

MERCURIAL | RESEARCH

WHITEPAPER

Framework

This whitepaper serves to provide clarity on the underpinnings of our top-down data-driven asset allocation framework.

The active asset allocation framework shown is based on our attempts to time the business cycle which we consider as the main driver of asset price fluctuations over a prolonged period.

It consists of getting the economic regime right followed by managing our trades with our proprietary indicators.

The inputs to our business cycle or economic regime, in this case, are economic growth and inflation. We use OECD Composite leading indicator (CLI) as our real GDP year-over-year proxy and non-seasonally adjusted nominal inflation numbers provided by the U.S. Bureau of Labor Statistics.

Our Volatility Implied Ranges and Price Memory Convergence Divergence indicators will then be used to manage our trades. The workings behind both models are based on theories developed by Benoit Mandelbrot rescaled ranges and Harold Edwin Hurst's Hurst exponents.

A basic understanding of macroeconomics, implied volatilities and statistical analysis should suffice in the understanding of this whitepaper. Should the process not be suitable, we hope that the reader would have found a tool to be used independently from the investment toolkit provided.

Our ETF Universe

ETFs will be used as proxies for backtesting how a particular industry/sector/factor etc. will perform given specific conditions.

With low or no costs fees involved, ETFs are a good proxy to implement an active risk management approach to portfolio management.

There are 63 ETFs in our universe which are divided into 5 categories or asset classes.

- 1) Equities
- 2) Style Factors
- 3) Fixed Income
- 4) Commodities
- 5) Currencies

Sectors		Style Factors		Fixed Income		Commodities		Currencies	
Utilities	XLU	Small-Cap	IJR	Convertibles	CWB	Base Metals	DBB	US Dollar	UUP
Healthcare	XLV	Small-Cap Value	IJS	High Yield	HYG	Corn	CORN	Pound	FXB
Consumer Staples	XLP	Small-Cap Growth	IJT	Leverage Loans	BKLN	Gasoline	UGA	Euro	FXE
Technology	XLK	Mid-Cap	IJH	BCDs	BIZD	Gold	GLD	Japanese Yen	FXJ
Energy	XLE	Mid-Cap Value	IJJ	TIPS	TIP	Agricultural	DBA	EM FX	CEW
Communications	IYZ	Mid-Cap Growth	IJK	Short Dur. TSY	SHY	Natural Gas	UNG	G10 FX	UDN
Industrials	XLI	Large-Cap	OEF	MBS	MBB	Oil	USO	Swiss Franc	FXF
Real Estate	VNQ	Large-Cap Value	IVE	Med. Duration Treasuries	IEF	Silver	SLV	Australian Dollar	FXA
Materials	XLB	Large-Cap Growth	IVW	IG Credit	LQD	Soybeans	SOYB	Canadian Dollar	FXC
Financials	XLF	Dividend	SPHD	Municipals	MUB	Wheat	WEAT		
Consumer Discretionary	XLY	Defensives	DEF	Long Dur. TSY	TLT	Wood	WOOD		
		Quality	QUAL	Preferred	PFF	Copper	CPER		
		Low Volatility	SPLV			Cocoa	NIB		
		High Beta	SPHB			Cotton	BAL		
		Momentum	MTUM			Coffee	JO		
						Sugar	SGG		

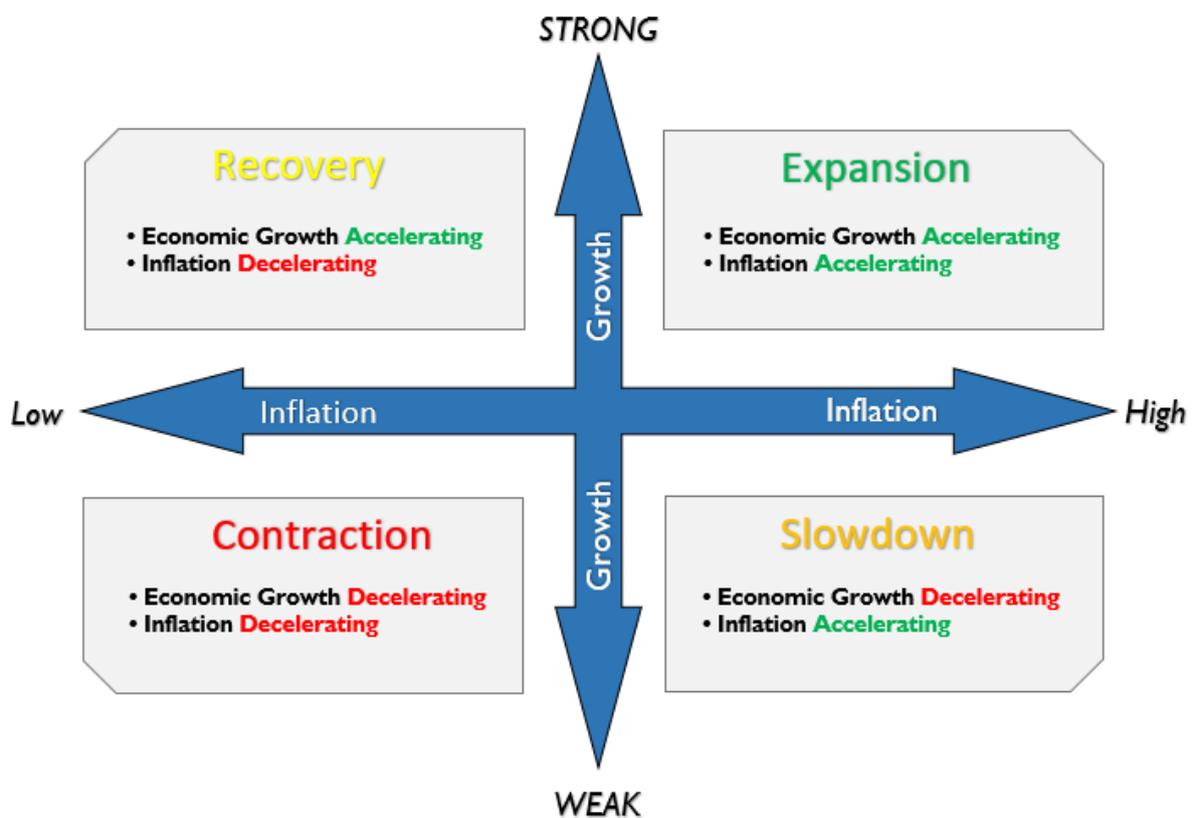
Economic Regimes

The business cycle reflects the fluctuations of economic activity of which determines asset performance over the intermediate-term.

Our approach seeks to identify the shifting economic phases, providing a framework for making asset allocation decisions according to the probability that assets may outperform or underperform.

We do this by tracking both economic growth and inflation on a year-over-year, rate of change basis which helps us identify 4 possible economic regimes:

- 1) **Recovery** (Growth accelerating, Inflation decelerating)
- 2) **Expansion** (Growth accelerating, Inflation accelerating)
- 3) **Slowdown** (Growth decelerating, Inflation accelerating)
- 4) **Contraction** (Growth decelerating, Inflation decelerating)



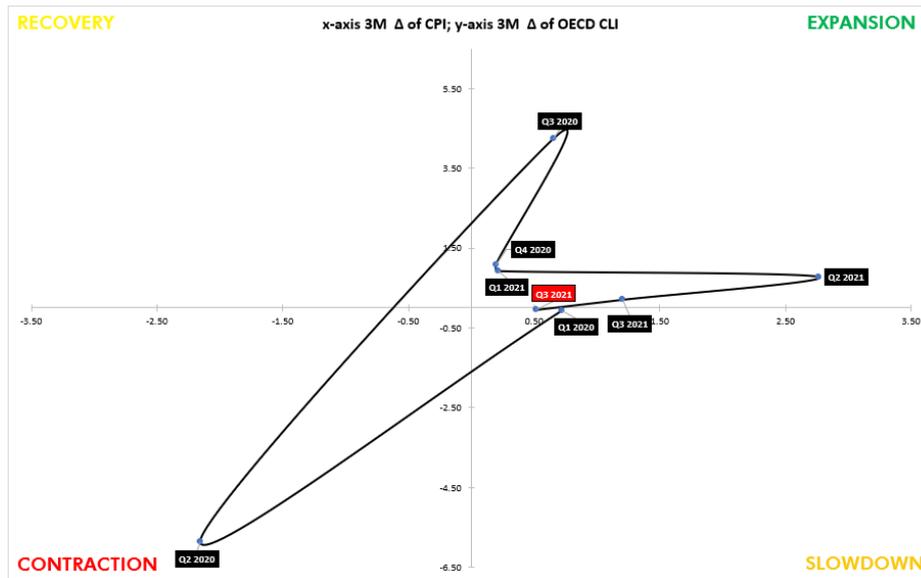
Therein lies the problem of knowing future economic regimes to better position portfolios. By tracking leading indicators of both economic growth and inflation, it serves to help in having a preconceived bias on where the economy is heading towards.

United States Economic Indicators	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
Real GDP YoY		12.2			4.9	
Leading Indicators OECD: Leading Indicators: CLI: Normalised for the United States	100.2	100.3	100.4	100.4	100.4	100.4
Industrial Production: Total Index YoY	17.9	16.4	10.2	6.9	5.7	4.6
Exports of Goods and Services, Balance of Payments Basis YoY	37.8	42.9	32.3	24.5	22.6	
Retail Sales: Retail Trade Less Food Services & Drinking & Building Materials & Supplier Dealers YoY	31.3	18.3	13.6	9.5	12.3	
ISM Manufacturing PMI	60.7	61.2	60.6	59.5	59.9	61.1
ISM Services PMI	62.7	64.0	60.1	64.1	61.7	61.9
University of Michigan: Consumer Sentiment	88.3	82.9	85.5	81.2	70.3	72.8
Business Tendency Surveys for Manufacturing: Confidence Indicators: Composite Indicators: OECD Indicator for the United States	102.0	101.9	101.7	101.6	101.6	101.8
Consumer Opinion Surveys: Confidence Indicators: Composite Indicators: OECD Indicator for the United States	99.8	99.8	99.6	99.3		
Total Nonfarm Payrolls YoY	10.9	9.0	5.8	5.3	4.3	
Total Nonfarm Private Payroll Employment YoY	10.2	7.9	4.5	4.6	4.5	4.2
Average Weekly Hours of Production and Nonsupervisory Employees, Total Private YoY	2.4	0.6	0.6	0.6	0.3	0.3
Average Hourly Earnings of Production and Nonsupervisory Employees, Total Private YoY	1.2	2.4	3.8	4.8	4.8	5.5
Job Openings: Total Nonfarm YoY	98.6	74.1	66.6	62.8		
U6-U3 Unemployment YoY	-16.2	-14.9	-11.6	-10.4		
Real Personal Consumption Expenditures YoY	25.4	15.1	9.3	7.4	7.4	6.2
Personal Consumption Expenditures YoY	29.9	19.7	13.8	11.9	11.9	10.9
Retail Sales: Retail Trade and Food Services YoY	-2.9	-0.7	0.5	0.7	4.4	2.3
Disposable Personal Income YoY	40.0	24.0	16.7	13.2	14.6	
Retail Sales: Food Services and Drinking Places YoY	122.1	74.8	40.7	38.0	32.3	
New Privately-Owned Housing Units Authorized in Permit-Issuing Places: Total Units YoY	58.4	35.1	23.0	5.7	13.1	-0.2
Total Vehicle Sales YoY	109.6	39.8	18.6	0.2	-14.5	-24.8
Capacity Utilization: Total Index YoY	17.9	16.4	10.1	6.8	5.5	4.4
Manufacturers' New Orders: Total Manufacturing YoY	34.7	31.2	22.4	16.3	16.0	
Manufacturers' New Orders: Nondefense Capital Goods Excluding Aircraft YoY	25.8	23.6	19.0	15.9	13.7	13.2
Imports of Goods and Services: Balance of Payments Basis YoY	34.7	37.9	35.2	22.2	20.6	
Rail Freight Carloads YoY	20.9	30.1	18.7	8.7	4.4	
Total Construction Spending: Total Construction in the United States YoY	7.0	8.8	10.1	10.0	8.9	

United States Inflation Indicators	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
Consumer Price Index	1.3	1.4	1.7	2.6	4.2	4.9	5.3	5.3	5.2
All Items Less Food and Energy	1.6	1.4	1.3	1.6	3.0	3.8	4.5	4.2	4.0
Producer Price Index by Commodity: Final Demand	0.8	1.7	2.9	4.2	6.4	6.9	7.1	7.7	8.3
Global Price Index of All Commodities	4.6	14.9	26.7	50.7	72.7	70.4	61.9	61.2	50.3
Global price of Food index	5.3	10.5	18.2	25.8	39.6	42.2	32.0	35.4	34.0
Global price of Industrial Materials index	30.6	34.5	43.9	54.5	67.2	75.7	68.8	60.7	37.0
Food	3.9	3.8	3.6	3.5	2.4	2.2	2.4	3.4	3.7
Energy	-7.3	-3.8	2.3	13.2	25.0	27.8	24.2	23.6	24.9
Commodities Less Food and Energy Commodities	1.6	1.7	1.3	1.7	4.4	6.5	8.6	8.4	7.6
Household Furnishings and Supplies	2.4	2.3	2.8	3.2	3.7	3.4	3.0	3.3	4.8
Apparel	-4.1	-2.6	-3.6	-2.5	1.9	5.6	4.9	4.2	4.2
Transportation Commodities Less Motor Fuel	4.6	4.2	4.5	9.2	13.3	20.3	19.8	17.2	14.9
Medical Care Commodities	-2.3	-2.5	-2.4	-1.7	-1.9	-2.2	-2.1	-2.5	-1.6
Recreation Commodities	-0.2	0.3	0.8	2.9	3.5	3.2	3.2	3.3	3.5
Education and Communication	2.0	1.7	1.7	1.5	1.7	1.9	2.1	1.1	1.2
Alcoholic Beverages	2.8	2.4	2.0	2.0	1.9	1.6	1.9	2.4	2.6

An Autoregressive Integrated Moving Average (ARIMA) forecast on both inflation and economic growth will also be used to substantiate our view, whilst constantly monitoring what the public nowcasting data is stating, to have a view on where the economy is and will be heading towards.

Regime Cycle	Historical									Forecast				
	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22
OECD CLI	99.44	99.74	100.01	100.22	100.31	100.41	100.43	100.43	100.40	100.38	100.38	100.37	100.37	100.37
3M Δ	0.93	0.92	0.86	0.78	0.57	0.40	0.21	0.11	-0.01	-0.05	-0.05	-0.03	-0.01	-0.01
Headline CPI NSA YoY	0.01	0.02	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.06	0.06
3M Δ	0.22	0.50	1.26	2.76	3.32	2.77	1.21	0.26	0.00	0.52	1.14	1.16	0.39	-0.36
Regime	Expansion	Expansion	Expansion	Expansion	Expansion	Expansion	Expansion	Expansion	Contraction	Slowdown	Slowdown	Slowdown	Slowdown	Contraction



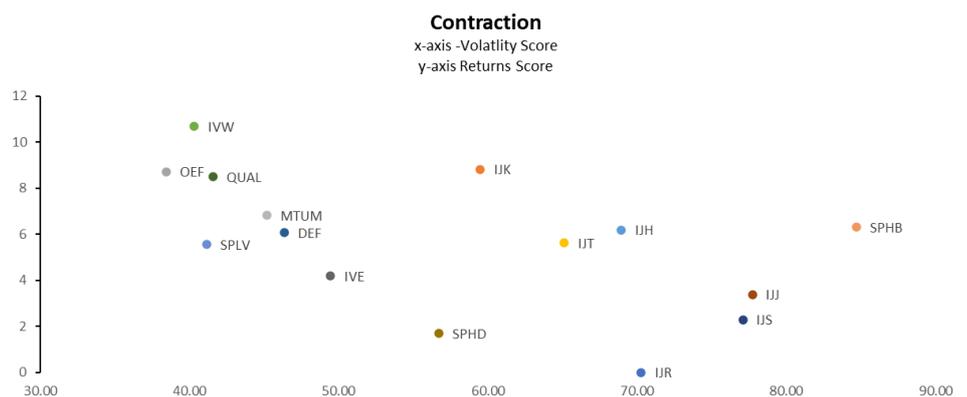
Back Test

Having determined the four economic regimes, backtests of volatility and returns will be done on all 63 ETFs.

Duration of the backtest is dependent on the newest ETF that exists in that particular asset class so as to achieve similar backtesting periods within the peer group.

Should a particular ETF be relatively new compared to its peers, proxies will be used instead; an example is using VNQ for older time periods instead of XLRE.

Contraction	Return	Volatility
IJR	3.84	70.26
IJK	8.82	59.47
OEF	8.71	38.46
IJT	5.63	65.11
IJH	6.19	68.94
IVW	10.68	40.30
IJS	2.29	77.10
IJJ	3.38	77.71
IVE	4.19	49.45
SPHD	1.69	56.73
DEF	6.06	46.34
QUAL	8.50	41.55
SPLV	5.56	41.15
SPHB	6.31	84.70
MTUM	6.82	45.17



The macro asset allocation playbook is then formed based on the results from the backtests. Each column shows recommendations on which asset to overweight and underweight in depending on the economic regime.

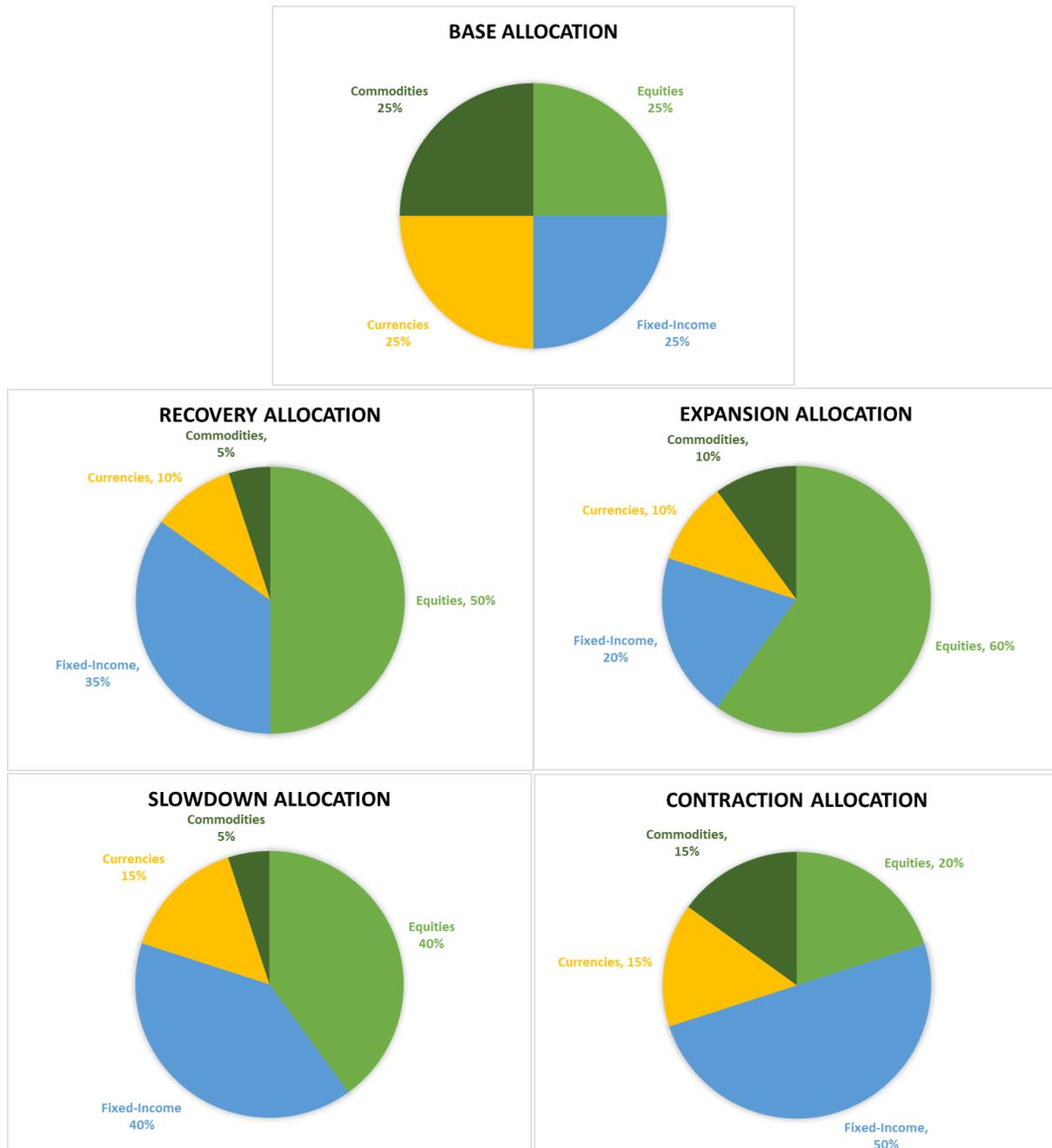
Recovery	Expansion	Slowdown	Contraction
Sector Overweights	Sector Overweights	Sector Overweights	Sector Overweights
Industrials	Industrials	Utilities	Real Estate
Consumer Discretionary	Materials	Consumer Staples	Utilities
Materials	Energy	Real Estate	Health Care
Technology	Financials	Health Care	Consumer Staples
Financials	Technology	Consumer Discretionary	Consumer Discretionary
Sector Underweights	Sector Underweights	Sector Underweights	Sector Underweights
Communication Services	Communication Services	Energy	Financials
Utilities	Real Estate	Materials	Communication Services
Consumer Staples	Consumer Staples	Industrials	Energy
Health Care	Health Care	Financials	Technology
Real Estate	Utilities	Communication Services	Industrials
Style Factor Overweights	Style Factor Overweights	Style Factor Overweights	Style Factor Overweights
High Beta	High Beta	Low Volatility	Low Volatility
Momentum	Small Cap Growth	Large Cap Growth	Dividend Yield
Large Cap Growth	Small Cap	Dividend Yield	Quality
Quality	Small Cap Value	Large Cap	Defensives
Large Cap	Mid Cap Growth	Defensives	Large Cap Growth
Style Factor Underweights	Style Factor Underweights	Style Factor Underweights	Style Factor Underweights
Defensives	High Dividend	High Beta	High Beta
Low Volatility	Large Cap Value	Small Cap Value	Small Caps
Dividend Yield	Low Volatility	Small Cap Growth	Small Cap Value
Mid Cap Value	Quality	Large Cap Value	Momentum
Mid Cap Growth	Large Cap	Small Cap	Small Caps Growth
Fixed-Income Overweights	Fixed-Income Overweights	Fixed-Income Overweights	Fixed-Income Overweights
Convertibles	Convertibles	Long Duration Treasuries	Long Duration Treasuries
BDCs	BDCs	TIPS	Medium Duration Treasuries
Preferred	High Yield	Municipals	IG Credit
Leverage Loans	TIPS	IG Credit	MBS
Fixed-Income Underweights	Fixed-Income Underweights	Fixed-Income Underweights	Fixed-Income Underweights
TIPS	Long Duration Treasuries	BDCs	BDCs
Medium Duration Treasuries	Medium Duration Treasuries	Convertibles	Leverage Loans
Short Duration Treasuries	Investment Grade Credit	High Yield	Preferred
MBS	Municipals	Preferred	High Yield
Currency Overweights	Currency Overweights	Currency Overweights	Currency Overweights
Australian Dollar	Emerging Markets FX	United States Dollar	United States Dollar
Euros	Australian Dollar	Japanese Yen	Swiss Franc
Emerging Markets FX	Canadian Dollar	Swiss Franc	Japanese Yen
Currency Underweights	Currency Underweights	Currency Underweights	Currency Underweights
Japanese Yen	G10 FX	Emerging Markets FX	Emerging Markets FX
Swiss Franc	United States Dollar	Australian Dollar	Australian Dollar
United States Dollar	Japanese Yen	Canadian Dollar	Canadian Dollar
Commodity Overweights	Commodity Overweights	Commodity Overweights	Currency Overweights
Timber	Timber	Coffee	Silver
Base Metals	Oil	Cocoa	Gold
Gasoline	Gasoline	Sugar	Sugar
Commodity Underweights	Commodity Underweights	Commodity Underweights	Commodity Underweights
Natural Gas	Wheat	Silver	Coffee
Silver	Gold	Oil	Oil
Base Agricultural	Cotton	Copper	Copper

Portfolio Construction

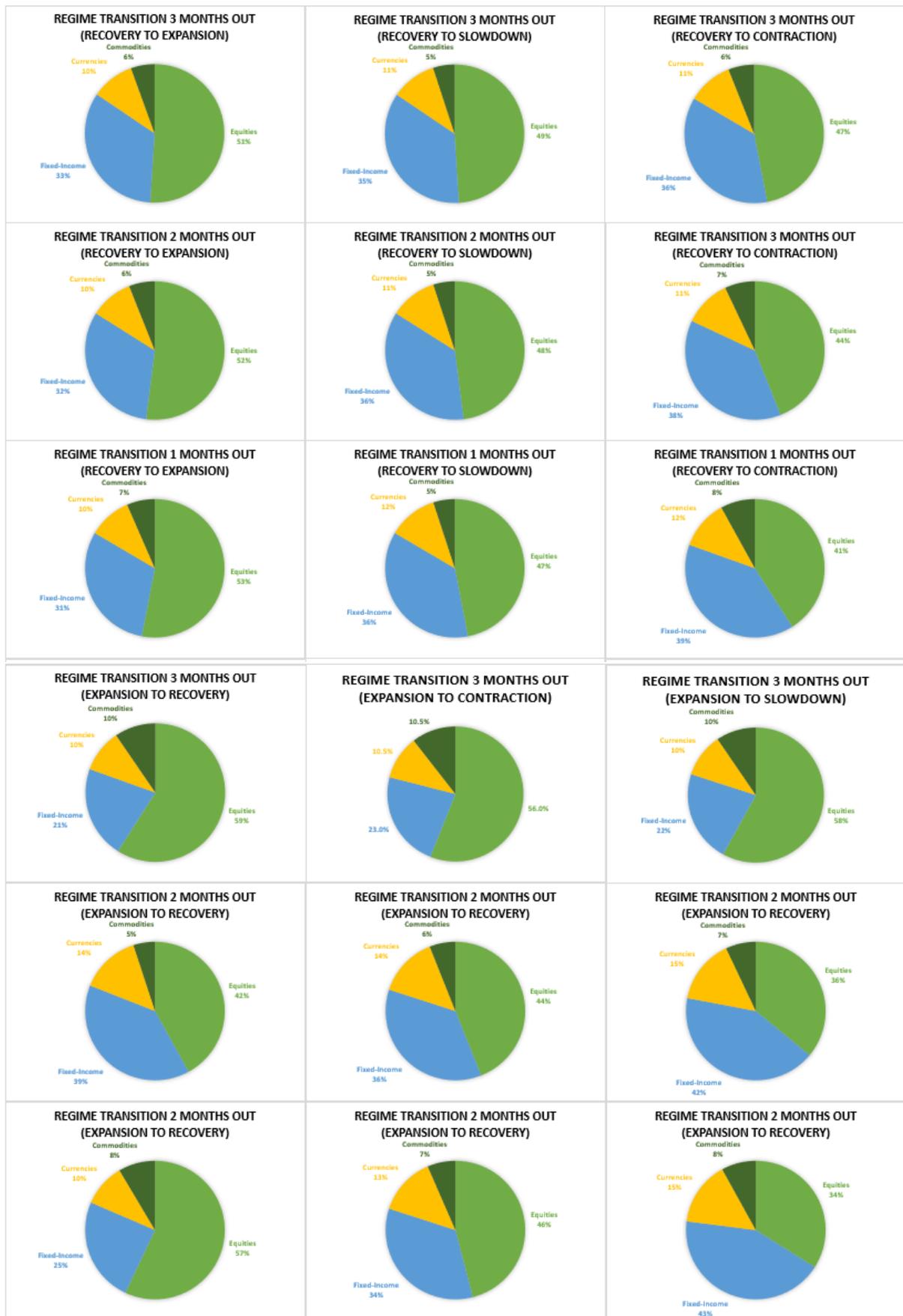
Portfolio construction becomes a lot easier knowing which assets to overweight and underweight in. The suggested weightage of the 4 main asset classes will differ depending on the current regime and upcoming regime (regime transitions).

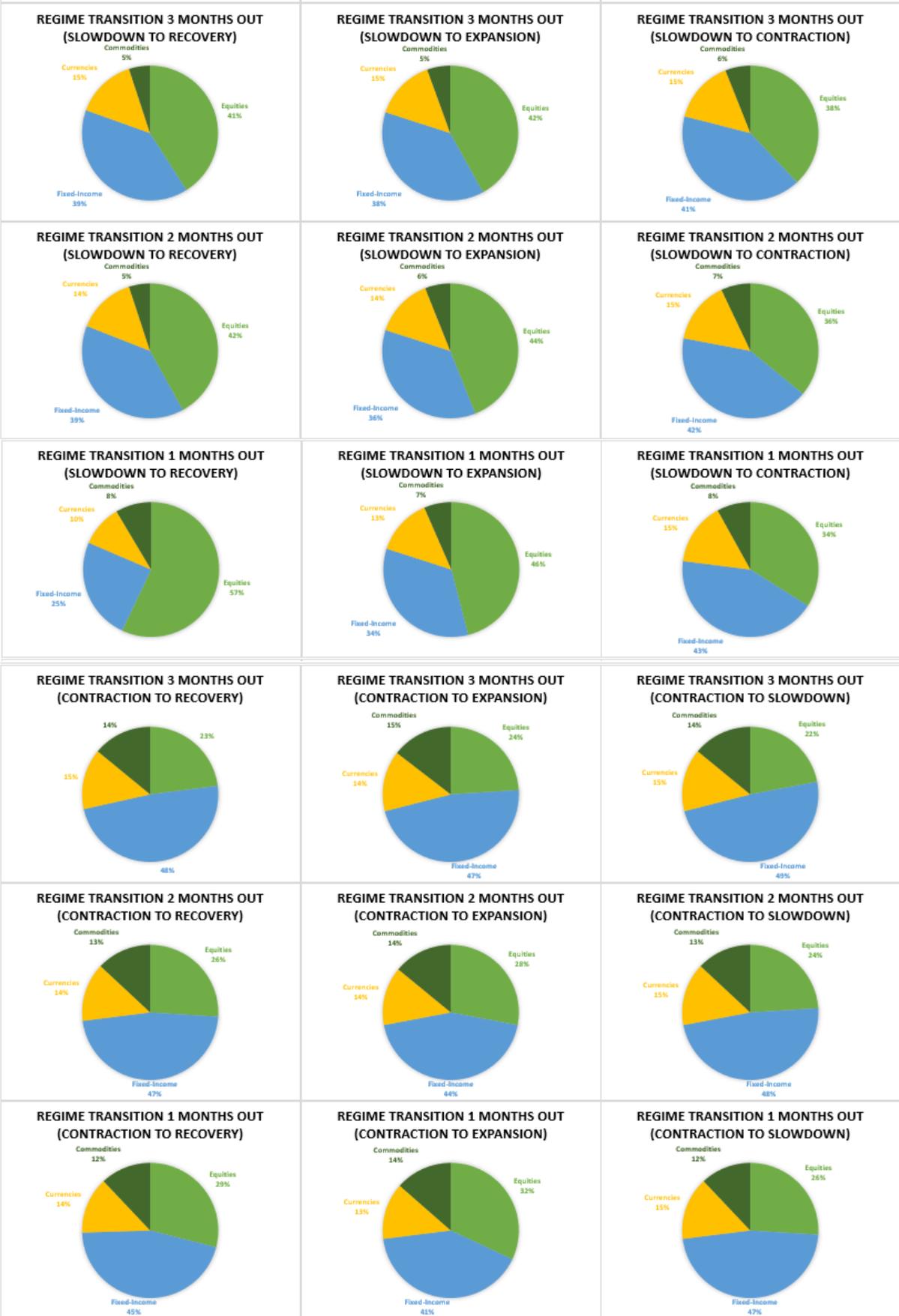
Regime transition allocation serves to help fade the prior regime and be positioned for the upcoming regime. This is due to the nature of the forecast accuracy increasing with more confirming macro signals available as we draw nearer to the forecasted date.

Base Allocation:



Regime Transition Allocation:





Volatility Premiums Tracker

Volatility reveals a market's deviation in price or returns. There are two types of volatility, implied and realised. Realised volatility is the volatility of an asset based on its historical returns. Implied volatility shows the market's expectations of future volatility based on what the options and futures markets are pricing in.

Therefore, investor sentiment can be gauged via the spread between the 30-day at-the-money put implied volatility and a similar length realised volatility.

Wide implied volatility premium is indicative of the market expecting higher volatility in the future in relation to the past. In other words, a higher volatility assumption and therefore higher options prices will be priced in the options market as investors are buying more insurance via puts.

The opposite is true with regards to implied volatility discounts. With the market expecting lower volatility in the future compared to the past, a lower volatility assumption and therefore lower options prices will be priced in as investors are buying less insurance via puts.

The relationship between the realised and implied volatility hence gives an indicative signal when prices are due for a bounce. Given the mean-reverting nature of volatility signals, a z-score approach is used to analyse the volatility premiums and discounts over a particular time horizon to find levels where a potential bounce could be due to the overcrowding of protective puts.

30D Volatility	Ticker Symbol	YTD Performance	30D Performance	IVOL PREMIUMS % (IVOL/RVOL)										Realized Volatility Trends			Implied Volatility Trends		
				Current	1D	1W	1M	1Y	3Y	1Y Z-Score	3Y Z-Score	Current	MoM%	3Y Percentile	Current	MoM%	3Y Percentile		
US EQUITIES																			
Technology Select Sector SPDR Fund ETF	XLK	20.50%	1.90%	62.06%	61.96%	62.56%	47.01%	-4.03%	42.91%	0.80	1.03	10.74	-7.10%	5.56%	17.4	2.41%	61.96%		
Consumer Staples Select Sector SPDR Fund ETF	XLP	6.83%	-0.80%	15.20%	12.25%	13.00%	40.85%	31.62%	5.88%	-0.41	-0.09	9.64	15.70%	26.06%	11.1	-5.37%	16.24%		
Health Care Select Sector SPDR Fund ETF	XLV	16.69%	-2.19%	13.77%	12.66%	18.25%	35.66%	38.27%	76.33%	-0.66	-0.11	11.34	16.26%	28.97%	12.9	-2.49%	13.69%		
Communication Services Select Sector SPDR Fund ETF	XLC	25.18%	2.99%	78.19%	68.62%	53.90%	22.29%	30.69%	49.73%	1.23	1.20	9.48	-26.83%	4.63%	16.9	-2.49%	78.30%		
Utilities Select Sector SPDR Fund ETF	XLU	8.98%	-1.07%	13.88%	6.70%	13.20%	15.32%	17.71%	35.95%	0.17	0.18	12.56	6.17%	34.13%	14.3	4.84%	17.30%		
Energy Select Sector SPDR Fund ETF	XLE	29.71%	7.36%	6.94%	8.94%	9.64%	-4.73%	66.60%	13.41%	0.01	0.17	26.93	-5.54%	47.22%	28.8	6.04%	6.98%		
Materials Select Sector SPDR Fund ETF	XLB	16.02%	0.84%	32.40%	32.18%	30.83%	5.90%	38.29%	17.04%	0.64	0.59	13.14	-20.24%	12.83%	17.4	-0.29%	33.31%		
Industrial Select Sector SPDR Fund ETF	XLI	15.45%	-0.13%	28.80%	30.75%	29.38%	-1.50%	56.11%	49.97%	-0.03	0.32	12.42	-22.95%	13.89%	16	0.76%	29.93%		
Financial Select Sector SPDR Fund ETF	XLF	28.93%	1.47%	30.39%	31.91%	44.35%	-12.45%	73.57%	66.13%	0.49	0.37	14.11	-32.08%	18.12%	18.4	1.15%	31.20%		
Consumer Discretionary Select Sector SPDR Fund ETF	XLY	14.04%	4.22%	39.62%	20.49%	21.82%	9.25%	63.85%	39.89%	0.13	0.33	11.67	-16.42%	23.15%	16.3	6.82%	37.74%		
Real Estate Select Sector SPDR Fund ETF	XLRE	28.86%	0.71%	11.26%	11.00%	-0.05%	-7.00%	59.98%	17.02%	-0.42	0.13	13.03	7.48%	30.56%	14.5	11.62%	13.25%		
SPDR S&P 500 ETF Trust ETF	SPY	19.44%	1.53%	57.59%	48.71%	47.82%	25.47%	21.27%	35.94%	0.64	0.65	7.87	-20.83%	9.26%	12.4	-0.56%	58.22%		
INTERNATIONAL EQUITIES																			
iShares MSCI Emerging Markets ETF	EEM	1.86%	6.24%	0.00%	-3.11%	-8.57%	-3.45%	29.60%	-24.88%	-0.49	-0.26	15.10	-13.11%	22.09%	15.1	-10.01%	0.00%		
iShares China Large-Cap ETF	FXI	-10.66%	6.25%	-21.30%	-20.66%	-32.31%	-45.58%	38.21%	-16.65%	-0.71	-0.68	24.27	-27.58%	64.68%	19.1	4.71%	-20.31%		
iShares MSCI Japan ETF	EWJ	9.25%	10.81%	-3.91%	-12.41%	-6.64%	-11.19%	66.37%	-6.30%	-0.76	-0.32	13.94	-3.40%	40.87%	13.4	4.52%	-3.26%		
SPDR Euro Stoxx 50 ETF	FEZ	14.93%	1.42%	37.25%	25.27%	40.33%	-9.43%	27.65%	-25.14%	0.91	0.71	10.56	-31.99%	7.41%	14.5	3.06%	40.28%		
CURRENCIES																			
Invesco DB US Dollar Index Bullish Fund ETF	UUP	2.60%	-1.11%	19.73%	30.93%	23.60%	48.50%	6.75%	13.71%	-0.53	-0.23	4.59	-0.85%	16.40%	5.5	0.00%	26.92%		
Invesco CurrencyShares British Pound Sterling ETF	FXB	0.89%	0.53%	0.46%	-3.36%	-10.22%	-4.73%	-31.94%	-0.89%	-0.51	-0.32	6.17	-3.46%	11.51%	6.2	1.81%	6.78%		
Invesco CurrencyShares Euro Trust ETF	FXE	-4.03%	0.73%	19.20%	13.68%	11.13%	17.75%	7.83%	-11.24%	0.56	0.42	4.45	-1.21%	15.61%	5.3	0.00%	24.14%		
Invesco CurrencyShares Japanese Yen Trust ETF	FXJ	-6.58%	-0.32%	37.75%	28.79%	9.09%	2.56%	-5.76%	23.76%	0.19	0.44	4.57	-19.55%	16.14%	6.3	8.06%	51.31%		
COMMODITIES																			
United States Oil ETF	USO	49.89%	10.52%	-1.72%	-1.14%	-1.22%	-15.80%	30.01%	10.11%	-0.46	-0.34	32.46	-5.77%	52.65%	31.9	10.00%	-1.16%		
United States Natural Gas Fund ETF	UNG	96.74%	33.88%	-11.33%	-13.67%	2.41%	9.83%	9.05%	10.80%	-1.17	-0.53	44.09	40.99%	55.82%	39.1	488.01%	-11.24%		
Invesco DB Base Metals Fund ETF	DBB	23.99%	8.19%	62.50%	75.22%	68.61%	58.69%	-9.21%	-4.85%	0.92	1.38	14.89	-7.76%	38.62%	24.2	-5.54%	44.83%		
Invesco DB Base Agriculture Fund ETF	DBA	14.87%	-2.57%	70.50%	38.21%	45.06%	6.84%	91.80%	13.05%	0.38	0.66	11.20	-37.63%	42.99%	19.1	-0.47%	63.45%		
SPDR Gold Trust ETF	GLD	-5.95%	0.68%	-8.68%	-10.09%	-10.02%	6.53%	-46.39%	-12.23%	-0.96	-0.48	14.45	12.24%	59.52%	13.2	-0.47%	-7.51%		
FIXED INCOME																			
iShares iBoxx \$ High Yield Corporate Bond ETF	HYG	0.86%	1.11%	15.72%	17.12%	14.52%	15.14%	99.08%	52.00%	-0.82	-0.34	3.32	-16.03%	18.65%	3.84	-15.60%	99.20%		
iShares 7-10 Year Treasury Bond ETF	IEF	-2.49%	-0.58%	43.19%	33.81%	38.29%	-1.69%	33.05%	26.65%	0.17	0.21	4.23	-26.09%	30.69%	6.05	7.65%	52.89%		
iShares JPMorgan USD Emerging Markets Bond ETF	EMB	-2.47%	0.70%	30.12%	36.78%	36.78%	96.34%	108.23%	1.21%	-0.09	-0.01	3.99	2.10%	8.33%	5.19	-32.33%	73.49%		
iShares iBoxx \$ Inv Grade Corporate Bond ETF	LQD	-1.83%	0.34%	9.50%	11.42%	13.85%	8.36%	13.31%	12.88%	-0.43	-0.31	5.32	-5.89%	52.38%	5.83	-4.89%	73.49%		
iShares 20 Plus Year Treasury Bond ETF	TLT	-5.34%	-0.76%	25.93%	22.99%	32.53%	-15.10%	9.61%	11.12%	0.33	0.58	11.20	-23.16%	45.24%	14.11	13.97%	32.45%		
MEGA-CAP TECHS																			
Apple Inc	AAPL	12.71%	1.94%	38.74%	39.18%	63.12%	7.43%	-11.35%	21.68%	0.65	0.77	19.69	-0.87%	19.58%	27.32	28.02%	41.07%		
Microsoft Corporation	MSFT	33.53%	0.07%	56.39%	54.16%	57.37%	40.16%	10.04%	36.32%	1.08	1.04	13.53	2.84%	7.67%	21.16	14.75%	56.69%		
Alphabet Inc	GOOG	63.78%	4.79%	95.54%	92.92%	95.36%	19.46%	29.55%	62.18%	1.79	2.07	12.94	-21.59%	4.10%	25.31	28.35%	94.85%		
Facebook, Inc	FB	37.83%	6.02%	83.66%	82.75%	48.89%	-4.36%	15.19%	18.43%	2.35	2.17	17.85	-29.09%	3.04%	32.79	36.17%	82.09%		
Amazon.com, Inc.	AMZN	6.15%	8.45%	100.71%	9.81%	15.06%	-30.86%	67.79%	58.31%	1.98	1.93	14.77	-50.92%	5.03%	29.65	42.48%	96.65%		

COT Reports

The COT report is a weekly sentiment report that can provide traders with important information on how the ‘smart money’ is positioned in the market. Knowing where traders’ positions are in the market can be valuable information when constructing trade ideas.

By focusing on the net managed money and asset manager components of the non-commercial segment, traders can know where the street is putting their money on.

The street’s consensus can be gauged by looking at the COT flip (net contract positioning) of asset managers.

Similar to our Volatility Premiums Tracker, a z-score approach will be used over a particular time horizon to find levels where a mean reversion could potentially happen due to asset managers overcrowding in longs or shorts.

Net Managed Money Longs/Net Asset Manager Positions Longs

	Asset	Latest	W/W Chg	3M Avg	6M Avg	1Y Avg	3Y Avg	3Y MAX	3Y MIN	1Y Z-Score	3Y Z-Score
EQUITIES	S&P 500 Consolidated	184,461.00	2,116.00	180,859.76	170,845.85	154,423.97	142,442.79	222,832.00	55,747.00	1.17	1.12
	E-MINI S&P 500 STOCK INDEX	917,305.00	10,579.00	902,632.71	852,023.65	770,286.63	719,203.51	1,124,081.00	341,344.00	1.15	1.12
	VIX FUTURES	17,530.00	5,920.00	30,180.76	48,956.62	53,053.48	44,049.85	99,636.00	-21,217.00	-1.45	-0.97
	DOW JONES INDUSTRIAL AVG - X \$5	26,115.00	-6,720.00	26,321.81	21,961.59	18,791.77	18,161.82	39,753.00	-8,798.00	0.85	0.75
	NASDAQ-100 STOCK INDEX (MINI)	20,344.00	-344.00	13,600.33	21,082.35	28,104.02	25,376.93	60,345.00	-30,998.00	-0.42	-0.22
	E-MINI RUSSELL 2000 INDEX	48,384.00	5,237.00	56,846.19	77,972.62	74,932.35	55,014.41	166,784.00	-52,369.00	-0.75	-0.14
RATES	10-YEAR U.S. TREASURY NOTES	128,117.00	-3,819.00	61,808.38	47,304.50	118,910.27	597,757.60	1,242,393.00	-89,475.00	0.08	-1.17
	5-YEAR U.S. TREASURY NOTES	892,713.00	35,049.00	646,662.00	600,876.24	709,653.55	1,212,575.65	2,253,986.00	376,615.00	1.05	-0.68
	2-YEAR U.S. TREASURY NOTES	269,182.00	23,444.00	390,749.52	421,859.44	422,445.82	687,480.43	1,342,415.00	245,738.00	-1.63	-1.39
	U.S. TREASURY BONDS	300,449.00	-14,589.00	299,374.71	329,532.79	382,626.08	258,500.63	529,099.00	59,860.00	-0.95	0.33
	30-DAY FEDERAL FUNDS	29,934.00	-302.00	19,822.95	20,419.79	19,483.73	-10,767.35	59,065.00	-176,906.00	0.79	0.81
	3-MONTH EURO DOLLARS	-735,871.00	2,832.00	-520,905.71	-407,247.03	-214,354.63	-794,846.74	600,535.00	-2,229,498.00	-1.71	0.07
CURRENCIES	U.S. DOLLAR INDEX	7,804.00	-3,153.00	3,665.29	2,691.82	519.82	9,730.84	27,710.00	-5,309.00	1.74	-0.22
	CANADIAN DOLLAR	28,574.00	0.00	41,157.62	36,112.35	34,945.23	20,541.99	71,909.00	-15,835.00	-0.46	0.41
	SWISS FRANC	-10,733.00	0.00	-7,167.86	-6,203.00	-992.72	-8,660.70	9,621.00	-30,743.00	-1.41	-0.20
	BRITISH POUND STERLING	-12,824.00	0.00	-5,096.95	-854.71	-4,158.88	-23,783.82	26,399.00	-99,158.00	-0.48	0.40
	JAPANESE YEN	-38,927.00	7,639.00	-17,528.29	9,764.06	39,272.77	12,166.70	104,094.00	-55,477.00	-1.62	-1.25
	EURO	284,539.00	14,481.00	329,174.90	329,100.03	321,451.58	222,368.75	386,913.00	105,156.00	-1.30	0.72
	AUSTRALIAN DOLLAR	-38,715.00	4,902.00	-25,820.19	-15,283.15	-6,704.33	-24,311.58	13,674.00	-84,142.00	-1.58	-0.63
	RUSSIAN RUBLE	32,385.00	660.00	29,351.24	24,723.68	16,715.20	27,845.76	69,049.00	-2,581.00	1.33	0.25
	MEXICAN PESO	75,291.00	6,076.00	61,526.71	61,469.50	64,367.93	88,515.18	156,528.00	16,233.00	1.54	-0.36
	BRAZILIAN REAL	5,833.00	2,053.00	8,690.81	-676.50	-6,820.87	-13,640.99	18,283.00	-43,965.00	0.88	1.33
	NEW ZEALAND DOLLAR	-580.00	3,662.00	15.62	1,833.65	4,119.52	-5,710.40	13,679.00	-32,452.00	-0.88	0.42
BITCOIN	243.00	-89.00	-69.52	-66.32	168.77	53.30	874.00	-729.00	0.18	0.62	
COMMODITIES	BLOOMBERG COMMODITY INDEX	18,753.00	-3,625.00	25,986.33	28,735.79	20,745.93	11,706.79	46,954.00	-6,834.00	-0.18	0.60
	CRUDE OIL, LIGHT SWEET	235,457.00	-3,487.00	310,712.24	327,678.21	325,852.03	259,609.37	397,549.00	59,699.00	-2.36	-0.26
	BRENT CRUDE OIL	-18,795.00	201.00	-24,842.48	-25,153.62	-13,644.87	-6,190.66	8,590.00	-32,415.00	-0.37	-1.14
	GASOLINE BLENDSTOCK (RBOB)	47,325.00	-3,641.00	54,350.43	58,174.91	54,999.57	65,997.96	115,372.00	21,756.00	-0.65	-0.80
	NATURAL GAS	87,133.00	15,082.00	63,321.43	60,569.71	73,882.08	15,957.73	279,113.00	-331,548.00	0.34	0.48
	GOLD	67,595.00	-14,082.00	77,804.10	71,889.32	83,288.43	91,553.74	238,546.00	-109,454.00	-0.66	-0.28
	SILVER	17,776.00	5,503.00	30,558.05	30,981.85	34,551.42	23,388.24	65,952.00	-48,923.00	-1.72	-0.20
	PLATINUM	-7,077.00	-1,512.00	5,486.71	11,835.76	10,795.17	8,427.95	51,712.00	-30,389.00	-1.82	-0.91
	COPPER	30,781.00	-187.00	34,111.71	44,803.85	57,919.38	7,131.25	92,077.00	-75,114.00	-1.18	0.52
	COTTON	89,069.00	1,520.00	56,610.48	58,392.56	55,786.12	22,230.00	89,069.00	-48,349.00	2.30	1.78
	SUGAR	250,710.00	-11,759.00	235,963.19	218,769.35	209,747.03	44,132.39	268,336.00	-231,887.00	0.95	1.38
	COFFEE	38,695.00	-720.00	37,003.71	30,922.62	26,111.53	-14,290.80	51,186.00	-111,997.00	0.79	1.17
	LEAN HOGS	82,151.00	961.00	74,861.86	70,904.91	53,527.93	31,056.04	85,661.00	-14,052.00	1.24	1.98
	LIVE CATTLE	65,040.00	-15,167.00	59,456.14	65,771.32	55,651.80	55,314.49	155,183.00	-10,478.00	0.51	0.27
	FEEDER CATTLE	7,158.00	-4,733.00	5,527.05	4,132.76	2,832.95	493.27	12,189.00	-8,704.00	1.00	1.56

Volatility Implied Ranges (VIR)

VIR signals are designed to help in buying low and selling high.

How it works:

VIR purpose is to help scale into positions as prices are near the upper or lower bounds that are determined by the model. By buying at lower bounds and selling at upper bounds, this decreases the probability of downside risk from price movements.

Bounds are determined by a combination of Benoit Mandelbrot's Bridge and Harold Edwin Hurst's rescaled range equations. With implied volatility as parameter inputs.

All 63 ETFs are tracked with different IV durations to give an immediate and intermediate-term perspective on where asset prices have a higher probability of bouncing off from.

VIR also gives a bullish/bearish bias on security trends based on how the asset is trading in relation to the VIR levels.



Trend Trackers

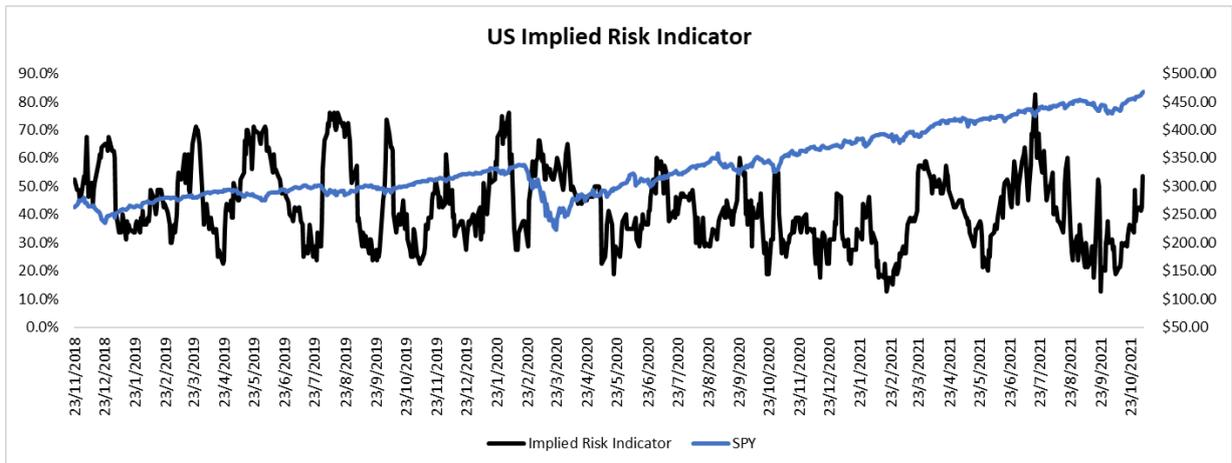
By tabulating all the VIR signals in the playbook, it serves to confirm the current economic regime by tracking them on an immediate and intermediate-term basis.

Recovery Overweights	Signal	Expansion Overweights	Signal	Slowdown Overweights	Signal	Contraction Overweights	Signal
Industrials	✗	Industrials	✗	Utilities	✗	Real Estate	✗
Consumer Discretionary	✓	Materials	✗	Consumer Staples	✗	Utilities	✗
Materials	✗	Energy	✓	Real Estate	✗	Health Care	✗
Technology	⚠	Financials	✗	Health Care	✗	Consumer Staples	✗
Financials	✗	Technology	⚠	Consumer Discretionary	✓	Consumer Discretionary	✓
High Beta	✓	High Beta	✓	Low Volatility	✗	Low Volatility	✗
Momentum	✓	Small Cap Growth	✗	Large Cap Growth	✗	Dividend Yield	✗
Large Cap Growth	✗	Small Caps	⚠	Dividend Yield	✗	Quality	✗
Quality	✗	Small Cap Value	⚠	Large Cap	✗	Large Cap Growth	✗
Large Cap	✗	Mid Cap Growth	✗	Defensives	✗	Defensives	✗
Convertibles	✓	Convertibles	✓	Long Duration Treasuries	✗	Long Duration Treasuries	✗
BDCs	✓	BDCs	✓	TIPS	✗	Medium Duration Treasuries	✗
Preferred	✗	High Yield	⚠	Municipals	✗	IG Credit	⚠
Leverage Loans	⚠	TIPS	✗	IG Credit	⚠	MBS	✗
Australian Dollar	✗	Emerging Markets FX	✗	United States Dollar	✓	United States Dollar	✓
Euros	✗	Australian Dollar	✗	Japanese Yen	✗	Swiss Franc	✗
Emerging Markets FX	✗	Canadian Dollar	⚠	Swiss Franc	✗	Japanese Yen	✗
Timber	✗	Timber	✗	Coffee	✓	Silver	✗
Base Metals	✓	Oil	✓	Cocoa	✗	Gold	✗
Gasoline	✓	Gasoline	✓	Sugar	✗	Soybeans	⚠
Recovery Underweights	Signal	Expansion Underweights	Signal	Slowdown Underweights	Signal	Contraction Underweights	Signal
Communication Services	✓	Communication Services	✓	Energy	✗	Financials	✓
Utilities	✓	Real Estate	✓	Materials	✓	Communication Services	✓
Consumer Staples	✓	Consumer Staples	✓	Industrials	✓	Energy	✗
Health Care	✓	Utilities	✓	Financials	✓	Technology	⚠
Real Estate	✓	Health Care	✓	Communication Services	✓	Industrials	✓
Defensives	✓	High Dividend	✓	High Beta	✗	High Beta	✗
Low Volatility	✓	Large Cap Value	✓	Small Cap Value	⚠	Small Cap	⚠
Dividend Yield	✓	Low Volatility	✓	Small Cap Growth	✓	Small Cap Value	⚠
Mid Cap Value	✓	Quality	✓	Large Cap Value	✓	Momentum	✗
Mid Cap Growth	✓	Large Cap	✓	Small Cap	⚠	Small Cap Growth	✓
TIPS	✓	Long Duration Treasuries	✓	BDCs	✗	BDCs	✗
Medium Duration Treasuries	✓	Medium Duration Treasuries	✓	Convertibles	✗	Leverage Loans	⚠
Short Duration Treasuries	✓	Investment Grade Credit	⚠	High Yield	⚠	Preferred	✓
MBS	✓	Municipals	✓	Preferred	✓	High Yield	⚠
Japanese Yen	✓	G10 FX	✓	Emerging Markets FX	✓	Emerging Markets FX	✓
Swiss Franc	✓	United States Dollar	✗	Australian Dollar	✓	Australian Dollar	✓
United States Dollar	✗	Japanese Yen	✓	Canadian Dollar	⚠	Canadian Dollar	⚠
Natural Gas	✗	Wheat	⚠	Silver	✓	Coffee	✗
Silver	✓	Gold	✓	Oil	✗	Oil	✗
Base Agricultural	✓	Cotton	✗	Copper	✗	Copper	✗

No. of Confirming Weekly Price Signals (Max=40)			
Recovery	Expansion	Slowdown	Contraction
25	22	13	9

Probability of Regime given Confirming Weekly Price Signals			
Recovery	Expansion	Slowdown	Contraction
62.50%	55.00%	32.50%	22.50%

VIR also forms the basis of the Implied Risk Indicator by providing risk-off signals based on the VIR trends of risk-off assets.



Price Memory Convergence Divergence (PMCD)

Similar to our VIR, PMCD is based on Harold Edwin Hurst's theory of Hurst exponents. PMCD is formed by combining this theory together with Gerald Appel's Moving Average Convergence Divergence (MACD).

How it works:

Compared to the VIR indicator, PMCD is shorter-term in nature.

To calculate, pick two sets of short term and longer-term Hurst values and determine bullish or bearish signals based on the different durations.

$$IF(H_s - H_l)_n > 0 \text{ AND } (H_s - H_l)_{n+1} < 0 = \text{BULLISH}$$

$$IF(H_s - H_l)_n < 0 \text{ AND } (H_s - H_l)_{n+1} > 0 = \text{BEARISH}$$

Where:

n = shorter term hurst

l = longer term hurst

n = index of time series

Risk Sentiment

A very simple model which tracks implied volatility trends for an asset by applying Richard Donchian's Donchian Channels on implied volatility. We track this for all 63 assets in our universe on both a 30-day and 60-day period. The concept is to take risks as volatility is near the Lower IV Channel vice versa. The Donchian Channel overlay helps to give a clearer perspective.

How it works:

Upper IV Channel = Highest IV in Last N Periods

Lower IV Channel = Lowest IV in Last N Periods

$$\text{Middle IV Channel} = \frac{(\text{Upper IV Channel} + \text{Lower IV Channel})}{2}$$

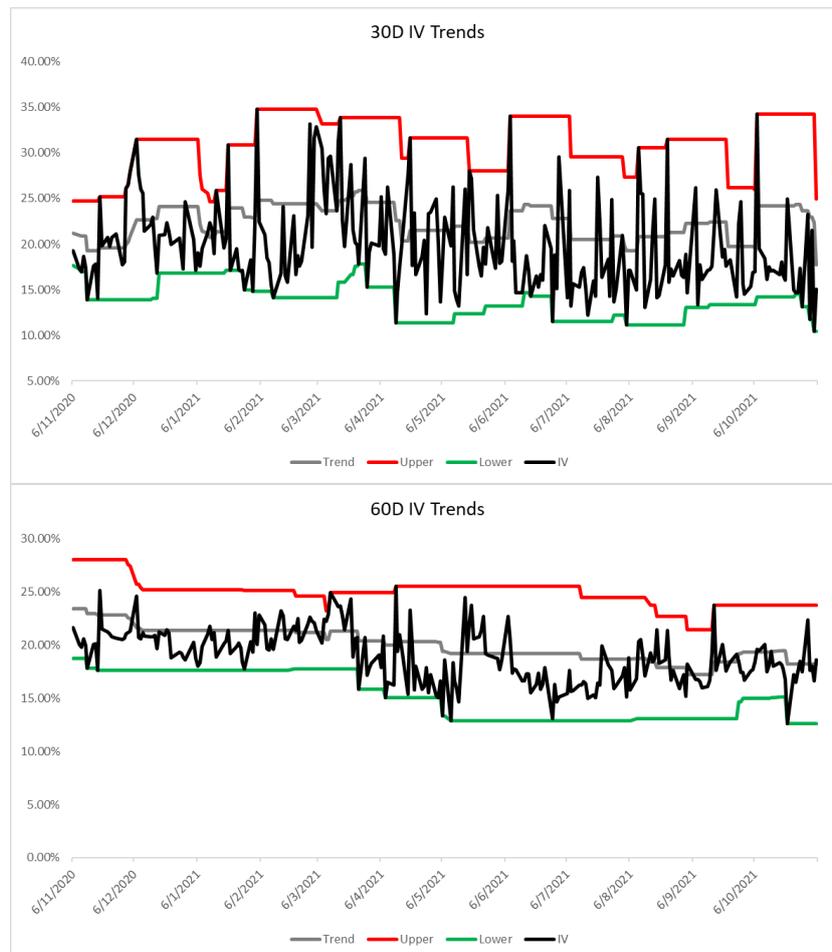
If Current IV < Middle IV Channel = Risk – on

If Current IV > Middle IV Channel = Risk – off

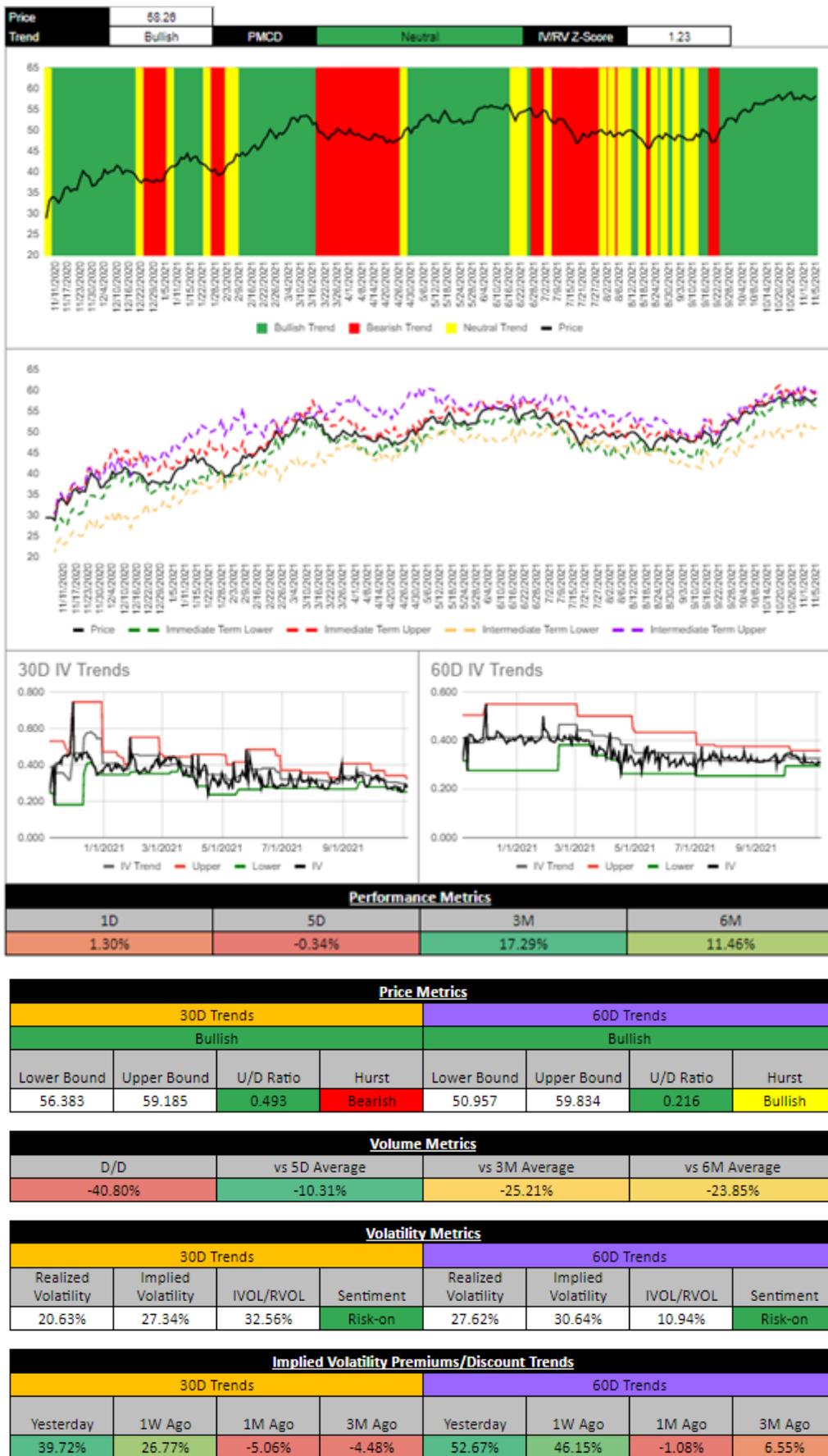
Where:

IV = implied volatility

N = time period



Example of what we track for each of the 63 ETFs.



Putting it all together

With so many tools in our investing toolkit, an example of how to utilise the tools in a step-by-step process will be shown below.

- Determine the current economic regime.
- Verify current economic regime with the nowcasts, immediate and intermediate trends tracker.
- Have a view on the upcoming economic regime based on leading indicators of economic growth and inflation. Determine how far ahead the next regime will be.
- Verify bias with forecasts.
- Determine the portfolio allocation based on the current and pending economic regimes.
- Check Implied Risk Indicator before taking a trade as it provides current risk outlook.
- Determine assets with bullish(bearish) VIR that are trading near the lower(upper) boundary.
- Verify VIR with PMCD for a shorter-term confirmation signal.
- Check security volumes to determine fake-outs (Prices going up on weaker volumes could spell end of price move).
- Verify risk sentiment. Due to the mean-reverting nature of volatility, one should be wary of taking on risks when implied volatilities are at the upper channel.
- Always watch for Implied Volatility Premiums/Discounts to be cautious of squeezes.
- Determine when to adjust portfolios accordingly to fit the suggested portfolio weights.
- Know how the street is positioned to know what the consensus is. Indicators must be in favour to justify going against consensus.

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