HARMEX: A Harmonic Model for Market Pattern Detection Based on Musical Theory

Author: Diego Fraiese
Email: dfraiese@gmail.com

Abstract

We propose a conceptual and operational model for detecting buy and sell signals in financial markets, called HARMEX (Harmony-Resolution Market Model). The innovation of the model lies in the use of musical triads—formed by defined intervals within a discretized price scale—to identify harmonic (consonant) or tense (dissonant) structures. Without relying on traditional technical indicators, the model converts prices into notes on a 12-semitone scale and applies musical theory to evaluate the harmonic quality of three-note blocks. Preliminary backtesting results on historical financial data are presented. The model represents an interdisciplinary approach, combining elements from music, systems theory, and quantitative finance.

1. Introduction

Traditional technical analysis relies on indicators derived from price or volume, which are widely used in practice. In this work, we propose a non-traditional approach based on the structural analogy between Western tonal music and complex systems such as financial markets. The focus is on the detection of harmonic and tense patterns, interpreting price movements as musical notes and price sequences as triads, which are then classified according to harmonic theory.

2. Theoretical Framework

Western tonal music is based on a 12-semitone scale and constructs triads by combining notes at specific intervals. These triads can be classified as consonant (major, minor, sevenths) or dissonant (augmented, diminished, suspended), depending on the relationships among the component notes. Similarly, complex systems such as financial markets produce structural patterns. This paper proposes a musical representation of price action as an alternative method for pattern detection.

3. Methodology

3.1. Price Discretization

Price is normalized over a moving window and mapped onto a 12-note scale. Each closing price is converted to an integer between 0 and 11, representing a musical note within the octave.

3.2. Triad Construction

Blocks of three consecutive prices are analyzed to form triads. These notes are ordered and their intervals are computed to determine the structure of the triad.

3.3. Harmonic Classification

The model classifies triads based on interval rules:

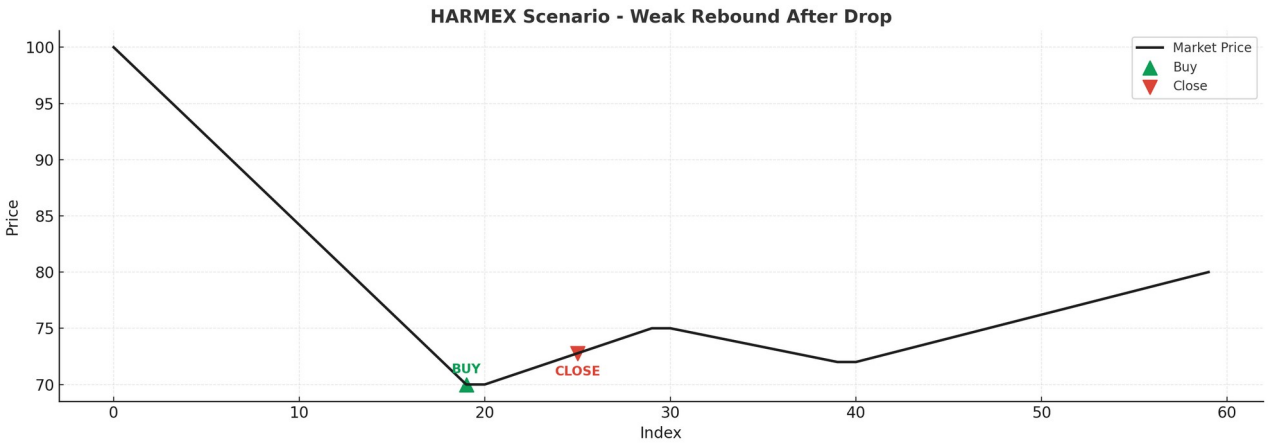
- Major: 4–3
- Minor: 3–4
- Sevenths: 3–3 or 4–3
- Diminished: 3–3
- Augmented: 4–4
- Suspended (sus2, sus4): 2–5, 5–2

Consonant triads generate buy signals ("harmony"), while dissonant triads trigger sell signals or alerts ("tension").

3.4. Operational Implementation

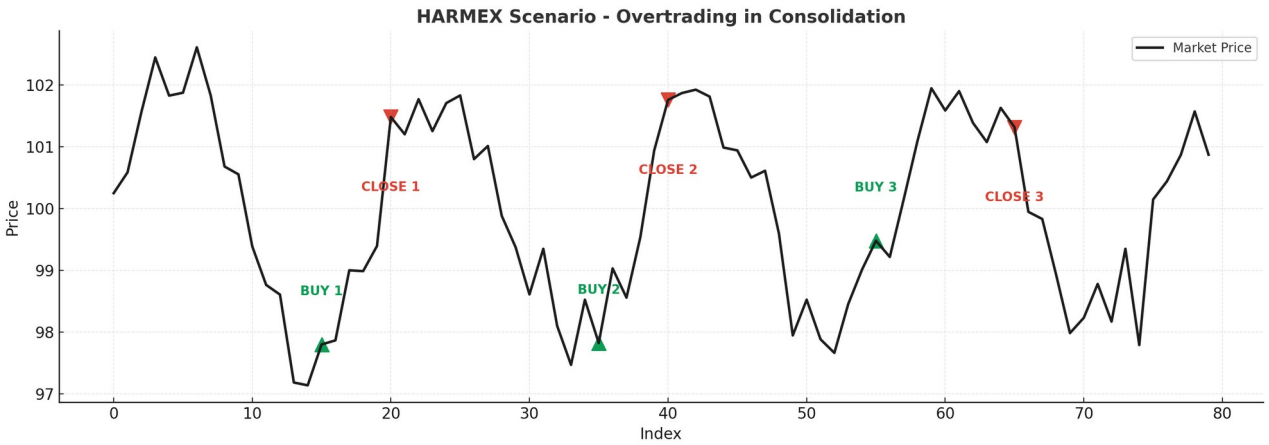
The charts shown in this paper were generated using custom scripts on a charting platform. No traditional technical indicators are used.

4. Case studies



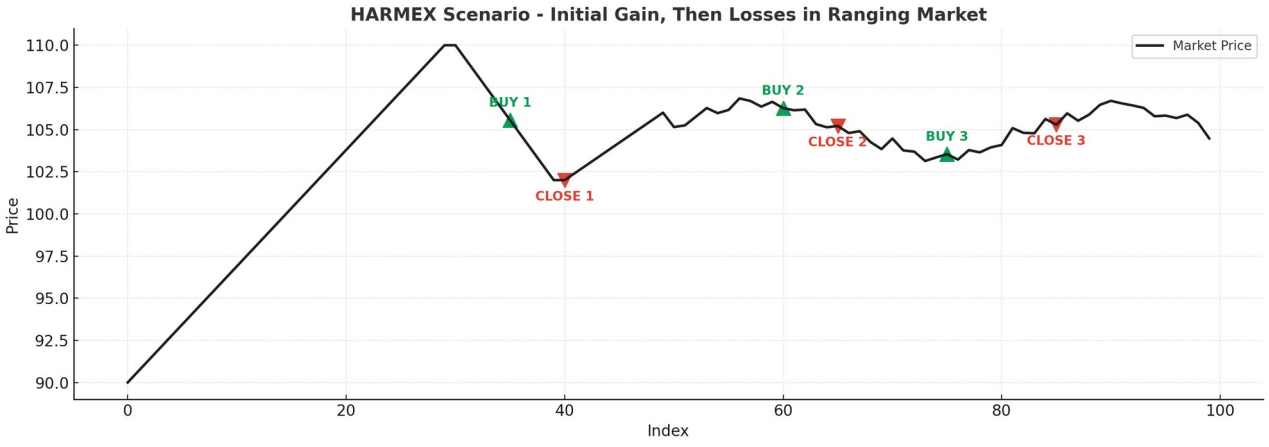
Case 1

The model issued a buy signal at a local minimum following a strong decline. The corresponding close signal occurred shortly afterward, capturing only a minimal upward move. The result was negligible profit or a small loss. This illustrates the model's limitation in differentiating short-term rebounds from deeper reversals in volatile conditions.



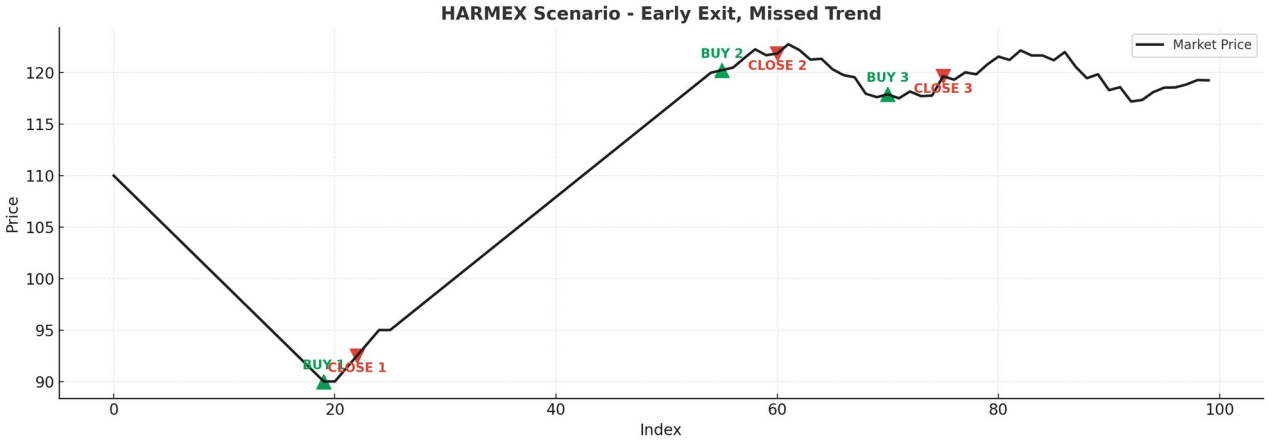
Case 2

Multiple buy signals appeared during consolidation. In two of the three trades, the position was closed with a small loss or break-even result; one trade closed with a minor gain. This case suggests that the model may generate excessive signals in range-bound or low-volatility contexts, where harmonic patterns do not translate into sustained price movement.



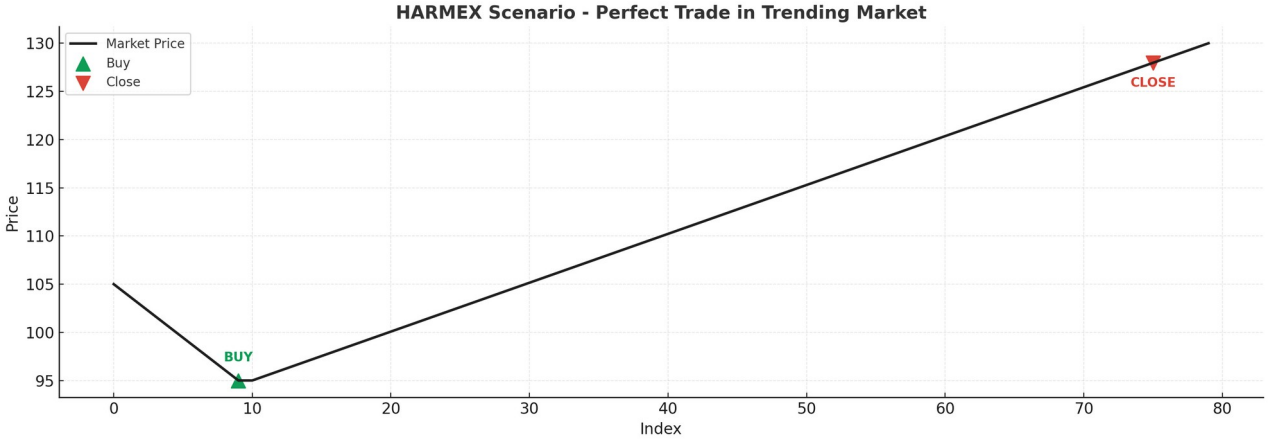
Case 3

A buy signal occurred during a pullback and exited after a small upward movement, producing a modest gain. However, subsequent trades during sideways price action resulted in losses. This behavior indicates a need for filtering mechanisms to avoid overtrading in non-trending phases.



Case 4

In this example, the harmonic entry correctly anticipated a local low, but the exit was triggered early, missing the broader upward move. Later trades failed to capture trends, closing prematurely. Improvements in exit conditions or the addition of volatility-based logic could enhance trade management.



Case 5

This case showed the most favorable outcome. A buy signal occurred near the bottom of a move, and the trade was held through a strong uptrend. The exit was well timed, resulting in a solid gain. This suggests the model can be effective in trending markets when musical structures align with price momentum.

The figures presented are illustrative simulations created to represent typical scenarios described by the HARMEX model. They do not correspond to real financial market data or actual trading results.

5. Perfomance summary

The five-case analysis demonstrates that HARMEX produces mixed results depending on market conditions. The model is able to detect harmonic structures and generate corresponding trade signals, but its effectiveness is inconsistent.

In trending scenarios (e.g., Case 5), signals aligned with price direction and yielded positive outcomes. In contrast, in choppy or sideways markets (Cases 1–4), trades often resulted in early exits or small losses. This indicates that the model lacks contextual sensitivity and may benefit from enhancements such as volatility filters, trend confirmation, or volume-based constraints to reduce false positives and improve robustness.

6. Discussion

The HARMEX model offers a novel conceptual framework by applying tonal harmony to financial data. Rather than merely sonifying price information, it employs a structured system to interpret market action as musical triads. This approach opens avenues for alternative data representation and analysis within complex systems.

7. Conclusion and Future Work

HARMEX introduces a new lens for viewing financial markets through the structure of musical harmony. Preliminary testing suggests the approach has potential, particularly in trending environments. However, further refinement is necessary. Future work includes:

- Statistical validation on a broader dataset
- Optimization of the normalization window
- Extension of the model to four-note chords (tetrads)
- Application of spectral analysis techniques to price series
- Integration of adaptive filters for noise reduction

8. Note

This paper was written with the assistance of artificial intelligence tools, including content generation, code development, and figure design. All conceptual contributions, model design, and validation were carried out by the author.