

Elliott Wave Analysis in Bloomberg

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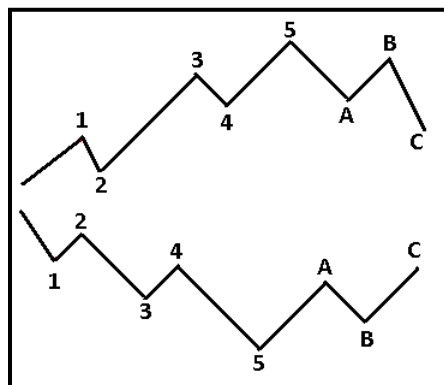
Introduction

The Elliott Wave Principle of technical analysis has gained in popularity in the past 20 years. Even though it was first proposed as a way in which to forecast market trends in the 1930s, its use among technical traders has increased in recent years as its principles become better known along with its past successes. Until recently, most of wave analysis relied on the skills and experience of Elliotticians. Given the labor intensive nature of this practice, the number of stocks that can be analyzed is small and the number of missed opportunities is large.

Bloomberg in conjunction with Recognia¹ has developed a sophisticated yet easy-to-use Elliott Wave analysis solution that uses quantitative characteristics associated with the waves that appear in market data, to allow each wave to be uniquely identified. This paper discusses the various challenges faced by Elliotticians and traders while applying the guidelines of Elliott Wave Theory and the solutions developed to address these challenges.

Elliott Wave Theory

In the 1930s, Ralph Nelson Elliott discovered that stock prices trend and reverse in recognizable patterns and that these patterns are created by underlying crowd behavior based on the fear and enthusiasm of investors.



Elliott used the data from the Dow Jones Industrial Average to discover that the ever-changing path of stock market prices revealed a structural design that, in turn, reflected a basic harmony found in nature. From this discovery, he developed a rational system of stock price analysis.

He isolated specific patterns or “waves” of directional movement that recur in markets and are repetitive in nature, but are not necessarily repetitive in time or amplitude. He then described how these structures link together to form larger versions of the same patterns, how those in turn are the building blocks for patterns of the next larger size, and so on. His descriptions constitute a set of empirically derived rules and guidelines for interpreting market movement.

¹ **Recognia** is an industry leader in providing automated interpretation of technical, fundamental and value based analytics.

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Highlights of the Elliott Wave Study

1. Bloomberg's Elliott Wave chart study is a step forward in providing a flexible, automated mechanism for investors and analysts to incorporate Elliott Wave theory in their analysis. One of the unique capabilities of this study is the ability to present waves on charts with different periodicities and date ranges thus permitting the investigation of the fractal nature of financial markets.
2. The Elliott Wave study presents a choice of the three most probable wave cycles, as primary, first and second alternate in the decreasing order of probability, which is a unique capability in the market today. It provides the user with the flexibility to use their discretion in terms of choosing the wave cycle they think is best and continue with their analysis. Each wave cycle in turn consists of three different sub-wave levels namely major, intermediate and minor. Users can turn on or off any of these wave combinations, each depicted with different style and color.
3. The user can chose to view target prices and retracement levels of the latest wave cycle based on Fibonacci levels.
4. The user can choose to view the trend channel for the most recent wave cycle which is not available with other existing Elliott wave solutions in the market.
5. The study not only provides the most current wave cycle but also an option for the user to view historical waves for the stock going back many years. This helps in looking at the bigger picture.
6. The study provides a lot of flexibility around customization of information for multiple wave cycles with information like labels, targets, and pivot lines etc with different colors and styles which makes the application very user friendly.
7. The study gives the user the option to force wave 3 to be the longest wave or to disregard this constraint which will result in more wave counts.



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Overview of Recognition Process

Mathematically, the Elliott Wave (EW) recognition problem is viewed as that of constrained optimization. Any wave system that satisfies a given set of constraints is seen as a feasible EW. Knowing the feasible EW's or partial EW's, it is possible to optimize (or rank) them.

The success or failure of an automated EW recognition system is critically dependent on an ability to recognize and categorize waves and their associated pivots. The task is more than just finding eight primary waves, as (ideally) thirty four intermediate and one hundred and forty four minor waves should also be found for every Elliott Wave.

The Elliott wave study recognition process runs over a user-specified window of price bars in which it tries to look for important pivot points that can form the start and end points of potential waves. Pivot points are typically points of trend reversal. A good starting point is to look for highs and lows in the window and to fit a motive wave in this date/time range. The system then continues to drill down within this wave to find more pivot points and fit more waves to form to the Elliott wave cycle.

One basic constraint of the recognition process is that wave one should begin at a major turning point, and wave five, or an irregular wave B, end at a major turning point.

Between major pivots, a number of less significant pivots need to be found, in a high, low, high, low, high continuous sequence. A set of rules have been devised to achieve this, the main ones being:

1. A pivot bar must be at least as high or low, but preferably higher or lower, than any adjacent bar.
2. A high pivot is only confirmed after a subsequent low pivot appears. Likewise, a low pivot is only confirmed after a subsequent high pivot appears.
3. If a high pivot is followed by a higher pivot before a low pivot is formed, the earlier high pivot is replaced by the later higher pivot. Similarly, if a low pivot is followed by a lower pivot before a high pivot is formed, the earlier low pivot is replaced by the later, lower pivot.

This results in the identification of a number of wave cycles. It is very important to filter out those wave cycles that do not match system constraints. Some of these constraints are as follows:

1. Overlap (if any) between wave 4 and wave 1 is constrained
2. Wave 1 needs to move a certain fraction of price before it becomes of interest
3. Individual intermediate and minor waves have bound constraints limiting them to defined fractions of the next most significant wave.

The Elliott Wave recognition engine provides the flexibility of configuring some of these rules. For example, the study gives the user the option to force wave 3 to be the longest wave or to disregard this constraint.

This process still leaves the recognition process with a number of alternates within the time period of interest. The algorithm assigns a probability to all alternates based on a Bayesian probability assessment. The top three most probable waves are presented to the user. Again, the study allows the user to chose between these three most probable waves and do further analysis.

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Wave recognition is not enough, providing a target is also critical. These targets are based on ends of actionary waves, or maximum retracements in reactionary direction. They are primarily needed for tradable (actionary) waves. Targets are proposed on rule as given below:

1. Wave 3: A ratio of 1 to 1.618 of wave 1, measured from the bottom of wave 2
2. Wave 5: Ratios of 1, 1.618, 2.618 etc. of un-extended wave 3, measured from the bottom of wave 4
3. Wave A: The system calculates the average of the two shortest actionary waves (from 1, 3 and 5), and subtracts it from wave 5. If the result is above the bottom of wave 4, it becomes the target; otherwise the bottom of wave 4 will be used.
4. Wave B: If wave A has five sub waves, wave B is between 0.382 and 0.618 of wave A. If wave A only has three sub waves, Wave B is likely to be flat or irregular, with a target of the top of wave 5.
5. Wave C: 1 times wave A, measured from the top of wave B.

Technical Challenges in Elliott Wave Analysis

Although Elliott Wave analysis has well established guidelines like any other stock analysis methodology, converting them into an actionable software solution is not easy. The following are some of the technical challenges associated with automated Elliott Wave recognition.

- **Ambiguity in distinguishing between waves:** In Elliott Wave analysis, rules for recognizing different waves are similar. For example, wave 3 and wave 5 extensions are similar, hence it is extremely difficult to distinguish between these two different events.
- **Problem of revisions:** As more data emerges previous waves sometimes need to be revised. For example, a wave 3 extension will initially look like a wave 5, and will probably be classified as such. In the light of later data, that wave 5 may have to be re-classified as wave 3 extensions.
- **Consistency of wave count with different bar sizes:** It is important that the wave count remains same for different chart resolutions; e.g. weekly, daily etc. The smaller the timeframe, the more susceptible the waves are to randomness in the behavior of market participants and many Elliott Waves are missed on low resolution charts.

Solutions to Technical Challenges

- At first sight, Elliott Wave recognition seems to be similar to technical pattern recognition but in fact it is very different. Mathematicians at Recognia found that rules-based pattern recognition was not effective for Elliott Wave analysis and a probability-based approach was adopted. On average, wave counts found using the “most probable current wave” approach result in more correct waves than the pattern recognition approach. Mixing a mathematician’s approach to developing an algorithm with a trader’s approach to picking trade set-ups resulted in an effective and scalable algorithm.

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- A solution to the problem of revision also lies in the probability outcomes and most probable waves. If previous wave counts are presented probabilistically, it becomes easier to do revisions when needed. Traders learn to recognize that the wave count presented is the best one currently available but not necessarily the only answer as new bars become available.
- The solution to the problem of consistency with different charting timeframe is to make the subwaves available as advisory information. The key point is to set minimum standards for acceptable sub waves. For example, an impulse intermediate wave might be somewhere between 0.246 and 0.382 of the primary wave, and an impulse corrective wave between 0.152 and 0.246 of the same primary wave. Practically, sub waves can only exist if the range of a weekly bar is sufficient to satisfy this kind of criteria. Effectively this tells us when we should stop looking for higher resolution data.

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