The Roll Is the Return: Commodity Funds Against the Spot Price, 2008–2026

Gaurav Gupta · Research note · 26 October 2026 · Oil (Jan 2008–Oct 2026), natural gas (Feb 2010–), broad funds (Sep 2010–); EIA spot prices, fund total returns, 3-month T-bills

$26.5M
$100M in front-month oil (USO), Jan 2008–Oct 2026; WTI +14.7%

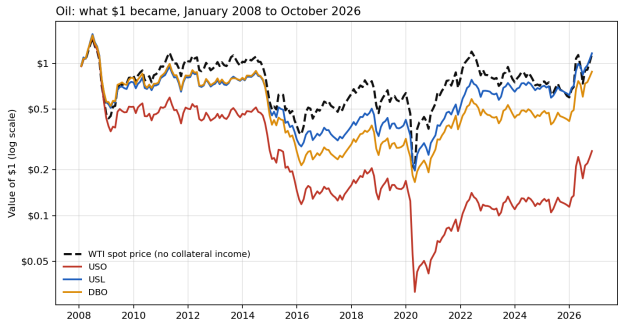
$116.2M
Same $100M in the 12-month oil strip (USL)

−8.8% vs −1.4%
Annual gap to spot + T-bills: front month vs strip

$0.9M
$100M in front-month natural gas (UNG) from Feb 2010

Vehicle	Roll design	Return a year	Gap to spot + bills	$100M became	Beta to spot
USO (oil)	Front month	−6.8%	−8.8%	$26.5M	0.85
USL (oil)	12-month strip	+0.8%	−1.4%	$116.2M	0.65
DBO (oil)	Optimum yield	−0.7%	−2.8%	$88.0M	0.65
UNG (gas)	Front month	−24.6%	−23.7%	$0.9M	0.60
UNL (gas)	12-month strip	−12.3%	−11.2%	$11.1M	0.36

WTI spot +0.7% a year, Henry Hub −2.8%; T-bills ~1.5%. 2026 YTD (backwardation): USO +132.5%, spot +92.1%, USL +88.5%. Pre-specified switching rule (front month after a positive 1/3/6-month roll, else strip; 10 bp/switch): −4.3% / −3.1% / −1.7% a year vs +0.8% always-strip. Broad funds Sep 2010–Oct 2026: USCI 5.1%, DBC 3.7%, GSG 1.8% a year; 2022 +19% to +30% vs S&P 500 −18%.



Oil: what $1 became, January 2008 to October 2026 (log scale).

SOURCES

- Spot: U.S. EIA WTI Cushing (RWTC) and Henry Hub (RNGWHHD) daily, via github.com/datasets/oil-prices and /natural-gas (ODC-PDDL), sha256-pinned
- Fund prices, distributions, 3-month T-bill yields: Yahoo Finance / US Treasury via huggingface.co/datasets/defeatbeta/yahoo-finance-data (ODC-BY), sha256-pinned
- Methods: Gorton & Rouwenhorst (2006), FAJ 62(2) 47–68; Erb & Harvey (2006), FAJ 62(2) 69–97

METHOD

- Total return = split-adjusted close + distributions on ex-date; month-end compounding; run stops on any daily move above 50%
- Gap = log(1+fund) − log(1+spot change) − log(1+T-bill), annualised: isolates roll and fees
- Switching rule and lookbacks fixed before results; all three reported

KEY CALCULATIONS

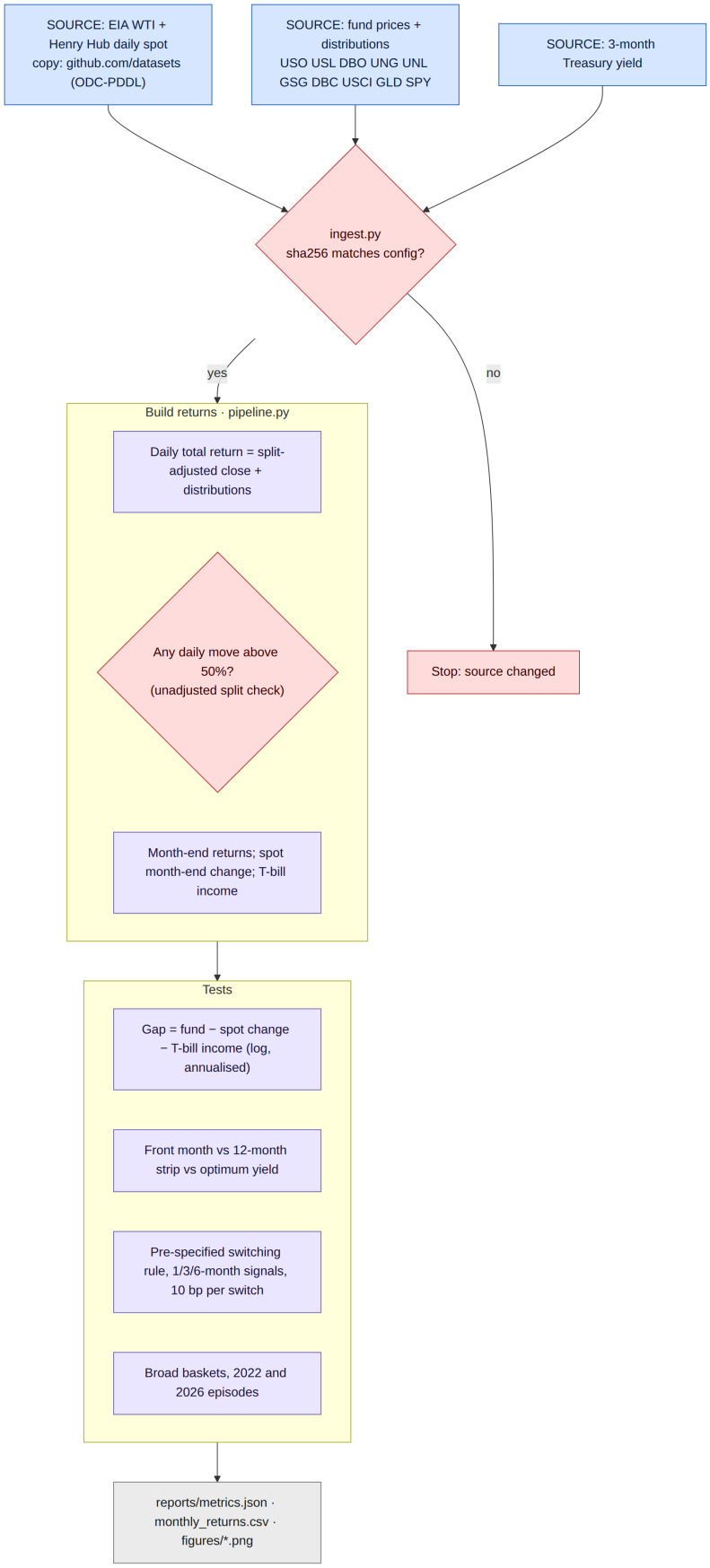
- Oil gap 2008–16 / 2017–26: USO −13.5% / −4.3%; USL −4.5% / +1.6%
- 2020: USO −67.8%, USL −25.2%, spot −20.9%
- Hedge ratio: strip needs ~1.3x notional (beta 0.65 vs 0.85)

RECOMMENDATIONS

- Strategic exposure only via strip, optimum-yield or backwardation-tilted vehicles
- Front month only for short, defined hedges with roll cost budgeted
- No front-month natural gas as a holding
- Size hedges by beta; do not approve curve-timing rules on averages
- Report each vehicle's gap to spot + T-bills monthly; review after two quarters over budget

Independent research on public data; not investment advice; dollar figures illustrative. Code: github.com/guptagaurav-info/commodity-roll-cost · Write-up: guptagaurav.info/articles/commodity-roll-cost

Pipeline


SOURCE: EIA WTI + Henry Hub daily spot copy: github.com/datasets (ODC-PDDL)
SOURCE: fund prices + distributions USO USL DBO UNG UNL GSG DBC USCI GLD SPY
SOURCE: 3-month Treasury yield
ingest.py sha256 matches config?
yes
no
Build returns · pipeline.py
Daily total return = split-adjusted close + distributions
Any daily move above 50%? (unadjusted split check)
Month-end returns; spot month-end change; T-bill income
Stop: source changed
Tests
Gap = fund − spot change − T-bill income (log, annualised)
Front month vs 12-month strip vs optimum yield
Pre-specified switching rule, 1/3/6-month signals, 10 bp per switch
Broad baskets, 2022 and 2026 episodes
reports/metrics.json · monthly_returns.csv · figures/*.png

Vehicle decision and monitoring

