Case Study: How Opening Gaps Transform Market Extreme Timing

Introduction

In the previous case study, we learned how to think probabilistically using the Essentials version of the Context Analysis Dashboard. In this study, we will examine one practical application of the opening gap analysis we conducted in our first study by examining how it affects when and where daily extremes will form. This case study reveals how understanding gap dynamics can sharpen your calibrated expectations and help you maintain your probabalistic mindset.

The Opening Gap Foundation

Baseline Gap Close Statistics

Today was a bull gap of >50% of the 20-day average daily range so we will use that as our baseline:

Overall Statistics:

- Gap close occurrence: **27.04%** (83 of 307 days)
- Non-occurrence: **72.96%**
- Confidence Interval: 22.37% - 32.27%

Timing Distribution:

- Median occurrence: Bar 24
- Mean occurrence: Bar 30.6
- Core range (IQR): Bars 13-45

Period Breakdown:

- Bars 1-9: 4.89% close rate
- Bars 10-18: 5.86% close rate (peak)
- Bars 19-27: 4.89% close rate

- **After Bar 27: Close probability drops dramatically**

The Critical Insight

When gaps >50% ADR occur, they fail to close roughly 73% of the time. More importantly, if the gap hasn't closed by the end of the morning session (bar 27), the probability of closing becomes negligible. This creates a powerful filter for analyzing market extremes.

Baseline HoD/LoD Distributions (Unfiltered)

Before applying our gap filter, let's establish the true baseline extreme distributions:

High of Day (Baseline - All Days)

- Average new HoD bar: **8.9** (median: 7, max: 37)
- Morning (1-27): 58.9% new highs → 45.3% final highs
- Mid-session (28-54): 19.5% new highs → 13.2% final highs
- Late session (55-81): 21.6% new highs → 41.5% final highs

Low of Day (Baseline - All Days)

- Average new LoD bar: **7.6** (median: 6, max: 37)
- Morning (1-27): 63.7% new lows → 54.8% final lows
- Mid-session (28-54): 18.2% new lows → 15.3% final lows
- Late session (55-81): 18.1% new lows → 29.9% final lows

The Transformation: Filtered Distributions

When we filter for days where opening gaps >50% ADR that DON'T close (73% of occurrences), the extreme distributions shift dramatically:

High of Day (Filtered: Gap >50% ADR, No Close After Bar 27)

- Average new HoD bar: **11.7** (median: 11) — **+31% later than baseline**

- Morning (1-27): 57.3% new highs → 29.0% final highs
- Mid-session (28-54): 22.9% new highs → 17.4% final highs
- Late session (55-81): 19.8% new highs → **53.6% final highs**

Low of Day (Filtered: Gap >50% ADR, No Close After Bar 27)

- Average new LoD bar: **4.5** (median: 3) — **-41% earlier than baseline**
- Morning (1-27): **78.9% new lows → 77.7% final lows**
- Mid-session (28-54): 11.0% new lows → 7.6% final lows
- Late session (55-81): 10.1% new lows → 14.7% final lows

The Dramatic Shifts Revealed

High of Day Changes:

- Final HoD in morning: 45.3% → 29.0% (**-36% reduction**)
- Final HoD in late session: 41.5% → 53.6% (**+29% increase**)
- New HoD +2.8

Low of Day Changes:

- New LoD in morning: 63.7% → 78.9% (**+24% increase**)
- Final LoD in morning: 54.8% → 77.7% (**+42% increase**)
- Final LoD in late session: 29.9% → 14.7% (**-51% reduction**)
- New LoD -3.1

Why This Transformation Matters

1. **Extreme Concentration**: When large gaps persist, LoD formation becomes heavily front-loaded (78.9% in morning vs 63.7% baseline)
2. **Late Session Reversal**: HoD formation shifts dramatically to late session (53.6% vs 41.5% baseline)
3. **Directional Persistence**: The gap creates a strong directional bias that persists throughout the day
4. **Properly Calibrated Expectations**: Understanding these shifts allows traders to quickly and accurately develop their traders imagination

Practical Application Framework

Morning Assessment (Bars 1-27)

1. **Identify Gap Size**: What is the size of the opening gap? Is it bull or bear?
2. **Monitor Close Attempts**: Track bars 10-18 for peak close probability
3. **Decision Point**: By bar 27, if gap hasn't closed, adjust extreme expectations

Probabilistic Trading Adjustments

If Large Gap Persists Past Bar 27:

- Expect LoD to have already formed (77.7% probability)
- Prepare for late session HoD formation (53.6% probability)
- Take quick profits on signals against the direction of the gap
- Expect intraday bias in the direction of the gap

Risk Management Implications:

- Avoid scaling into trades against the direction of the gap when LoD forms early
- Consider using wider stops for positions in the direction of the opening gap
- Set your take profits at 0.5-1 ABR if trading against the direction of the gap

The Complete Picture

This analysis reveals three interconnected probability layers:

1. **Gap Size**: Determines initial close probability (27% for gaps >50% ADR)
2. **Gap Timing**: Shows when closes are most likely (bars 10-18)
3. **Extreme Timing**: Shifts dramatically based on gap persistence

By combining these layers, traders move from simple "HoD forms early" observations to sophisticated, context-aware probability models.

Key Takeaways

- Opening gaps >50% ADR close only 27% of the time
- Gap persistence past bar 27 signals extremely low close probability
- This persistence fundamentally alters HoD/LoD timing distributions:
  - New LoD drops by 41% (7.6 → 4.5 bars)
  - New HoD increases by 31% (8.9 → 11.7 bars)
  - Final extremes shift dramatically between sessions
- The most profitable trades align with these layered probabilities
- Context transforms random events into predictable patterns

Next Steps

1. Study your specific market's gap behavior
2. Document how different gap sizes affect extreme timing
3. Build session-specific strategies based on gap persistence
4. Track performance differences between baseline and filtered conditions
5. Continuously refine filters as market conditions evolve

Remember: What appears random in aggregate becomes predictable when properly filtered. The difference between baseline and filtered conditions represents your statistical edge.