A NEW ADAPTIVE MOVING AVERAGE (VAMA) TECHNICAL INDICATOR FOR FINANCIAL DATA SMOOTHING

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Alex Pierrefeu
Sevilla, Dos Hermanas, 41700
shaddoll07@gmail.com

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ABSTRACT

The separation of the trend from random fluctuations (noise) is a major objective in technical analysis and for a long time two commons filters, the simple moving average and the exponential moving average have been used to achieve this goal, those two filters use one parameter to control this degree of separation, higher degree of separation involve smoother results but also more lag. Lag is defined as the effect of a moving average to show past trends instead of new ones, this effect his unavoidable with causal filters and is a major drawback in decision timing . In this article I will introduce a new adaptive moving average technical indicator *(VAMA)* who aim to provide smooth results as well as providing fast decision timing. This new method will be used for the construction of a simple MA crossover strategy in EURUSD, the results of this strategy will then be compared to the results of the same strategy using other adaptive moving averages to provide a comparison of the profitability of this indicator.

***K*eywords** Moving Average · Adaptive Moving Average · Smoothing · Filters · Technical indicator · Technical Analysis · Volatility

1 Introduction

One of the main characteristic of the financial market is its dynamic condition, so in order to respond to this dynamical behaviour as well as addressing solutions to the lag induced by classical filters various adaptive filtering methods have been proposed. Adaptive filters aim to adapt to characteristics of the market price, they might tend to adapt such that smoothness increase or decrease when market act in a certain way, some methods adapt to market trend strength [1], to market shape complexity [2], to the rate of change of the phase [3] or to market volatility [4]. Adapting to market characteristics require to quantify those characteristics in a smoothing variable α_n who will control the smoothness of the filter. The smoothing variable used for the calculation of *VAMA* is a modified version of the ratio of open-close to high-low range indicator. This indicator originally measures the dispersion of the absolute difference of the close price with the open price relative to the difference of the high price with the low price and is calculated as follows : $\frac{|C_n - O_n|}{H_n - L_n}$ where C_n is the closing price, O_n is the open price, H_n the high price and L_n is the low price.

2 Moving Average Construction

This adaptive moving average will use a simple exponential filter architecture and is calculated as follows :

$$VAMA_n = \alpha_n C_n + (1 - \alpha_n) VAMA_{n-1}$$

$$\text{where } \alpha_n = \frac{|SMA_p(C_n) - SMA_p(O_n)|}{SMA_p(H_n) - SMA_p(L_n)}$$

A simple moving average of period p defined as SMA_p is used to smooth each price components in order to increase smoothness *(decrease α_n)* when p increase.

3 Strategy Construction and Testing

3.1 Conditions

In order to test the profitability of the *VAMA* indicator, a simple MA crossover strategy will be tested with EURUSD, results will then be compared to the same strategy using other adaptive moving average instead of *VAMA*. The MA crossover strategy is a simple strategy who use the crosses of a fast moving average with a slow moving average to generate signals, a common period is 50 for the fast moving average (SMA_{50}) and 200 for the slow moving average (SMA_{200}), when SMA_{50} cross over SMA_{200} a buy signal is generated and when SMA_{50} cross under SMA_{200} a sell signal is generated. For this strategy SMA_{50} will be replaced by *VAMA* with $p = 50$. The other adaptive moving averages used for comparison will include the Kaufman adaptive moving average[1] *(KAMA)* with *period = 50*, Fractal adaptive moving average[2] *(FRAMA)* with *period = 50*, Mesa Adaptive Moving Average[3] *(MAMA)* with *fast limit = 0.1* and *slow limit = 0.02*, Variable Index Dynamic Average[4] *(VIDYA)* with *period = 25*, Parameters have been selected to reduce the difference between each moving average in order to have more accurate testing results.

3.2 Testing

The strategy is tested from 2018-02-06 to 2019-05-06 in 1H time frame and dollar as base currency, no commission/spread have been applied to the test. Previous positions are exited when a new position is opened.

Table 1: Statistics of the strategy applied to EURUSD with order size of 1000 contracts

	$VAMA_{50}$	$KAMA_{25}$	$FRAMA_{50}$	$MAMA_{0.1,0.02}$	$VIDYA_{10}$
Net Profits	-57.34	-132.5	-38.28	-74.48	-84.27
Gross Profit	135.21	123.39	174.44	143.96	133.72
Gross Loss	192.55	255.64	212.72	218.44	217.99
Max Drawdown	-78.76	-132.25	-83.64	-128.11	-98.46
Total Closed Trades	59	61	72	58	61
Number Winning Trades	15	12	18	17	18
Number Loosing Trades	44	49	54	41	41
Average Profit per Trade	-0.97	-2.17	-0.53	-1.28	-1.38

4 Conclusion

I have presented a new adaptive moving average that adapt to a modified version of the ratio of open-close to high-low range indicator. Testing results show that the classic MA cross strategy is not profitable, however *VAMA* proved to have good results among other adaptive moving averages, this show that it can be interesting to adapt to market price based on high/low/open and not only closing price information, thus making the modified ratio of open-close to high-low range indicator an interesting smoothing variable for other adaptive indicators.

5 Pinescript Code

```
//@version=2
study("VAMA",overlay=true)
length = input(14)
//----
c = sma(close,length)
o = sma(open,length)
h = sma(high,length)
l = sma(low,length)
lv = abs(c-o)/(h - l)
//----
ma = lv*close+(1-lv)*nz(ma[1],close)
plot(ma,color=#FF0000,transp=0)
```

References

[1] P. Kaufman, Trading Systems and Methods, John Wiley Sons, Third Edition (2008).

[2] J. Ehlers, "Fractal Adaptive Moving Average", Technical Analysis of Stock Commodities", October 2005.

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[4] VIDYA, Chande, Tushar S. and Stanley Kroll, "The New Technical Trader", New York, John Wiley Sons, 1994