



## Whitepaper

### Jesse Livermore “Reminiscences of a Stock Operator” - (1877 – 1940)

*“They say there are two sides to everything. But there is only one side to the stock market. And it is not the bull side or the bear side, but the right side. It took me longer to get that general principle fixed firmly in my mind than it did most of the more technical phases of the game of stock speculation.”*

### Executive Summary

Asset managers have a vested interest in understanding the right side of the stock market and Laomedea believes it has identified the fundamental building blocks and rules to consistently analyse financial markets. Our innovative mathematical financial market research enables asset managers to participate in assets of their choice, guided by verifiable entry and exit levels and superior risk management. This mathematical approach can be used complementary to existing fundamental, technical or systematic strategies. Benefits are significantly improved risk management and increased transparency, while subjectivity is a fraction of original levels.

### Evaluating long term investments

Financial market analysis methods used by investors to evaluate the benefits and risks associated with longer term investments, include fundamental analysis, technical analysis and quantitative analysis. Most likely a combination of these methods results into an impression of a company’s potential for growth and profitability.

- Fundamental analysis aims to evaluate all aspects of a company as a business with respect to industry, market, environment etc in order to determine its fair value. The rationale is that markets may incorrectly price a security in the short run but that the correct price will eventually be reached.
- Technical analysis aims to forecast the direction of prices through the study of past market data, primarily price and volume, to chart patterns that can be used to predict future price movements.
- Quantitative analysis is the use of models or algorithms to evaluate assets for investment or model risks in general. The process usually consists of searching databases for patterns and correlations.



## Evaluating long term investments – a mathematical approach

The likelihood of recurring events is an aspect used in various financial market analysis methods. *Consistently recurring events* are key ingredients of the mathematical method developed by Laomedea. The beauty of these recurring actions taking place simultaneously on multiple distinct levels is mind blowing.

Key Objectives for developing a different financial market analysis perspective were to *reduce subjectivity* and *increase transparency*. Laomedea's proprietary dynamic chaos theory mathematics yields accurate and verifiable time dependent price targets on multiple distinct levels.

As a reader of alpha research resulting from chaos theory mathematics, your mindset has to allow for an innovative concept regarding analyzing price action in financial markets. This concept is based on key characteristics of complex polynomials, not on generally accepted economic or supply and demand criteria.

## Price action in financial markets – Observations

Financial markets are continuously evolving, seemingly chaotic, multi-layered, asymmetrical and time-dependent systems showing repetitive patterns. Repetition or recurring events resonates with physics and mathematics in the area of fractals. Fractals are infinitely self similar, iterated and detailed mathematical constructs which are of particular relevance in the field of chaos theory mathematics. Chaos theory aims to find hidden order in a seemingly chaotic environment.

When observing price development over time, we noted consistent price-evolution through fractals "*from boundary to boundary*". To address this time-dependent nature of financial markets, Laomedea developed dynamic chaos theory mathematics. Apparently, the hidden order in financial markets is reflected by a limited set of consistently recurring characteristics of asymmetrical complex polynomials or Julia-sets.

Laomedea observed how asymmetrical complex polynomials accurately resemble price-progress over time. Although the trajectory of price-evolution through an asymmetrical complex polynomial is unknown, the initial price and final price are accurately known. The initial price is related to the value of the entry boundary of the Julia set, while the exit boundary relates to the ultimate price target. Due to the irregular shape of a Julia-set, these price targets are time dependent.



### Dynamic chaos theory Mathematics – toolset

The mathematical solution to analyse financial markets is based on a fundamental building block (Julia-set) which is governed by a few basic rules and which generates a handful of consistently recurring events. Laomedeia’s rules-based mathematical approach results into considerably reduced subjectivity and allows for significantly improved risk management. Key elements of the toolset are Segmentation and Calculation.

- Segmentation is based on a limited set of consistently recurring characteristics in financial markets. Duplication of an event within the same segment is not allowed, resulting into a multi-level approach, similar to the nature of fractals. Each level represents a fundamental building block (Julia-set) which enables the calculation of key data such as boundary values for entry price (representing risk) and exit price (representing reward) and associated dominant trend. When zooming-in towards “deeper” levels they represent a shorter time duration for price to evolve from boundary to boundary.
- Calculations are based on proprietary dynamic chaos theory mathematics. Each distinct level represents a unique building block which is governed by a limited set of rules and generating a handful of reliably recurring events. Although price targets are time-dependent, all levels have their own unique identifiers thus allowing for a full audit trail.

### Pros and Cons of a mathematical approach

The benefits of this mathematical solution to analyse financial markets are:

- Universal method (successfully applied to stock, commodities, bonds, currency pairs, indices)
- Simplicity (single building block, rules based)
- Consistency (handful of reliable events per level)
- Stability (longer duration levels are lasting)
- Reduced Subjectivity
- Improved Risk management
- Traceable (price targets subject to audit trail)

### Disadvantages of a mathematical approach

- Continuously evolving systems over time cannot be back tested, hence all price targets are uniquely numbered and a full audit trail is part of Laomedeia alpha research.

## Information resulting from dynamic chaos theory

What does it mean to apply chaos theory mathematics on stock market data?

When this method starts to work on multiple levels, it yields two time dependent price values for each distinct level. The time dependency of these price values is a direct consequence of the irregular shape of Julia-sets. Based on characteristics observed, one of these price values represents the price-target for an underlying asset. This price-target equals the value an underlying asset will assume in future.

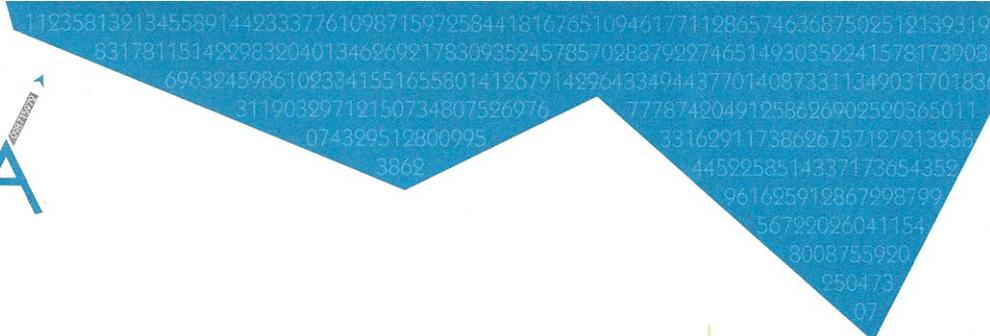
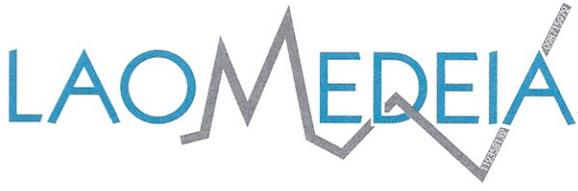
The other price value (price-edge) represents the lowest or highest value the underlying asset may assume without jeopardizing the price-target. In other words, the value of the underlying asset should stay within the boundaries of the Julia-set. This applies to all distinct levels.

Let's assume a price-target for a certain level aims for a higher value than the actual price (upward dominant trend). In this case the bottom value represents a threshold below which the target-price may be invalidated. Although the target-price is time dependent, it functions as a take-profit value when the actual price is equal to the target-price. Similarly, the price-edge functions as a stop-loss value in case the actual price is equal to the price-edge.

In the opposite situation when a distinct level shows a dominantly downward trend, the price-target seems to be heading towards a value below the actual price. Now the price-edge represents a ceiling above which the target-price may be invalidated. One important observation in these situations is that financial markets tend to test extremes and this particularly applies to the price-edges. To stay on the safe side however, price-edges can be used as hard (although time dependent) stop-loss values.

Laomedeia research covers at least 8 distinct levels for which time dependent and uniquely numbered price-targets (take profit values) and price-edges (stop loss values) are provided. With the ingredients of price-target, price-edge and actual price, it is possible to calculate trading range and Risk/Reward for each distinct level.

Having all this key information available per distinct level, allows for building a grand summary. The grand summary provides an impression of the most likely price action in the short, medium and long term. A vision reflecting the most likely price action is included in Laomedeia research and verifiable over time through an inclusive audit trail. Laomedeia has tested this mathematical concept on several asset classes and it turns out that applying dynamic chaos theory mathematics proves successful on commodities, stock, indices, bonds and currency pairs. Given the amazing accuracy on price, there are no objections using this innovation to analyze financial markets.



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## Biography



### Hans van der Wielen

Understanding physics in our universe as an astrophysicist didn't mean having an answer for the chaotic behavior of financial markets. Over the years I drafted a few concepts, but my busy job for a multinational did not allow for further investigation. Late 2013, I decided to quit and focus on researching these intriguing concepts. My objective was to develop an analysis method which would reduce subjectivity and increase transparency, if at all possible.

Seemingly random financial market behavior asks for a rigorous approach from a different perspective. The concepts documented when traveling the globe, included a few key observations and a thesis with respect to a potential role of chaos theory in financial markets. The misleading word "chaos" gives an impression as if this is the science of surprises, where the unexpected can be expected. Chaos theory however aims to find "hidden order" in a seemingly chaotic environment. This hidden order is often reflected in symmetry and in repetitive events.

May 2017 resulted in a break-through moment, when the fundamental building block for financial market behavior was isolated, including the definition of 3 basic rules and 5 consistently recurring characteristics. Benefits are significantly improved risk management and increased transparency, while subjectivity is a fraction of original levels.

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