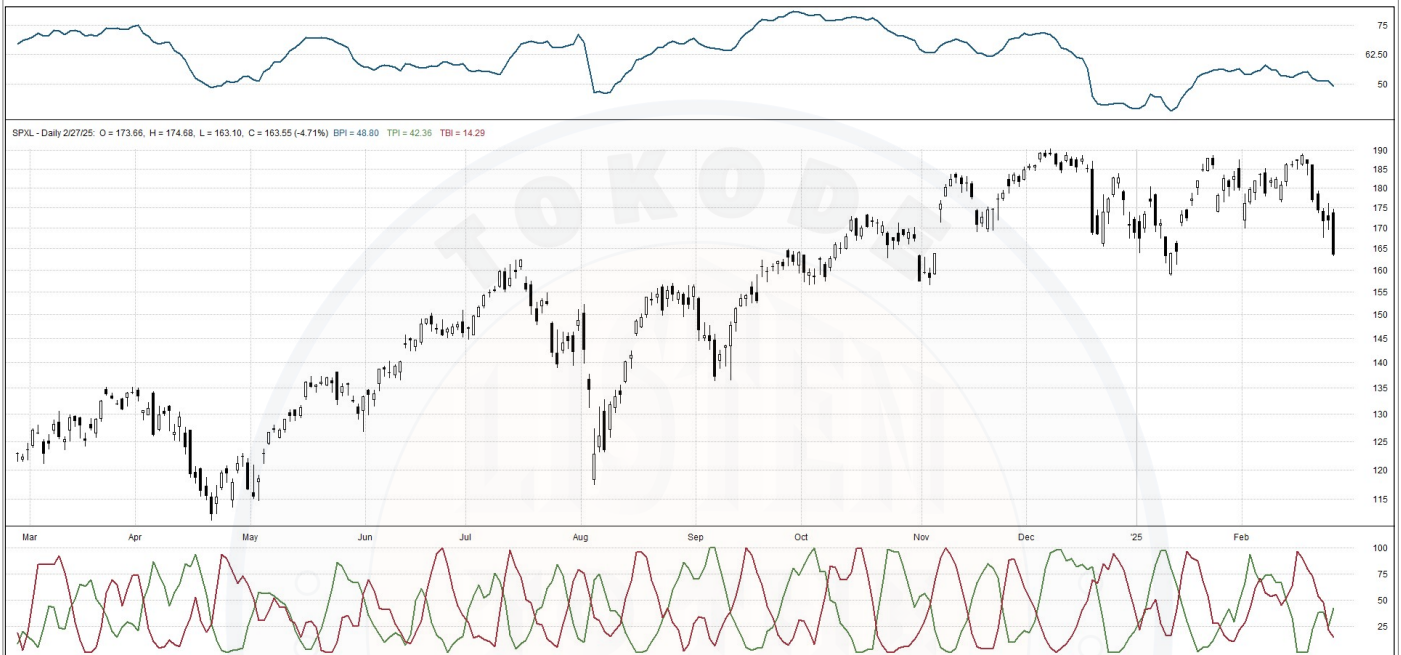
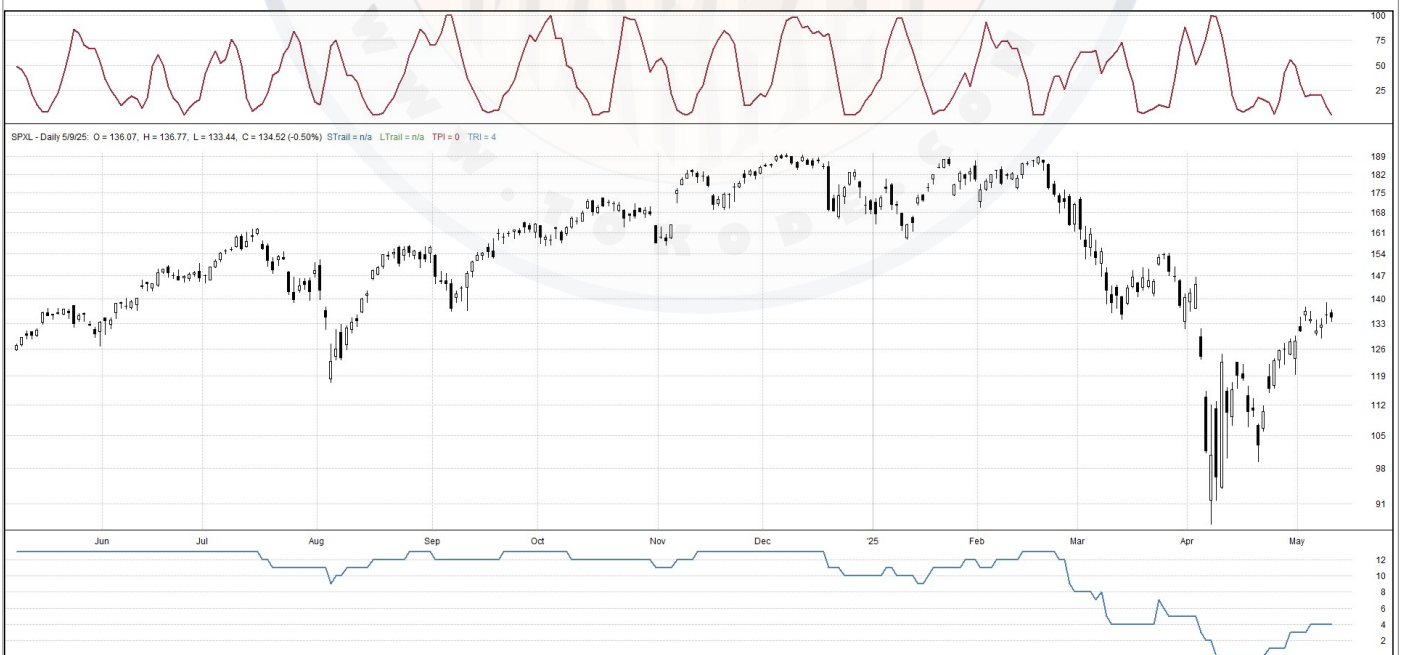


DESCRIPTION

Tokode Market Study (TMS) consist of three indicators to assess "Market Conditions" at any given time in the stock market. The Tokode Pullback Index (TPI), evaluates downside exhaustion during a pullback or correction while the Tokode Breakout Index (TBI) evaluates upside participation after a market pullback or correction. Tokode Regime Index (TRI) evaluates market regimes to determine if it is one of rising or falling prices. A fourth indicator; The Bullish Percent Index (BPI), which is not part of TMS, measures the percentage of stocks within the index (S&P 500) exhibiting a bullish set-up. These four indicators are studied to determine market conditions.



The Tokode Pullback Index (TPI) and Tokode Breakout Index (TBI) are plotted together below the price in the chart above. The Bullish Percent Index (BPI) is plotted above price.



The Tokode Pullback Index (TPI) is plotted above price in the chart above. The Tokode Regime Index (TRI) is plotted in the bottom pane.

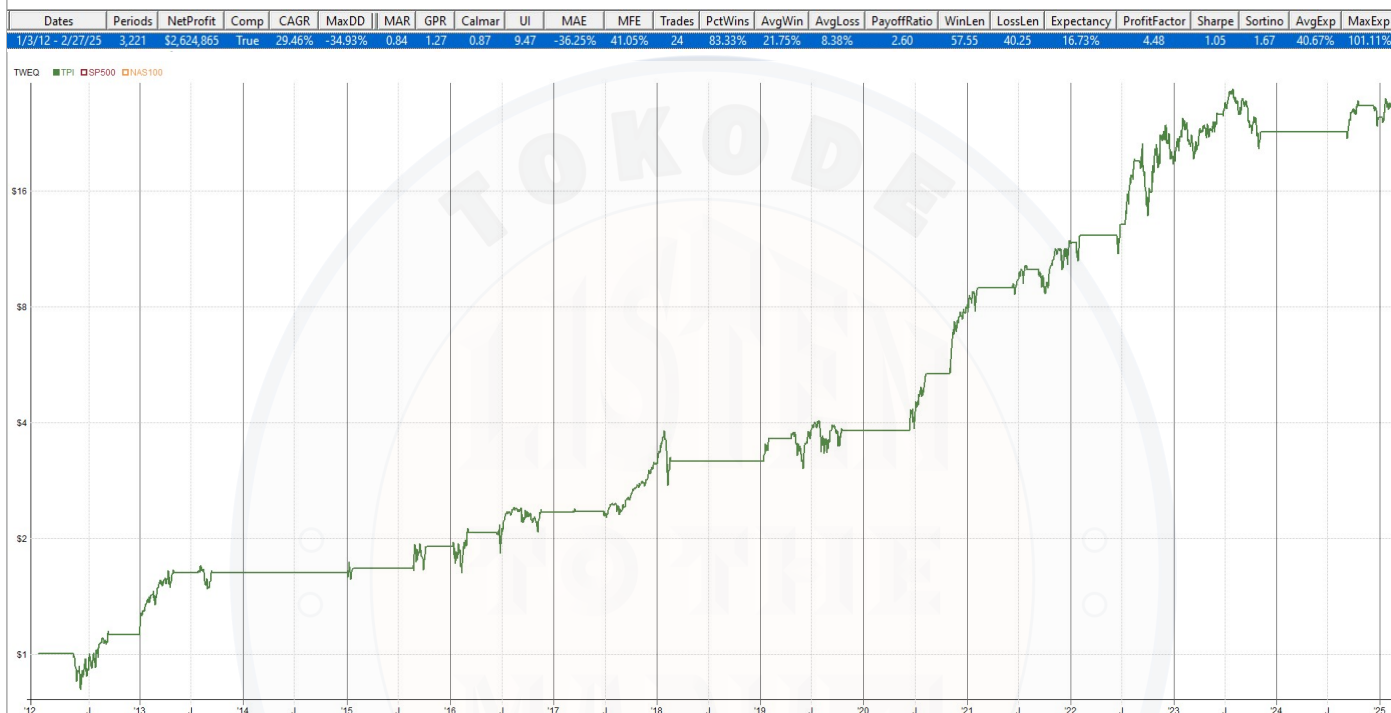
SYSTEMS

Algorithmic

Entry and Exit can be based on "Oversold" and "Overbought" market conditions. TPI is the most suitable oscillator for determining these levels. Default threshold for both are:

- 95 for oversold (100 for deep oversold)
- 0 for overbought

Entry and exit at these default thresholds for TPI, with a basic stretch as is commonplace for mean reversion, reveals the edge in TPI signals for SPXL (Figure below). Although, the win rate and payoff ratio are unusual for mean reversion, the results are reproducible in other levered ETFs. BPI and TRI could be used as filters on any TPI setups.



Discretionary

Several combinations of setups are available when TPI is combined with BPI, TRI or other non-TMS indicators or patterns. Risk management is an important aspect of discretionary trading hence, with a variety of appropriate risk controls, further edges can be realised with the general principles of:

- TPI for entry signals
 - ⇒ Above 90 for oversold, long signals
 - ⇒ At 100 for deep oversold, long signals
- TBI for pyramid signals
 - ⇒ Above 70 for breakout, after TPI long signals
- BPI as a filter for TPI signals
 - ⇒ Below 45 to confirm oversold, TPI long signals
 - ⇒ Below 70 to prevent false, TPI long signals
 - ⇒ Above 65 to confirm pyramid, TBI long signals
- TRI as a filter for TPI signals
 - ⇒ Below 3 for market bottom, after/when TPI is oversold
- TRI for exit signals
 - ⇒ Cross below 8 for start of falling prices regime
 - ⇒ Equal to 13 while TPI is 0, after market bottom

PERFORMANCE DATA

The ideal asset to trade with TMS is the leveraged, large cap index — SPXL or UPRO.

S&P 500

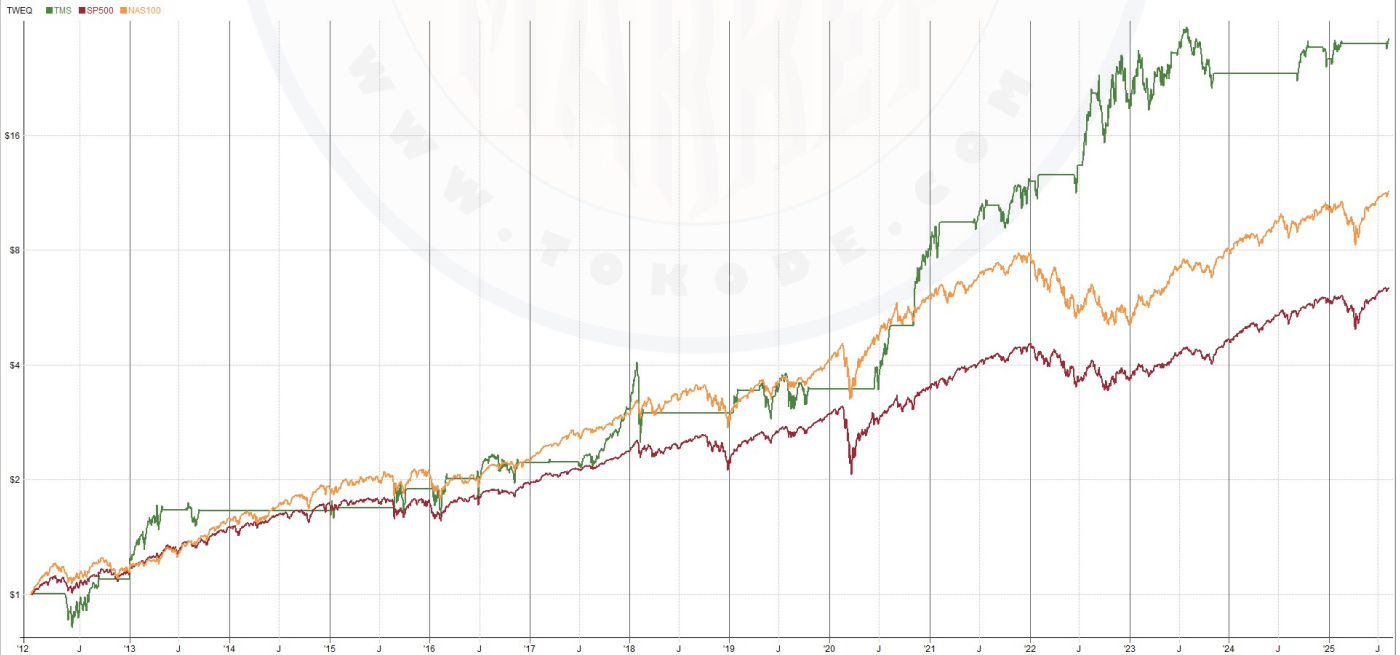
The figure below shows performance of a simple mean reversion strategy (100% allocation) with a basic stretch, that buys SPXL when TPI = 100 (deep oversold) and sells when TPI = 0 (overbought).

Test	Name	Dates	Periods	NetProfit	Comp	ROR	MaxDD	MAR	Calmar	UI	MAE	MFE	Trades	PctWins	Expectancy	AvgWin	AvgLoss	WinLen	LossLen	ProfitFactor	Sharpe	Volatility	Sortino	AvgExp	MaxExp
0015	2 - Testing Code	1/3/12 - 8/8/25	3,257	\$569,594	True	16.79%	-33.53%	0.50	0.18	9.56	-27.57%	67.75%	14	85.71%	16.21%	20.33%	6.47%	39.33	29.50	6.48	0.89	19.73%	1.38	18.18%	167.61%



The same strategy's performance is shown below: buying when TPI >= 95 (oversold) and selling when TPI = 0 (overbought).

Test	Name	Dates	Periods	NetProfit	Comp	ROR	MaxDD	MAR	Calmar	UI	MAE	MFE	Trades	PctWins	Expectancy	AvgWin	AvgLoss	WinLen	LossLen	ProfitFactor	Sharpe	Volatility	Sortino	AvgExp	MaxExp
0014	2 - Testing Code	1/3/12 - 8/8/25	3,333	\$2,710,619	True	28.82%	-38.49%	0.75	0.51	12.80	-27.57%	67.75%	25	84.00%	16.18%	20.86%	8.38%	55.05	40.25	4.60	0.96	31.51%	1.49	44.90%	167.61%



NOTE:

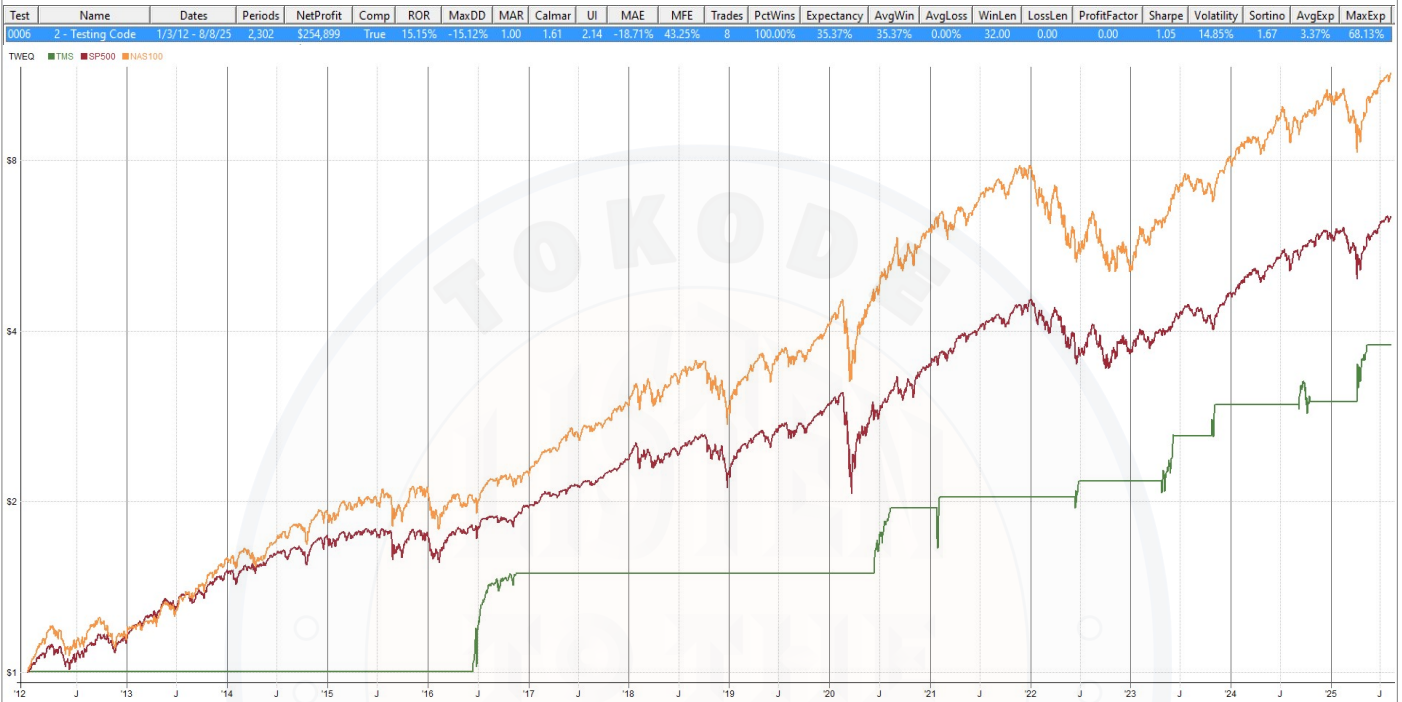
Both strategies' performance worsen if traded without a stretch.

PERFORMANCE DATA

Since the VIX is based on the implied volatility of S&P 500 index options, VIX ETFs such as UVXY can also be traded with TMS signals.

The VIX

The figure below shows performance of a simple mean reversion strategy (50% allocation) with a basic stretch, that shorts UVXY when TPI = 100 (deep oversold) and covers when TPI = 0 (overbought).



The same strategy's performance is shown below; shorting when TPI >= 95 (oversold) and covering when TPI = 0 (overbought).



NOTE:

Both strategies' accounts blow out in 2020 if traded without a stretch.

STUDIES

The data from TMS can be plotted as an indicator on a chart or shown as a table (see table below).

Date ▼	Symbol	SPXL	BPI	TPI	TBI	TRI
8/8/25	SPXL	187.40	54.80	29.98	25.30	12.00
8/7/25	SPXL	183.43	54.60	39.02	15.01	12.00
8/6/25	SPXL	183.76	55.40	41.67	25.62	12.00
8/5/25	SPXL	179.83	56.60	62.88	19.40	12.00
8/4/25	SPXL	182.53	56.60	84.47	13.43	12.00
8/1/25	SPXL	174.65	56.40	100.00	6.43	12.00
7/31/25	SPXL	183.80	61.80	95.24	22.86	13.00
7/30/25	SPXL	186.06	66.00	67.60	46.00	13.00
7/29/25	SPXL	186.76	69.00	34.26	69.76	13.00
7/28/25	SPXL	188.29	70.60	9.07	83.14	13.00
7/25/25	SPXL	188.43	70.80	3.38	93.33	13.00
7/24/25	SPXL	186.37	70.00	6.50	96.47	13.00
7/23/25	SPXL	186.14	70.00	14.06	97.85	13.00

Studies can also be carried out using the CSV data of TMS in Microsoft Excel, RealTest, AmiBroker, Optuma or other platforms, to set expectations after pullbacks, correction, bottoms or other significant market events. For example, what is performance like after major corrections or market bottoms. The table below is the result of a scan of every time when for Symbol = \$SPXL, (TPI >= 95) and (TRI <= 3); indicating the end (exhaustion) of a downtrend in a RiskOFF market environment. PctChgDayX indicates the percent rise or fall in SPXL "X" days after the event.

Date ▼	Symbol	BPI	TPI	TBI	TRI	Day0Close	Day5Close	Day15Close	Day25Close	Day35Close	Day45Close	Day60Close	PctChgDay5	PctChgDay15	PctChgDay25	PctChgDay35	PctChgDay45	PctChgDay60
4/8/25	SPXL	11.80	98.63	38.27	0.00	96.11	118.29	128.09	151.20	152.22	162.03	175.41	23.08	33.27	57.32	58.38	68.59	82.51
4/7/25	SPXL	12.60	100.00	43.83	2.00	100.75	119.14	128.01	150.65	150.18	160.33	179.41	18.25	27.06	49.53	49.06	59.14	78.07
10/23/23	SPXL	28.80	98.47	1.08	2.00	73.58	70.78	83.41	91.58	96.74	105.00	107.66	-3.81	13.36	24.46	31.48	42.70	46.32
10/20/23	SPXL	31.40	100.00	13.64	2.00	74.02	68.33	83.71	91.33	95.47	104.36	103.90	-7.69	13.09	23.39	28.98	40.99	40.37
10/12/22	SPXL	22.60	95.40	15.90	0.00	52.77	57.83	60.22	69.70	75.55	65.49	64.56	9.59	14.12	32.08	43.17	24.10	22.34
8/31/22	SPXL	54.40	99.26	29.88	3.00	73.22	76.00	62.02	60.71	56.32	58.28	73.08	3.80	-15.30	-17.09	-23.08	-20.40	-0.19
8/30/22	SPXL	55.80	100.00	53.68	3.00	75.01	74.52	63.67	62.66	57.83	60.22	73.13	-0.65	-15.12	-16.46	-22.90	-19.72	-2.51
7/14/22	SPXL	28.20	100.00	11.41	2.00	65.75	76.87	85.58	93.93	73.97	67.97	55.63	16.91	30.16	42.86	12.50	3.38	-15.39
7/13/22	SPXL	31.80	100.00	8.88	2.00	66.24	74.62	85.82	93.23	73.22	69.68	60.71	12.65	29.56	40.75	10.54	5.19	-8.35
6/13/22	SPXL	24.20	98.64	10.62	1.00	64.64	64.92	68.79	74.62	85.82	93.23	76.00	0.43	6.42	15.44	32.77	44.23	17.57
6/10/22	SPXL	42.60	100.00	1.10	2.00	72.96	60.47	68.06	73.23	82.00	95.21	74.52	-17.12	-6.72	0.37	12.39	30.50	2.14
1/14/19	SPXL	39.40	100.00	39.51	3.00	35.58	37.81	42.21	44.56	43.88	46.39	49.51	6.27	18.63	25.24	23.33	30.38	39.15
1/11/19	SPXL	40.00	100.00	65.93	2.00	36.24	39.35	41.69	44.30	44.74	46.86	49.01	8.58	15.04	22.24	23.45	29.30	35.24
12/10/18	SPXL	39.00	95.96	9.65	1.00	39.08	35.27	32.93	37.02	40.80	42.69	42.53	-9.75	-15.74	-5.27	4.40	9.24	8.83
1/8/16	SPXL	36.00	97.12	4.90	1.00	68.80	64.11	69.92	65.30	74.02	78.49	84.56	-6.82	1.63	-5.09	7.59	14.08	22.91
9/28/15	SPXL	31.00	100.00	1.06	1.00	65.20	76.54	82.16	90.70	84.52	90.74	82.48	17.39	26.01	39.11	29.63	39.17	26.50
9/25/15	SPXL	36.00	96.12	2.42	1.00	70.56	72.62	81.97	87.62	80.84	88.16	80.30	2.92	16.17	24.18	14.57	24.94	13.80
9/24/15	SPXL	36.80	96.12	10.30	1.00	70.80	69.63	80.92	88.85	83.67	89.31	78.15	-1.65	14.29	25.49	18.18	26.14	10.38
8/24/15	SPXL	22.40	100.00	10.56	3.00	67.28	75.69	76.02	65.38	78.55	86.02	84.24	12.50	12.99	-2.82	16.75	27.85	25.21
11/23/11	SPXL	50.80	100.00	2.60	3.00	48.79	59.73	55.18	60.84	66.47	69.88	77.73	22.42	13.10	24.70	36.24	43.23	59.32
2/18/09	SPXL	35.80	96.34	0.00	2.00	23.55	21.32	17.50	24.40	25.24	27.62	31.20	-9.47	-25.69	3.61	7.18	17.28	32.48

A quick calculation in Microsoft Excel shows in the table below, the average percent rise X days later, after these market events.

Date	Symbol	BPI	TPI	TBI	TRI	Day0Close	Day5Close	Day15Close	Day25Close	Day35Close	Day45Close	Day60Close	PctChgDay5	PctChgDay15	PctChgDay25	PctChgDay35	PctChgDay45	PctChgDay60
04/08/2025	SPXL	11.8	98.63	38.27	0	96.11	118.29	128.09	151.2	152.22	162.03	175.41	23.08	33.27	57.32	58.38	68.59	82.51
04/07/2025	SPXL	12.6	100	43.83	2	100.75	119.14	128.01	150.65	150.18	160.33	179.41	18.25	27.06	49.53	49.06	59.14	78.07
10/23/23	SPXL	28.8	98.47	1.08	2	73.58	70.78	83.41	91.58	96.74	105	107.66	-3.81	13.36	24.46	31.48	42.7	46.32
10/20/23	SPXL	31.4	100	13.64	2	74.02	68.33	83.71	91.33	95.47	104.36	103.9	-7.69	13.09	23.39	28.98	40.99	40.37
10/12/2022	SPXL	22.6	95.4	15.9	0	52.77	57.83	60.22	69.7	75.55	65.49	64.56	9.59	14.12	32.08	43.17	24.1	22.34
8/31/22	SPXL	54.4	99.26	29.88	3	73.22	76	62.02	60.71	56.32	58.28	73.08	3.8	-15.3	-17.09	-23.08	-20.4	-0.19
8/30/22	SPXL	55.8	100	53.68	3	75.01	74.52	63.67	62.66	57.83	60.22	73.13	-0.65	-15.12	-16.46	-22.9	-19.72	-2.51
7/14/22	SPXL	28.2	100	11.41	2	65.75	76.87	85.58	93.93	73.97	67.97	55.63	16.91	30.16	42.86	12.5	3.38	-15.39
7/13/22	SPXL	31.8	100	8.88	2	66.24	74.62	85.82	93.23	73.22	69.68	60.71	12.65	29.56	40.75	10.54	5.19	-8.35
6/13/22	SPXL	24.2	98.64	10.62	1	64.64	64.92	68.79	74.62	85.82	93.23	76	0.43	6.42	15.44	32.77	44.23	17.57
06/10/2022	SPXL	42.6	100	1.1	2	72.96	60.47	68.06	73.23	82	95.21	74.52	-17.12	-6.72	0.37	12.39	30.5	2.14
1/14/19	SPXL	39.4	100	39.51	3	35.58	37.81	42.21	44.56	43.88	46.39	49.51	6.27	18.63	25.24	23.33	30.38	39.15
01/11/2019	SPXL	40	100	65.93	2	36.24	39.35	41.69	44.3	44.74	46.86	49.01	8.58	15.04	22.24	23.45	29.3	35.24
12/10/2018	SPXL	39	95.96	9.65	1	39.08	35.27	32.93	37.02	40.8	42.69	42.53	-9.75	-15.74	-5.27	4.4	9.24	8.83
01/08/2016	SPXL	36	97.12	4.9	1	68.8	64.11	69.92	65.3	74.02	78.49	84.56	-6.82	1.63	-5.09	7.59	14.08	22.91
9/28/15	SPXL	31	100	1.06	1	65.2	76.54	82.16	90.7	84.52	90.74	82.48	17.39	26.01	39.11	29.63	39.17	26.5
9/25/15	SPXL	36	96.12	2.42	1	70.56	72.62	81.97	87.62	80.84	88.16	80.3	2.92	16.17	24.18	14.57	24.94	13.8
9/24/15	SPXL	36.8	96.12	10.3	1	70.8	69.63	80.92	88.85	83.67	89.31	78.15	-1.65	14.29	25.49	18.18	26.14	10.38
8/24/15	SPXL	22.4	100	10.56	3	67.28	75.69	76.02	65.38	78.55	86.02	84.24	12.5	12.99	-2.82	16.75	27.85	25.21
11/23/11	SPXL	50.8	100	2.6	3	48.79	59.73	55.18	60.84	66.47	69.88	77.73	22.42	13.1	24.7	36.24	43.23	59.32
2/18/09	SPXL	35.8	96.34	0	2	23.55	21.32	17.5	24.4	25.24	27.62	31.2	-9.47	-25.69	3.61	7.18	17.28	32.48
Average													4.66	9.83	19.24	19.74	25.73	25.56

The strategies shown and studies employed are intentionally the most basic applications of the TMS indicator, to reveal the edge in TMS.

More sophisticated strategies can be designed for algorithmic trading. Other kinds of studies not limited to the one shown here can also be carried out for trading.

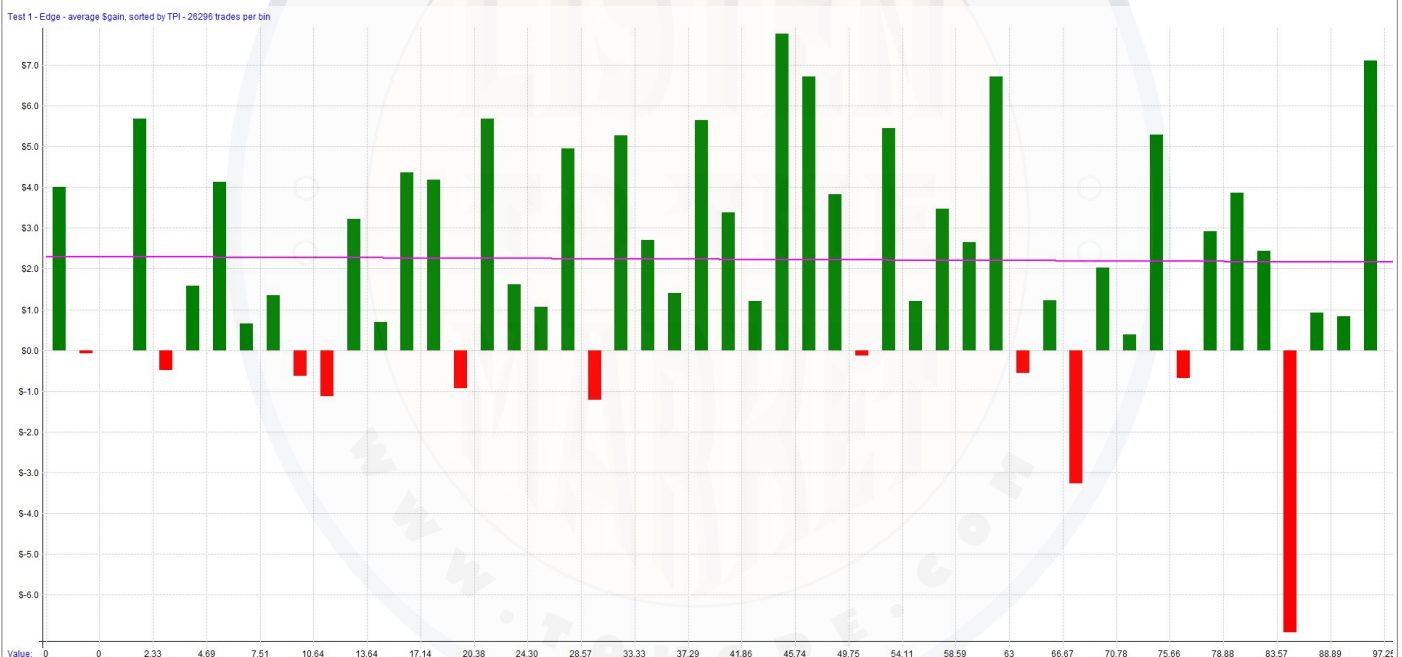
EDGE / EXPECTANCY—BY—BIN

To test the indicator's edge using expectance-by-bin analysis, an intentionally unbiased strategy was built, that purchased every eligible S&P 500 constituent each day with fixed dollar sizing of \$1,000 per position, pyramiding enabled, and a specified holding period, with both entries and exits executed at the open. The universe required at least 252 prior bars of history and a minimum of three bars ahead to ensure data integrity.

Account capital was set to approximately \$1.5 million to keep the average daily investment near 100% deployment under the "buy everything" logic. This configuration produced over a million trades—an exceptional sample that suppresses outlier influence and reveals true expectancy patterns. Within this framework, the complete trade set was sorted by candidate factors (TPI) and partitioned into equal-count bins (for example, 50 ventiles with the same number of trades per bin). Factors were evaluated at the entry setup bar, enabling genuine pre-trade assessment that mirrors real decision timing.

Short hold (5 bars)

Below is the outcome of TPI's performance for 1.3 million trades. TPI has a positive skew when used as a regime filter for mean reversion trades in stocks, across its entire range (0 to 100).



Analysis

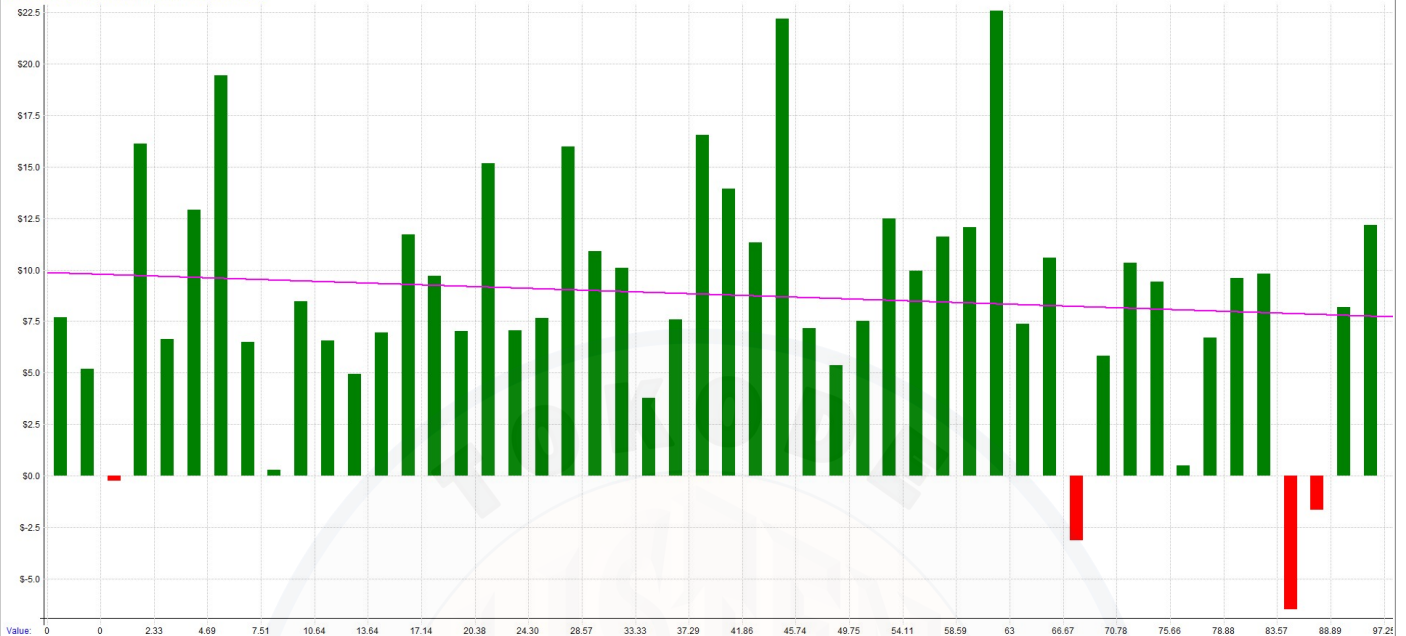
Expectancy oscillates across bins, with clusters of positive bars interspersed with occasional negative outliers in the higher TPI range. The mean line sits near the midrange, while dispersion increases as TPI rises, indicating more unstable conditions at elevated readings.

The results show TPI is better suited as a regime filter than a precise entry selector. Lower TPI bins frequently align with above-average 5-day gains, consistent with a supportive backdrop for short-term long trades. As TPI moves into upper quantiles, expectancy compresses and the incidence and depth of adverse outcomes grow, implying a riskier or less forgiving environment for mean-reversion entries.

Long hold (20 bars)

The outcome of TPI's performance for the same test is shown below.

Test 2 - Edge - average \$gain, sorted by TPI - 26296 trades per bin

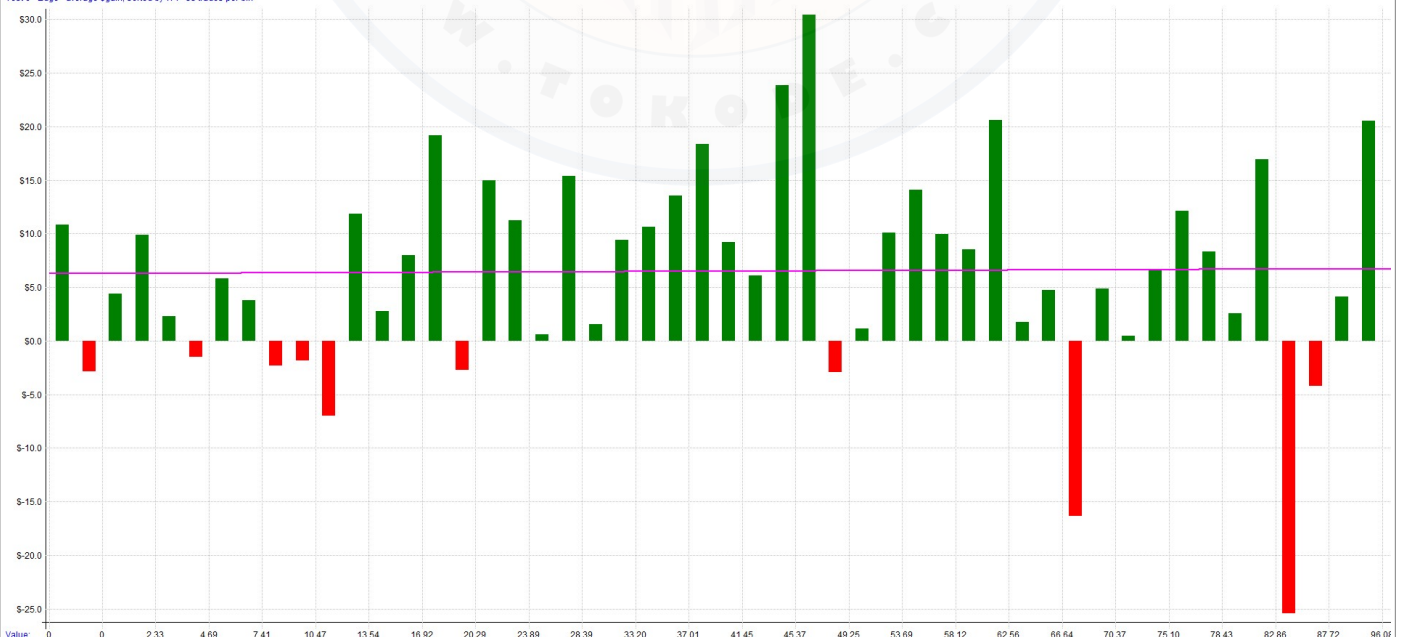
**Analysis**

The results show that expectancy is positive in most bins, with the best performance spikes appearing in the mid-to-upper ranges. The trendline has a slight downward slope, which means high expectancy is not confined to the top-ranked signals. Instead, profitability is dispersed across the scale, giving traders multiple zones to work with.

Short hold (5 bars)

The same test was performed on the 3X leveraged S&P 500 ETF (Symbol: SPXL). 2,699 trades were executed, the results show TPI has a positive skew.

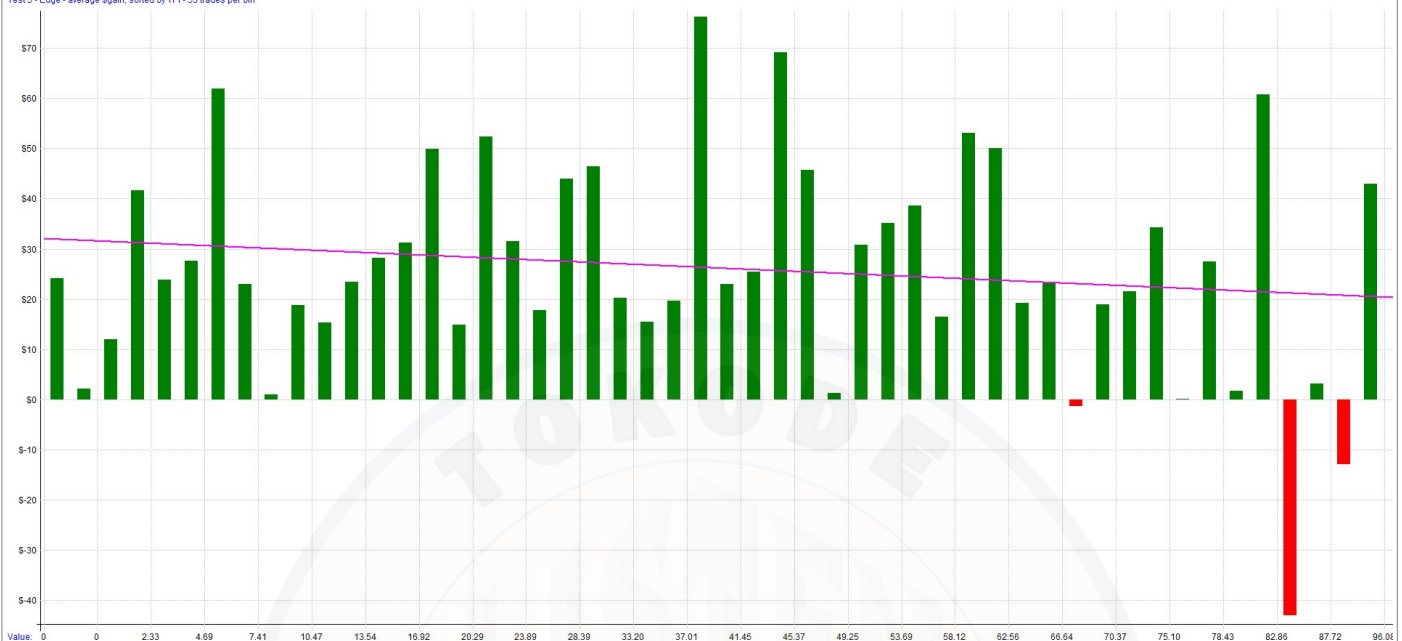
Test 6 - Edge - average \$gain, sorted by TPI - 53 trades per bin



Long hold (20 bars)

Same outcome for long hold SPXL.

Test 5 - Edge - average \$gain, sorted by TPI - 53 trades per bin

**CONCLUSION**

Expectancy-by-bin analysis confirms that TPI, an indicator applying momentum and trend analysis to breadth data, is a powerful tool for identifying extreme market conditions in the S&P 500. By measuring the extent of market participation, TPI pinpoints both overbought (for mean reversion exit or pyramiding) and particularly oversold (for mean reversion entry) conditions with actionable precision.

The results show a clear pattern: at oversold extremes ($TPI \geq 95$), forward expectancy often stabilises or improves, signalling that downside momentum has likely reached exhaustion and a rebound is statistically favoured. At overbought extremes ($TPI = 0$), forward returns frequently flatten or underperform. If used in conjunction with TBI, it could signal pyramiding opportunities.

What makes TPI especially effective for the S&P 500 is its breadth-based foundation. Unlike price-only indicators, TPI, an index of participation, gauges the collective movement of market constituents, giving a deeper view into the true strength or weakness behind an index move.

In short, TPI excels at recognising when momentum extremes in breadth align with statistical turning points. These results demonstrate its value as a contrarian tool for navigating the S&P 500 and the Vix, transforming apparent "too strong to stop" trends into profitable opportunities to anticipate and act on reversals.