is being hampered by tariffs and policy uncertainty

Indicator Definition

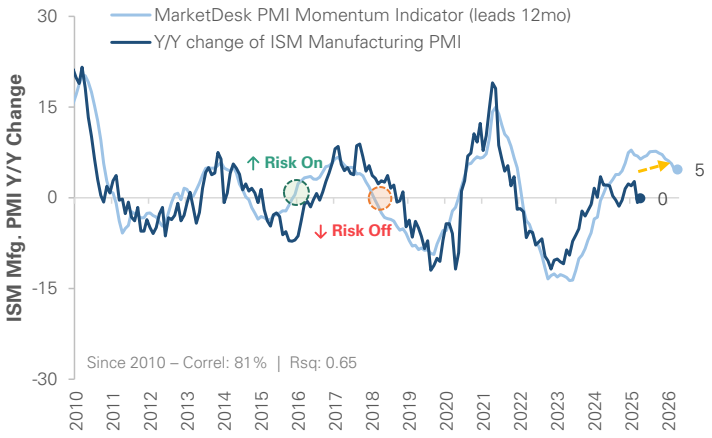
The MarketDesk PMI Momentum Indicator (USPMI) forecasts the next 12-month change in the ISM Manufacturing PMI (i.e., year-over-year). The indicator is based on a composite of 14 macro inputs. A USPMI reading above (below) zero suggests the economy is expanding (contracting).

How to Use

The goal of the USPMI is to: (1) provide a long-term view into the overall direction of manufacturing and economic activity, and (2) inform strategic portfolio positioning across asset classes (i.e., cyclical vs. defensive equities, long-term vs. short-term bonds, investment-grade vs high-yield corporate bonds, etc.). When USPMI crosses above (below) zero, it suggests owning cyclical (defensive) areas of the market.

Figure 36 – MarketDesk PMI Momentum Indicator Since 2010

Recent Forecasted History



Source: MarketDesk Quant Pack, ISM

Figure 37 – Relative Forward Performance Based on Historical Readings

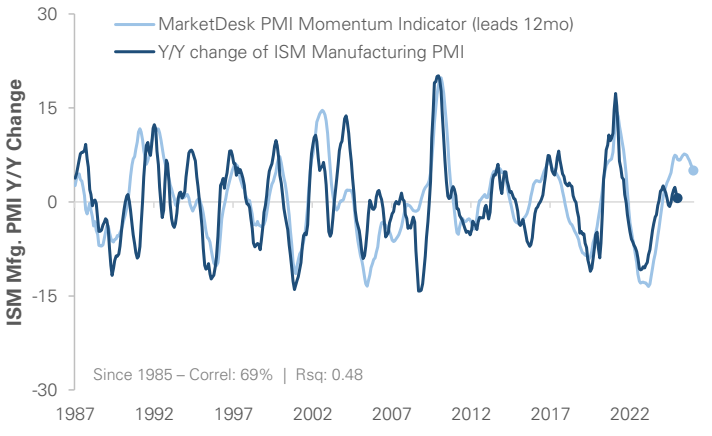
MSCI Cyclical Sectors vs MSCI Defensive Sectors

USPMI Reading		3 Months		6 Months		9 Months		12 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Risk On	12 to 15	1.9	50%	5.7	64%	7.3	64%	7.5	57%
	9 to 12	-0.2	57%	5.6	71%	7.7	86%	8.7	71%
	6 to 9	2.1	71%	4.5	75%	10.6	88%	15.3	86%
	3 to 6	**1.5**	**68%**	**3.8**	**70%**	**6.3**	**79%**	**10.2**	**89%**
	0 to 3	2.1	64%	3.7	68%	3.5	62%	4.3	74%
All Past Events		0.8	57%	1.7	57%	2.5	61%	3.2	61%
Risk Off	-3 to 0	0.4	50%	0.4	54%	0.0	56%	-0.5	54%
	-6 to -3	1.0	60%	2.2	53%	2.2	57%	0.8	47%
	-9 to -6	-1.2	41%	-4.2	26%	-3.1	41%	-4.2	33%
	-12 to -9	-4.5	19%	-4.7	31%	-9.5	31%	-10.1	25%
	-15 to -12	-4.6	36%	-10.6	14%	-12.1	14%	-10.2	21%

Source: MarketDesk Quant Pack. Based on data since 2000.

Figure 38 – Actual Y/Y Change vs MarketDesk PMI Momentum Indicator

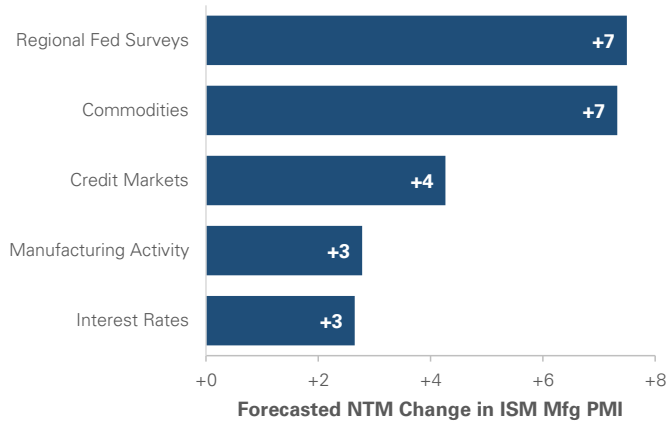
Historical Relationship of the Indicator and Y/Y Changes in Manufacturing PMI



Source: MarketDesk Quant Pack, ISM. Both lines smoothed with 3-month average.

Figure 39 – MarketDesk USPMI Input Categories

Forecasted Next 12-Month PMI Change by USPMI Input Category



Source: MarketDesk Quant Pack

MarketDesk U.S. Inflation Indicator (USCPI)

Forecasting U.S. Inflation Trends

Inflation

Current Takeaway Commodities & Energy are pushing the indicator CPI forecast higher in the near-term; Continuing to monitor incoming data

Indicator Definition

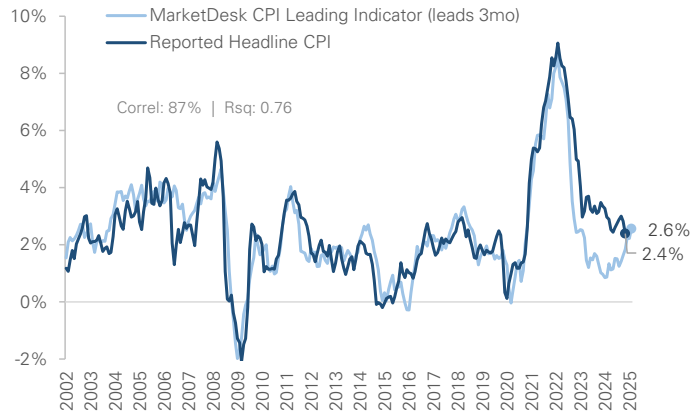
The MarketDesk U.S. Inflation Indicator (USCPI) forecasts the direction and approximate magnitude of changes in the headline U.S. consumer price index (CPI) over the next three months. MarketDesk maintains inflation indicators for headline CPI and five main CPI categories: food, shelter, energy, commodities (ex. food and energy), and services. These indicators use 21 macroeconomic inputs that have been shown to have a high statistical correlation with future inflation trends, including wages, employment, money supply, commodity prices, energy prices, home values, movements in the value of the U.S. dollar, regional Federal surveys, and freight indices.

How to Use

It is important to note that inflation is difficult to model accurately due to one-time, idiosyncratic factors. As a result, the indicator is not intended to provide exact forecasts of future inflation rates. Instead, investors should focus on the two main model outputs: (1) the direction of headline CPI, and (2) the movement of each underlying category in order to better understand the current inflation drivers. By analyzing these outputs, investors can gain insight into the likely trajectory of inflation.

Figure 40 – MarketDesk U.S. CPI Leading Indicator

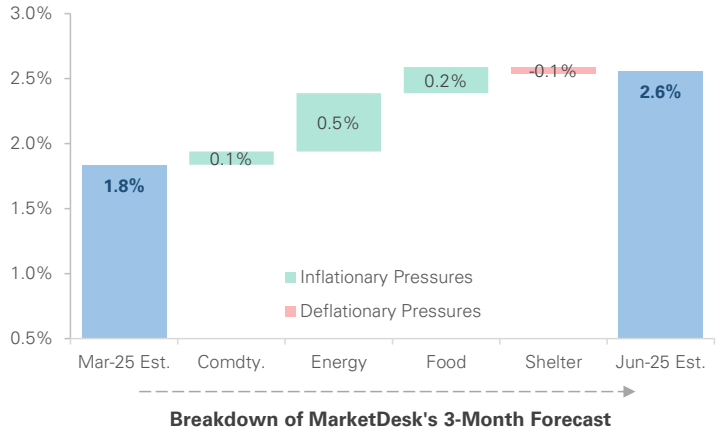
Composite Indicator & Historical U.S. Headline CPI since 2000



Source: MarketDesk Quant Pack, U.S. Department of Labor (DOL)

Figure 41 – Breakdown of MarketDesk's CPI Forecast by Category

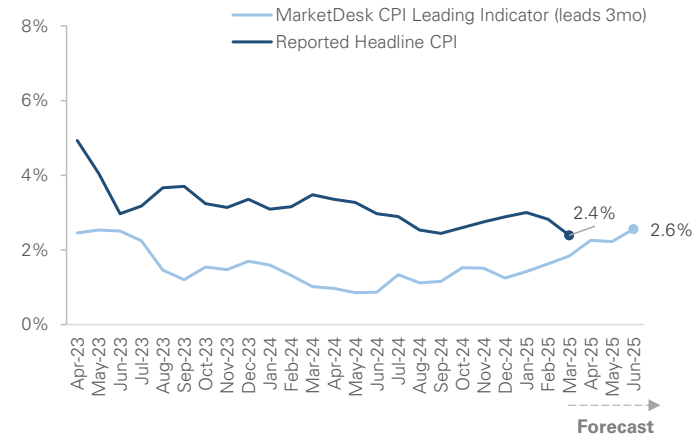
Next Three Month Change in the Indicator's Forecast by Category



Source: MarketDesk Quant Pack. Note: Our Services CPI Indicator (see next page) is not included in the calculation of our Headline CPI Forecast due to lower accuracy.

Figure 42 – Recent History of MarketDesk U.S. CPI Leading Indicator

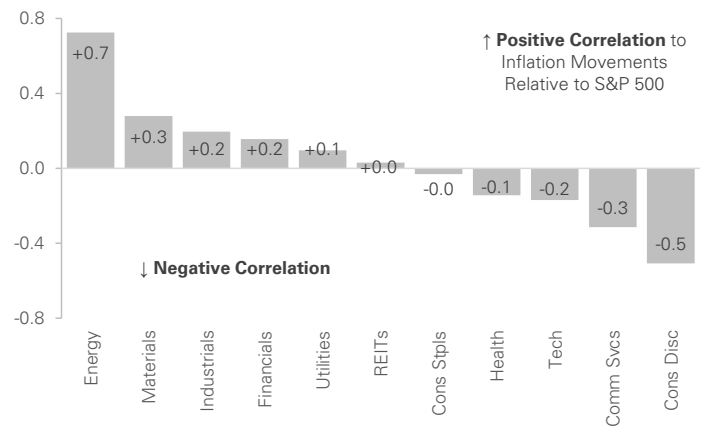
Last Two Years of Composite Indicator & Historical U.S. Headline CPI



Source: MarketDesk Quant Pack, U.S. Department of Labor (DOL)

Figure 43 – U.S. Sector Correlation to Inflation Movements

Calculations Based on Relative Y/Y Returns vs S&P 500 over the Last 20 Years



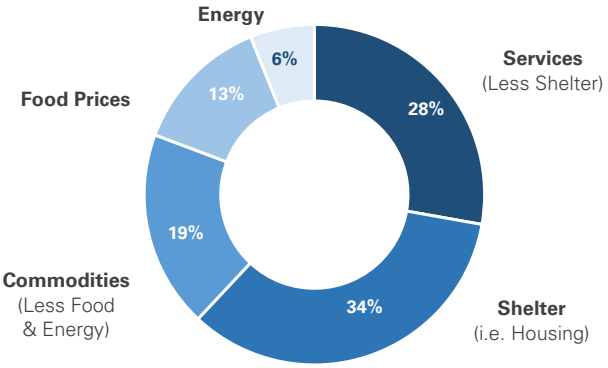
Source: MarketDesk Quant Pack

MarketDesk U.S. Inflation Category Indicators

Forecasting U.S. Inflation Trends

Figure 44 – Key Components of U.S. Headline CPI

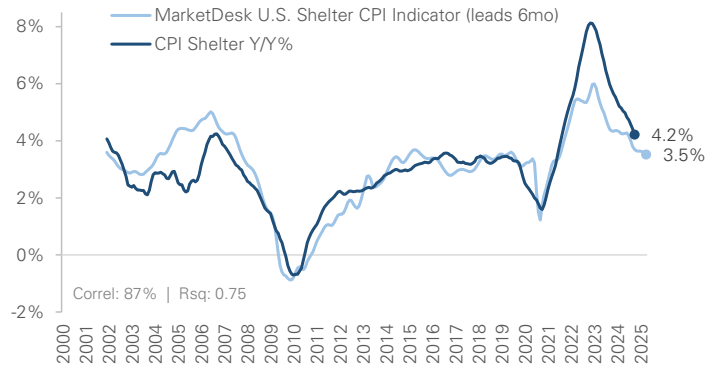
CPI Category Weights



Source: MarketDesk Quant Pack, U.S. Department of Labor (DOL)

Figure 45 – MarketDesk U.S. Shelter CPI Indicator

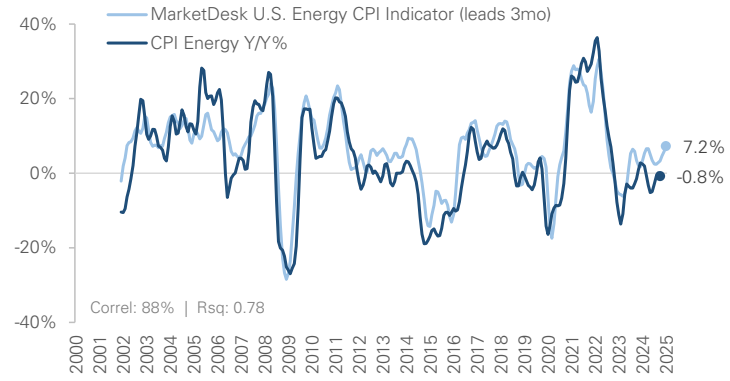
Historical Relationship Since 2000



Source: MarketDesk Quant Pack, DOL. Both lines smoothed by 3-month average.

Figure 46 – MarketDesk U.S. Energy CPI Indicator

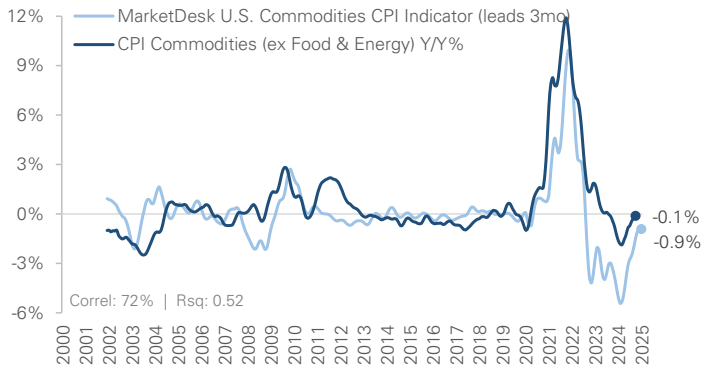
Historical Relationship Since 2000



Source: MarketDesk Quant Pack, DOL. Both lines smoothed by 3-month average.

Figure 47 – MarketDesk U.S. Commodities CPI Indicator

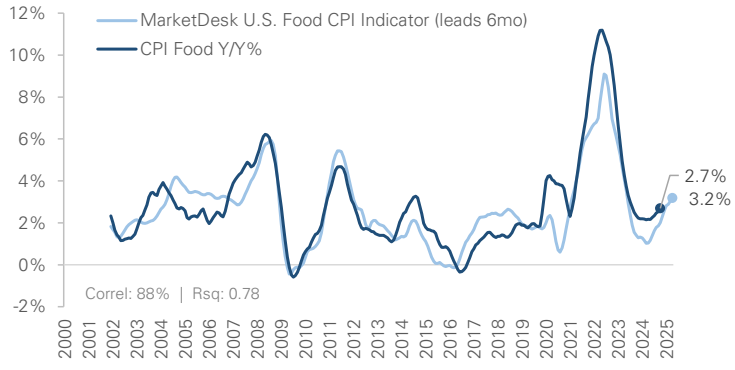
Historical Relationship Since 2000; Commodities excludes Food & Energy



Source: MarketDesk Quant Pack, DOL. Both lines smoothed by 3-month average.

Figure 48 – MarketDesk U.S. Food CPI Indicator

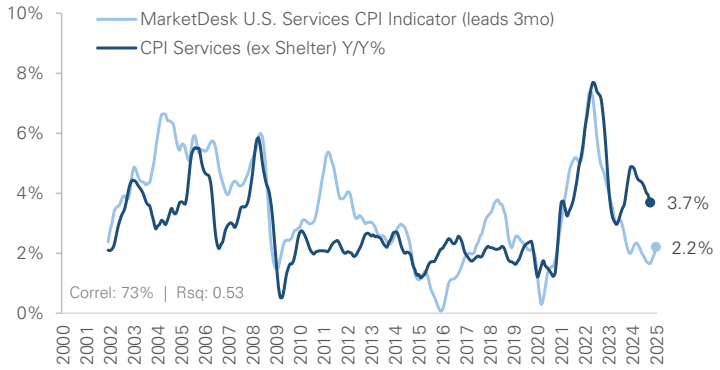
Historical Relationship Since 2000



Source: MarketDesk Quant Pack, DOL. Both lines smoothed by 3-month average.

Figure 49 – MarketDesk U.S. Services CPI Indicator

Historical Relationship Since 2000; Services excludes Shelter



Source: MarketDesk Quant Pack, DOL. Both lines smoothed by 3-month average.

MarketDesk U.S. Home Price Indicator (USHPI)

12-Month Forecast of the Y/Y Change in the U.S. National Home Price Index

Housing

Current Takeaway Macro data suggest national home prices will move sideways in 2025

Indicator Definition

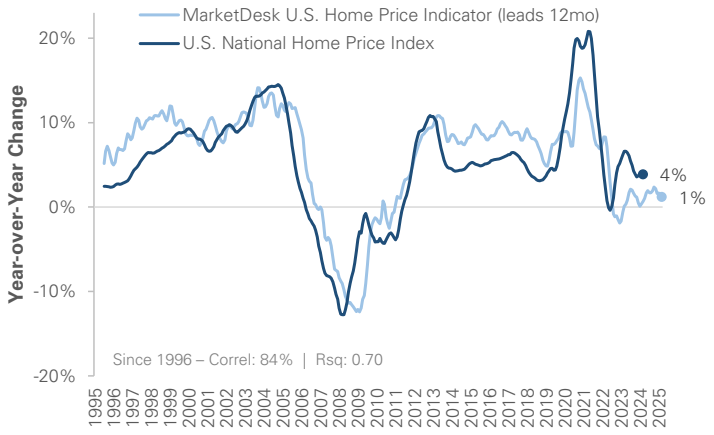
The MarketDesk U.S. Home Price Indicator (USHPI) is built to forecast the direction and approximate magnitude of changes in the U.S. national home price index over the next 12 months. The indicator is a combination of five macro inputs that historically exhibit a high statistical correlation with future changes in home prices.

How to Use

Housing is a critical input into the business cycle. Over the past 40 years, home construction and consumption of housing services have accounted for 15-18% of annual U.S. GDP. In addition to housing's direct impact on economic activity, home prices also impact consumer confidence and spending and banks' willingness to lend capital. The indicator should be used to forecast and spot key 'turning points' in home prices throughout economic cycles, as well as subsequent impacts on housing related macro variables like purchases of furniture and other fixtures. While changes in home prices are not directly actionable in public markets, home prices indirectly impact multiple macro variables via the consumer wealth effect.

Figure 50 – Actual Home Price Change vs MarketDesk Indicator

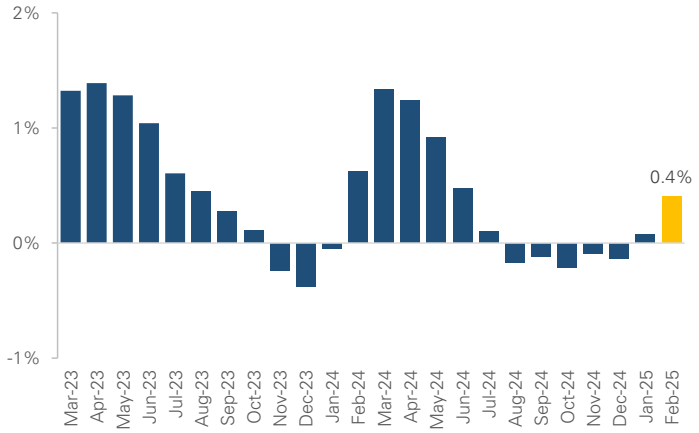
Relationship Between MarketDesk Forecasts and Actual Y/Y Price Changes



Source: MarketDesk Quant Pack, Case-Shiller National Index

Figure 51 – Rolling 1-Month Change in U.S. Home Prices

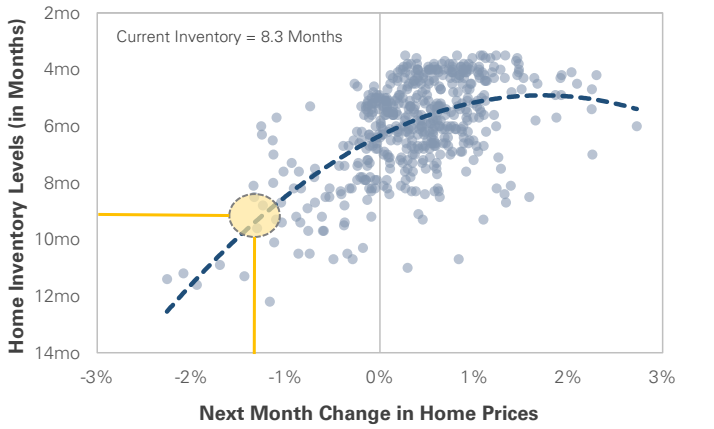
Short-Term Trend in Home Prices Over the Last 36 Months



Source: MarketDesk Quant Pack, Case-Shiller National Index

Figure 52 – Inventory Levels vs Home Price Changes Since 1980

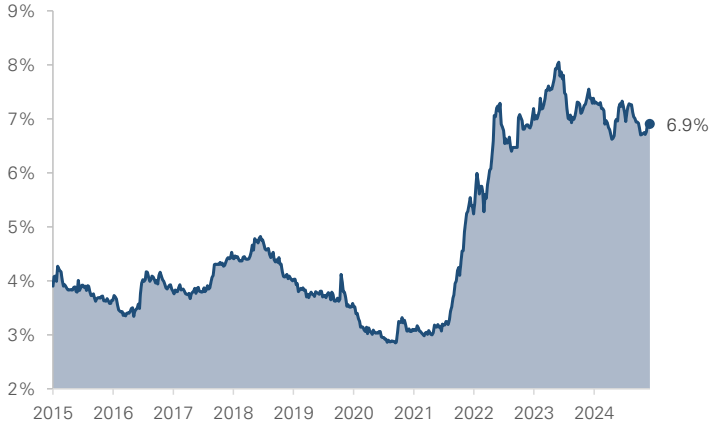
Higher (Lower) Inventory Levels Historically Cause Prices to Fall (Rise)



Source: MarketDesk Quant Pack. Inventory = # Homes for Sale / # Homes Sold.

Figure 53 – Current 30-Year Fixed Rate Mortgage

Rolling 30-Year Fixed Mortgage Rate Over the Last 10 Years (U.S. National Average)



Source: MarketDesk Quant Pack, Federal Reserve

MarketDesk U.S. Unemployment Rate Indicator (USURI)

12-Month Forecast of the U.S. Unemployment Rate

Labor Markets

Current Takeaway Macro inputs suggests weakness however ~5 million workers leaving labor force will keep a ceiling on unemployment this cycle

Indicator Definition

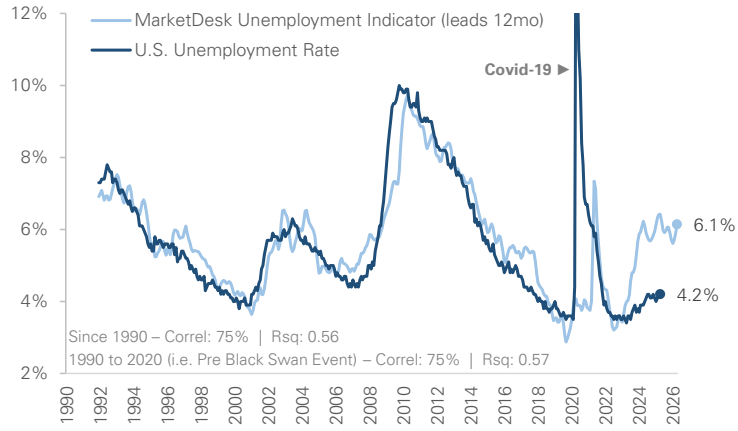
The MarketDesk U.S. Unemployment Rate Indicator (USURI) is built to forecast the direction and approximate magnitude of changes in the U.S. unemployment rate over the next 12 months. The indicator is a combination of six macro inputs that historically exhibit a high statistical correlation with future unemployment trends.

How to Use

Unemployment is a key measure of the overall health of the economy. Changes in unemployment carry ripple effects across every aspect of the economy and impact consumer financial health, retail spending, loan defaults, and consumer sentiment. In addition, the level of unemployment is a key input into U.S. monetary policy due to the Federal Reserve's dual mandate to promote stable prices and maximum employment. Forecasted increases in the unemployment rate signal weaker labor demand and suggest businesses are growing more cautious. In contrast, falling unemployment rates signal strengthening labor demand and an improving macro backdrop. The indicator should be used to forecast and spot key 'turning points' in unemployment trends throughout economic cycles.

Figure 54 – Actual Unemployment Rate vs MarketDesk Indicator

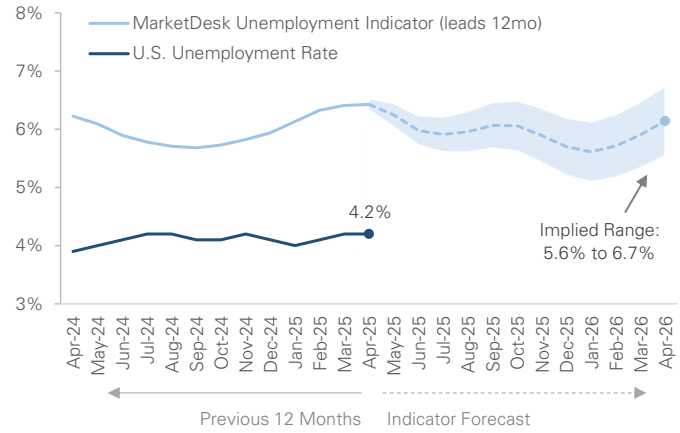
Relationship Between MarketDesk Forecasts and Actual Unemployment Rate



Source: MarketDesk Quant Pack, Bureau of Labor Statistics

Figure 55 – Recent History & MarketDesk Indicator Forecast

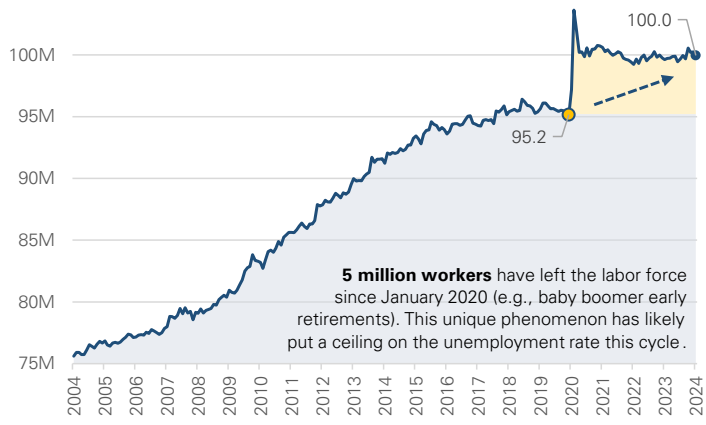
Forecast of U.S. Unemployment Rate Based on the MarketDesk Indicator



Source: MarketDesk Quant Pack, Bureau of Labor Statistics

Figure 56 – Total U.S. "Not in Labor Force" Population

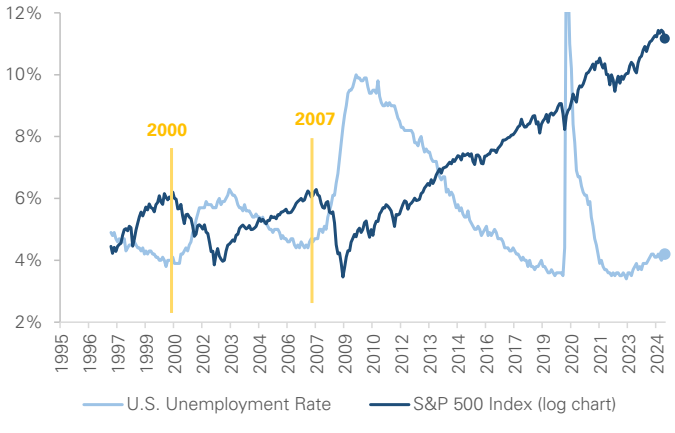
Population in Millions Updated Monthly (Seasonally Adjusted)



Source: MarketDesk Quant Pack, Bureau of Labor Statistics (as of 3/31/2024)

Figure 57 – Equities Historically Peak Near Troughs in Unemployment

Relationship Between S&P 500 and Unemployment Rate



Source: MarketDesk Quant Pack, Bureau of Labor Statistics

MarketDesk U.S. Consumer Health Indicator (USCHI)

Economic Pulse of Consumer Behavior

Consumers

Current Takeaway	Consumer health has been a source of strength for markets; Recent trends suggest data is normalizing to pre-pandemic levels

Indicator Definition

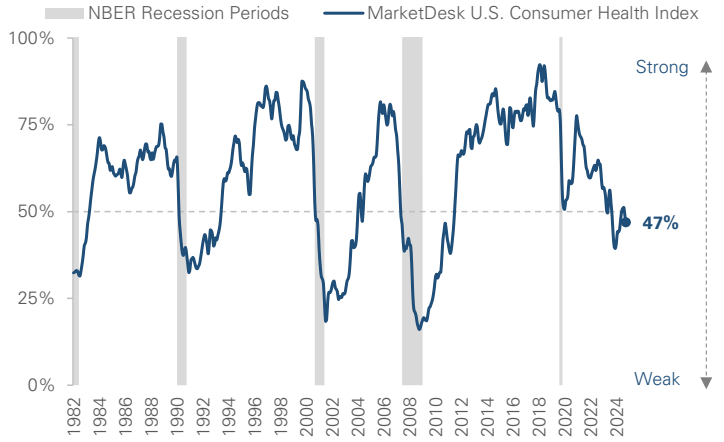
The MarketDesk U.S. Consumer Health Indicator (USCHI) is a macro-based model that provides a quick snapshot of U.S. consumers' ability (or lack thereof) to spend money on goods and services. The indicator is a combination of five consumer-related inputs: labor markets, net worth, personal income, household debt, and sentiment. A high (low) USCHI reading indicates consumer health is strong (weak). The indicator historically exhibits a 3- to 6-month lead time to past U.S. recessions.

How to Use

Consumer health is a critical component of the U.S. business cycle. During the past 70 years, private consumption (consumer spending on goods and services) accounted for ~66% of annual U.S. GDP. The health of the U.S. consumer is a key input into both consumers' willingness and ability to spend. Large shifts in consumer health, both positive and negative, tend to happen around cyclical inflection points and warrant more in-depth analysis. The indicator is designed to track consumer health over time and is best used to identify medium- and long-term trends rather than month-to-month moves.

Figure 58 – MarketDesk U.S. Consumer Health Indicator

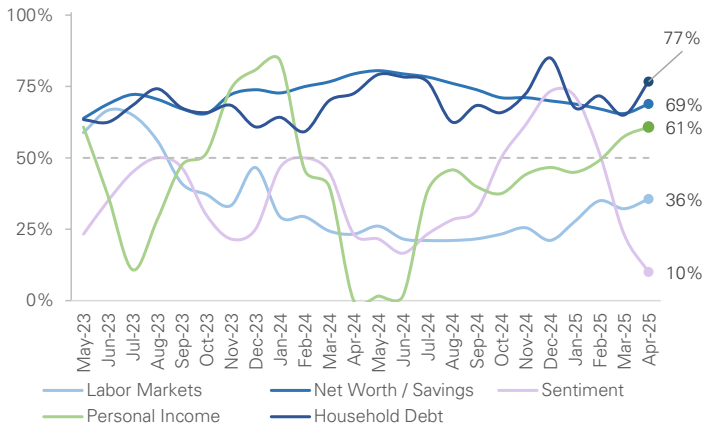
Composite Indicator and Historical U.S. Recessions



Source: MarketDesk Quant Pack, National Bureau of Economic Research

Figure 59 – Rolling 5-Year Percentiles of Key Composite Inputs

Trends in Underlying Categories of Composite During the Last Two Years



Source: MarketDesk Quant Pack

Figure 60 – MarketDesk U.S. Consumer Health Indicator Components

Latest Reading and Current Trend Across All MarketDesk Inputs

5-Year Historical Percentile

<25% = Weak and >75% = Strong

Composite Input	Category	6m Ago	3m Ago	1m Ago	Latest	Current	5-Year Range in Pctl (%)
Unemployment Rate (%)	Labor Markets	4.1%	4.1%	4.2%	4.2%	— Neutral	42
Quit Rates (%)	Labor Markets	1.9%	1.9%	2.0%	2.1%	▼ Weak	18
Nonfarm Payrolls (Y/Y Growth)	Labor Markets	0.2%	0.3%	1.3%	1.5%	— Neutral	47
S&P 500 (Proxy for 401k Values)	Net Worth / Savings	5,705	6,041	5,612	5,569	▲ Strong	87
U.S. Home Prices	Net Worth / Savings	325k	324k	324k	325k	▲ Strong	95
Personal Savings Rate (%)	Net Worth / Savings	4.1%	3.7%	3.8%	4.0%	— Neutral	25
Personal Income (3Y Growth)	Income	16.9%	17.1%	17.6%	17.8%	— Neutral	33
Disposable Income (3Y Growth)	Income	17.7%	18.4%	20.4%	21.5%	▲ Strong	88
Non-Revolving Credit (Y/Y Growth)	Household Debt	2.7%	2.2%	1.8%	1.2%	▲ Strong	82
Revolving Credit (Y/Y Growth)	Household Debt	3.1%	3.0%	5.6%	2.3%	— Neutral	72
Consumer Sentiment Index	Sentiment	105	109	100	93	▼ Weak	10

Source: MarketDesk Quant Pack, Bureau of Labor Statistics. Note regarding the 5-Year Range: • denotes current & — denotes the datapoint's 6-month change.

U.S. Credit Indicators

MarketDesk Quant Pack

Page 25 **U.S. Net Liquidity Indicator (USNLI)**
Monitoring Real-time Changes in Financial System Liquidity

Page 26 **U.S. Lending Standards Indicator (USLSI)**
12-Month Forecast of Changes in Bank Lending Standards

Page 27 **U.S. Financial Conditions Indicator (USFCI)**
Real-World Measure of the Cost and Availability of Accessing Capital

MarketDesk U.S. Net Liquidity Indicator (USNLI)

Monitoring Real-time Changes in Financial System Liquidity

Liquidity

Current Takeaway Market liquidity has risen above the key 50% threshold supporting equity and credit markets

Indicator Definition

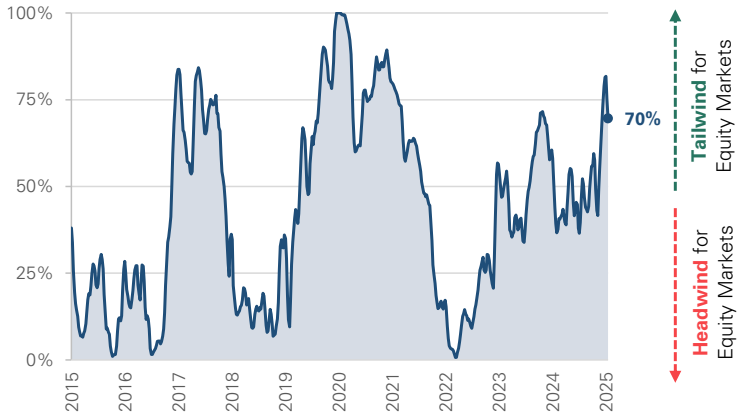
The MarketDesk U.S. Net Liquidity Indicator (USNLI) measures current liquidity dynamics in financial markets. The indicator tracks liquidity changes based on three key components: total assets on the Fed's balance sheet, the Fed's overnight reverse repurchase agreements, and the Treasury's general account. A USNLI reading above (below) 50% indicates net liquidity is increasing (decreasing) and is likely to be a tailwind (headwind) for equity markets. **Click here** to read the July 2023 Strategy Snapshot for additional background.

How to Use

Liquidity is an important factor in financial markets as the Federal Reserve increasingly uses its balance sheet to set monetary policy. The indicator is best used as a model signal for capital preservation, with the S&P 500 historically experiencing higher volatility and bigger drawdowns when liquidity is decreasing. In addition, history shows there is a greater potential for things to break as liquidity decreases, such as in March 2023's regional bank turmoil. When utilizing the indicator, it is important to focus on the direction and rate of change rather than simply the absolute level.

Figure 61 – MarketDesk U.S. Net Liquidity Indicator

Average 3-Year Percentile of Rolling 3-, 6-, and 12-Month Changes in Net Liquidity



Source: MarketDesk Quant Pack, Federal Reserve

Figure 62 – S&P 500 Forward Performance Based on Historical Readings

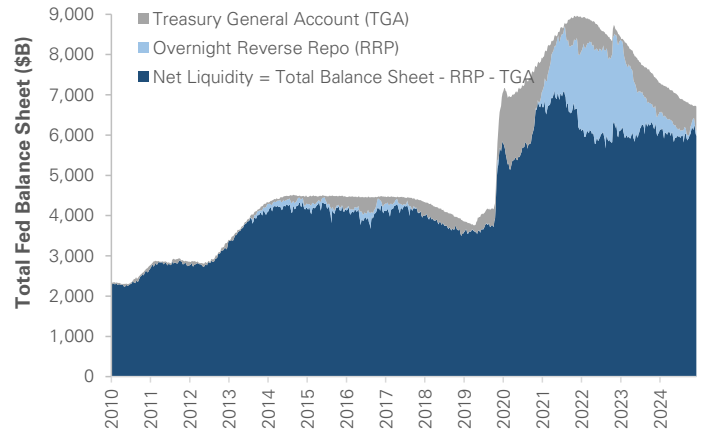
Historical Forward S&P 500 Returns (%) Since 2014

USNLI Reading		1 Month		3 Months		6 Months		9 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Liquidity Rising	90% to 100%	6.2	77%	11.4	92%	20.8	92%	31.2	100%
	80% to 90%	1.4	87%	2.5	79%	9.9	84%	15.4	100%
	70% to 80%	1.1	80%	4.1	84%	9.8	96%	13.9	96%
	60% to 70%	**1.1**	**68%**	**5.6**	**95%**	**6.3**	**75%**	**8.7**	**76%**
	50% to 60%	1.5	74%	3.5	81%	6.9	85%	9.2	81%
All Past Events		0.8	64%	2.8	73%	5.7	76%	8.7	79%
Liquidity Falling	40% to 50%	0.3	52%	2.5	66%	3.1	69%	4.1	65%
	30% to 40%	0.6	63%	2.3	78%	5.3	81%	6.1	68%
	20% to 30%	1.0	57%	1.6	69%	4.6	77%	6.3	79%
	10% to 20%	-0.7	51%	-0.2	55%	0.8	59%	4.7	73%
	0% to 10%	1.0	63%	2.3	66%	5.2	68%	8.0	77%

Source: MarketDesk Quant Pack. Win % = # of positive events / total # of events.

Figure 63 – Components of the Net U.S. Liquidity Indicator

Net Liquidity = Total Fed Balance Sheet – RRP – TGA



Source: MarketDesk Quant Pack, Federal Reserve

Figure 64 – Recent Changes of USNLI Components

Tracking changes across three components

Components of Fed Balance Sheet	Liquidity Changes in % and $ Billions						
	2wk	1m	2m	3m	6m	9m	12m
Total Federal Reserve Balance Sheet Assets	0%	0%	-1%	-2%	-4%	-7%	-9%
	-$18	-$14	-$57	-$109	-$304	-$469	-$653
minus (–)							
(RRP) Overnight Reverse Repurchase Agreements	44%	-52%	70%	25%	-40%	-64%	-71%
	$42	-$149	$57	$28	-$91	-$245	-$335
minus (–)							
(TGA) U.S. Treasury General Account	41%	90%	-13%	-24%	-29%	-24%	-35%
	$173	$282	-$85	-$188	-$239	-$191	-$321
Equals =							
MarketDesk U.S. Net Liquidity Indicator	-3.8%	-2.4%	-0.5%	+0.9%	+0.4%	-0.5%	+0.1%
	-$233	-$147	-$29	+$52	+$27	-$33	+$4

Source: MarketDesk Quant Pack, Federal Reserve

MarketDesk U.S. Lending Standards Indicator (USLSI)

12-Month Forecast of Changes in Bank Lending Standards

Current Takeaway	Macro inputs suggest bank lending standards will normalize in 2025 = More bank lending and future economic growth

Indicator Definition

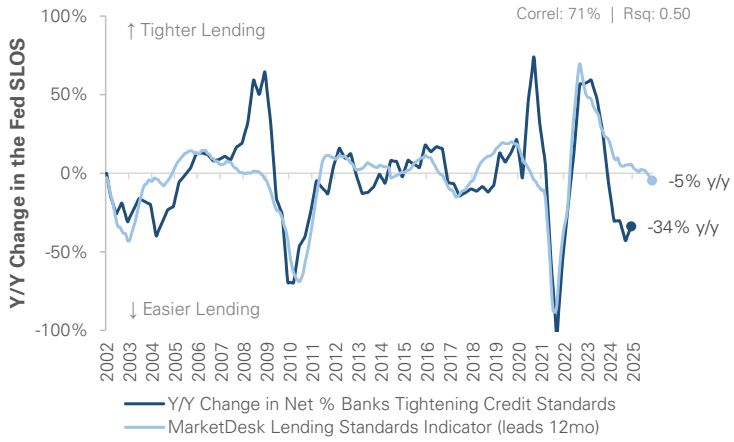
The MarketDesk U.S. Lending Standards Indicator (USLSI) is built to forecast the directional trend and year-over-year change in the net percentage of banks tightening lending standards. The indicator is a combination of six macro inputs that historically exhibit a high statistical correlation with future bank lending preferences and risk tolerance. In general, periods of looser (tighter) bank lending practices favor risk-on (risk-off) portfolio positioning.

How to Use

The Senior Loan Officer Opinion Survey (SLOOS) is a quarterly survey conducted by the Federal Reserve. A key question in the survey watched by economists and policymakers is the net percentage of banks tightening their lending standards. All else equal, tighter (looser) lending leads hint at lower (higher) loan growth, which leads to slower (higher) economic growth. The indicator should be used as a leading indicator to assess the level of future credit growth and economic activity over the next 12 months.

Figure 65 – Y/Y Change in Net % Tightening vs MarketDesk Y/Y Indicator

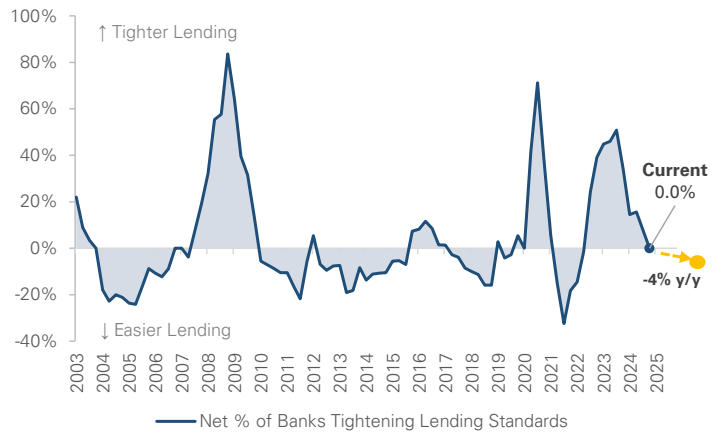
Historical relationship over the last 20 years



Source: MarketDesk Quant Pack, Federal Reserve

Figure 66 – Net % of Banks Tightening Lending Standards & Forecast

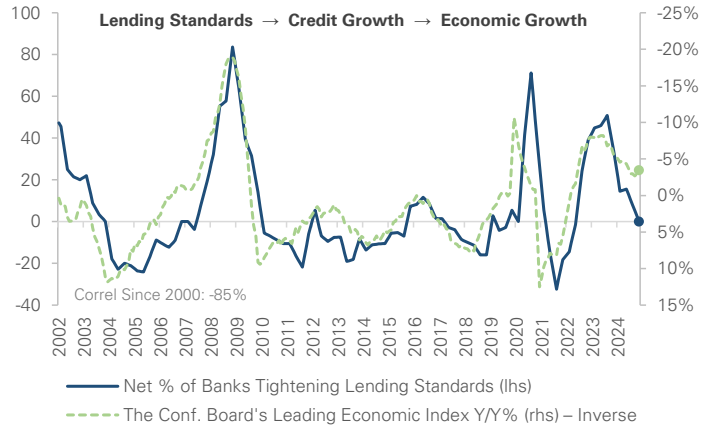
Based on the Senior Loan Officer Opinion Survey from the Federal Reserve



Source: MarketDesk Quant Pack, Federal Reserve

Figure 67 – Historical Lending Conditions & U.S. Economic Growth

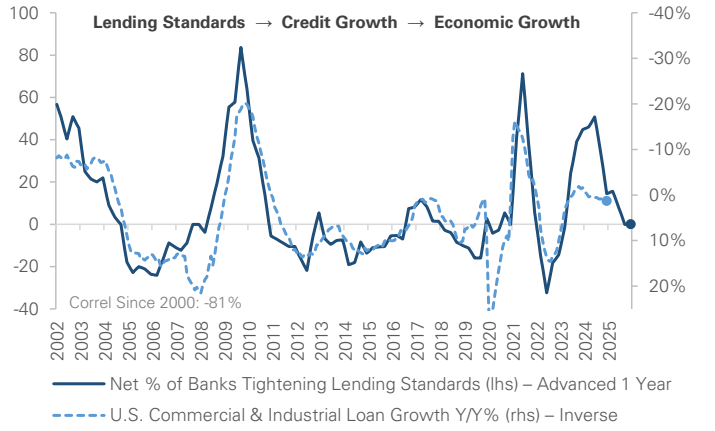
Lending conditions are key to U.S. economic growth



Source: MarketDesk Quant Pack, Federal Reserve, The Conference Board

Figure 68 – Historical Lending Standards & U.S. Loan Growth

Bank Lending Standards lead U.S. loan growth by 12-months



Source: MarketDesk Quant Pack, Federal Reserve

MarketDesk U.S. Financial Conditions Indicator (USFCI)

Real-World Measure of the Cost and Availability of Accessing Capital

Access to Capital

Current Takeaway Loose financial conditions were a tailwind for equity markets in 2024, however conditions have tightened since the initial rate cut

Indicator Definition

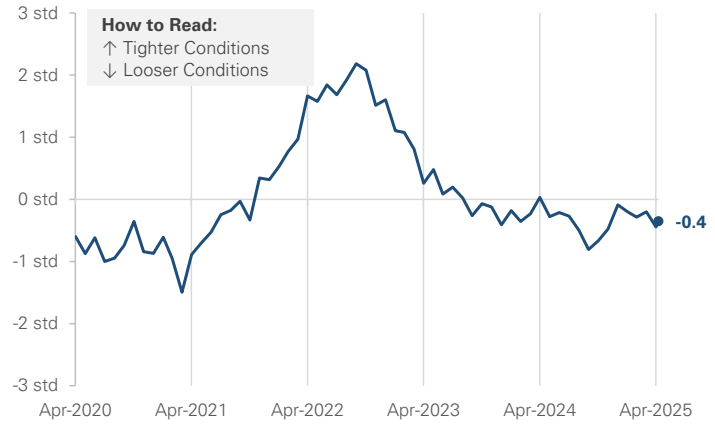
The MarketDesk U.S. Financial Conditions Indicator (USFCI) is a barometer of several macro factors that influence the availability and cost of credit, liquidity in financial markets, and overall economic health. The indicator is an equal weighted average of volatility-adjusted year-over-year changes across eight inputs, including interest rates, credit spreads, lending rates, VIX, equity prices, and USD. A USFCI reading above (below) zero indicates that financial conditions are tighter (looser), which can be a headwind (tailwind) for equity markets.

How to Use

A strong economy relies on access to capital. "Financial Conditions" refers to the ease and cost of obtaining capital for individuals and businesses. While the Federal Reserve's policy rate has a limited direct effect on credit markets, it has a larger indirect impact on financial conditions, such as long-term interest rates, credit spreads, exchange rates, and equity prices. By monitoring these factors, we can gain a better understanding of how monetary policy affects credit growth and overall economic activity. The index should be used to forecast the potential for liquidity and credit events, as well as the potential for financial conditions to support or restrict economic growth.

Figure 69 – MarketDesk Financial Conditions Indicator (USFCI)

Last 5 Years of USFCI Readings



Source: MarketDesk Quant Pack

Figure 70 – S&P 500 Coincident Performance Based on Historical Readings

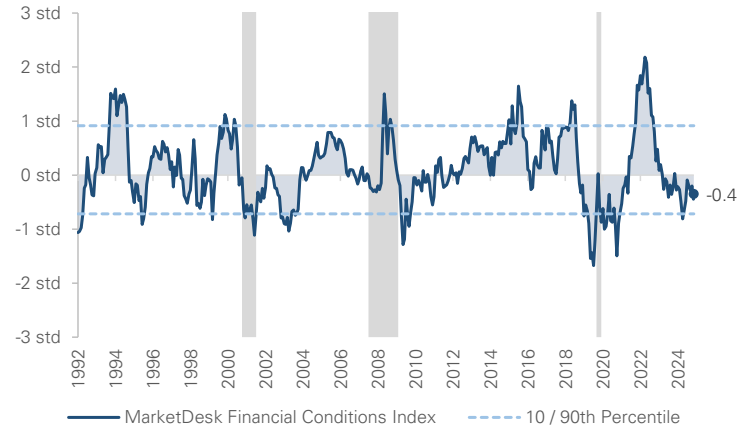
Historical S&P 500 Returns (%) from Last 10 Years

USFCI Reading		3 Months		6 Months		9 Months		12 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Tighter Financial Conditions	> +1.0 std	-3.9	28%	-5.8	33%	-6.5	25%	-6.0	33%
	> +0.8 std	-2.7	38%	-4.0	44%	-3.5	42%	-2.8	47%
	> +0.6 std	-1.2	47%	-1.2	56%	-0.4	58%	0.9	60%
	> +0.4 std	0.0	57%	1.2	67%	2.7	70%	5.0	71%
	> +0.2 std	0.8	62%	2.1	71%	4.1	74%	6.4	76%
All Past Events		2.3	69%	4.7	74%	7.2	78%	9.7	79%
Looser Financial Conditions	< -0.2 std	4.1	77%	7.5	75%	10.4	77%	13.2	75%
	< -0.4 std	**5.2**	**84%**	**8.6**	**78%**	**12.5**	**84%**	**15.1**	**78%**
	< -0.6 std	5.2	88%	8.6	81%	12.5	86%	14.1	79%
	< -0.8 std	5.2	93%	9.6	86%	16.4	93%	18.1	90%
	< -1.0 std	5.0	100%	8.5	83%	14.8	92%	16.2	92%

Source: MarketDesk Quant Pack. Win % = # of positive events / total # of events.

Figure 75 – USFCI Historical Readings Since 1990s

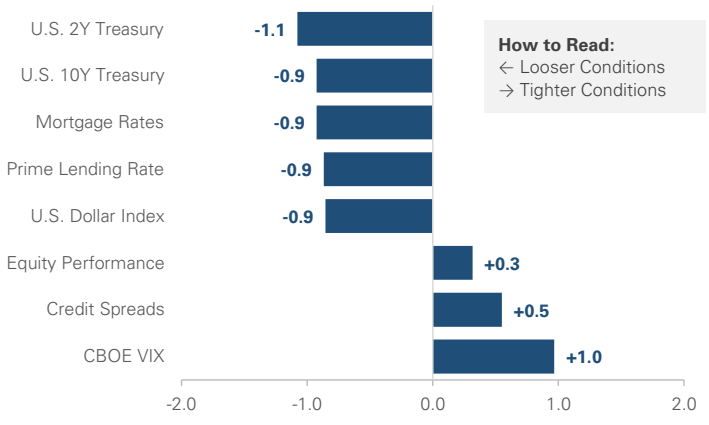
Long-term Trends in Financial Conditions



Source: MarketDesk Quant Pack

Figure 72 – MarketDesk USFCI Macro Inputs

5 Year Z-Score of the Y/Y Change of Each Input



Source: MarketDesk Quant Pack

Technical Analysis Indicators

MarketDesk Quant Pack

Page 29 **U.S. Investor Sentiment Indicator (USSI)**
Summary of Current Positioning, Flows, & Hedging

Page 30 **U.S. Risk Demand Indicator (USRDI)**
Measure of the Willingness of U.S. Investors to Take Risk Over the Long-term

Page 31 **U.S. Breadth Indicator (USBI)**
Measures the Strength of S&P 500's Intermediate Trend

Page 32 **U.S. Technical Indicator (USTI)**
Measures if the S&P 500 is Overbought or Oversold in the Near-term

Page 33 **U.S. Capitulation Indicator (USCAP)**
Quantitative Tool to Identify and Time Market Bottoms

Page 34 **U.S. Bear Market Probability Indicator (USBMP)**
Forecasting Drawdown Risk Over the Next 12 Months

Page 35 **International Risk Demand Indicator (IRDI)**
Measure of the Willingness of International Investors to Take Risk Over the Long-term

MarketDesk U.S. Investor Sentiment Indicator (USSI)

Summary of Current Positioning, Flows, and Hedging

Sentiment

Current Takeaway Investor sentiment remains weak driven by survey data, call/put ratio, treasury bond futures, and a volatile VIX

Indicator Definition

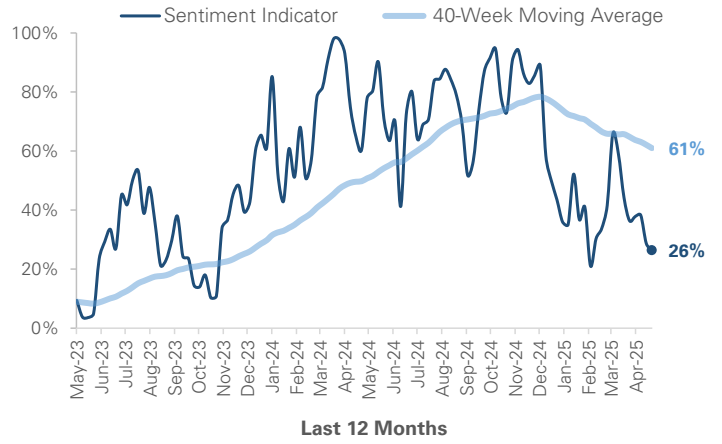
The MarketDesk U.S. Investor Sentiment Indicator (USSI) provides timely 'bottom-up' information about how retail and institutional investors are positioned in the current environment. The indicator is an equal weight composite of ten data points, including institutional investor positioning, equity and credit flows, changes in cash balances, VIX movement, and sentiment surveys. A USSI reading of 100% (1%) equates to extreme bullish (bearish) investor positioning relative to the past 10 years.

How to Use

Investor behavior plays a crucial role in determining market returns and provides insights into market dynamics, trends, and potential risks. By analyzing investor sentiment, market participants can better anticipate market movements and make more informed investment decisions. The U.S. Sentiment Indicator should be used in conjunction with other MarketDesk Indicators, which are designed to forecast the macro environment. Investors should monitor for two events: (1) when sentiment and the remaining indicators don't agree, and (2) extreme bullish and bearish readings that leave the market susceptible to a sudden sentiment shift.

Figure 73 – U.S. Investor Sentiment over the Last 24 Months

Composite Indicator and 40-Week Moving Average



Source: MarketDesk Quant Pack

Figure 74 – S&P 500 Forward Performance Based on Historical Readings

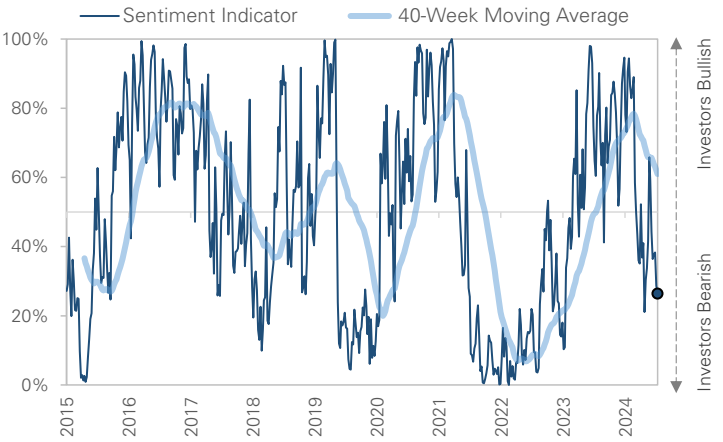
Historical Forward S&P 500 Returns (%) from Last 10 Years

USSI Reading		3 Months		6 Months		9 Months		12 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Investors Bullish	90% to 100%	0.0	68%	0.9	59%	1.6	65%	2.2	52%
	80% to 90%	1.5	74%	5.4	86%	8.3	86%	8.6	74%
	70% to 80%	3.7	87%	6.0	81%	8.7	86%	8.9	80%
	60% to 70%	2.4	71%	5.2	73%	7.7	76%	8.8	77%
	50% to 60%	1.8	67%	4.0	66%	5.1	67%	6.7	71%
All Past Events		2.7	72%	6.0	75%	9.3	81%	12.8	83%
Investors Bearish	40% to 50%	0.4	56%	2.9	60%	5.5	71%	9.9	85%
	30% to 40%	0.1	57%	2.7	70%	6.6	80%	11.0	91%
	20% to 30%	**4.1**	**80%**	**9.2**	**84%**	**13.7**	**88%**	**19.9**	**96%**
	10% to 20%	7.8	83%	12.8	88%	20.2	92%	28.2	100%
	0% to 10%	4.9	80%	9.7	85%	14.0	94%	20.3	98%

Source: MarketDesk Quant Pack. Win % = # of positive events / total # of events.

Figure 75 – Historical U.S. Sentiment Indicator over the Last 10 Years

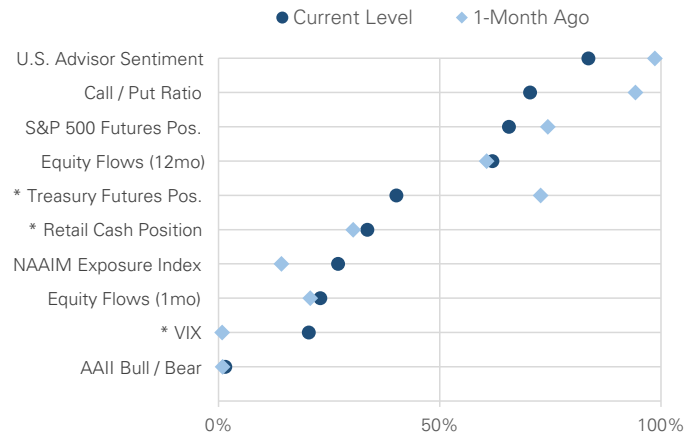
Long-term Trends in Investor Positioning and Sentiment



Source: MarketDesk Quant Pack

Figure 76 – 10 Year Percentile of Sentiment Composite Inputs

Current Status for Each Input (How to Read: 100% = Bullish, 0% = Bearish)



Source: MarketDesk Quant Pack. Note: * denotes inverse sentiment reading.

MarketDesk U.S. Risk Demand Indicator (USRDI)

Measure of the Willingness of U.S. Investors to Take Risk Over the Long-term

Positioning

Current Takeaway USRDI turned "Risk-Off" on February 26th (i.e., decrease portfolio risk); The average Risk-Off regime last 10 months

Indicator Definition

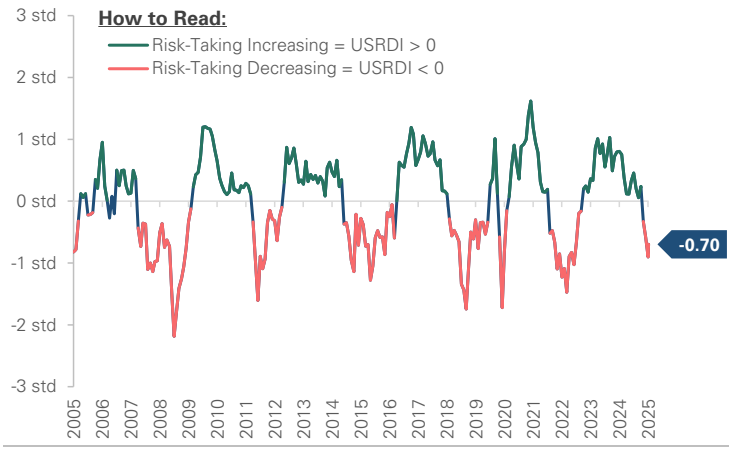
The MarketDesk U.S. Risk Demand Indicator (USRDI) is a quantitative model built to measure investors' willingness (or lack thereof) to increase portfolio risk. USRDI is a composite of momentum measures across four asset classes: equities, equity derivatives, credit markets, and foreign currencies. A reading above zero suggests investors should increase portfolio risk to benefit from rising market momentum. A reading below zero suggests investors should decrease portfolio risk to protect capital from falling market momentum. USRDI is adjusted for volatility to decrease market noise and is built to identify long-term trends and changes in investor preferences. **Click here** to read the October 2023 Strategy Snapshot for additional information.

How to Use

For markets to move higher, there must be a counterparty that is willing to buy what you are selling at a higher price. The MarketDesk USRDI should be viewed as a momentum signal rather than a contrarian signal. Historically, risk demand drops off well before the top in the market. This is why forward S&P 500 returns and win rates (i.e., the percentage of positive outcomes) tend to increase as the indicator rises above zero and vice versa when the index drops below zero. When the composite indicator is above (below) zero, investors should own risk-on (risk-off) portfolio exposure. **Click here** to see the indicator's historical model signal.

Figure 77 – MarketDesk Risk Demand Indicator

Latest Composite Index Reading



Source: MarketDesk Quant Pack

Figure 78 – Forward Performance Based on Historical Readings

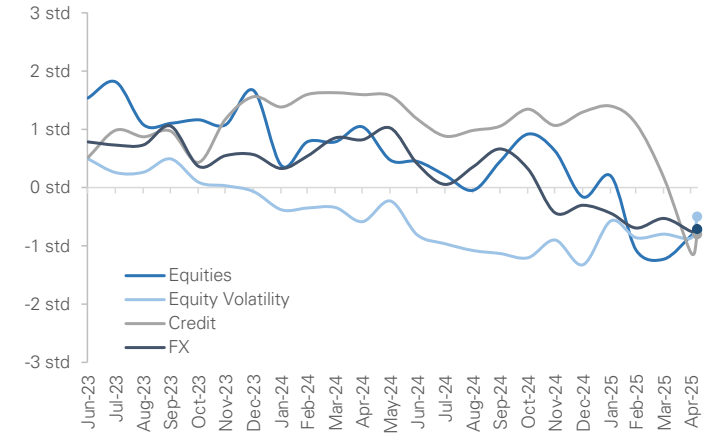
Historical Forward S&P 500 Returns (%) Since 2000

USRDI Reading		3 Months		6 Months		9 Months		12 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Risk On	> +1.0 std	3.6	83%	7.3	78%	10.5	94%	14.6	94%
	> +0.8 std	3.2	74%	7.0	79%	10.5	92%	14.2	92%
	> +0.6 std	2.8	78%	6.9	79%	10.0	88%	12.9	88%
	> +0.4 std	3.1	79%	7.2	83%	10.3	89%	12.2	85%
	> +0.2 std	3.0	77%	6.3	80%	9.7	87%	11.7	84%
All Past Events		1.9	67%	3.8	70%	5.6	74%	7.5	74%
Risk Off	< -0.2 std	0.2	56%	0.0	55%	0.7	57%	2.0	60%
	< -0.4 std	-0.1	53%	-0.3	49%	0.6	53%	1.8	58%
	< -0.6 std	0.0	53%	-0.1	47%	0.9	52%	1.7	55%
	< -0.8 std	**1.3**	**59%**	**2.4**	**54%**	**3.2**	**59%**	**4.2**	**61%**
	< -1.0 std	0.8	52%	3.1	52%	5.5	61%	5.9	65%

Source: MarketDesk Quant Pack. Win % = # of positive events / total # of events.

Figure 79 – Risk Demand Indicator by Asset Class

Last 24 Months of Readings for Equities, Equity Volatility, Credit, and FX



Source: MarketDesk Quant Pack

Figure 80 – MarketDesk USRDI Composite Inputs

Underlying Inputs of the Composite Index for each Asset Class

Asset Class	Input	Measure	Reading
Equities	International	Price Momentum	Risk-On
	Cyclical Businesses	Price Momentum	Risk-Off
	Size Factor	Price Momentum	Risk-Off
	High Beta	Price Momentum	Risk-Off
Equity Vol	VIX	Volatility Trends	Risk-Off
	Put/Call Ratio	Volatility Trends	Risk-On
Credit	U.S. High Yield	Spread	Risk-Off
	Europe High Yield	Spread	Risk-Off
	U.S. Interest Rates	Monetary Policy	Risk-Off
	Europe Interest Rates	Monetary Policy	Risk-On
FX	APAC Currencies	Currency Pairs Momentum	Risk-Off
	Europe Currencies	Currency Pairs Momentum	Risk-Off
	USD Index	Currency Pairs Momentum	Risk-On

Source: MarketDesk Quant Pack

MarketDesk U.S. Breadth Indicator (USBI)

Measures the Strength of S&P 500's Intermediate Trend

Technicals

Current Takeaway A reading above (below) 50 suggests the upward trend in the S&P 500 is stable and healthy (weak and deteriorating)

Indicator Definition

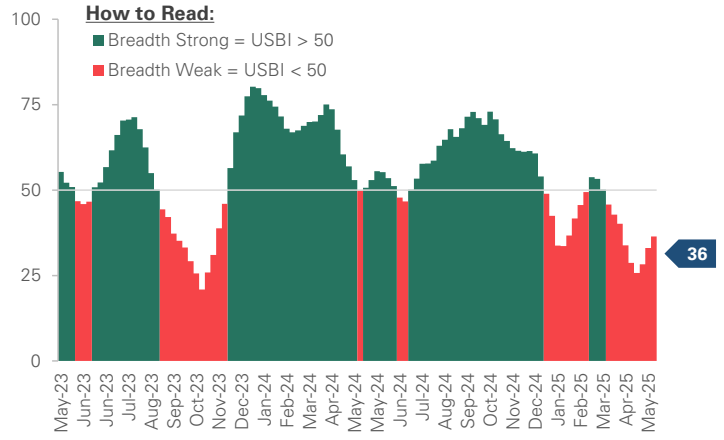
The MarketDesk U.S. Breadth Indicator (USBI) measures the strength of the S&P 500's upward trend over the intermediate term horizon (i.e., 3-12 months). USBI is a equal weighted composite of three inputs: the percentage of S&P 500 holdings trading above their 20 day moving average (DMA), 50DMA, and 100DMA. A reading above (below) 50 suggests the underlying momentum of the market is healthy (weak). The higher the number, the stronger the trend. To minimize signal noise, USBI is based on weekly data points and is calculated using an average of the indicator's reading during the past six weeks.

How to Use

The MarketDesk USBI should be viewed as a momentum signal rather than a contrarian signal. This is why forward S&P 500 returns and win rates (i.e., the % of positive outcomes) tend to increase as the indicator rises above 50, and vice versa when the index drops below 50. Readings between 30 and 50 have a wider potential range of outcomes, with higher potential upside but also higher potential downside. This increased volatility, combined with below-average win rates, demonstrate the difficulty of picking a market bottom. A reading above 50 suggests the upward trend in the S&P 500 is stable and healthy.

Figure 81 – MarketDesk U.S. Breadth Composite Indicator

Indicator reading over the last 10 years



Source: MarketDesk Quant Pack

Figure 82 – Forward Performance Based on Historical Readings

Historical Forward S&P 500 Returns (%) Last 20 Years

USBI Reading		1 Month		2 Months		3 Months		6 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Strong	80 to 85	0.6	79%	1.8	75%	4.1	79%	8.4	88%
	75 to 80	0.7	64%	2.6	80%	3.5	76%	8.5	93%
	70 to 75	0.3	57%	1.0	73%	1.4	70%	4.3	76%
	65 to 70	1.1	72%	2.0	70%	2.7	76%	5.8	84%
	60 to 65	0.6	68%	1.4	67%	2.0	69%	3.3	70%
	55 to 60	0.9	64%	1.6	62%	2.6	73%	3.4	67%
	50 to 55	-0.6	62%	0.2	64%	1.3	73%	2.1	72%
All Past Events		0.7	65%	1.6	68%	2.3	71%	4.7	74%
Weak	45 to 50	-0.1	61%	0.8	59%	2.1	71%	4.0	72%
	40 to 45	-0.7	53%	-1.0	53%	0.5	59%	2.1	55%
	35 to 40	**-0.1**	**49%**	**0.8**	**69%**	**2.2**	**69%**	**4.8**	**66%**

Source: MarketDesk Quant Pack. Win % = # of positive events / total # of events.

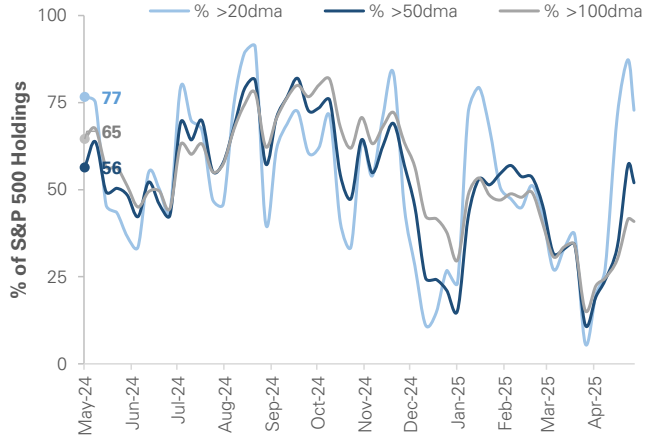
Figure 83 – S&P 500 Index and Historical USBI Readings

Context for how the indicator behaved throughout market cycles

Source: MarketDesk Quant Pack

Figure 84 – Last 12 Months of USBI Underlying Input Readings

Underlying inputs of the composite indicator (equal-weight average)



Source: MarketDesk Quant Pack

MarketDesk U.S. Technical Indicator (USTI)

Measures if the S&P 500 is Overbought or Oversold in the Near-term

Current Takeaway A reading above +1.0 (below -1.0) suggests markets overbought (oversold) over the near-term horizon of 1-2 months

Indicator Definition

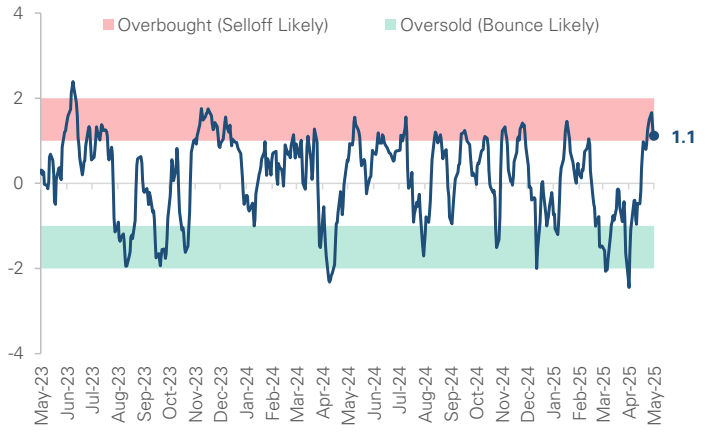
The MarketDesk U.S. Technical Indicator (USTI) measures whether the S&P 500 is overbought or oversold over a near-term horizon (i.e., 1-2 months). USTI is an equal weighted composite of three inputs: the 14-day relative strength index (RSI), the 50-day moving average (DMA), and the 10-day advance/decline line (A/D). A reading above +1.0 (below -1.0) suggests markets are near-term overbought (oversold). The longer the signal stays overbought above +1.0 (oversold below -1.0), the higher the probability of the market reversing near-term.

How to Use

Recency bias is the tendency to place too much emphasis on experiences that are freshest in our memory. For this reason, most investors tend to believe the recent trend will continue in a straight line. However, at some point, enough investors will have bought into or sold the market that there are no more willing buyers or sellers at current levels. This is when markets tend to reverse. The USTI measures this process as it unfolds across markets and should be used as a contrarian signal. The S&P 500's average forward return tends to decrease as the indicator rises above 0, and vice versa. The indicator can be paired with USBI and USRDI to capture profits or enter new opportunities, particularly on a near-term basis.

Figure 85 – MarketDesk U.S. Techncial Indicator

Indicator reading over the last 24 months



Source: MarketDesk Quant Pack

Figure 86 – Forward Performance Based on Historical Readings

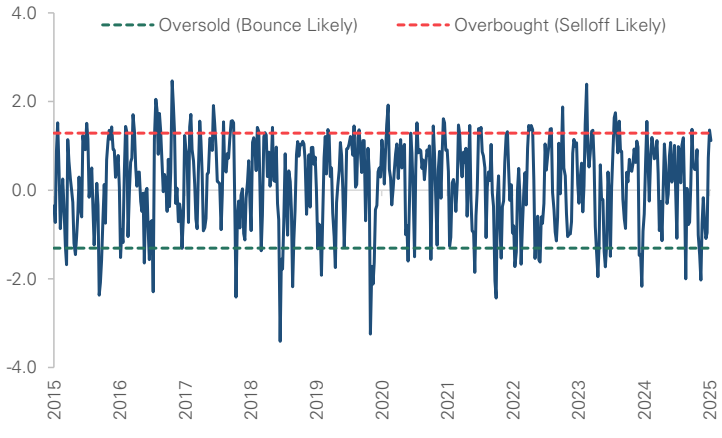
Historical Forward S&P 500 Returns (%) Since 2000

USTI Reading		1 Week Avg Return	2 Weeks Avg Return	4 Weeks Avg Return	2 Months Avg Return
Markets Rising	> +2.0	0.03%	0.27%	0.68%	1.29%
	1.5 to 2.0	0.07%	-0.01%	-0.03%	0.28%
	1.0 to 1.5	**0.06%**	**0.24%**	**0.42%**	**0.86%**
	0.5 to 1.0	0.19%	0.33%	0.71%	1.00%
	0.0 to 0.5	0.03%	-0.03%	0.15%	0.78%
All Past Events		0.13%	0.25%	0.53%	1.05%
Markets Falling	0.0 to -0.5	0.01%	0.22%	0.45%	0.82%
	-0.5 to -1.0	0.17%	0.52%	0.65%	1.53%
	-1.0 to -1.5	0.71%	0.91%	1.12%	1.72%
	-1.5 to -2.0	-0.09%	0.36%	1.21%	2.52%
	< -2.0	0.35%	-0.90%	1.00%	2.37%

Source: MarketDesk Quant Pack

Figure 87 – Indicator's Historical Readings from the Last 10 Years

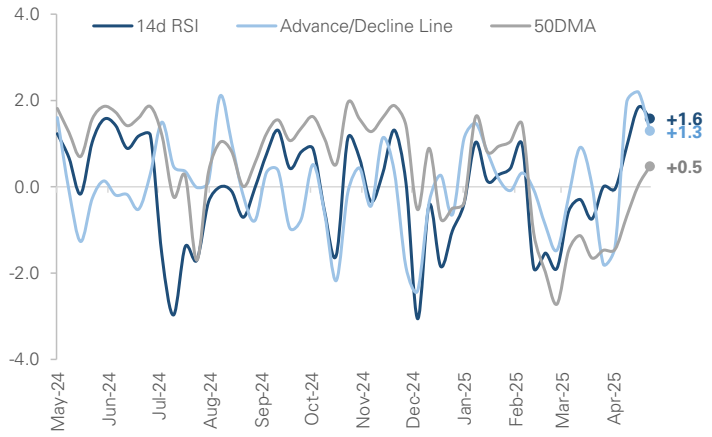
Context for how the indicator behaved throughout market cycles



Source: MarketDesk Quant Pack

Figure 88 – MarketDesk USTI Composite Inputs

Underlying inputs of the composite indicator (equal-weight average)



Source: MarketDesk Quant Pack

MarketDesk U.S. Capitulation Indicator (USCAP)

Quantitative Tool to Objective Identify Market Bottoms

Market Timing

Current Takeaway Market selling reached it lowest level in recent years on March 13th (-2std) supporting the recent market bounce

Indicator Definition

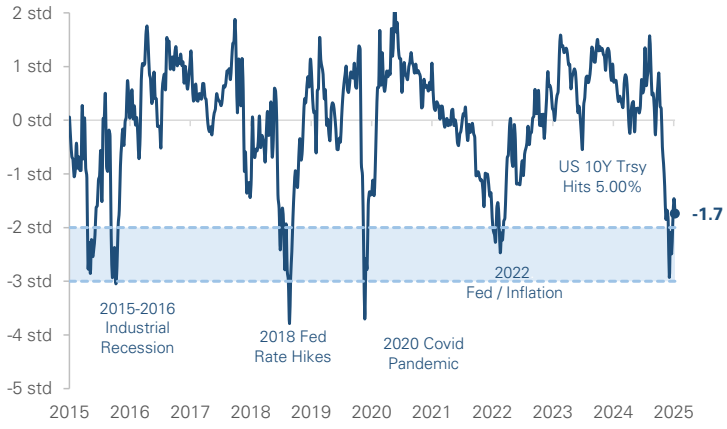
The MarketDesk U.S. Capitulation Indicator (USCAP) is built to identify equity market bottoms. The indicator is a composite of rolling returns across key areas of the market, which uses a rolling z-score to adjust for volatility. Equity market bottoms are usually found at the intersection of aggressive selling, elevated emotions, doomsday headlines, and investor panic. While buying at the exact market bottom is nearly impossible in practice, putting this process into a mathematical model increases the odds of success.

How to Use

The MarketDesk U.S. Capitulation Indicator is built to be used during periods of equity market drawdowns. The indicator works in two stages. First, as the selloff intensifies, the volatility adjusted framework quantifies each leg of the selloff (i.e., -15% may feel emotionally significant, but is it statistically significant?). Second, as the indicator falls below -2.5 std and approaches -3 std, investors should start to identify a market entry point. The indicator is calibrated such that levels between -2 std and -3 std historically have provided investors with optimal entry points and minimized further drawdown risk.

Figure 89 – MarketDesk U.S. Capitulation Indicator

Weekly Signals Over the Last 10 Years



Source: MarketDesk Quant Pack

Figure 90 – Forward Performance Based on Historical Readings

Historical Forward S&P 500 Returns (%) Since 1930s

USCAP Reading		1 Month		3 Months		6 Months		12 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Markets Rising	> +2.0	1.2	70%	4.7	80%	6.2	73%	10.2	83%
	1.5 to 2.0	1.4	70%	4.6	80%	9.9	86%	13.5	84%
	1.0 to 1.5	1.0	66%	3.5	70%	8.8	85%	14.7	83%
	0.5 to 1.0	0.7	61%	2.4	70%	5.2	72%	11.4	78%
	0.0 to 0.5	0.6	59%	1.8	65%	3.1	69%	5.6	64%
All Past Events		0.7	60%	2.2	64%	4.4	68%	8.8	71%
Markets Falling	0.0 to -0.5	0.5	58%	1.9	60%	3.9	66%	7.3	66%
	-0.5 to -1.0	0.0	53%	0.9	57%	2.3	57%	7.1	67%
	-1.0 to -1.5	0.9	62%	1.8	60%	2.6	58%	8.5	69%
	-1.5 to -2.0	**0.7**	**59%**	**0.8**	**55%**	**2.3**	**54%**	**4.8**	**62%**
	< -2.0	1.0	61%	2.9	69%	5.1	69%	12.0	83%

Source: MarketDesk Quant Pack. Win % = # of positive events / total # of events.

Figure 91 – Last 10 Indicator Readings Below -3 std

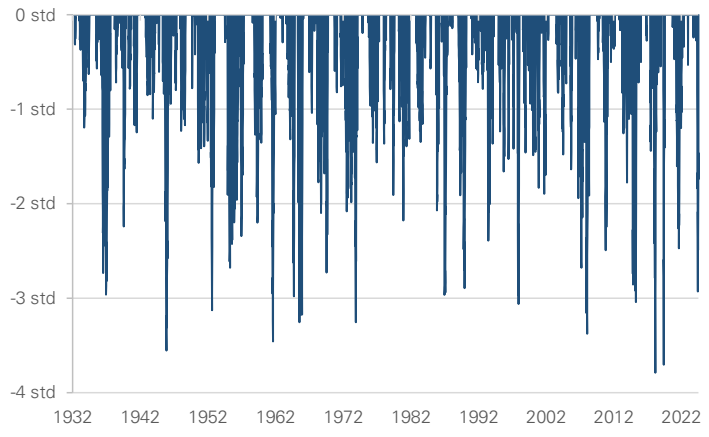
Indicator Track Record of Identifying the Market Bottom

Date	Capitulation Indicator	# Weeks to Bottom	% to Bottom	Forward Returns		
				3mo	6mo	12mo
Aug 30, 1946	-3.3	11	-12%	-4%	-8%	-5%
Jun 5, 1953	-3.2	13	-3%	4%	12%	20%
Jun 8, 1962	-3.3	1	-6%	12%	18%	26%
May 6, 1966	-3.3	21	-14%	-4%	2%	9%
Sep 6, 1974	-3.3	3	-4%	30%	39%	28%
Oct 9, 1998	-3.1	0	0%	37%	43%	36%
Oct 24, 2008	-3.2	19	-22%	-1%	12%	23%
Feb 5, 2016	-3.1	0	-1%	16%	11%	22%
Dec 21, 2018	-3.8	0	0%	22%	24%	33%
Mar 20, 2020	-3.8	0	0%	44%	61%	70%
Average	**-3.3**	**6.8**	**-6.2%**	**16%**	**21%**	**26%**
Median	**-3.3**	**2.0**	**-3.6%**	**14%**	**15%**	**24%**

Source: MarketDesk Quant Pack

Figure 92 – MarketDesk U.S. Capitulation Indicator Since 1930

Historical USCAP Signal Over the Last Century



Source: MarketDesk Quant Pack

MarketDesk U.S. Bear Market Probability Indicator (USBMP)

Forecasting Drawdown Risk Over the Next 12 Months

Drawdown Risk

Current Takeaway	Drawdown risk remains elevated; Doesn't mean markets will fall, but suggests assets are priced for perfection

Indicator Definition

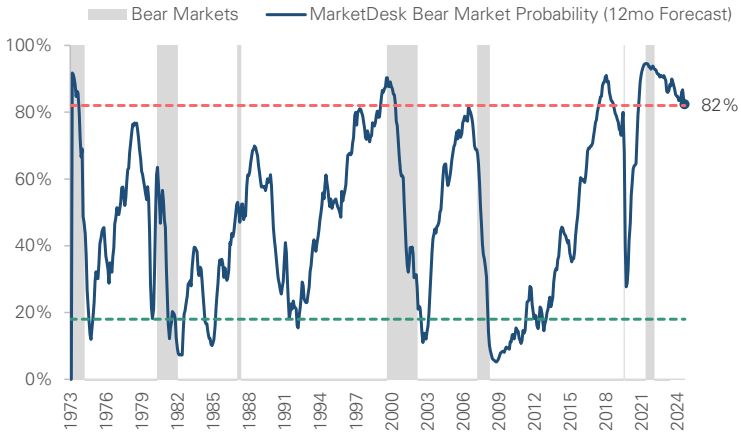
The MarketDesk U.S. Bear Market Probability Indicator (USBMP) is a macro-based model built to forecast the probability of a bear market occurring in the next 12 months (i.e., a 20% drawdown in the S&P 500 Index). USBMP combines 12 macro inputs, including unemployment data, equity market valuations, economic momentum, credit markets, and inflation. The indicator is calibrated such that levels above 80% (below 20%) suggests investors should start to decrease (increase) overall portfolio risk.

How to Use

Bear markets are an unavoidable part of investing. Market drawdowns can quickly erase years of investment gains over only a few short months. However, these inflection points also offer investors new opportunities. There are two model outputs to focus on: (1) the current probability level of a bear market over the next 12 months, and (2) the expectations gap of investors. We measure the expectations gap as the difference in probabilities between USBMP and the implied probability based on S&P 500 put options activity. Investors will benefit most when the indicator is at extreme levels and the expectations gap is wide (i.e., nothing is priced into the markets).

Figure 93 – MarketDesk U.S. Bear Market Probability Indicator (USBMP)

Historical Probability of 20% Market Drawdown in the Next 12 Months



Source: MarketDesk Quant Pack

Figure 94 – Forward Performance Based on Historical Readings

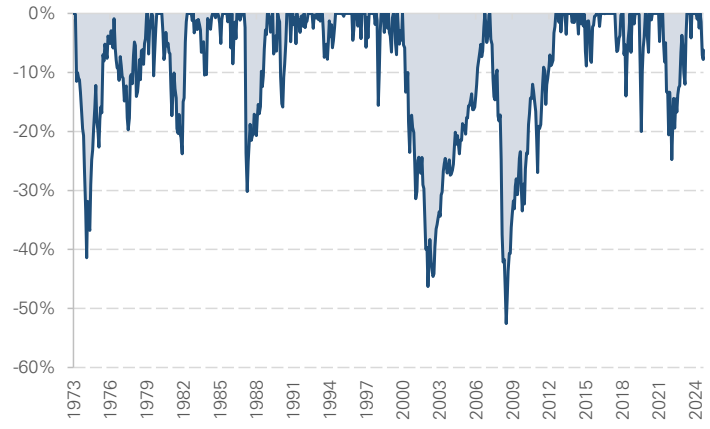
Historical Forward S&P 500 Returns (%) Since 1970s

USBMP Reading		6 Months		9 Months		12 Months		18 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Increasing Odds	> 90%	-0.5	49%	-0.7	49%	0.9	57%	8.7	58%
	> 80%	**1.9**	**61%**	**1.9**	**63%**	**2.8**	**57%**	**7.6**	**56%**
	> 70%	3.2	66%	4.7	72%	6.3	69%	10.1	66%
	> 60%	3.9	69%	6.0	74%	7.8	74%	10.7	71%
	> 50%	4.0	69%	6.5	75%	8.7	75%	13.0	75%
All Past Events		4.7	71%	7.1	75%	9.7	77%	15.1	80%
Decreasing Odds	< 50%	5.2	73%	7.7	75%	10.6	78%	16.9	85%
	< 40%	6.5	78%	9.8	82%	13.1	86%	18.9	89%
	< 30%	8.1	83%	12.3	87%	15.9	93%	22.0	96%
	< 20%	9.5	83%	14.6	89%	19.2	96%	25.4	98%
	< 10%	11.9	83%	18.8	89%	21.9	100%	25.8	100%

Source: MarketDesk Quant Pack

Figure 94 – Historical S&P 500 Market Drawdowns

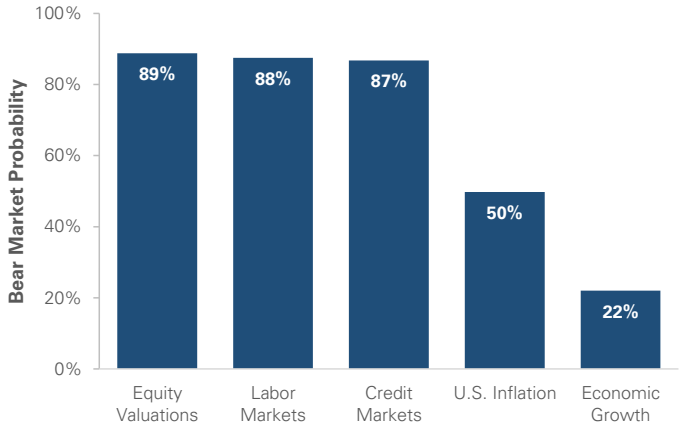
Monthly datapoints since 1970s



Source: MarketDesk Quant Pack

Figure 95 – MarketDesk USBMP Input Categories

Current probability for each input category



Source: MarketDesk Quant Pack. Win % = # of positive events / total # of events.

MarketDesk International Risk Demand Indicator (IRDI)

Measure of the Willingness of International Investors to Take Risk Over the Long-term

Positioning

Current Takeaway Investors' appetites have turned negative for international regions and factors

Indicator Definition

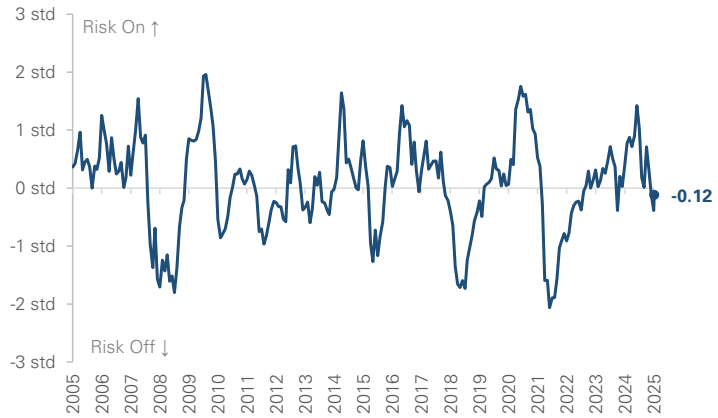
The MarketDesk International Risk Demand Indicator (IRDI) is a quantitative model built to measure investors' willingness (or lack thereof) to increase portfolio risk. IRDI is a composite of momentum measures across four asset classes: equities, equity derivatives, credit markets, and foreign currencies. A reading above zero suggests investors should increase portfolio risk to benefit from rising market momentum. A reading below zero suggests investors should decrease portfolio risk to protect capital from falling market momentum. IRDI is adjusted for volatility to decrease market noise, and is built to identify long-term trends and changes in investor preferences.

How to Use

In order for markets to move higher, there must be a counterparty that is willing to buy what you are selling at a higher price. The MarketDesk IRDI should be viewed as a momentum signal rather than a contrarian signal. Historically, risk demand drops off well before the top in the market. This is why forward S&P 500 returns and win rates (i.e., the percentage of positive outcomes) tend to increase as the indicator rises above zero and vice versa when the index drops below zero. When the composite indicator is above (below) zero, investors should own risk-on (risk-off) portfolio exposure.

Figure 97 – MarketDesk International Risk Demand Indicator

Historical IRDI readings from the last 20 years



Source: MarketDesk Quant Pack

Figure 98 – Forward Performance Based on Historical Readings

Historical Forward ACWI ex US (%) Since 2000

IRDI Reading		3 Months		6 Months		9 Months		12 Months	
		Avg	Win %	Avg	Win %	Avg	Win %	Avg	Win %
Risk On	> +1.0 std	4.1	80%	6.9	80%	10.0	87%	11.4	91%
	> +0.8 std	3.4	76%	5.4	78%	7.5	81%	7.1	83%
	> +0.6 std	3.3	72%	5.4	77%	7.2	81%	7.0	80%
	> +0.4 std	2.7	74%	4.4	72%	5.6	77%	5.7	72%
	> +0.2 std	2.2	73%	4.0	71%	5.2	74%	6.1	75%
All Past Events		1.2	65%	2.5	66%	3.8	67%	5.2	67%
Risk Off	**< -0.2 std**	**-0.5**	**51%**	**0.7**	**56%**	**2.4**	**62%**	**4.1**	**61%**
	< -0.4 std	-1.6	48%	-2.2	43%	-1.0	52%	1.0	51%
	< -0.6 std	-3.0	42%	-5.1	34%	-4.8	40%	-2.2	44%
	< -0.8 std	-3.8	38%	-6.9	30%	-6.2	38%	-3.0	40%
	< -1.0 std	-4.8	40%	-8.1	27%	-8.0	30%	-4.1	33%

Source: MarketDesk Quant Pack. Note: Win % = # of positive events / total # of events.

Figure 100 – Interntional Market Segments to Own During Each Regime

Equity factors, sectors, credit, and international positioning ideas

Asset Classes	Risk-On Regimes Shortlist of Areas to Own	Risk-Off Regimes Shortlist of Areas to Own
International Regions	Emerging Markets Latin America Asia-Pacific	Developed Markets Europe Japan
International Factors	Growth Momentum Small Cap Buybacks	Low Volatility Dividend Large Cap Quality
International Sectors	Consumer Discretionary Industrials & Materials Financials	Consumer Staples Health Care Utilities

Source: MarketDesk Quant Pack

Figure 100 – International Risk Demand Composite Inputs

Underlying Inputs of the Composite Index for each Asset Class

Asset Class	Input	Measure	Reading
Regions	Emerging Markets	Price Momentum	**Risk-Off**
	Developed Markets	Price Momentum	**Risk-Off**
	Asia Pacific	Price Momentum	**Risk-On**
	China	Price Momentum	**Risk-On**
Factors	Cyclical Businesses	Relative Strength	**Risk-On**
	Size Factor	Relative Strength	**Risk-On**
Commodities	Energy	Relative Strength	**Risk-On**
	Broad Commodities	Relative Strength	**Risk-On**
	Industrial Metals	Relative Strength	**Risk-Off**
	Copper	Relative Strength	**Risk-Off**
FX	South Korean Won	Currency Pairs Momentum	**Risk-On**
	Japanese Yen	Currency Pairs Momentum	**Risk-Off**
	USD Index	Currency Pairs Momentum	**Risk-Off**

Source: MarketDesk Quant Pack

Page 26 **USD Technical Indicator (USDTI)**
3-Month Forecast of the U.S. Dollar Index

MarketDesk USD Technical Indicator (USDTI)

3-Month Forecast of the U.S. Dollar Index

Currency

Current Takeaway Indicator's macro inputs suggest USD could surprise to the upside over next three months

Indicator Definition

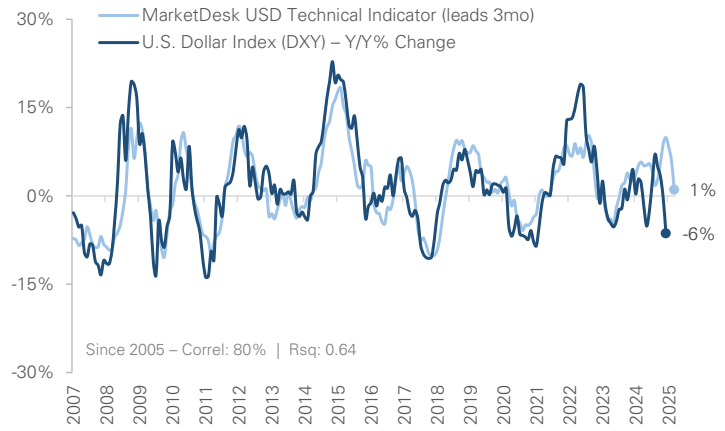
The MarketDesk USD Technical Indicator (USDTI) is a quantitative model built to forecast major near-term moves in the currency over the next 3 months. USDTI is a composite of five inputs, including investor positioning, technical conditions, and relative strength vs. key global regions. A reading above (below) the current year-over-year change suggests the U.S. dollar index will appreciate (depreciate).

How to Use

The U.S. dollar is considered to be the world's dominant currency and is widely used as a reserve currency by central banks, financial institutions, and governments around the world. The direction of USD is important for asset allocation decisions, especially when investing in emerging market equities and bonds, global commodities, U.S. treasuries, and U.S. equities that derive a large portion of their revenue from overseas. The indicator should be used to highlight potential turning points and the directional momentum of the U.S. dollar index.

Figure 101 – Actual Y/Y Change vs MarketDesk Indicator

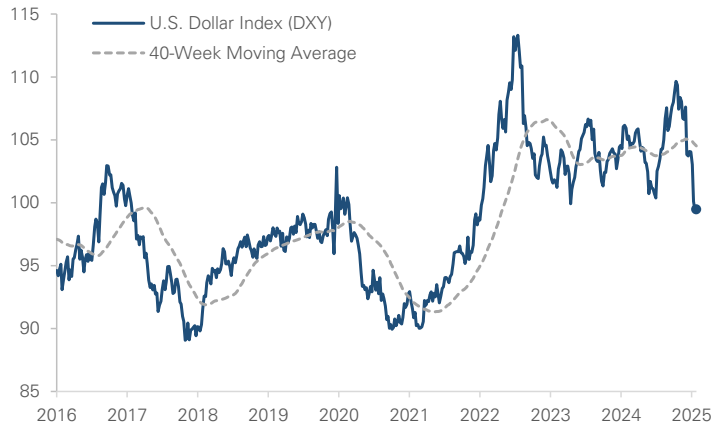
Historical Relationship Since 2005



Source: MarketDesk Quant Pack

Figure 102 – U.S. Dollar Index Over the Last 10 Years

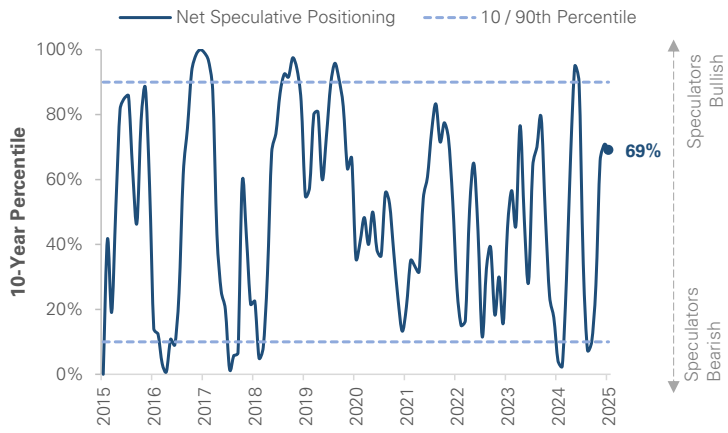
Recent USD History



Source: MarketDesk Quant Pack

Figure 103 – Net Speculative Positioning in USD Futures

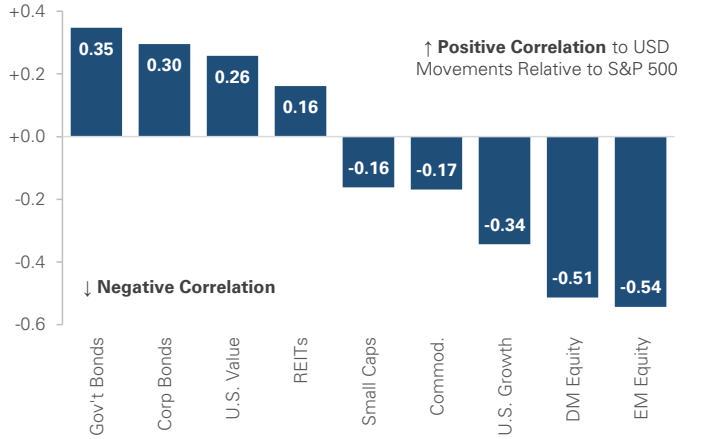
10-Year Percentile for Historical Context



Source: MarketDesk Quant Pack, Commodity Futures Trading Commission (CFTC)

Figure 104 – Asset Class Correlation to USD Movements

Calculations Based on Relative Y/Y Returns vs USD over the Last 20 Years



Source: MarketDesk Quant Pack

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