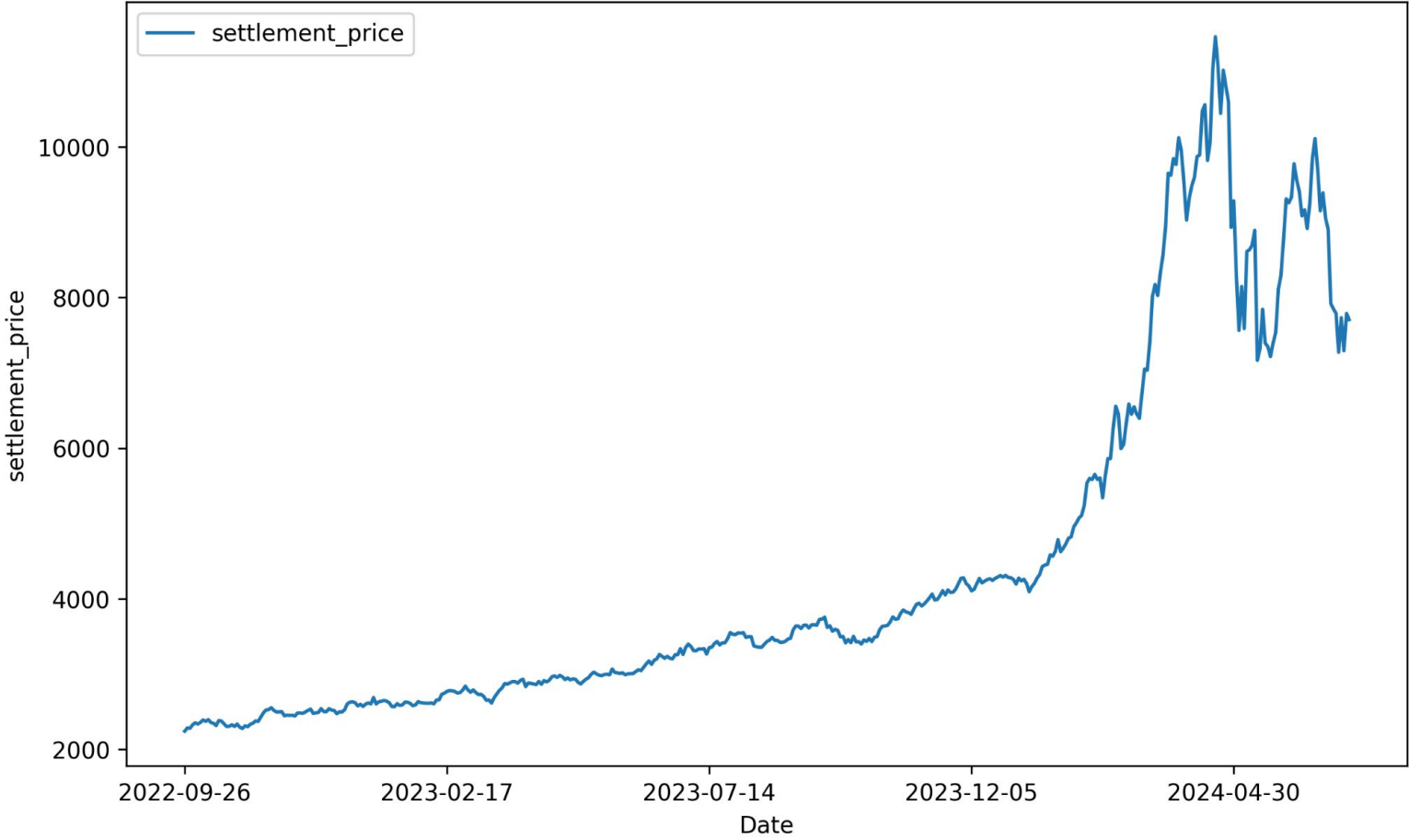


Cocoa Trading System

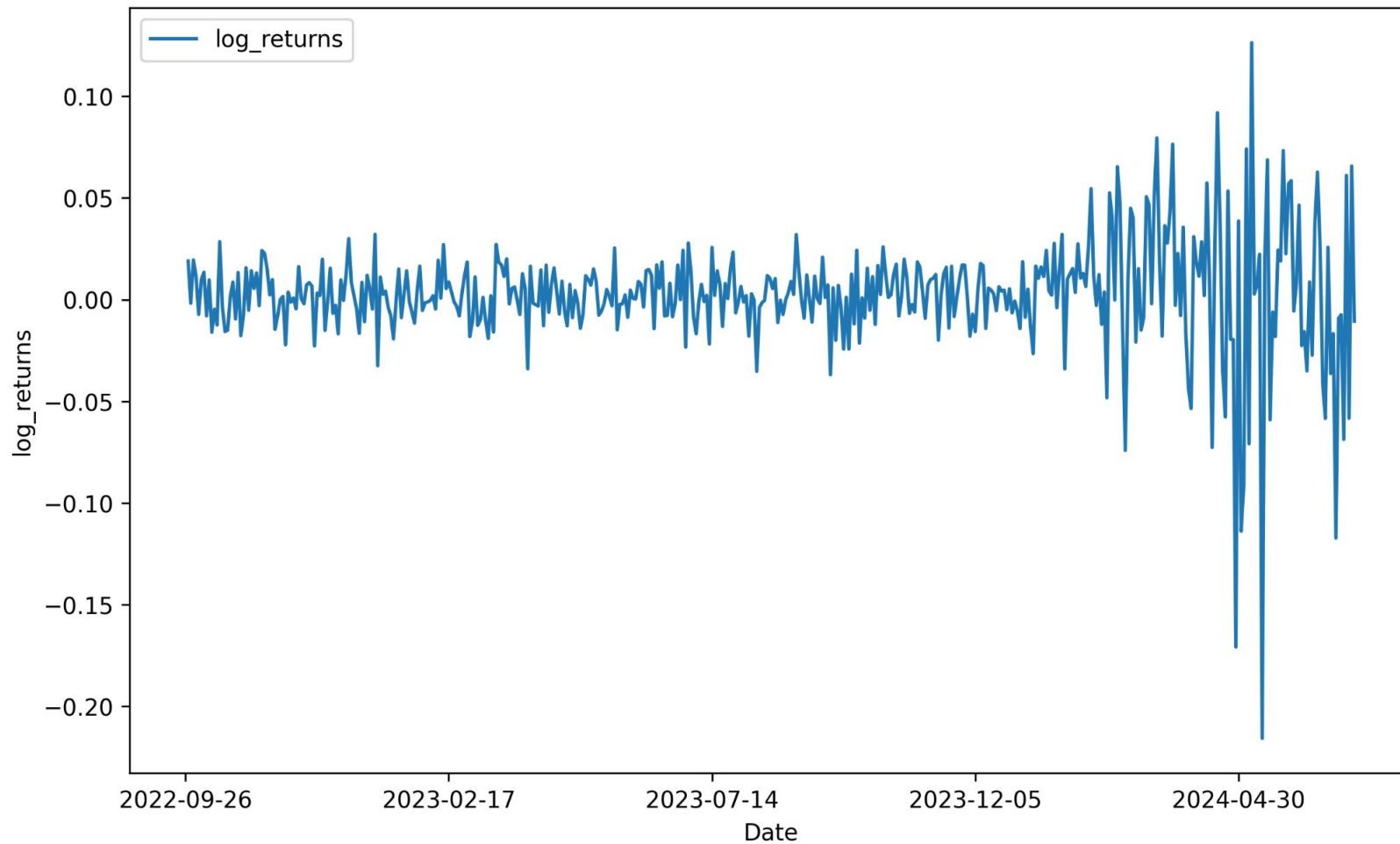
Active Futures Contract Cocoa

- Select active contract as the one with the highest Open Interest
- If Open Interest missing in the data, take the one with the highest trade volume
- See resulting price series of active cocoa futures contract in next two slides:
 - The settlement price and log returns of the settlement price
 - Note that we do not correct for the *premium difference when rolling the future contract*. Due to time constraints this could not have been corrected.

Cocoa Active Contract



Cocoa Active Contract



Trading System

- Based on eye-balling the anti-persistent nature of the log-returns, a simple strategy would be a *countertrend breakout system*
- System:
 - Enter short position if daily settlement price is an **X**-day high price
 - Enter long position if daily settlement price is a **Y**-day low price
 - Stop-loss of **Z**
 - Trade 1 future contract at a time (Position sizing comes later)
 - Fees/Slippage is assumed zero for now (very unrealistic)
- Need to optimize parameters: **X, Y, Z**
- Backtest-method used will be: *Walk-Forward Testing*

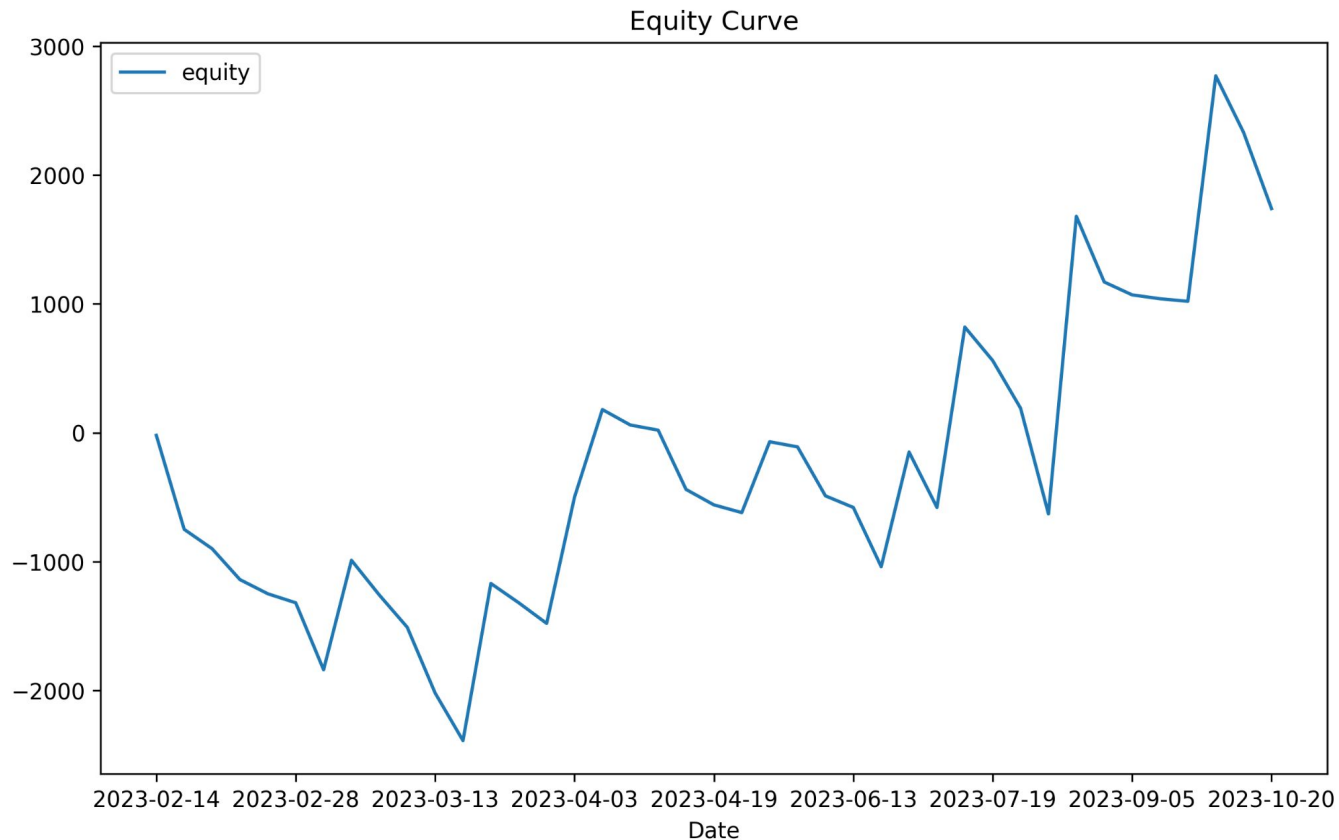
Walk-Forward Testing

- Walk Forward parameters:
 - *In-sample period*: 60 days
 - *Out-sample period (Walk-Forward period)*: 30 days
 - *Fitness function*: \$ PnL of closing position
 - *Un-anchored test*: period start date shifts
- Choice of In-sample and Out-sample period was arbitrary and requires more attention.
- Performance of backtest is the sum over all Out-sample periods

Walk-Forward Results: Output

start_date	end_date	X;Y;Z	in_sample_pnl	out_sample_pnl
2022-12-20	2023-02-02	14;6;10	\$ 3,840.00	\$ -
2023-02-03	2023-03-17	6;6;10	\$ 7,380.00	\$ (1,170.00)
2023-03-20	2023-05-01	5;5;10	\$ 3,620.00	\$ 1,060.00
2023-05-02	2023-06-13	26;3;43	\$ 5,380.00	\$ (470.00)
2023-06-14	2023-07-27	10;4;94	\$ 4,380.00	\$ (50.00)
2023-07-28	2023-09-08	10;5;10	\$ 2,660.00	\$ 1,650.00
2023-09-11	2023-10-20	12;7;162	\$ 4,640.00	\$ 720.00
2023-10-23	2023-12-04	24;34;10	\$ 6,510.00	\$ -
2023-12-05	2024-01-18	46;4;10	\$ (630.00)	\$ -
2024-01-19	2024-03-01	27;6;297	\$ 3,480.00	\$ -
2024-03-04	2024-04-15	46;3;10	\$ 6,980.00	\$ -
2024-04-16	2024-05-28	48;7;10	\$ 24,550.00	\$ -
				\$ 1,740.00

Walk-Forward Results: Equity Curve



Walk Forward Results

- Total PnL: \$1,740
- Total number of trades: 41 (not out sample periods had trades)
- System not very promising based on first analysis:
 - More trades needed for statistical significance
 - System too simple, more parameters needed: momentum indicators, better exit conditions, max-drawdown, etc
 - Need to consider margin requirement, position sizing, slippage/fees/commission, etc.
 - Need to correct for future premiums when rolling active contract
 - Monte-Carlo analysis of trade returns to have probabilistic measures for system