THE PHILOSOPHY OF TREND FOLLOWING

By Dr Andreas A. Aigner & Walter Schrabmair

We have come across many questions from people regarding trend following. To a lay person this is shrouded in mystery and often confused with prediction methods, which are regarded as dubious rightly so. How are you able to predict anything with confidence especially if it's a highly complex system where there are no governing equations, even if it is deterministic we know from mathematics that a system can be chaotic. Here we discuss trend following which is on the contrary rather a determination method than a prediction method. It is actually a method that is common sense and we use it daily in our lives surprisingly. Here we want to discuss the 'philosophy of trend following'.

Many books have been written about trend following in the stock market [1-7], yet there is a need to discuss the raw basics underlying the nature of trend following. We know from basic life experience that if something is here today it is most likely there tomorrow also. If birds are flying today, we can expect birds to fly tomorrow. If we are living today, then very likely we can safely assume we will be alive tomorrow as well. Things are continuing all the time. Life as such is a continuing process. We age every day. Our body deteriorates every day. There is no arguing about the constant deterioration of our bodies over our lifetime. We can therefore regard our life as a trend as well. In the social context there is also a name for what is called the 'Matthew Effect' [8], it simply proclaims that there will be growth where there is growth and decay where there is decay. What is growing keeps growing. It's a proclamation of the continuation of a trend. It is usually summarized as 'the rich get richer and the poor get poorer' and named after a section of the bible [9]

> "For to every one who has will more be given, and he will have abundance; but from him who has not, even what he has will be taken away."
>
> Matthew 25:29

So even in that time period they knew that plenty will bring plenty and little will become little. This term 'Matthew Effect' was coined by Robert K Merton to describe how credit is usually given to the more famous scientist even though he might not be the originator of the idea or research. This was later called the 'Stigler's law of eponymy' – "No scientific discovery is named after its original discoverer" with in itself was borrowed of Merton, so was proving its own validity ironically.

There is a similar recognition of a trend in other religions too, take for instance the Dharmachakra ('Wheel of Dharma' or 'Wheel of the Law') [10] in Hinduism and Buddhism represented by the symbol of a steering wheel or helm similar to a boat. The word dharma actually is a derivation of the root *dhr* which actually means to hold, maintain or keep. It's a symbol of the trend. One cannot deny the fact that life is a revolving wheel and represents many things in Buddhism. The turning of the wheel can represent the constant

progress of Buddha's teachings permeating through the world as well as the cyclical nature of life in the world (aka. 'Wheel of Samsara').

There is more evidence of common knowledge about trends that can be found in one of the oldest sayings on Wall Street [11, 12] which is

> "Cut short your losses. Let your profits run on"
>
> David Ricardo (Born 1772--1823)

and usually paraphrased as *"Let your winners run and cut your losers"*, which is quoted by Warren Buffett and many others.

It is only utilizing the positive trends and discards the negative trends, but one can generalize this to letting the winners run and shorting the losers. Actually following a trend is unlike picking a single direction, it is rather the flexibility to change direction at any point, it is more general in that sense.

It's fair to say there are trends are quite ubiquitous. In essence it is a pattern that we associate with things and these patterns become part of common knowledge and we don't recognize them as such anymore once they are internalized. We don't even question them anymore once they have become accepted without question. The topic of pattern recognition has been intensely studied in many fields and are still today a matter of research in a wide variety of fields. Pattern recognition is a huge field, it's quite impossible to name all fields here. What we are interested here is how do you follow a trend and when do you determine that a trend is broken. Assume you have no knowledge of the trend a priori. Let's say you know you are in an existing trend; how would you determine when the trend changes?

We could pick any example from daily life, like driving along a road or walking along a trail, and assume the only thing we are given are for simplicity is one variable that just measures the length across a y-axis with time. If the variable increases we go further left, if the variable decreases we go further right, if it stays the same we just go ahead. This problem is essentially a 'steering problem'. When do we steer left or right and how much are questions we would ask ourselves to program such an autonomous driving vehicle or an autonomous walker.

Let's illustrate this using another example. We take the temperature reading of a location over several years [13-15]. If we didn't know there was winter time and summer time, if we didn't know the Earth travelled around the sun and had a closer distance to the sun in the summer and a longer distance in the winter. How would we determine that a trend is changing?

Borrowing concepts from technical trading of stocks we would determine a trend is reversing if a certain threshold below or above the last level is broken. So once the current level breaks through this threshold below/above the previous level we would determine that a trend is reversing. There are other trend following methods in stock trading which don't utilize a threshold but instead use some kind of technical indicator to trigger a reversal, such as for instance moving average cross overs. Introducing technical

indicators as an indicator for reversal automatically introduces some measure of delay into the actual price movement. We won't go into how to calculate this delay here, but we will advise to use these with caution. We implement a more traditional method proposed by Wilder in 1978 based on the average true range of price (ATR), its description can be found in these sources [16-18]

Here is an example of the temperature in Portland (Maine, US) from 1 January 2016 until 1 January 2019. We start off with just picking any direction since we don't know it yet, and then just subsequently observe if our threshold rule is broken or not. In this example you see the reversal happens after a while and from that point onwards we are reversing our trend from Up/Down in lockstep with the temperature. We have a little slippage every time we are reversing the trend, but overall we are able to capture most if not all of the major trends.

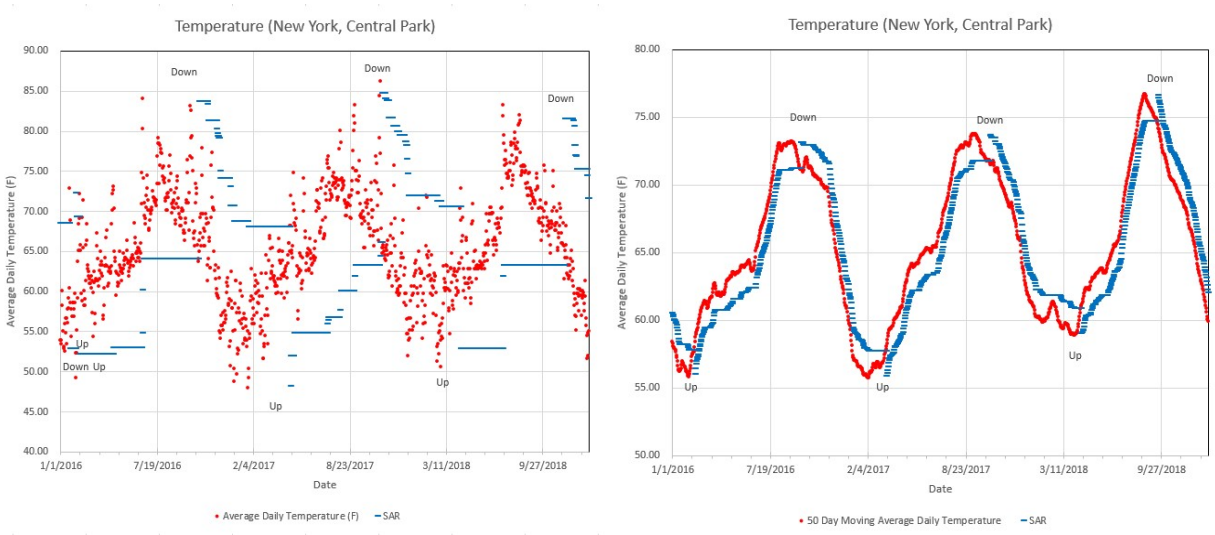

Figure 1 (a) Chart of the real average daily temperature with the Stop-and-Reverse (SAR) trend following point and (b) on the the right using a 50-day moving average of the average daily temperature for illustrative purposes.

We have just determined a method to blindly decide when the start of the winter and summer period is. We have trained an automated way to trade the temperature in Portland, Maine without knowing how long or when the seasons would be. We are simply trend following. If the summer was going to be warmer than the previous year we reversed our trend later and at a higher level. It is simply following the weather pattern. This trend following would work in any climate change scenario. Likewise, if the winter was a lot warmer, we would not have waited for the low or some predefined level to break. We would reverse at a low corresponding to the low of that specific season low.

Let's look at the Corona Virus (CoVid19) global infection numbers as another example to illustrate this [19, 20]. Below is a chart of the global data of infected people. At which point do you decide the trend is reversing? We apply the same methodology here and decide that the trend is only broken once a dynamic threshold based on the previous detected numbers is breached. We start off with assuming any direction of

the trend, and let the algorithm decide subsequently which is the right trend. Below chart you see the methodology decides on an up, down trend but then settles for an uptrend which it is not changing anymore. Please note that the jump in the numbers on the 17th of February is a result of the change of the WHO's reporting methodology including both laboratory-confirmed as previously reported and those reported as clinically diagnosed. This jump represents this change in reporting methodology.

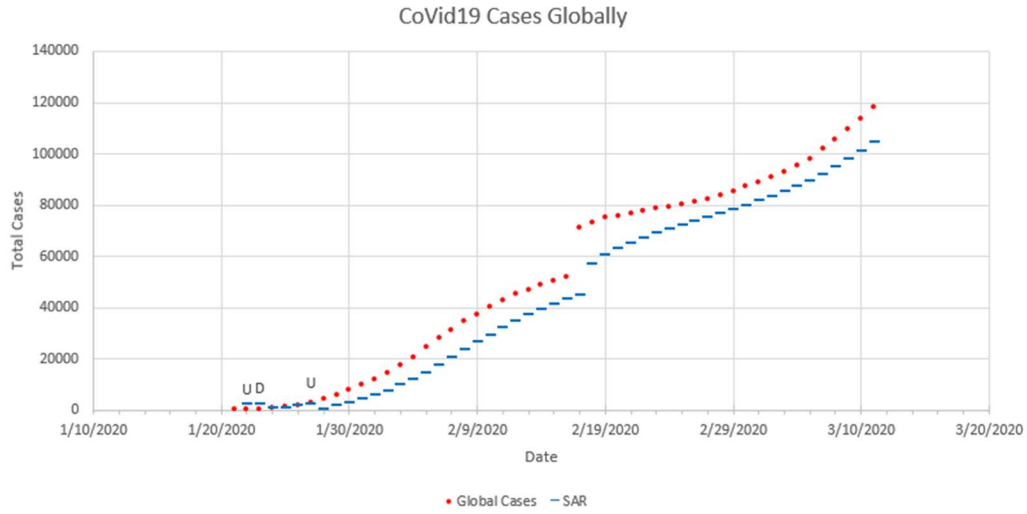

Figure 2 Global cases of CoVid-19 (Corona Virus) infected people according to official data (as of 13th of march 2020)

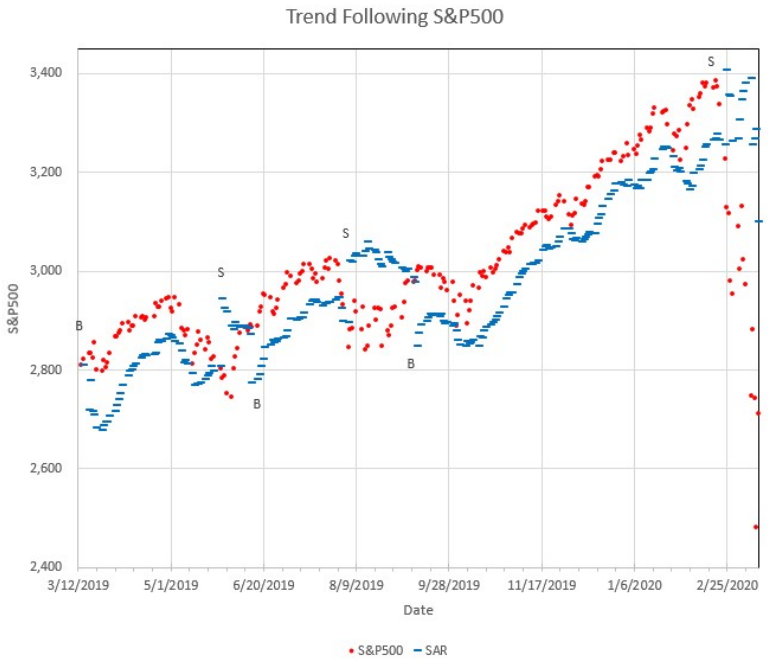

Figure 3 Chart of the S&P500 with the Stop-and-Reverse (SAR) points indicated as calculated with the trend following.

Figure 3 is a chart of the S&P500 up to Friday 13th of March 2020 with the trend following applied. It also shows quite clearly it has shorted the S&P500 on the 24th of February at 3226 and has maintained short since that point. It also picked the buy and sell levels before that the last sell quite nicely.

CONCLUSION

Trend Following is not predictive in any way, except judging the future by measuring the past and ascertaining that whatever worked in the past should continue working as long as a break-level is not reached. This break level is dynamic since it incorporates daily volatility. It is simply a manifestation of what hundreds of years of trend followers have already practiced unconsciously or subconsciously in the social, religious or economical/financial context.

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