WISDOMTREE RULES-BASED METHODOLOGY

WisdomTree Managed Futures Index

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The WisdomTree Managed Futures Index tracks a diversified portfolio of futures contracts on both commodities and financials based on a proprietary rules-based momentum investing framework.

Assets

The investment universe of the index includes the following components

Commodities				Financials	
Crude Oil	Copper	Soybeans	Live Cattle	Euro	10 Year US Note
Natural Gas	Gold	Corn	Lean Hogs	Japanese Yen	30 Year US Bond
Heating Oil	Silver	Wheat		British Pound	
Gasoline		Coffee		Swiss Franc	
		Sugar		Australian Dollar	
		Cotton		Canadian Dollar	
		Cocoa			

Instruments

The index tracks the prices of futures contracts on the components in the universe. The futures contracts for the corresponding components and their exchanges are summarized in the table below.

Commodities				Financials		
Asset	Futures Contract	Exchange		Asset	Futures Contract	Exchange
Crude Oil	CL	NYMEX		Euro	EC	CME
Natural Gas	NG	NYMEX		Japanese Yen	JY	CME
Heating Oil	HO	NYMEX		British Pound	BP	CME
Gasoline	XB	NYMEX		Swiss Franc	SF	CME
Copper	HG	CMX		Australian Dollar	AD	CME
Gold	GC	CMX		Canadian Dollar	CD	CME
Silver	SI	CMX		10 Year US Note	TY	CBT
Soybeans	S	CBT		30 Year US Bond	US	CBT
Corn	C	CBT				
Wheat	W	CBT				
Coffee	KC	NYB-ICE				
Sugar	SB	NYB-ICE				
Cotton	CT	NYB-ICE				
Cocoa	CC	NYB-ICE				
Live Cattle	LC	CME				
Lean Hogs	LH	CME				

Rolling schedule

The futures contract of each component follows a fixed rolling schedule as listed below. For example, the contract applicable to Crude Oil in April is the June contract of the same year. In May, the contract applicable to Crude Oil will roll into the September contract of the same year, according to the schedule.

Asset	Contract	January	February	March	April	May	June	July	August	September	October	November	December
Crude Oil	CL	H	M	M	M	U	U	U	Z	Z	Z	H	H
Natural Gas	NG	H	M	M	M	U	U	U	Z	Z	Z	H	H
Heating Oil	HO	H	M	M	M	U	U	U	Z	Z	Z	H	H
Gasoline	XB	H	M	M	M	U	U	U	Z	Z	Z	H	H
Copper	HG	H	K	K	N	N	U	U	Z	Z	Z	H	H
Gold	GC	J	J	M	M	Q	Q	Z	Z	Z	Z	G	G
Silver	SI	H	N	N	N	N	U	U	Z	Z	Z	H	H
Soybeans	S	H	N	N	N	N	X	X	X	X	H	H	H
Corn	CO	H	N	N	N	N	U	U	Z	Z	Z	H	H
Wheat	W	H	N	N	N	N	U	U	Z	Z	Z	H	H
Coffee	KC	H	N	N	N	N	U	U	Z	Z	Z	H	H
Sugar	SB	H	K	K	N	N	V	V	V	H	H	H	H
Cotton	CT	H	N	N	N	N	Z	Z	Z	Z	Z	H	H
Cocoa	CC	H	N	N	N	N	U	U	Z	Z	Z	H	H
Live Cattle	LC	M	M	M	M	Q	Q	Z	Z	Z	Z	G	G
Lean Hogs	LH	M	M	M	M	Q	Q	Z	Z	Z	Z	G	G
Euro	EC	H	H	M	M	M	U	U	U	Z	Z	Z	H
Japanese Yen	JY	H	H	M	M	M	U	U	U	Z	Z	Z	H
British Pound	BP	H	H	M	M	M	U	U	U	Z	Z	Z	H
Swiss Franc	SF	H	H	M	M	M	U	U	U	Z	Z	Z	H
Australian Dollar	AD	H	H	M	M	M	U	U	U	Z	Z	Z	H
Canadian Dollar	CD	H	H	M	M	M	U	U	U	Z	Z	Z	H
10 Year US Note	TY	H	M	M	M	U	U	U	Z	Z	Z	H	H
30 Year US Bond	US	H	M	M	M	U	U	U	Z	Z	Z	H	H
		January	February	March	April	May	June	July	August	September	October	November	December
Contract Month Code		F	G	H	J	K	M	N	Q	U	V	X	Z

Contract prices and returns of components

Two settlement prices for each component contract are used in the calculation of the final index.

Position Determination Date (PDD) Prices: prices are collected on the "position determination date", which is two business days before the last trading day of the month for the most recent month and one business day before for every other month, to calculate monthly percentage change time series for each component (e.g. compare PDD price of the current month with PDD price from the month before).

$$R_k(PDD) = \frac{P_k(PDD)}{P_k(PDD - 1)} - 1$$

Where,

$R_k(PDD)$, the monthly return of component k on the Position Determination Date.
$P_k(PDD)$, the settlement price of the futures contract of component k on the Position Determination Date.
$P_k(PDD - 1)$, the settlement price of the futures contract of component k on the previous Position Determination Date.

Roll Date (RD) Prices: settlement prices are collected on the "roll date", which is the last trading day of the month, to calculate monthly percentage change time series for each component (e.g. compare RD price of the current month with RD price from the month before).

$$R_k(RD) = \frac{P_k(RD)}{P_k(RD-1)} - 1$$

Where,

$R_k(RD)$, the monthly return of component k on the Roll Date.
$P_k(RD)$, the settlement price of the futures contract of component k on the Roll Date.
$P_k(RD-1)$, the settlement price of the futures contract of component k on the previous Roll Date.

Long/short decision under composite momentum signal framework

The index establishes long or short positions once a month using a transparent, rules-based investment process. For each component, the index calculates the following momentum signals.

Short-term momentum: at the position determination date, the index calculates the last 3-month return based on the PDD prices. If the last 3-month return is greater than or equal to zero, the index denotes $M_3=1$, otherwise, $M_3=-1$.

$$ST_k(PDD) = \sum_{i=0}^{2} R_k(PDD - i)$$
$$If\ ST_k(PDD) \geq 0, M_3 = 1, otherwise\ M_3 = -1.$$

Where,

$ST_k(PDD)$, the short term momentum of component k on the Position Determination Date.

Medium-term momentum: at the position determination date, the index calculates the last 6-month return based on the PDD prices. If the last 6-month return is greater than or equal to zero, the index denotes $M_6=1$, otherwise, $M_6=-1$.

$$MT_k(PDD) = \sum_{i=0}^{5} R_k(PDD - i)$$
$$If\ MT_k(PDD) \geq 0, M_6 = 1, otherwise\ M_6 = -1.$$

Where,

$MT_k(PDD)$, the medium term momentum of component k on the Position Determination Date.

Long-term momentum: at the position determination date, the index calculates the last 12-month return based on the PDD prices. If the last 12-month return is greater than or equal to zero, the index denotes $M_{12}=1$, otherwise, $M_{12}=-1$.

$$LT_k(PDD) = \sum_{i=0}^{11} R_k(PDD - i)$$
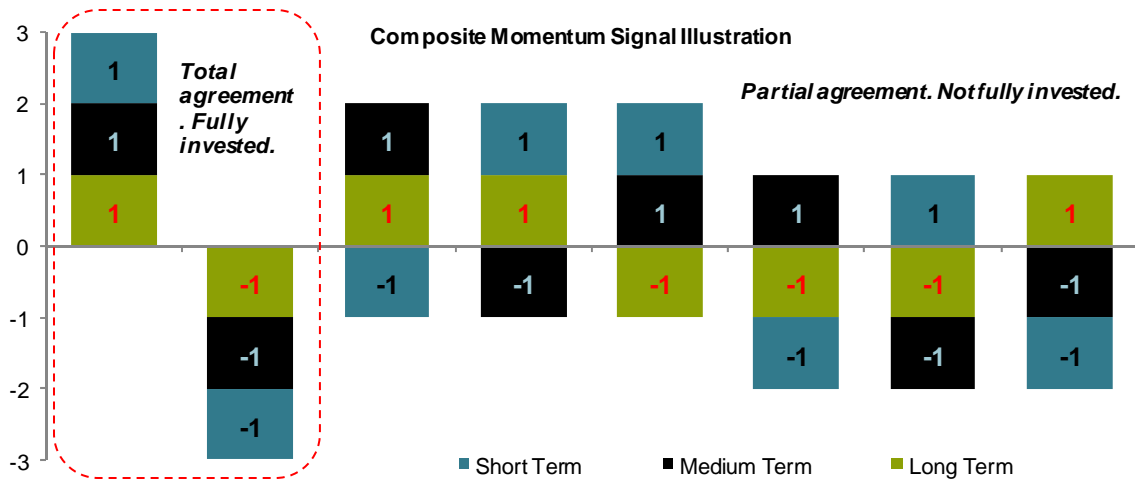$$If\ LT_k(PDD) \geq 0, M_{12} = 1, otherwise\ M_{12} = -1.$$

Where,

$LT_k(PDD)$, the long term momentum of component k on the Position Determination Date.

Composite momentum signal: the composite momentum signal of each component is the sum of M_3, M_6 and M_{12}.

$$M_{kc}(PDD) = M_3 + M_6 + M_{12}$$

If M_{kc} =3 or -3, the momentum signals are in total agreement. The index invests the full notional amount of the weight assigned to the component with a long (M_{kc}=3) position or a short (M_{kc} =-3) position.

If M_{kc} =1 or -1, the momentum signals are in partial agreement. The index invests the two thirds of the notional amount of the weight assigned to the component with a long (M_{kc} =1) position or a short (M_{kc} =-1) position.

Composite Momentum Signal Illustration

Total agreement. Fully invested. *Partial agreement. Not fully invested.*

■ Short Term ■ Medium Term ■ Long Term

However, the short position in energy commodities is not allowed, which includes Crude Oil, Natural Gas, Heating Oil and Gasoline. When the composite momentum signal of an energy component mentioned above indicates a short position (M_{kc} =-3 or -1), the index stays flat and assigns the weight of the component to other components proportionally.

Index components selection and weighting

The index selects 20 out of 24 components in the universe with lower realized volatility each month. The realized volatility is calculated as the annualized standard deviation of the last 36-month RD prices-based monthly returns of long/short positioning under the composite momentum signal framework.

$$SD_k(RD) = \sqrt{12} \times \sqrt{\frac{\sum_{i=0}^{35}(Ret_k(RD-i) - \overline{Ret_k})^2}{N-1}}$$

Where,

$SD_k(RD)$, the annualized standard deviation of component $k's$ last 36 month's monthly returns of long or short positioning under the composite momentum signal framework.
$Ret_k(RD)$, the RD price based monthly return of component k of long or short positioning under the composite momentum signal framework.
$N = 36$, the number of months of the look back period.
$\overline{Ret_k}$, the average of $Ret_k(RD-i)$, $i = 0, \dots 35$.

The index gives equal weight to all selected components.

If an energy component is selected into the index but the composite momentum signal suggests a short position, the index stays flat and assigns the weight of the energy component to other selected components proportionally.

There are 16 components in the index each month at minimum and 20 components at maximum. Therefore, the notional amount of the weight of each component ranges from 5% to 6.25%.

Index calculation

Index values are calculated daily after the close of the underlying component markets.

Calculation of price return

Each trading day the index will be valued based on the settlement prices of their respective component contracts. The price return is a sum of the contract percentage changes that does not include any interest component.

$$WTMFPR(t) = WTMFPR(RD) \times \left(1 + \sum_{k=1}^{n} LSF_k(RD) \times W_k(RD) \times \left(\frac{P_k(t)}{P_k(RD)} - 1 \right) \right)$$

Where,

$WTMFPR(t)$, the value of WisdomTree Managed Futures Index on day t.
$WTMFPR(RD)$, the value of WisdomTree Managed Futures Index on the Roll Date preceding day t.
t: the current trading day.
n: the number of components in WTMFPR Index on day t.
$LSF_k(RD)$: The long or short or flat indicator of the component k on the Roll Date preceding day t. The value is either $1, -1, or\ 0$.
$W_k(RD)$: The weight of component k on the Roll Date preceding day t.
$P_k(t)$: the settlement price of component k on day t.
$P_k(RD)$: the settlement price of component k on the Roll Date preceding day t.

Note that positions roll at the close of business on the Roll Date. Index valuations on the Roll Date (t=RD) will refer to the prior Roll Date for component prices, direction and weights.

Calculation of total return

The total return of the index consists of both price return and interest rate return that is earned on futures collateral. The futures collateral is assumed to be invested in a short term risk free rate to approximate the return earned from the collateral positions.

$$WTMFTR(t) = WTMFTR(RD) \times \left(1 + \left(\frac{WTMFPR(t)}{WTMFPR(RD)} - 1 \right) + R_{rf} \right)$$

Where,

$WTMFTR(t)$, the value of WisdomTree Managed Futures Total Return Index on day t.
$WTMFTR(RD)$, the value of WisdomTree Managed Futures Total Return Index on the Roll Date preceding day t.
t: the current trading day.
$WTMFPR(t)$, the value of WisdomTree Managed Futures Index on day t.
$WTMFPR(RD)$, the value of WisdomTree Managed Futures Index on the Roll Date preceding day t.
R_{rf}, the return of the risk free rate over the period from the preceding (RD) to (t)

Note that positions roll at the close of business on the Roll Date. Index valuations on the Roll Date (t=RD) will refer to the prior Roll Date for component prices, direction and weights.