

# **A FRACTAL MARKET THEORY REVISITED THROUGH CHART ANALYSIS FOR A BETTER RISK/REWARD MANAGEMENT STRATEGY**

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## **Abstract**

*Through observing financial charts we found out repetitive and fractal behavior of financial markets. There are evidences from observations that show also a correlation in price direction, as well as strong a dependence. EMA and Bollinger Band show clearly the fractal nature of financial markets. The symmetry towards EMA 200 is one of the most natural behavior of financial markets. Exponential Moving Average (EMA) could be used as one of the most accurate trend follow indicator / pattern / trading strategy for all kind of markets, including forex in Albania. The prices' behavior towards the exponential moving average (20, 50, 200), not coincidentally shows that prices have a dependence on the past and present. The aspects covered in this article favor a low risk strategy. This article explains the idea of using EMA as a trading strategy, a target indicator, and as a pattern that matches a fractal market theory to provide a better risk/reward management strategy.*

*Keywords: Chart Analysis; EMA; Fractal Markets; Risk Management; Technical Indicators; Strategy*

## INTRODUCTION

*Anyone who has never made a mistake has never tried anything new- Albert Einstein*

Markets are dynamic and the traders should be as well. Money management is different for everyone because everyone has an entirely different risk tolerance (Saettele, J., 2008). But traders, investors, we all have something in common.

We repeat what is familiar. We develop patterns. We want to see patterns. One action triggers the next. It is how we evolve. That's the way markets also work. It reflects the habits of all participants. It has memory. We have the tendency to try new things in life. Sometimes this leads us to mistakes. This leads markets to a certain degree of turbulence. A long time before modern financial theory was born, were introduced a statistical and visual approach. The chart analysis, purely graphical as it looks for chart patterns and the price filters applied to past data. These techniques opposed one of the basic principles of financial theory which is the "efficient market hypothesis" (EMH). EMH claims that it is impossible to predict the future from the observation of past prices. In economics, there can never be a "theory of everything" (Mandelbrot, B. B., & Richard L. H., 2008), but each attempt comes closer to a proper understanding of how markets behave.

Researches over the past few decades, shows that many financial price series have memory. Today does, in fact, influence tomorrow. Price changes are very far from following the bell curve (Mandelbrot, B. B., & Richard L. H., 2008). From 1916 to 2003, the daily index movements of the Dow Jones Industrial Average do not fit the standard bell curve. There are too many price changes that are very small, and too many that are very large. Hence too few points in between. The same phenomenon was found in daily, weekly, monthly, and annual foreign exchange rates. There are several studies that adopt GARCH methods, improve Black-Scholes, and others that criticize Fama and French's paper. As each anomaly is reported, a "fix" is made to accommodate it. Financial markets require strong disciplined investors, with the right kind of probability to model a profitable system. Real markets are wild. Stocks and currencies are riskier than normally assumed. Standard risk software that underestimate stock market risk, and build bad portfolios used by many of the world's banks, are based on Brownian motion. Anywhere the bell curve enters the financial calculations, an error can come out. Speaking mathematically, markets can exhibit dependence without correlation (Mandelbrot, B. B., & Richard L. H., 2008). It is not certain that using the bell curve is the best way to measure stock market risk; it is easy but not necessarily right (Mandelbrot, B. B., & Richard L. H., 2008).

## **FRACTAL THEORY AND CHART ANALYSIS**

Chart analysis (also called technical analysis) is the study of market action, using price charts, to forecast future price direction. The cornerstone of this philosophy is the belief that all the factors that influence market price - fundamental information, political events, natural disasters etc. are quickly discounted in market activity (Murphy, J. J., 1998).

Market fractals constitute a visual analysis of financial markets charts highlighting the trend. Those are trend changes. A trend change is a correction of the prior trend and that is the same from a technical point of view. Also, in chart analysis we have some most common fractal patterns, such as spike, double top, triple top, double and triple bottoms that occur on all time frames. Human nature yearns to see order and hierarchy in the world. It will invent it where it cannot find it (Saettele, J., 2008). This is true as part of technical analysis philosophy. Fractal theory resembles technical or just visual analysis on Elliot Wave theory, and other technical patterns as they appear to repeat on all time frames.

Most market analysis looked in a conventional way how prices behave. Something happens and the prices react, a story of “cause and effect”. In general, people have the tendency to study the cause rather than the effect of the price movement. This is the reason why the so far financial theories have been opposed from the real world’s financial data. Scientific research has found that the emotional part of the brain, works faster than the neocortex, which is significantly developed in humans as part of the brain that controls reason and speech. In other words, emotion trumps rational thought (Mandelbrot, B. B., & Richard L. H., 2008). Due to this reason, the cause’s analysis takes more time than the effect’s analysis. Economy is like music and the nature of these price changes without necessarily knowing the specific reason causing them is like listening to an infinite playlist of classic music. There is no Brownian motion in the music. Music occurs when sounds are contrasted against silence, without the silence, there is no music. If every music note were played at the same time, you’d have noise and no music. In economy, notes are price changes with only three trend direction: up, down, and sideways. Silence is just the information as a sort of a memory of the past. Recently some leading universities around the world have begun to explore Behavioral Finance which maintains that the human psychology and prices are intertwined. There is also another kind of analogy to economics from cosmology. An expanding market is like an expanding universe, has unique laws and local phenomena. Similarly, what happens to the markets, is what happens with nature; it is fractal and wild in details but soft in overall.

## **REAL WORLD FRACTAL CHARTS IN THE FINANCIAL MARKET**

Our research in economics is mostly based on observation, rather than abstract theory. The charts below are an amazing evidence of the fractal nature of financial markets.



Figure 1. What happens in the monthly chart repeats in the quarterly chart

\* All data in a quarterly chart; \*\* 10 Years data in a monthly chart



Figure 2. The attempt to change the trend by crossing the EMA 200 that repeats for USD/CHF;

if this picture is reversed we face the same behavior with EUR/USD as shown in Fig. 3;

\*First attempt, crossing EMA 200, EMA 20 crosses above EMA 50 (golden cross); \*\* Market correction; \*\*\* Second attempt, EMA 20 crosses above EMA 200 followed by EMA 50;



Figure 3. The attempt to change the trend by crossing the EMA 200 that repeats for EUR/USD; if this picture is reversed we face the same behavior with USD/CHF as shown in Fig. 2; \*First attempt, crossing EMA 200, EMA 20 crosses below EMA 50; \*\* Market correction;\*\*\* Second attempt, EMA 20 crosses below EMA 200 followed by EMA 50;

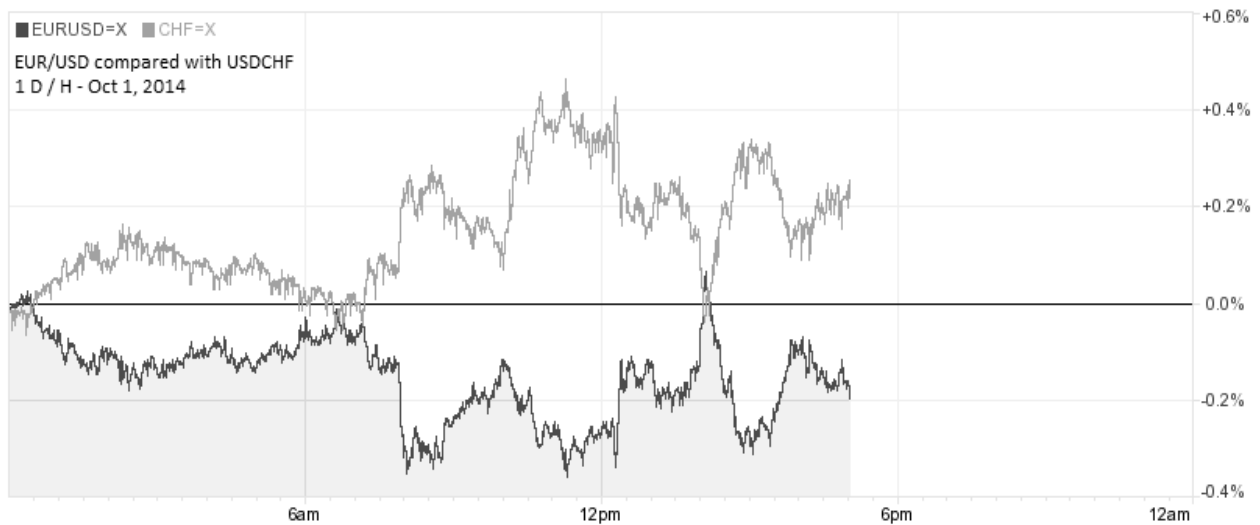


Figure 4 EUR/USD compared with USD/CHF, October 1<sup>st</sup> 2014 - hourly chart



Figure 5. EUR/USD compared with USD/CHF, 1 year - daily chart



Figure 6. An identical behavior that defines an entry point in the market;

*\* Contact lower Bollinger followed by a second movement to contact the upper Bollinger without contact EMA 200; \*\* EMA 200 contact, BUY signal; \*\*\* Identical behavior;*

There are many other repeating behaviors which vary from hourly to weekly, monthly or yearly identical movements. Some of them are shown below. There is a case that we describe as the general performance. In this case, when MACD(H) signal turns negative and in an higher order, let's assume from weekly to monthly, EMA 20 is below EMA 50 than the target is at least as the prior lowest value as 200 in chart number 7. This is also followed by a bearish crossover of EMAs in a lower order that in our case is in a daily chart.

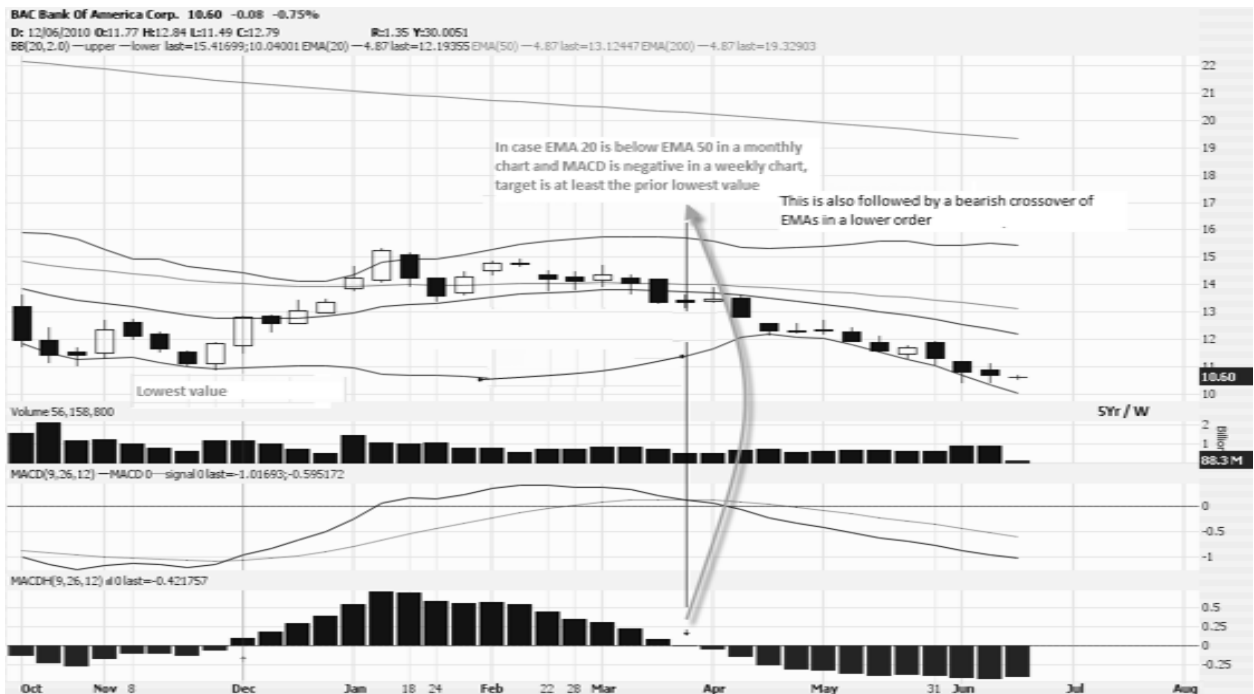


Figure 7. BAC – Bank of America, general performance, 5 years – weekly chart;



Figure 8. Ford Motor Company

*\* Target is upper Bollinger – 10 years monthly chart;\*\* A bullish alignment of EMAs in a monthly chart leads the way towards the bullish alignment of EMAs in a weekly chart when the market in a daily chart is in the above condition – 1 year daily chart;\*\*\* 5 years weekly chart;*



Figure 9. EMA 50 and Bollinger

*\* The contact with Bollinger after the cross of EMA 50 with the lower Bollinger band;\*\* The cross of lower Bollinger band with EMA 50 precedes the contact with lower Bollinger, after which comes the 5<sup>th</sup> wave at a minimum of the 4<sup>th</sup> wave's peak;\*\*\* In a downtrend;*

This nature of market behavior differs not only from minutes to hourly, daily, weekly, monthly, and yearly charts but also in the same time periods. It's a peculiar dimension as shown in the chart below where prices reaches EMA 200 on a 15 minutes chart meanwhile in the hourly chart EMA 200 is above the prices' value.





Figure 10. EMA 200 in a 20 days - 15 min chart and 60 min

### EMA 200 AS A TREND AND RISK MANAGEMENT STRATEGY

From the mainly empirical researches, EMA seems to properly define the trend and enables favorable entry and exit points in the market. It can also show moments of market correction. EMA 200 is one of the indicators commonly used by analysts.

Its behavior in relation to Bollinger Band, EMA 20, and EMA 50 serves to build strategies for determining the trend, value of the target price, and the entry or exit moment in the market. The way prices behave around EMA 200 makes the strategy very interesting and promises to greater results.

Why using the averages as such can improve the possibility of the price being in uptrend or downtrend? As shown in the chart below, when prices move above EMA 200 the target is simply defined according to the rule of symmetry.

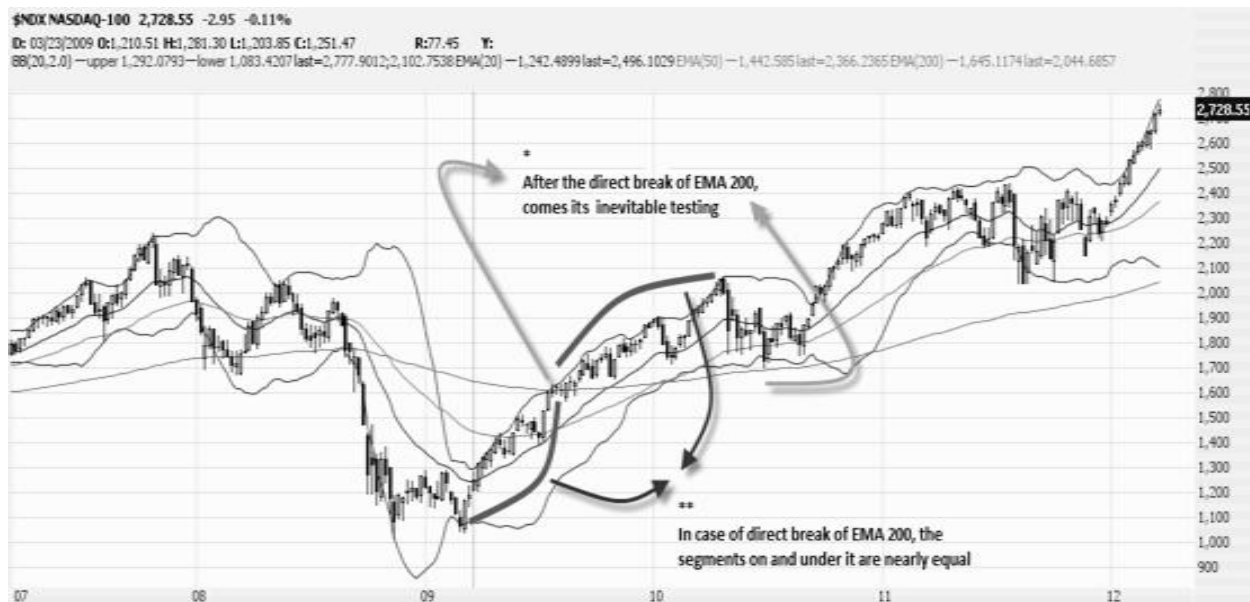


Figure 11. Symmetry of prices to the EMA 200;

*\* Prices move above EMA 200, comes its inevitable testing; \*\* In this case, the segments on and under it are nearly equal;*

The symmetry towards EMA 200 is one of the most natural behavior of financial markets. This serves to establish a low risk strategy and a well-defined target. Symmetry is part of the fractal nature from which derives that the market is characterized by a fractal analysis of EMA 200. This strategies are evidenced even in limited financial markets. In terms of this, a study of the forex market in Albania was completed, based on the exponential moving average of the EUR/ALL and USD/ALL exchange rate (Lamani, L. & Baci, N., 2014).

## CONCLUSION

The price's behavior towards the exponential moving average (20, 50, 200), not coincidentally shows that prices have a dependence on the past and present. It also shows that the price changes can be predicted.

The visual analysis approach as a theory to study economics is somehow left in the shadow, due to subjective views towards the price changes as shown in the chart, although is a successful approach to market analysis.

In this paper, EMA and Bollinger Band shows clearly the fractal nature of financial markets in which we found that the market has a tendency to repeat certain behaviors of a particular strategy in different time periods and time units. Risk management constitutes a key point on which these strategies are developed.

The aspects covered in this article favor a low risk strategy. The problem that exists with the price dependence on each other lies in the distinction between the size and the direction of the price changes. It remains possible for the absolute changes to be dependent, but provide no advance way of telling whether it will be up or down (Mandelbrot, B. B., & Richard L. H., 2008). But in this article there are evidences from observations that shows also a correlation in price direction, as well as strong dependence.

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