MILL STREET RESEARCH

Combining Asset Allocation With Stock Selection Tools

EXCLUSIVE PRESENTATION FOR:

InteractiveBrokers

PREPARED BY:

Sam Burns, CFA

Chief Strategist

info@millstreetresearch.com

508-655-1896

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Contents

An overview of one of our asset allocation tools, the Short-Term Risk Model

- Our views on asset allocation indicators and models
- How our Short Term Risk Model works
- Results of our studies

The benefits of using asset allocation indicators alongside stock selection models

- How the market backdrop can affect the efficacy of stock selection tools
- The ways we use our asset allocation and stock selection tools together

Asset Allocation: Strategic vs. Tactical

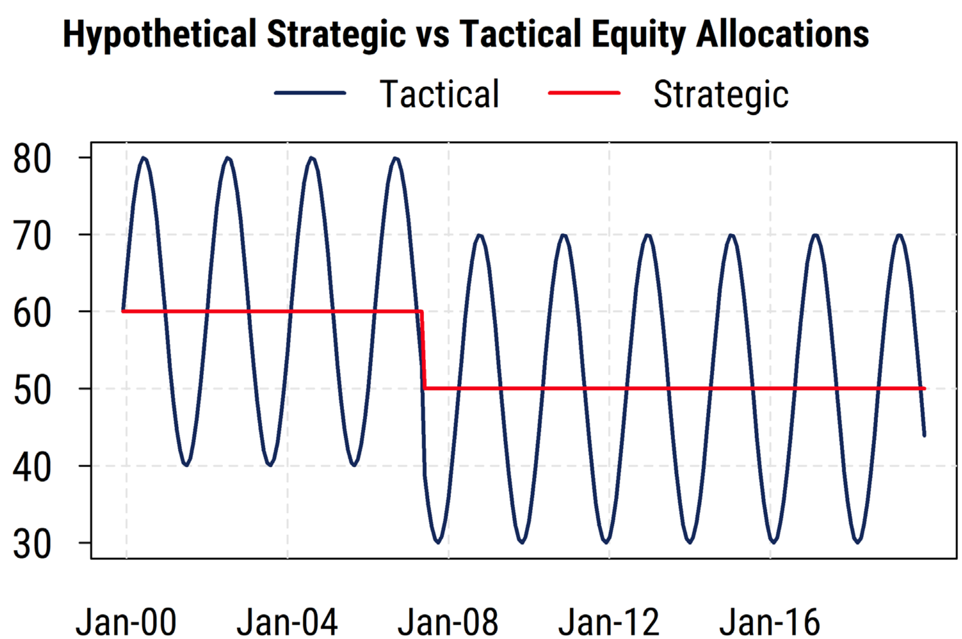
Asset allocation decisions are most often driven by an investor's risk appetite and time horizon.

Two main flavors:

- **Strategic = long-term benchmark allocations**

  versus

- **Tactical = shorter-term deviations from strategic benchmark**



Risk On / Risk Off

Which assets are in your investable universe?

– Stocks/bonds/cash
– Commodities
– Currencies
– Real estate
– Private equity/debt
– Hedge fund strategies

Our focus today:
Stocks vs. Bonds/Cash

Tactical Allocation

- Our time horizon here is "tactical" -- not strategic

For our clients this typically means a 1 - 6 month horizon

- We seek indicators that help predict both returns and risk (volatility)

- A multi-factor approach is (still) key

- We try to make indicators global

- We can mix indicators with different "speeds"

Investor behavior and macro backdrop

For tactical indicators, we rely on investor behavior measures along with market-based macro inputs.

Drivers for our equity risk indicators can be put in two categories:

EQUITY MARKET BASED

- Trend/momentum
- Volatility
- Risk appetite
- Short-term sentiment

CROSS-ASSET

- Credit risk
- Monetary policy
- Global growth/inflation

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Our Short-Term Risk Model

- Our key Short-Term Risk Model has eight indicators
- Percentile scores (0-100%), 100% is most bullish (lowest risk)
- Indicators are equally weighted to produce the composite percentile score

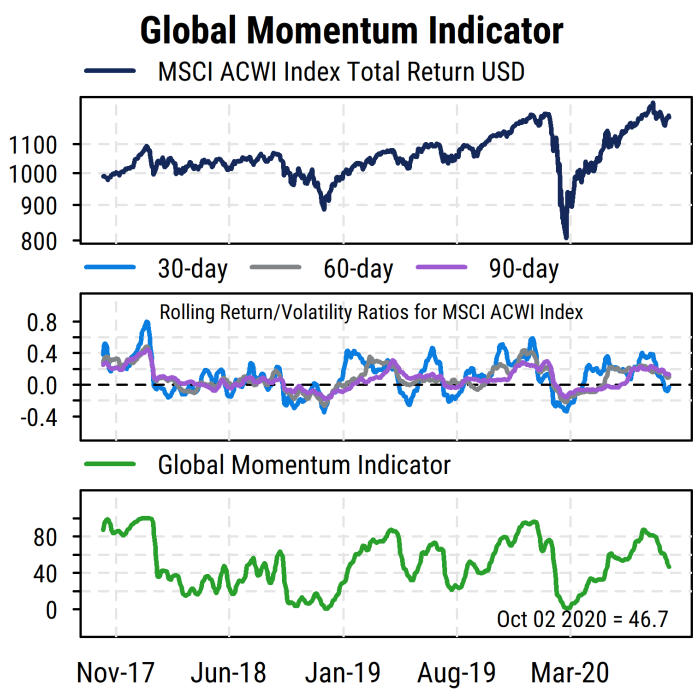
Short-Term Risk Model Indicators
02 Oct 2020

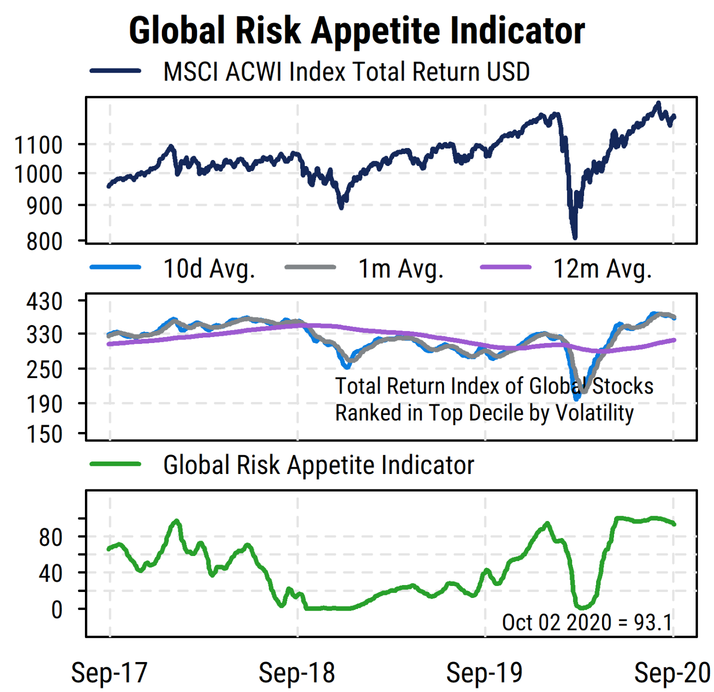
Indicator	Current	1-month Change
Global Equity Volatility	73%	13%
Global Risk Appetite	93%	-6%
Global Momentum	47%	-34%
Global VIX Divergence	95%	1%
Global Credit Risk	100%	0%
Fed Expectations	55%	4%
Global Real Yield	67%	7%
Global Metals	63%	36%
Short-Term Risk Model	**74%**	**3%**

Momentum and Risk Appetite

- **Shorter-term momentum:** combines 1, 2, and 3 month rolling ***risk-adjusted*** returns of MSCI ACWI
- Higher risk-adjusted momentum is better

- **Risk Appetite:** tracks performance of most volatile global stocks relative to 12-month average
- Stronger trend in risky stocks is better



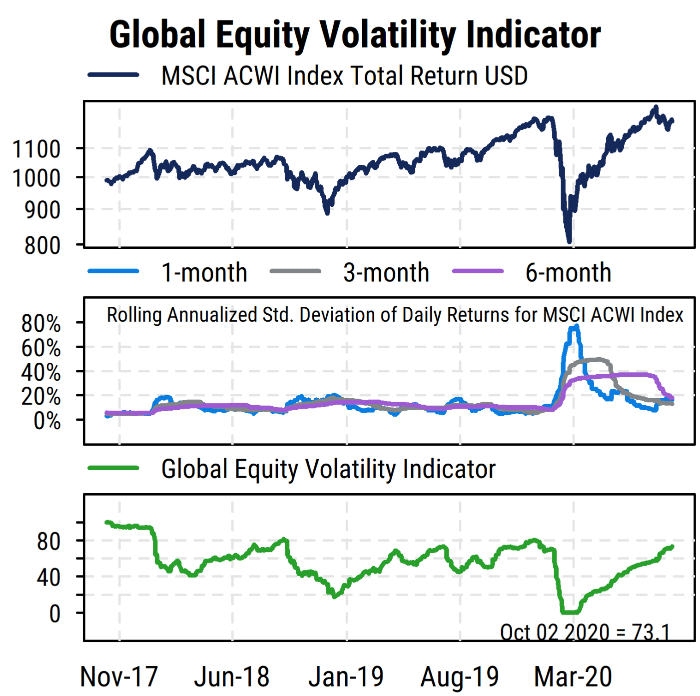


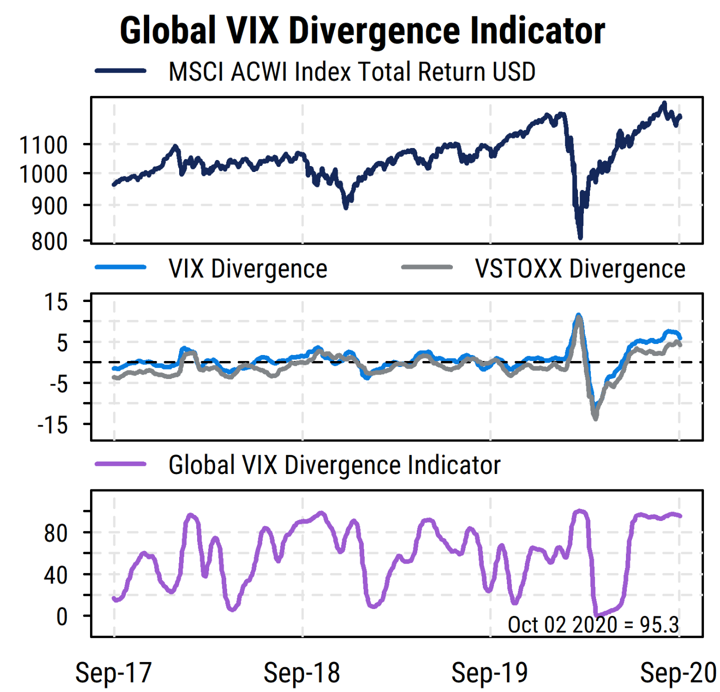
Source: Mill Street Research, Factset, Bloomberg

Equity Volatility and Option Sentiment

- **Equity Volatility:** combined 1, 3, and 6 month rolling volatility of MSCI ACWI
- Lower volatility is better

- **VIX Divergence:** US VIX and Europe VSTOXX implied option volatility relative to realized volatility
- VIX/VSTOXX being "too high" versus actual volatility is a favorable contrarian sentiment measure



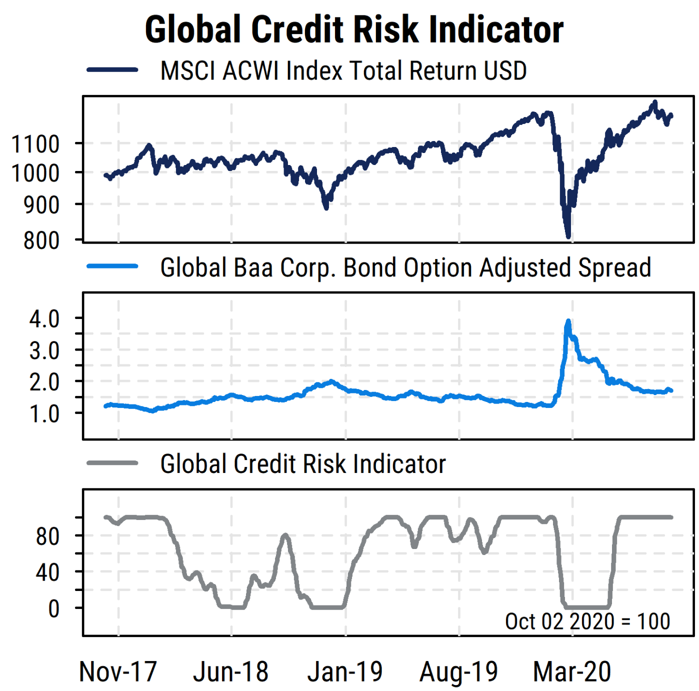


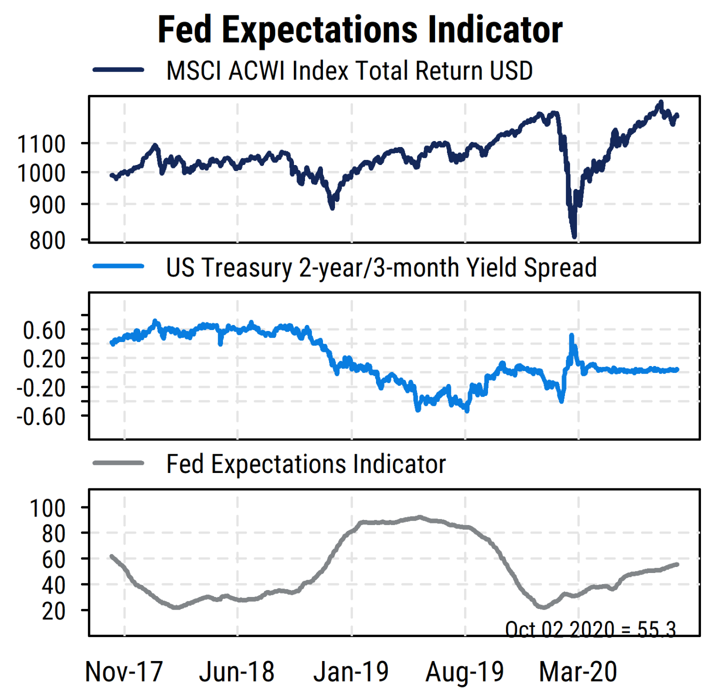
Source: Mill Street Research, Factset, Bloomberg

Credit Risk and Fed Policy

- **Credit Risk:** change in global Baa-rated corporate bond spreads
- Falling credit spreads are better: lower credit risk, higher risk appetite

- **Fed Expectations:** direction of the spread between 2-year and 3-month Treasury yields
- Lower spreads are better: Fed rate cuts expected, favorable monetary support for asset prices



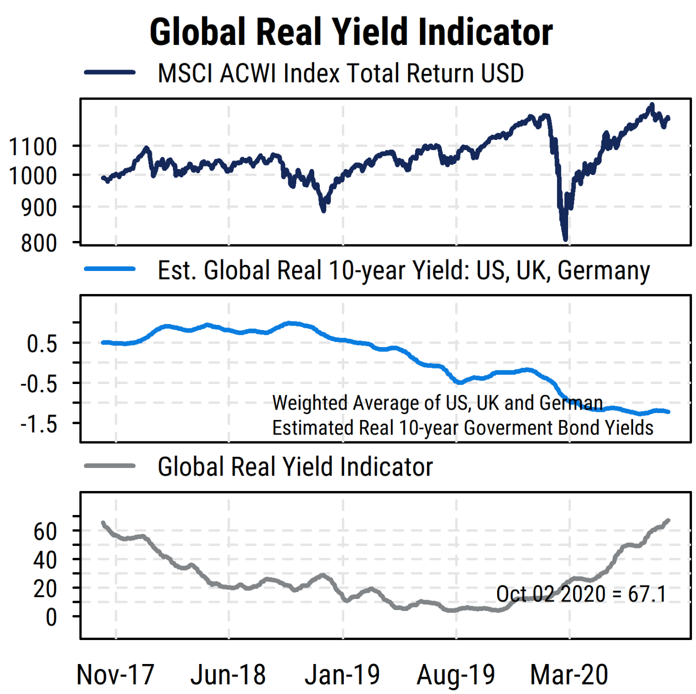


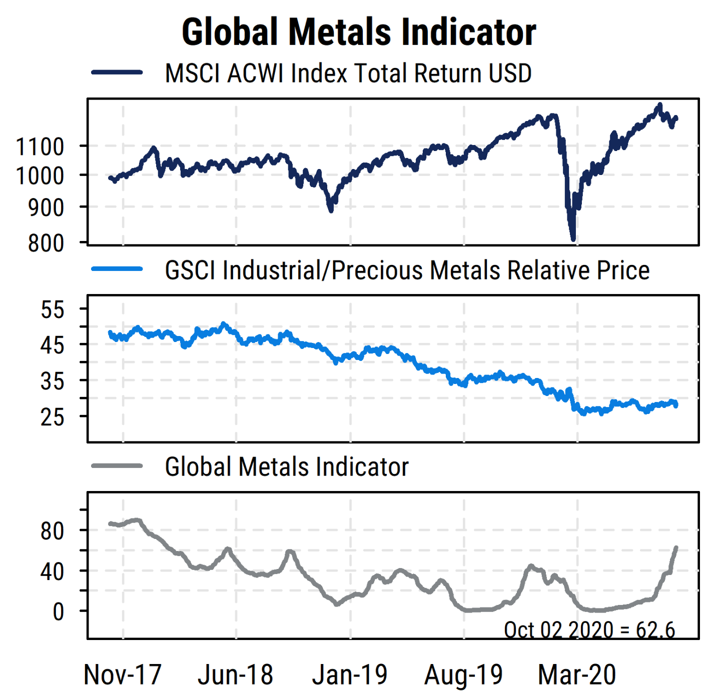
Source: Mill Street Research, Factset, Bloomberg

Real Yields and Metals Prices

- **Real Yield:** level of lagged real government bond yields (US, UK, German yields minus inflation)
- Falling real yields are better: stimulative for growth and corporate profits, with a lag

- **Global Metals:** trend in ratio of industrial metals prices to precious metals prices
- Rising ratio is better: industrial metals track global growth, precious metals reflect inflation/ currency worries



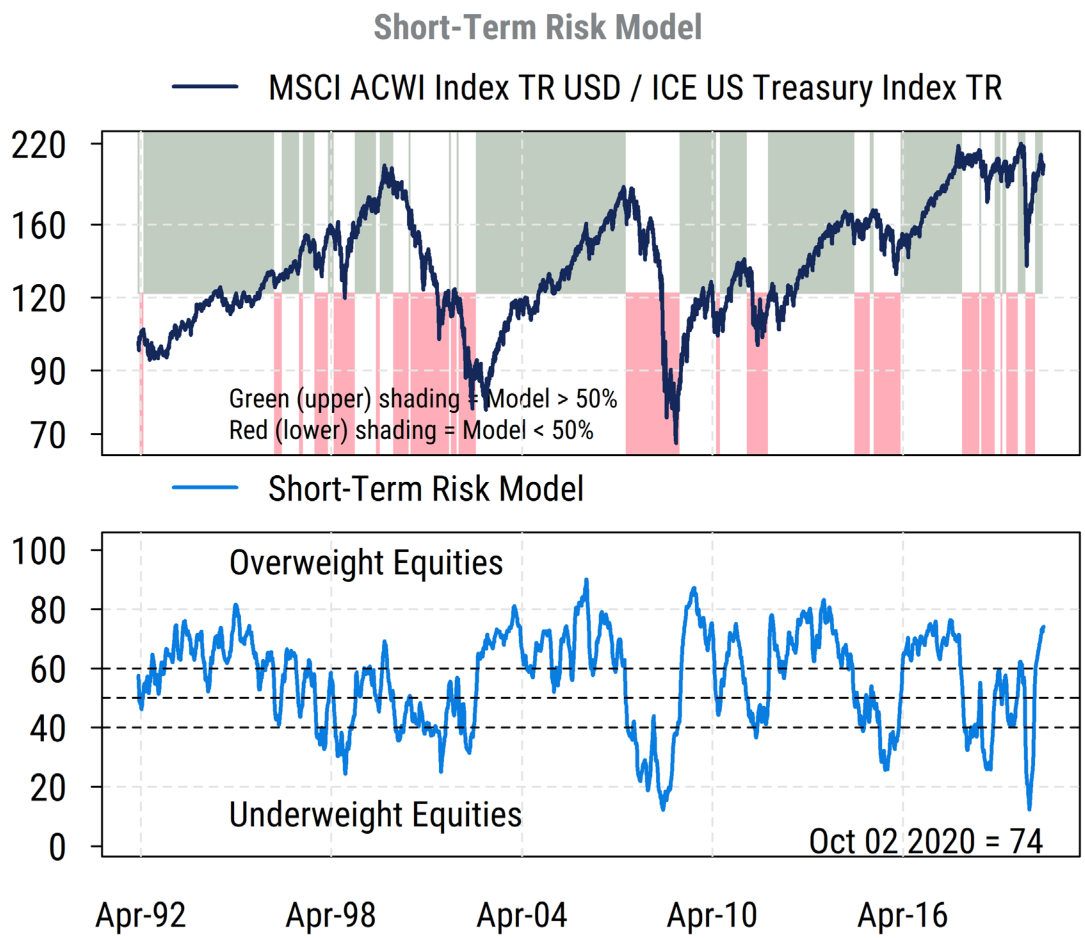


Source: Mill Street Research, Factset, Bloomberg

The Model

The composite eight-indicator model has data back to 1992

- Above 60% is most bullish (lowest risk)
- Below 40% is most bearish (highest risk)



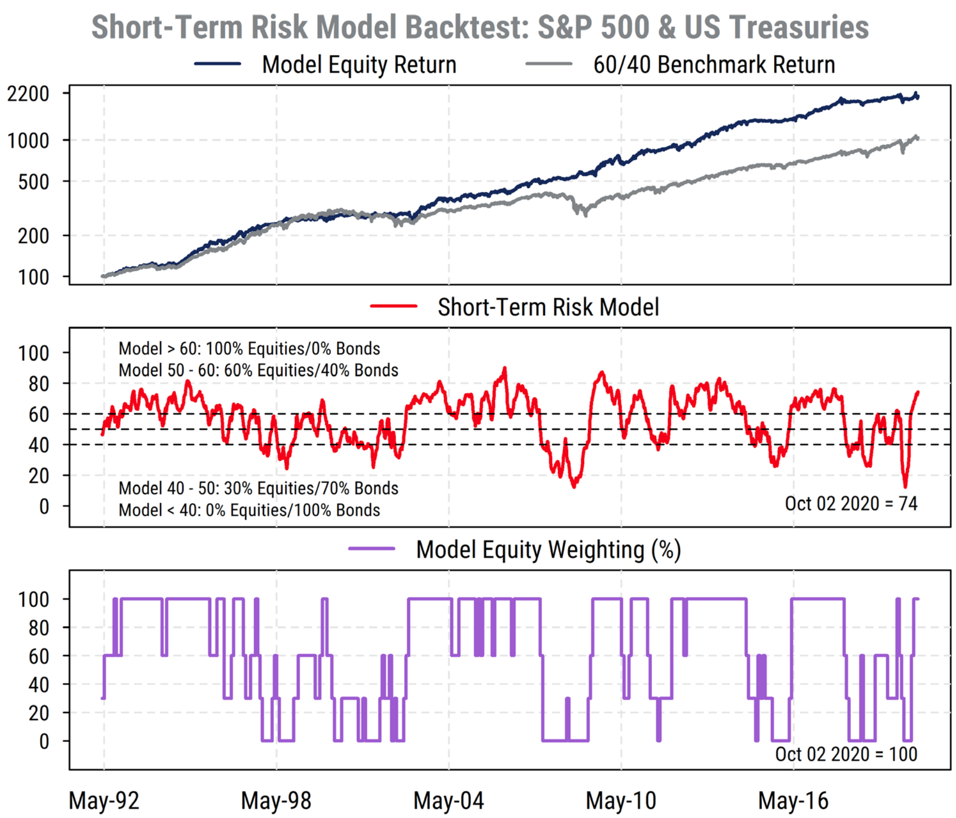
Source: Mill Street Research, Factset, Bloomberg

Model Backtest Results

Test of using model for tactical allocation relative to fixed 60/40 stock/bond portfolio

- High model readings = overweight stocks, underweight bonds
- Low model readings = underweight stocks, overweight bonds

Backtest shows higher returns, similar risk to 60/40, much lower drawdowns, even after costs



Short-Term Risk Model - Backtest Results for S&P 500

Apr 1992 - Oct 2020	Global ERM	60/40 Benchmark	S&P 500 Index
Annualized Return (%)	11.37	8.63	10.01
Std. Dev. of Returns (%)	10.26	10.83	18.57
Sharpe Ratio	0.87	0.57	0.41
Information Ratio	0.27	0	0.29
Max. Drawdown (%)	-14.4	-32.6	-55.3

Equity weighting changed every 2-3 months on average

NOTE: All results shown above are hypothetical and do not represent any actual trading. Mill Street Research does not manage money. The results shown do not include important considerations such as taxes, and may not have been achievable in practice. See important disclosures at the end of this document.

Source: Mill Street Research, Factset, Bloomberg

Holding Period Results

Test results below show average returns and risk (volatility) over fixed 1, 3, and 6 month holding periods

For stocks (US or Global), high (60+) readings show much higher returns and about half the risk of low (<40) readings

Short-Term Risk Model: Average Future Returns (%) Apr 1992 - Oct 2020

Range	ACWI Next6m	SP500 Next6m	Treas Next6m	ACWI Next3m	SP500 Next3m	Treas Next3m	ACWI Next1m	SP500 Next1m	Treas Next1m
60 - 100	7.37	7.94	1.97	3.49	3.73	0.88	1.15	1.19	0.23
50 - 60	4.59	5.28	3.01	1.93	2.20	1.69	0.57	0.80	0.65
40 - 50	-0.83	1.52	3.85	0.32	1.18	1.97	0.25	0.41	0.62
0 - 40	0.05	1.41	2.97	-0.21	0.91	1.61	-0.11	0.31	0.65
AllPer	4.32	5.32	2.62	2.08	2.57	1.32	0.69	0.85	0.44

Higher model readings followed by higher returns on average for US and Global stock indices. Bonds have beaten stocks at lower readings.

Short-Term Risk Model: Std. Deviation of Daily Returns (%) Apr 1992 - Oct 2020

Range	ACWI Next6m	SP500 Next6m	Treas Next6m	ACWI Next3m	SP500 Next3m	Treas Next3m	ACWI Next1m	SP500 Next1m	Treas Next1m
60 - 100	0.65	0.77	0.25	0.65	0.77	0.25	0.62	0.73	0.24
50 - 60	0.80	1.04	0.27	0.77	1.01	0.27	0.72	0.97	0.26
40 - 50	1.02	1.30	0.30	0.93	1.17	0.28	0.89	1.13	0.27
0 - 40	1.19	1.49	0.33	1.19	1.51	0.33	1.19	1.52	0.32
AllPer	0.83	1.03	0.27	0.81	1.00	0.27	0.78	0.97	0.27

Equity risk (volatility) declines as the model reading rises over all three time horizons

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Source: Mill Street Research, Factset, Bloomberg

Key Points

Using objective, tested indicators helps avoid emotions and biases

Forecasting both risk and return is important

Use a multi-factor approach and think about your time horizon

Construct and test indicators carefully

Combining Risk Model + Stock Selection

MAER is the **Monitor of Analysts' Earnings Revisions**, Mill Street's proprietary stock selection tool. It is made up of two key components:

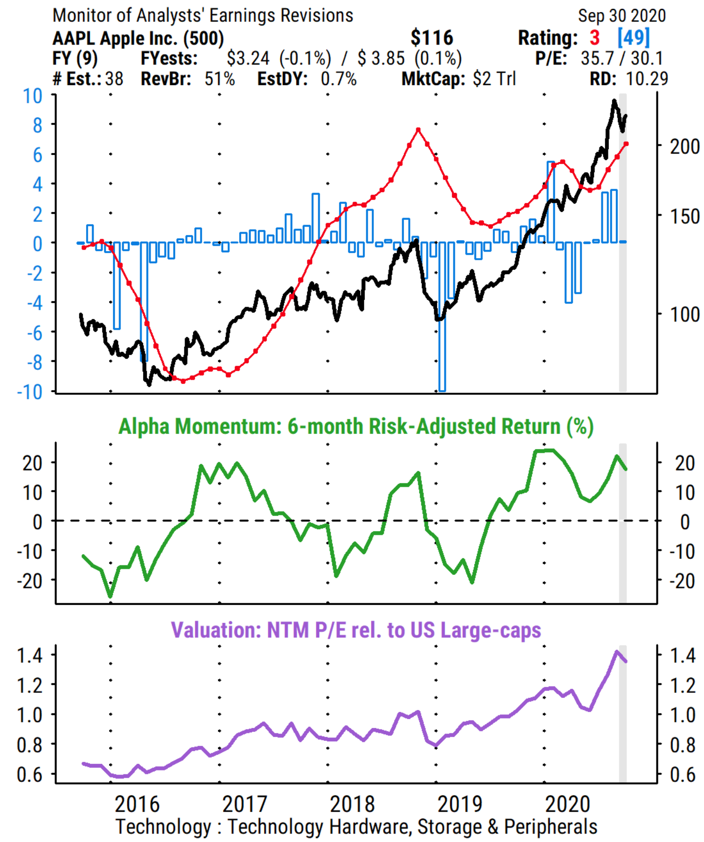
A Multi-Factor Ranking Model

Top 20 Ranked Global Large-Cap Stocks

Ticker	Name	Composite MAER Rank
UBSG-CH	UBS Group AG	1.000
RIO-GB	Rio Tinto plc	0.999
GIS-US	General Mills	0.998
LEN-US	Lennar	0.997
LEN.B-US	Lennar	0.996
NEM-US	Newmont	0.995
DHI-US	D.R. Horton	0.994
WY-US	Weyerhaeuser Company	0.993
BHP-GB	BHP Group Plc	0.992
KR-US	Kroger	0.991
CHU-US	China Unicom (Hong Kong)	0.990
FMG-AU	Fortescue Metals Group	0.989
GOLD-US	Barrick Gold	0.988
FDX-US	FedEx	0.987
W-US	Wayfair	0.986
SWK-US	Stanley Black & Decker	0.985
MS-US	Morgan Stanley	0.984
CTAS-US	Cintas	0.982
9843-JP	Nitori Holdings	0.981
BHP-AU	BHP Group	0.980

NOTE: The list above is for demonstration purposes only and is not a recommendation to buy or sell any security.

MAER Charts



Source: Mill Street Research, Factset, Bloomberg

MAER Stock Selection Drivers

Key drivers, in order of importance in our model:

- **Earnings estimate revisions**: a measure of "fundamental momentum" that works well on one- to six-month horizons.
- **Price momentum and mean reversion**: intermediate-term trend/momentum along with short-term price reversal tendencies.
- **Valuation**: both absolute and relative valuation, used as longer-term measures of mean-reversion and risk control.

Fundamental Momentum:
Earnings estimate revisions breadth and magnitude

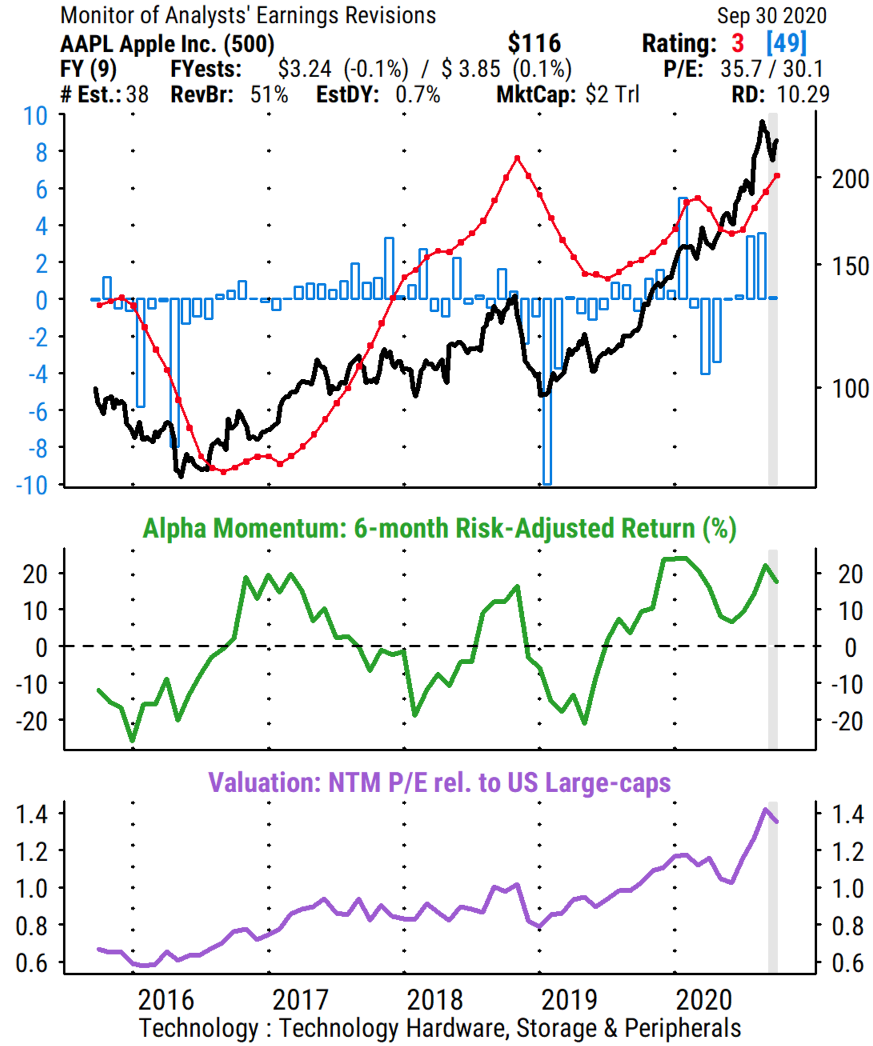
Price Action:
Risk-adjusted six-month momentum & one-month mean reversion

Valuation:
Absolute and relative forward earnings yield

MAER Charts

MAER charts incorporate a significant amount of current and historical information into a single picture and provide useful context for the indicators and rankings.

- The main section of the chart depicts the trends in analyst estimate revisions for each stock over the last five years, showing both the direction and magnitude of the monthly revisions activity. These indicators are overlaid on ***relative*** returns.
- In addition to the revisions indicators, it plots our measure of risk-adjusted six-month price momentum (Alpha Momentum) and relative valuation based on forward P/E.
- The header data shows current values for key variables for the company.



Source: Mill Street Research, Factset, Bloomberg

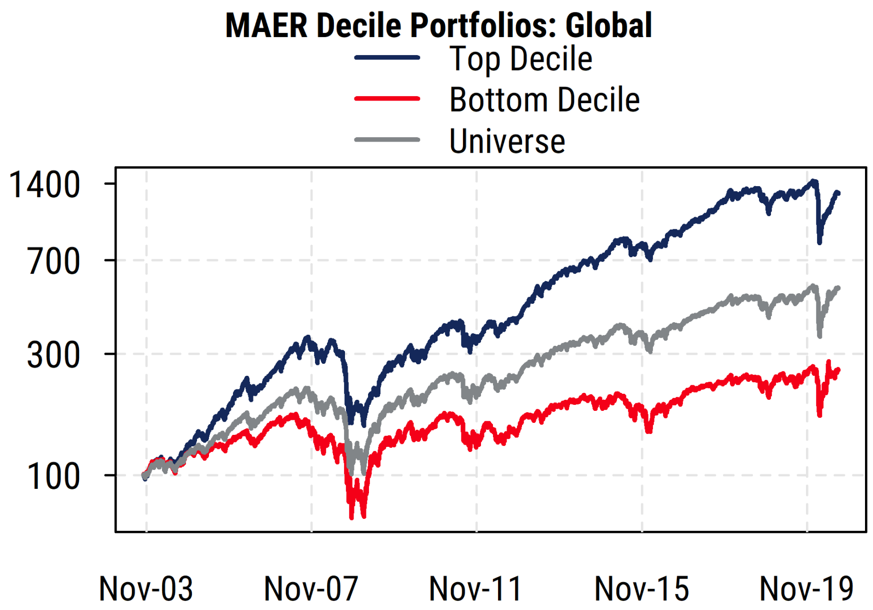
MAER Ranking

The **MAER Ranking Model** uses six inputs to objectively rank stocks in any universe and help identify stocks with the most, or least, favorable combination of earnings revisions, price action and valuation. The indicators and their weights have been fixed since the model was developed in 2013. They were chosen to reflect the relative importance of each input for a 3-6 month forecasting horizon and manage risk and turnover.

INDICATOR	WEIGHTING
• Revisions breadth	30%
• Revisions magnitude	20%
Revisions inputs total	**50%**
• Alpha Momentum	20%
• Prior month return	10%
Price inputs total	**30%**
• Relative forward earnings yield vs. history	10%
• Absolute earnings yield	10%
Valuation inputs total	**20%**

MAER Ranking Backtest Results

This test of our global MAER universe assumes holding top or bottom decile stocks in the ranking, rebalanced monthly.
Top-ranked stocks show significantly higher returns bottom-ranked stocks on average, with less risk.



	Top Decile	Universe	Bottom Decile
Ann. Return (%)	16.4	10.6	5.8
Ann. Volatility (%)	17.5	16.2	18.6
Sharpe Ratio	0.86	0.57	0.24
Maximum Drawdown (%)	-55	-54	-61

Source: Mill Street Research, Factset, Bloomberg

All returns shown are hypothetical percentage total returns in local currency for equal-weighted portfolios based on monthly rebalancing using the MAER ranking process. "Universe" = benchmark returns based on equal-weighted total return for full indicated MAER universe as of each monthly rebalancing. Data for May 2003 - Sep 2020.

NOTE: All results shown above are hypothetical and do not represent any actual trading. Mill Street Research does not manage money. The results shown do not include important considerations stuch as transactions costs or taxes, and may not have been achievable in practice. See important disclosures at the end of this document.

Impact of Risk Model on MAER Results

The Short-Term Risk Model helps forecast overall equity returns and volatility

It also helps identify when MAER ***relative*** performance is stronger or weaker

Biggest effect is in the riskiest periods (very low risk model readings)

WHEN RISK MODEL > 40%

Global MAER universe	**Top Decile**	**Bottom Decile**
Ann. 1-mth Return (%)	21.3	6.9
Ann. 1-mth Volatility (%)	16.2	14.6

About 80% of the time
Top decile strongly outperforms bottom decile when model is outside of bearish territory.

Volatility is moderate for both deciles.

WHEN RISK MODEL < 40%

Global MAER universe	**Top Decile**	**Bottom Decile**
Ann. 1-mth Return (%)	-7.0	-0.4
Ann. 1-mth Volatility (%)	26.4	36.4

About 20% of the time
Top decile underperforms bottom decile when model is in high-risk territory.

Volatility is significantly higher, and more extreme for the bottom decile.

Source: Mill Street Research, Factset, Bloomberg

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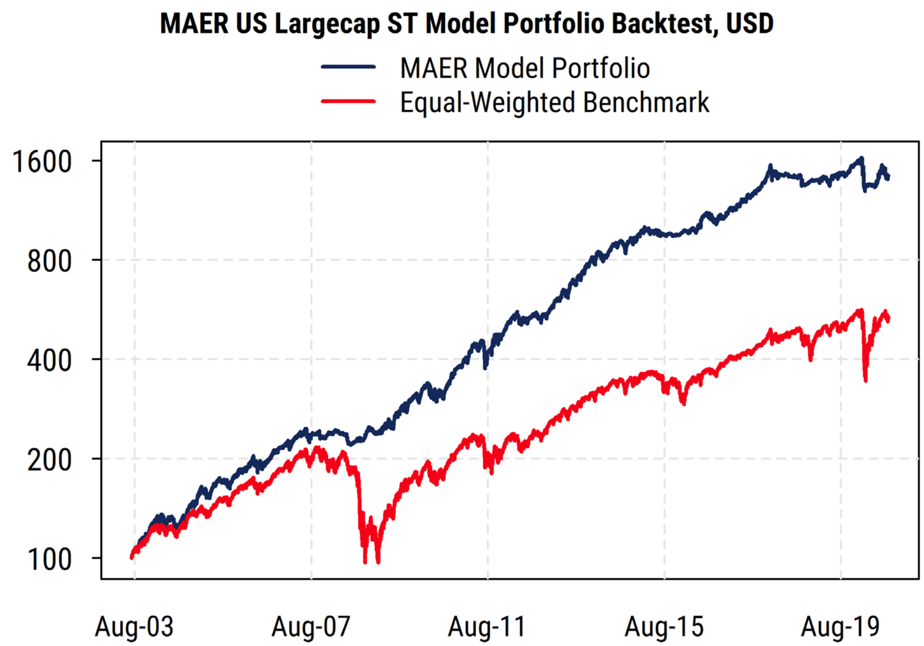
More Backtests Did You Say?

We also do tests using "model portfolios" of 50 stocks that take turnover and transactions costs into account.

The test below is for US large-caps, and assumes being 100% invested in the model portfolio when the Short-Term Risk Model is above 40%, and switching to Treasuries when below 40% (no leverage).



MAER US Largecap ST (USD)
Aug 2003 - Sep 2020

	Composite Strategy	Benchmark
Annualized Return (%)	16.77	10.24
Annualized Std. Dev. (%)	13.39	20.86
Sharpe Ratio	1.16	0.43
Sortino Ratio	1.65	0.60
Beta vs. Benchmark	0.35	1.00
Annualized Alpha (%)	12.28	0.00
Information Ratio	0.25	0.00
Max. drawdown (%)	-20.9	-55.4
Avg. Equity Allocation (%)	81	100

NOTE: All results shown above are hypothetical and do not represent any actual trading. Mill Street Research does not manage money. The results shown do not include important considerations stuch as taxes, and may not have been achievable in practice. See important disclosures at the end of this document.

Source: Mill Street Research, Factset, Bloomberg

Why?

Why are stock selection models less reliable in extreme market conditions?

- **Volatility**:

  Extreme volatility -- forced trading, usually selling (leverage, derivatives, risk rules, etc.)

  Often more violent short-term reversals -- momentum strategies cannot work

- **Lack of differentiation**:

  Extreme economic conditions -- almost all estimate revisions are negative

  All stocks falling -- price momentum is only about “which is down less”

  Widespread negative earnings -- valuations based on P/E become less meaningful

- **Macro influence**:

  Fed (central bank) impact -- “whatever it takes”, free money, fundamentals don’t matter

  Fiscal effects -- stimulus, tax changes, bond issuance

  Rules change -- short selling bans, new accounting rules, brokerage margin requirements changed

Key Points

Asset allocation tools can help improve stock selection

Combine "top down" and "bottom up" indicators

Many stock selection models do not work as well in "extreme" environments

High volatility, panic, extraordinary monetary and fiscal policy interventions

Construct and test indicators carefully and independently

Need intuitive and quantitative support, reliable data, proper techniques

A simple rule for our Short-Term Risk Model is:

- Stay invested and use MAER to help guide stock selection when model is above 40%
  This has been true about 80% of the time historically
- Exit stocks or shift strategies when model goes below 40%.
  Shift to safer assets, use defensive strategies, become more tactical

Trader Ideas Report

TRADER IDEAS

Best & Worst Ranked S&P 500 Stocks
PLUS **Our Short-Term Equity Risk Model**

PREPARED EXCLUSIVELY FOR
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Current Market Outlook

The S&P 500 has now declined for four consecutive weeks, though only modestly in the last two weeks. Lack of progress on new fiscal support for the economy and the upcoming November elections remain a concern for investors, as do concerns about worsening COVID-19 trends. Support for stocks continues to come from perceptions of continued Fed stimulus and progress toward a COVID-19 vaccine, along with the unattractive returns on cash and Treasury bonds now.

Away from the headlines, our proprietary Short-Term Risk Model provides an objective, multi-factor model reading to gauge the risk for the equity market over the next 1-3 months.

Short-Term Risk Model: Bullish

The current model reading of 74% on the 0-100% scale is up slightly despite the market's recent pullback, and remains a favorable backdrop for stock prices in the near-term.

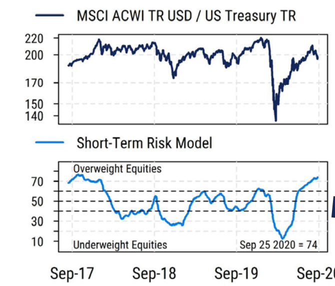
The eight indicators that comprise the **Short-Term Risk Model** are a mixture of **equity market indicators** and **cross-asset inputs** from fixed income and commodities. We do not use economic and valuation indicators in this model, as they tend to capture longer-term influences. All of the readings are percentiles (0-100%) and the model reading is the average of the eight percentile scores.

The table at right shows that the model reading remains above its level from a month ago. The Global Momentum indicator has weakened alongside the market's correction in recent weeks.

This has been offset by improvement in the Global Metals indicator. This indicator uses the relative returns of industrial metals (copper, aluminum, zinc, etc.) versus precious metals (gold, silver) as a measure of global growth versus inflation/currency worries. It has improved recently after being a negative influence for quite some time.

The equity market continues to show signs of a trading range environment, with increased rotation among styles and sectors. The model argues against a major decline unfolding right now, but volatility may remain somewhat elevated as the risks of the November elections, COVID-19, and potential policy activity garner more attention in investors' minds.

Short-Term Risk Model



MSCI ACWI TR = MSCI All-Country World Index Total Return Index
US Treasury TR = Merrill Lynch/BofA US Treasury Total Return Index

Short-Term Risk Model updated weekly

Short-Term Risk Model Indicators
25 Sep 2020

Indicator	Current	1-month Change
Global Equity Volatility	72%	15%
Global Risk Appetite	96%	-4%
Global Momentum	57%	-24%
Global VIX Divergence	96%	4%
Global Credit Risk	100%	0%
Fed Expectations	55%	4%
Global Real Yield	65%	7%
Global Metals	51%	32%
Short-Term Risk Model	**74%**	**4%**

Source: Mill Street Research, Factset, Bloomberg

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About the Firm

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- Sam has over 20 years of experience as a market strategist, providing analysis and commentary to institutional investors globally.
- Prior to founding Mill Street Research in 2016, Sam Burns, CFA worked as a senior strategist at leading firms including Oppenheimer & Co., Brown Brothers Harriman, State Street Global Markets, and Ned Davis Research.
- Mill Street Research provides a suite of consistently updated research reports and data for institutional investors covering asset allocation, country allocation, sector and industry selection, and a robust quantitative stock selection process.
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MILL STREET
RESEARCH

P.O. Box 282
Sherborn, MA 01770
www.millstreetresearch.com

MARKETING AFFILIATE:

BlueFox

(212) 452-3115
info@millstreetresearch.com