Introduction

It's all about cycles

Cycles that influence our life here on Earth. Cycles that represent energy flows that influence people’s moods and emotions. Cycles that represent energies originating from outer space. Cycles that manifest themselves in the measurable value of the economy.

This publication introduces an approach on how to identify relevant cycles and how to use this information for forecasting. The approach is not entirely new. But the way we use the “cyclic approach” is.

Cycles are important.

Cycles surround us and influence our daily lives. Many events are cyclical in motion. There is the ebb and the flow of waves and the inhaling and exhaling of humans.

Our daily work schedule is determined by the day and night cycles that come with the rotation of the Earth around its own axis. The orbit of the Moon around the Earth causes the tides of the oceans. Cycles also have an impact on women from their teenage years on – the menstruation cycle.

Gardeners have long understood the advantages of working with cycles to ensure successful germination of seeds and high-quality harvest. They work in harmony with the cycles to attain the best results, the best crops.

We experience four seasons every year, namely the changes in climate, resulting from the rotation of the Earth around the Sun. This seasonal cycle creates the changes in conditions that affect all living beings on Earth. One common cycle based on seasonal conditions is the bird migration, a regular seasonal journey undertaken by many species of birds.

You would wait until early spring to plant new seeds to take advantage of the rise in pulsing energy of the warming spring temperatures. Knowing when the sun will rise may not seem like a prediction, because we associate prediction with uncertainty and risk, but it is, nonetheless, a prediction of future events that is highly accurate.

These cycles are largely based on the cyclical movements of the Sun and Moon.

However, there is strong evidence that other additional energy cycles in the universe influence our life here on Earth. Independent research by the University of California and the University of Kansas has revealed that the rise and fall of species on Earth seems to be driven by the motions of our solar system as it travels through the Milky Way. Some scientists believe that this cosmic force may provide the answer to some of the biggest questions about Earth’s biological history (Schwarzschild, 2007). Finally, cycles have a long history in explaining our behavior on Earth.

We can go back a long time in history to recognize that life follows a path of time cycles. We can even find reference to this in the Bible:

> “
>
> **A Time for Everything**
>
> There is a time for everything,
> and a season for every activity under heaven:
>
> a time to be born and a time to die,
> a time to plant and a time to uproot,
>
> a time to kill and a time to heal,
> a time to tear down and a time to build,
>
> a time to weep and a time to laugh,
> a time to mourn and a time to dance,
>
> a time to scatter stones and a time to gather them,
> a time to embrace and a time to refrain,
>
> a time to search and a time to give up,
> a time to keep and a time to throw away,
>
> a time to tear and a time to mend,
> a time to be silent and a time to speak,
>
> a time to love and a time to hate,
> a time for war and a time for peace.
>
> **Ecclesiastes 3:1-8**

If there is indeed a time for everything that explains and predicts our behavior, this must also be applicable to people’s economic hopes, which manifest themselves in the value of the stock market.

Two well-known pioneers who applied cyclic analysis in the stock market are W.D. Gann and J.M. Hurst. Gann used cyclic and geometric time and price patterns, but did not elaborate the details of his approach. His work is still a mystery to many of us.

Hurst was the first to introduce cycle analysis to the technical analysis of the stock market. Even today, a lot of cycle forecasters, like Peter Eliades, successfully use the techniques of Hurst’s approach outlined in his seminal work “The Profit MAGIC of Stock Transaction Timing”. For example, Hurst demonstrated that the only difference between a head and shoulders pattern and a double top pattern is the phasing of the cyclic components.

Additionally, a paper published by three authors from the MIT Laboratory for Financial Engineering in 2000 concludes that ''technical patterns do provide information. It does raise the possibility that [pattern] analysis can add value to the investment process.” (Lo; Mamaysky; Wang; 2000)

Today we have evidence that detecting patterns adds value to the investment process and that all technical patterns can be rebuilt by means of cyclic components. In this regard, it should be valuable to think in terms of cycles rather than using a framework that consists of static chart patterns.

If this is the case and has already been widely acknowledged, why are only a few analysts and investors using cyclic analysis?

The likely answer to that question is because cyclic analysis is extremely difficult to put into practice. It requires a great deal of work and some complex mathematics that is not easy for everyone to apply. Additionally, many obstacles exist that hamper the use of cycle analysis:

The gap in speech/language between cycle researchers and traders

One reason cycle analysis is often limited to scientific researchers is the linguistic barrier. This becomes clear in the following example:

- “The actual support level identified, coupled with Fibonacci retracement, suggests the presence of strong buying opportunities in the near-term.”
- “The magnitude of the first six frequency patterns and the statistical significance of the Q-score suggest the presence of a high-frequency predictable component in the stock market.”

Even though both statements have the same meaning, most readers will understand the first statement but find the second puzzling.

The gap of trading expertise vs. cycles calculation

The second gap is attributable to different knowledge areas. Technical analysis is primarily visual while cycle analysis is mostly numerical.

The visual mode of technical analysis is one of the few human cognitive activities where computers do not yet have an absolute advantage over us. Numerical analysis involves the study of data sets *after* the fact. But in real-time environments, traders and investors must decide in the now and their decisions are mainly based on visual pattern recognition from charts. In many cases, the human eye can perform this “signal extraction” quickly and accurately. There are no, or more precisely, only few available cycle tools that can present the visual information extracted from numerical cycle analysis to the trader and function as a visual guide.

The gap of forecasting vs. trading

The third reason cyclic analysis is something of a rarity in trading is the distinction between forecasting and trading.

Most traders are not interested in predicting the future; instead, they enter a trade based on probabilities, apply money management and exit the trade sticking to clear rules. They claim that this is “the real way of trading”. Traders are convinced that they can make money by simply entering the trade randomly and by applying money management and exit rules.

On the other end of the spectrum are the “forecasters”. This group of experts is not interested in money management and exit strategies. They solely base their trading on predicting future market behavior. A gap exists in the mindsets of these two groups characterized by an ongoing debate about trading versus forecasting.

Cyclic analysis is more of a forecasting method. It is therefore not surprising that this tool cannot be found in an active trader’s toolbox. The active trader is not interested in “forecasting”. He manages his trade.

Bridging the Gap

This book tries to bridge these gaps with this publication. This book differs from traditional ones on cycle approaches, because it does not deliver a static framework of cycles that data need to be squeezed into.

That is, we do not try to make the market “fit” into a particular cycle framework which has at least two different possible outcomes. "Failures" within static frameworks are often explained with a complex set of named exceptions and deviations. The listing of exceptions after a static cycle framework fails (such as: “A cycle inversion took place”) is of little comfort to the investor who has made investments based on one of the delivered predictions.

All cycle tools are explained in detail and can easily be dragged ‘n dropped onto the chart via the cycle.tools cloud application; or can be integrated in your own applications via our public API access. Even most source codes for the introduced algorithms are shared as open source code for interested follow up projects on your own.

How to detect and measure cycles

The pivotal point of the approach described here is a method that can accurately determine which cycle is currently active with regard to the length, amplitude, and duration of the last high and low of a data series.

To borrow from the language of engineering, frequency analysis is used to measure cycles. As simple users, however, we should not be deterred by these "technical" terms. Frequency is nothing other than "oscillations (cycles) per time frame". In technical-mathematical analysis, the measurement of frequency is therefore repeatedly described. Time-frequency analysis identifies the point in time at which various signal frequencies are present, usually by calculating a spectrum at regular time intervals.

The application of frequency analysis to financial data is in principle nothing new and has already been described in numerous articles. However, current methods often come up against barriers in terms of application in financial markets. This is attributable to the specific features of the financial markets. Financial markets are influenced by numerous overlapping waves, whose strength and phases vary over time and are consequently not constant. The data are also overlaid by significant one-off events (noise) and quasi-linear trends. The classical methods of frequency analysis are not designed for the special characteristics of financial markets. Hence, the established methods are largely unable to provide reliable results as far as practical trading signals are concerned.

However, this section is designed for practical application in trading and forecasting and is not intended to be a scientific publication on new algorithms. Against this background, I would like, on the one hand, to abstain from the academic debate about the advantages and disadvantages of individual methods and, on the other, to avoid repeating what has already been said in other publications.

By combining special DFT methods (including the Goertzel algorithm), validation by means of statistical measurement methods (including the Bartels Test) and approaches to pre-processing (detrending), this framework provides a reliable method for measuring cycles in financial time series datasets.

The proposed method provides the spectrum of frequency analysis for every asset, dataset and every possible time frame. The following results are thereby provided:

1. Presenting a visual spectrum of the wave analysis of a length of 5 - 400 bars;
2. Determining the peaks in the spectrum analysis - i.e., the relevant and significant cycles;
3. Filtering of the values derived from the frequency analysis through statistical validation, i.e., identifying the cycles that are actually "active";
4. Determining the precise phase and amplitude of every active cycle;

5. Output of the data in a form comprehensible to traders, i.e.,
    - the phase in the form of the date of the last low point
    - the amplitude in the form of the current price-scale, and
    - the length of the wave in the form of the number of bars on the chart;
6. Determining the "strength" of a cycle by establishing the price movement per bar ("cycle strength").

In classical cycle analysis, the waves with the largest amplitude are usually described as dominant. However, the relative influence of a cycle per time unit - i.e., per bar on the chart - is of much greater interest. Therefore, the so-called cycle strength is ultimately introduced here and used as a measurement value for the cycle with the greatest influence per price bar. The value with the highest cycle strength will be used again later as representing the "Dominant Cycle".

These results and the mathematical method alone would fill an entire book on their own. As this publication is designed for practical purposes and aims to advance the method’s successful application in cycle analysis, this book is structured in the following main chapters:

1. Cycles Explained - To introduce basic parameters and knowledge
2. Applications and Examples - To illustrate the analytical algorithm
3. Scanner Framework - To explain how the algorithm is designed
4. Real World Examples - To see how it works in live situations