AI-Powered Trading — From Analysis to Automated Strategy

MooMoo Financial Canada Meetup

BIG THANKS

To Moomoo Financial for hosting this event!

Bryan of QuantLabsNet.com

- 1 year old new site after 13 years of Quantlabs.net
- Focus on automated trading and quant related strategy techniques

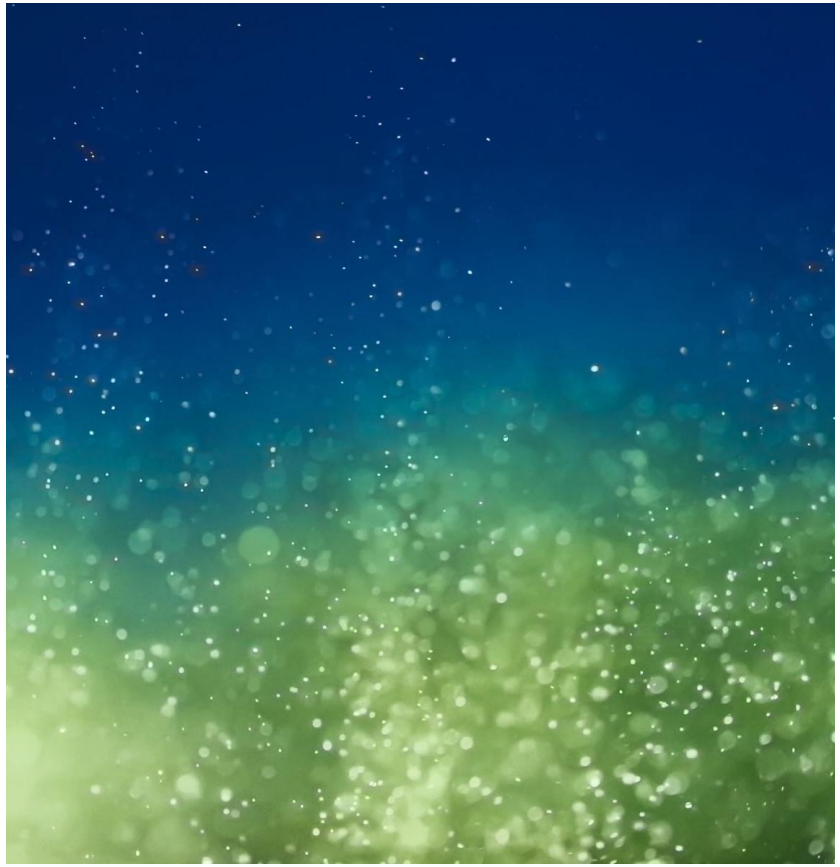
Contact:

- Feedback@quantlabs.net
- Chat feature on website

Disclaimer

This information is for general knowledge and educational purposes only and should not be considered financial advice.

For accurate and precise daily rate calculations, consult with a financial professional or utilize specialized financial software.



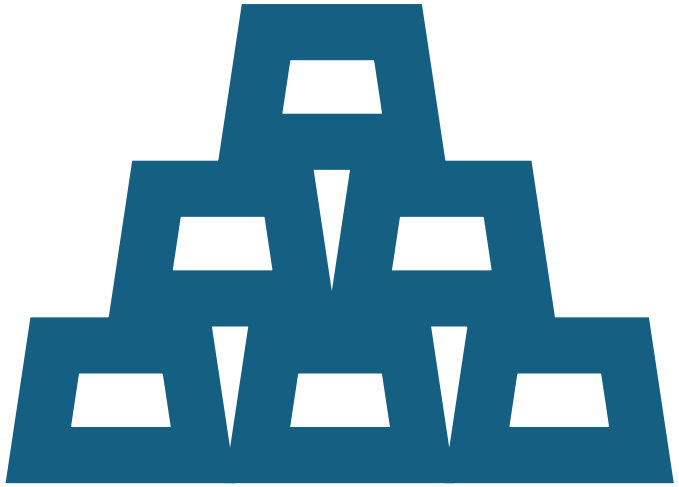
Notional value

- Total dollar exposure of a futures position, calculated as (contract size × current price); it measures how much of the underlying asset you control even though you only post a margin deposit.

What Are Futures & Options?

Futures: A Financial Obligation

- **Definition:** A standardized legal contract to **buy or sell** a specific asset (like a stock index, oil, or gold) at a predetermined price on a future date.
- **Core Concept:** It is an **obligation**. If you hold the contract, you *must* complete the transaction.
- **Primary Use:** Used by speculators to bet on price direction and by producers/consumers to hedge against future price changes.
- **Analogy:** Pre-ordering a product at a locked-in price for future delivery.



Options: A Financial Choice

- **Definition:** A contract that gives the buyer the **right, but not the obligation**, to buy (**Call**) or sell (**Put**) an asset at a set price on or before a specific date.
- **Core Concept:** It is a **choice**. The buyer pays a "premium" for this flexibility and can choose to walk away.
- **Primary Use:** Used to speculate with limited risk, protect existing investments (hedging), and generate income.
- **Analogy:** A down payment on a house that gives you the right to buy it at an agreed price, but you can forfeit the payment if you change your mind.

Futures Contract Size Tiers – Micro, Mini & Full

- • **Purpose of Multiple Tiers**
  • Offer right-sized exposure for different account sizes & risk tolerances
  • Maintain identical underlying asset, expiration cycle & exchange rules
- • **Micro Contract**
  • ~1/10th (or smaller) notional value of the full contract
  • Lowest margin & tick value → fine-grained risk control
  • Designed for retail traders testing strategies or scaling in/out
- • **Mini Contract**
  • ~1/5th–1/2 notional value of the full contract (varies by product)
  • Moderate margin requirement; ticks still meaningful but affordable
  • Suited to active individuals & small funds seeking efficiency without full-size swings
- • **Full (Standard) Contract**
  • Benchmark size on which exchange volumes & settlement prices are based
  • Highest capital & margin; each tick moves the P/L the most
  • Preferred by institutions needing deep liquidity and tight spreads
- • **Key Takeaways**
  • Same market access, clearing & leverage mechanics across tiers
  • Only the multiplier changes; pricing, expiration, and daily settlement stay equal
  • Traders can graduate from micro → mini → full as capital and risk appetite grow

Advantages of Futures vs. Equity (Stock/ETF)

Higher Capital Efficiency: Control large contract values with a small amount of capital (leverage).

Favorable Tax Treatment: In the U.S., gains are taxed at a blended 60% long-term / 40% short-term rate.

Nearly 24/5 Market Access: React to global news and events outside of standard stock market hours.

Pure Asset Exposure: Directly trade commodities, indices, or rates without company-specific risk.

Advantages of Options vs. Equity (Stock/ETF)

Defined & Limited Risk: Maximum loss for buyers is capped at the premium paid for the option.

Strategic Flexibility: Profit in bullish, bearish, or neutral markets using a wide range of strategies.

Cost-Efficient Leverage: Control 100 shares of stock for a fraction of the cost of buying them outright.

Income Generation: Earn income by selling options against existing stock positions (e.g., covered calls).

Advantages of Futures vs. Retail Forex

Centralized & Regulated Exchange: Ensures transparent pricing and eliminates broker conflicts of interest.

Transparent Volume Data: All participants see the same real-time price and volume information.

No Counterparty Risk: The exchange clearinghouse guarantees every transaction, preventing defaults.

Standardized Contracts: Clear, uniform contract terms simplify trading across different assets.

Advantages of Options vs. Retail Forex

Strictly Limited Risk: Buyers cannot lose more than their initial investment; no risk of margin calls.

Profit from Volatility & Time: Benefit from changes in implied volatility or time decay, not just direction.

No Obligation for Buyers: The right, but not the obligation, to transact provides superior flexibility.

Broader Market Access: Trade options on stocks, indices, and commodities, not just currency pairs.

Advantages of Futures vs. Crypto

Highly Regulated & Secure: Traded on established exchanges with strong investor protections.

Simplified Short Selling: Easily and efficiently profit from falling cryptocurrency prices.

No Wallet or Custody Needed: Avoid the technical complexity and security risks of managing digital wallets.

Superior Capital Efficiency: Use leverage to control a larger position with less capital.

Advantages of Options vs. Crypto

- **Defined Risk in a Volatile Market:** The maximum loss is known upfront—a critical feature for crypto.
- **Regulated Access:** Trade options on regulated products like spot Bitcoin ETFs for enhanced security.
- **Strategic Sophistication:** Implement strategies to profit from volatility, which is inherent in crypto markets.
- **No Self-Custody Hassles:** Gain exposure to crypto price movements without managing private keys.

CME futures list

Over 40+ instruments from USA Chicago Mercantile Exchange (CME) for both futures and options

Futures lookback is 1 year

Options chain data can range from 1.5 days to 1.5 years but optimal is 3 months

Options chain is very expensive e.g. $1400 plus licensing fees per month over 1 year contract from DataBento

Create detailed Word Doc for each of the following 40+ instruments

Equity Index

- **CME Futures Overview**
- **Equity Index**
- **ES:** E-mini S&P 500 Futures
- **M2K:** Micro E-mini Russell 2000 Futures
- **MES:** Micro E-mini S&P 500 Futures
- **MNQ:** Micro E-mini Nasdaq-100 Futures
- **MYM:** Micro E-mini Dow Jones Industrial Average Futures
- **NQ:** E-mini Nasdaq-100 Futures
- **RTY:** E-mini Russell 2000 Index Futures
- **SMC:** S&P MidCap 400 Futures
- **YM:** E-mini Dow Jones Industrial Average Futures

Metals

- **ALI:** Aluminum Futures
- **GC:** Gold Futures
- **HG:** Copper Futures
- **MGC:** Micro Gold Futures
- **MHG:** Micro Copper Futures
- **PA:** Palladium Futures
- **PL:** Platinum Futures
- **SI:** Silver Futures

Energy

- **BZ:** Brent Crude Oil Last Day Financial Futures
- **CL:** Crude Oil Futures
- **HO:** Heating Oil Futures
- **MCL:** Micro WTI Crude Oil Futures
- **NG:** Natural Gas Futures
- **RB:** RBOB Gasoline Futures

Agriculture

- **CC:** Cocoa Futures
- **CT:** Cotton No. 2 Futures
- **DA:** Milk Class III Futures
- **GF:** Feeder Cattle Futures
- **HE:** Lean Hog Futures
- **KC:** Coffee "C" Futures
- **KE:** KC HRW Wheat Futures
- **LBR:** Lumber Futures
- **LE:** Live Cattle Futures
- **OJ:** Orange Juice Futures
- **SB:** Sugar No. 11 Futures
- **ZC:** Corn Futures
- **ZL:** Soybean Oil Futures
- **ZM:** Soybean Meal Futures
- **ZO:** Oats Futures
- **ZR:** Rough Rice Futures
- **ZS:** Soybean Futures

Interest Rates

ZB: U.S. Treasury Bond Futures

ZF: Five-Year U.S. Treasury Note Futures

ZN: 10-Year U.S. Treasury Note Futures

ZQ: 30-Day Federal Funds Futures

ZT: Two-Year U.S. Treasury Note Futures

Crypto

- **BRR:** CME CF Bitcoin Reference Rate
- **MBT:** Micro Bitcoin Futures
- **MET:** Micro Ether Futures
- Plus Solana and XRP

Forex

AUD: Australian Dollar Futures

CAD: Canadian Dollar Futures

CHF: Swiss Franc Futures

DX: U.S. Dollar Index Futures

EUR: Euro FX Futures

GBP: British Pound Futures

JPY: Japanese Yen Futures

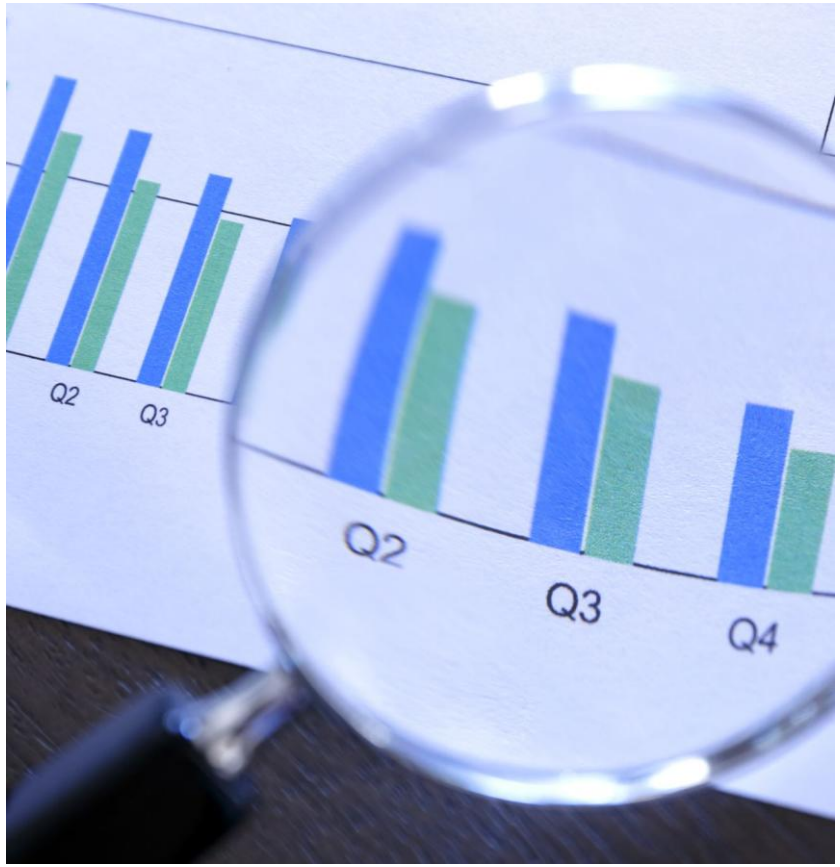
NZD: New Zealand Dollars

Futures and Options Analysis

Create Individual Instrument Reports Used by Multi Billion Dollar Financial Institutions.

1. Market Condition & Volatility Assessment

- **Historical Volatility**
- **Analyze Recent Price Action:** Examine the last 5 days of data (close, returns) to understand the market's recent trend and short-term choppiness.
- **Establish Long-Term Context:** Use overall annualized volatility (e.g., **15.97%**) to provide a broader risk perspective, which is crucial for pricing options.
- **Implied Volatility (IV)**
- **Gauge Future Expectations:** IV reflects the market's consensus on future volatility and is a key input for option pricing models.
- **Assess Market Sentiment:** A significant difference between Put IV and Call IV signals sentiment. A higher Put IV (e.g., **7.97%**) vs. Call IV (**2.76%**) indicates bearish or cautious sentiment, as traders pay more for downside protection.



Hedging Strategy: Formulation & Evaluation

Foundation: Utilizes statistical analysis (returns, variance, correlation) of cash and futures markets to inform hedging decisions.

Optimal Hedge Ratio (h*): Calculated at -0.0144, this ratio determines the ideal number of futures contracts to sell to minimize price risk. This is compared against the current portfolio's hedge ratio (0.5000) to assess risk and return.

Effectiveness & Basis Risk: Hedge effectiveness was found to be "NEUTRAL" as the basis (Cash Price - Futures Price) remained unchanged.

Scenario Analysis: The report compares futures with put options, demonstrating that a put option establishes a "floor price." This protects against price declines while still allowing for potential gains.

Options-Specific Analysis & Strategy

- Options-Specific Analysis & Strategy
- Valuation Analysis: Deconstructing the Premium with Intrinsic vs Time Value
- Strategies & Visual Tools like Payoff Diagrams
- **Complex Options Strategies**

Arbitrage and Mispricing Opportunities

Put-Call Parity Check with Analysis

Cash-Futures Arbitrage with Analysis

Predictive Elements

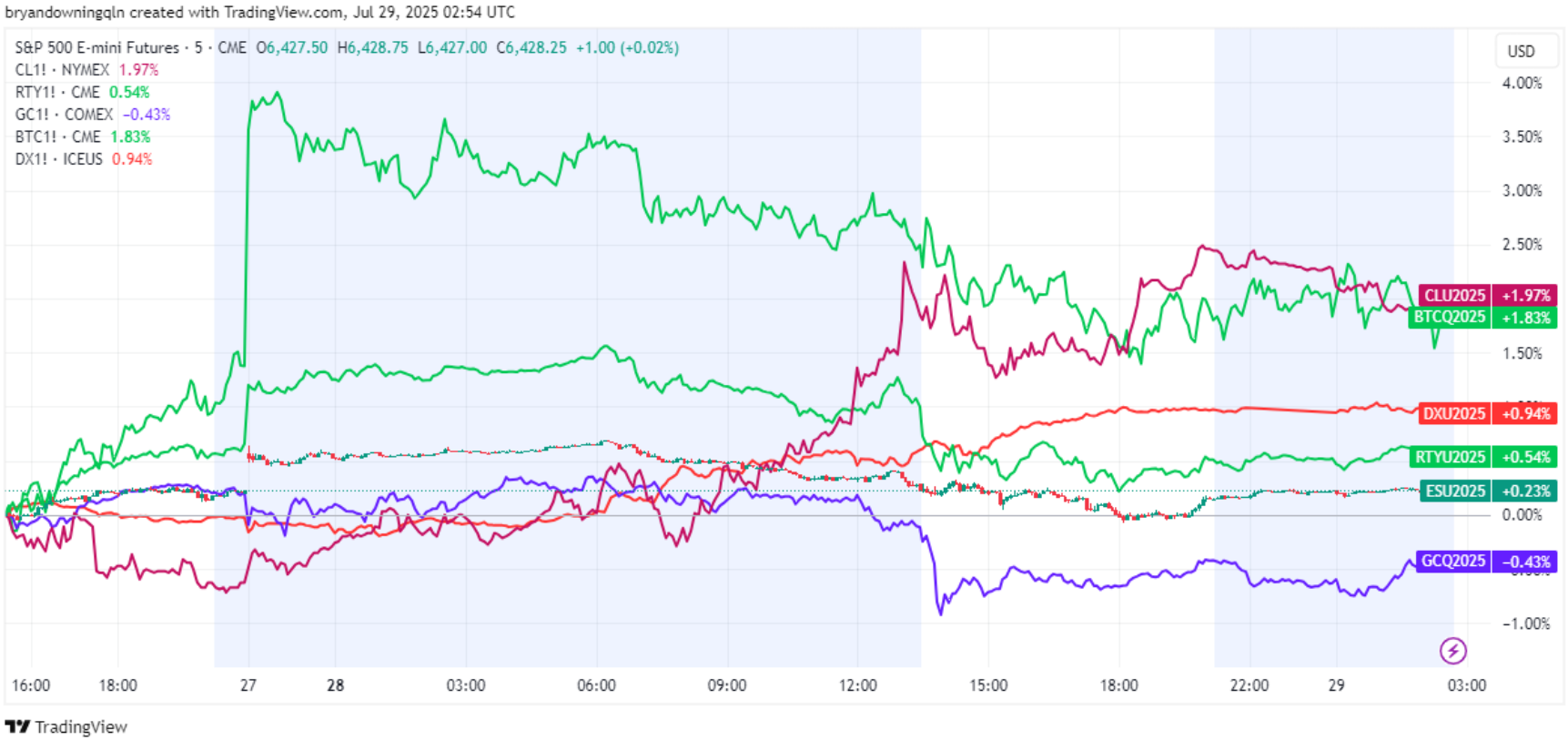
- **ARIMA Forecast** The report includes a section for a predicted futures floor using an ARIMA model, a statistical method for time-series forecasting

Create an Executive Summary Word Doc

- **All individual reports were fed into an AI to create this Executive Summary**
- **Gauge the market's risk environment** through volatility metrics.
- **Evaluate and construct optimal hedging strategies** using statistical analysis and scenario modeling.
- **Dissect options positions** using the Greeks and valuation metrics to manage risk and understand price behavior.
- **Identify and structure potential trading opportunities**, ranging from complex options strategies to arbitrage.

Does this work?

- Predicted on Jul 23 for RTY and CL



Simulator Python Streamlit App.py

Feed Executive Summary into the AI to generate a Python Streamlit app. Analyze top performing forecasted instruments

SI silver and CC cocoa identified with bear put strategies

Multiple iterations implemented using Claude 3.7 Reasoning with final correction with Qwen 3 Coder. Qwen 3 was used to remove any potential hallucination.

Trading-engine.py

- All prices are simulated for demo purposes We focus on Silver and Cocoa bear put strategies.
- Created console app with Claude 3.7 Reasoning

Q&A

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- Email: feedback@quantlabsnet.com
- https://github.com/quantlabs