

# JUST SIT BACK AND LET THE GIRTH MODEL MAKE MONEY FOR YOU

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## Abstract

The Girth Model will use the 10-period exponential moving average (EMA) and the 20-period EMA as their proxy for market trend. The Girth Model is a trend following model incorporating volatility, momentum and velocity. We will use girth as an early close indication to both long and short positions. Typically, early exit due to decreasing girth results in a more favorable profit position than that taken if the trader simply waited for an exit on the EMA cross to the downside.

**Key words and phrases:** Exponential Moving Average (EMA), Girth, Momentum, Moving Average, Velocity, Volatility.

## 1 Introduction

“Trend is your friend” is the first rule of trading [3]. One of the easiest and most visual methods of trend following is to locate the moving average of the price data and trade with it. Experts have declared that trend trading is dead, or at least seriously injured, but one real-world experiment shows that with the right filters trading the trend as described by a set of moving averages is profitable [3].

What are moving averages?

A moving average is an indicator that will calculate the average price of a commodity (in this case, the EUR/USD) throughout a period of time. With each new candlestick, the oldest data point is dropped and the newest candlestick of data is added. Thus, a moving average is not static, it is rolling. A simple moving average for  $M$  candlesticks of data shows the closing price of each candlestick ( $M_1, M_2 \dots M_D$ ) is  $M$ , and where  $D$  is the total number of measurements made and  $M_D$  is the most recently made measurement. For our discussion, we employ exponential moving averages (EMA), the 10 and 20-period EMA, which are calculated similar to the simple moving average but give more weight to the more recent price action. The EMA is an attempt to reduce the lag of the simple moving averages: to make the moving average trend line respond more quickly to changing price action [3].

The rule is simple: when the shorter of the two moving averages crosses over the longer of the two moving averages, a buy signal is generated. Conversely, when the longer of the two moving averages crosses over the shorter of the two moving averages, a sell signal is generated. Because we are day trading the EUR/USD, we use an even shorter EMA against a short EMA: the 10-period against the 20-period EMA. The length of the moving average chosen should fit the time cycle traded [3]. When the 10-period EMA is above the 20-period EMA, we buy the EUR/USD (10 > 20 EMA). When the 20-period EMA is above the 10-period EMA, we sell the EUR/USD (20 > 10 EMA).

John Murphy, author of the technical trading bible [5], linked cycles and moving averages: “There appears to be a definite relationship between moving averages and cycles. For example, the monthly cycle is one of the best known cycles operating throughout the commodity markets. A month has 20 to 21 trading days. Cycles tend to be related to their next longer or shorter cycles harmonically, or by a factor of two. That means that the next longer cycle is double the length of a cycle and the next shorter cycle is half its length.”

The Girth Model will use the 10-period exponential moving average (EMA) and the 20-period EMA as their proxy for market trend. The Girth Model is a trend following model incorporating volatility, momentum and velocity.

What is a momentum indicator?

Momentum is simply a visual reference point of whether a security is rising or falling and how fast that rise or fall is. Construction of the indicator is simple - just subtract the close of the security  $X$  (whatever period you want) days ago from today's close. The resulting number can then be plotted around a zero line. For example let's say we were looking at a 10 period momentum indicator. You would simply deduct today's close from the close 10 days ago. If the close was higher than the close 10 days ago then it would be plotted above the zero line. If on the other hand the close was lower than the close 10 days ago, it would be plotted below the zero line. If the momentum line is rising and above the zero line we can interpret that as a strong bullish trend. If the momentum line is below the zero line and falling we can interpret that as a strong bearish trend [4].

Momentum can be a very good confirmation indicator. If you were using a moving average or a trend line to help determine trend, then a cross above or below the zero line could be just the confirmation you need. Momentum was used in Girth Model to calculate the girth number that is a function of momentum, velocity and volatility.

## 2 Our Trading Method

The Girth Model will use the 10-period exponential moving average (EMA) and the 20-period EMA as their proxy for market trend. The model will enter new trades only on an EMA cross (for example, if the 10-period EMA crosses above the 20-period EMA, the model will go long). We will calculate girth at the close of each four-hour

candlestick. We will use girth as an early close indication to both long and short positions. Existing trades will be closed when the girth indicator decreases below a specified threshold, indicating that the trend may reverse [1].

The Girth Model is embedded with statistical modules. These modules help define the direction, strength, volatility and velocity of each commodity's major and minor trends. This modified momentum and trend following model can be tailored to any market [2].

The first step is locating the trend. We use long and short exponential moving averages (EMAs) to find the primary trend. Back-testing of results finds that the euro four-hour time frame trend was best monitored by the 10-period and 20-period EMAs [2]. When this trend is bullish ( $10 > 20$  EMA), the shorter trend is above the longer trend, the model generates a buy signal. When bearish, it generates a sell signal. Our model's foundation is a simple EMA model, buying or selling when the trends change. We only enter a trade upon a trend change. However we use "girth" as a signal for early exit. In Figure 1, the purple line is the longer EMA and the light blue line is the shorter. Therefore the trend is bearish and the model's basic position is short:  $20 \text{ EMA} > 10 \text{ EMA}$ .

Next we determine the velocity, momentum and volatility of the trend. It is necessary to compute these factors, otherwise the trader will not exit in the most profitable position. Reviewing the graph, our model signals exit below \$1.2600 and not above \$1.2800, where the EMAs cross. A simple trend trade would be set to exit the short and enter a long position on the candlestick after the EMA cross. Using the girth indicator, we exited at \$1.2597. We took a long position at \$1.2840 after the EMA cross. The girth indicator added 200 pips to our profits.

The mechanics of calculating basic girth are simple. Basic girth is the difference between the longer EMA and the shorter EMA.  $\text{Girth} = (10 \text{ EMA} - 20 \text{ EMA})$ . Implementing trades based on girth requires not only calculating the basic value but integrating this result with momentum, velocity and volatility. Girth coupled with velocity is used to optimize early exits. Girth coupled with momentum and velocity is used to add notational size to exiting positions.

Higher volatility of the underlying price can indicate a higher probability of EMA cross and therefore a weaker trend. High price volatility results in earlier trade exits. Higher velocity and momentum of the underlying indicate a stronger trend and require adding to winning positions. The girth factor indicates both early exit before losing significant profits and increasing the notational size of profitable positions. These indications are consistent with the old trading maxim: "Add to winners and cut losers [2]."

The girth number combines these concepts into a single quantity. Girth number =  $f$  (volatility, momentum, velocity) per time frame per commodity. Choosing a girth number is an ongoing optimization process [2].

Figure 1 visually shows how the Girth Model works [1].

Reviewing "The Early Out Diagram" shows how the model picked a strong trend



Figure 1: The Early Out Diagram

upward, and indicated an early close to the upside trade in late May. We saw a limited cross to the downside and then a resumption of the uptrend. We would be watching the four-hour girth threshold and the trend indicators and would have entered another long position.

The graph shows how the trends and the girth indicator are used to preserve profits pending a reversal in trend. During the late May move from 1.34 to 1.44, two long positions were taken. They were both entered at the time of the EMA cross. Both trades were exited prior to the EMA cross, when the girth figure crossed below the girth threshold. Typically, early exit due to decreasing girth results in a more favorable profit position than that taken if the trader simply waited for an exit on the EMA cross to the downside.

### 3 Logistics Matter and Hidden Risks

At the close of its candlestick, the specified executing team inputs that candlestick's data into the spreadsheet model. Based on the continuously updated girth threshold, the model then indicates one of three options to the executing team: close the current trade, enter a new trade or take no action. In the event of no action, the trader running the model updates the model. In the event that trade entry or exit is indicated, the executing trader immediately notifies another member of his team, who independently enters the data to confirm the action. After confirmation, the first trader takes the indicated action and sends the updated model to his and the subsequent executing team.

The forex market trades continuously from Sunday late afternoon until Friday late afternoon, so there is no market close during which to discover and to correct errors through the week [1].

Another significant operational risk is the passing of a contaminated book: a model that has errors in it. To mitigate this risk, each morning the management team confirms the accuracy of all the data entered into the model over the last 24 hours, prepares a daily profit/loss report that combines both cash and mark-to-market positions and reports any anomalies. The managing team also is responsible for preparing weekly reports summarizing the fund's closed trades, floating P/L and other parameters of the fund's performance, including any operational risk occurrences or human errors.

At the end of New York trading on the last trading day of each month, the fund closes any open position and goes to cash. The managing team is responsible for this action and for the preparation of the end-of-month performance and investor return reports. The end-of-month liquidated positions may be re-established at the beginning of the new month next trading day, if girth and trends dictate. These steps have been implemented to mitigate any issue of an operationally contaminated book.

Risk management is largely intrinsic to the Girth Model, as the model never enters trades against the four-hour trend. The model instead is traded with the trend, after the trend is established, and then looks to make an early exit from the position.

The Girth Model works best when there are strong trends during the four-hour time frame. The model may churn or yield no profits if the market is not trending during the four-hour time frame. However, the trader will never be able to hold a long position against a short trend. Thus, it inherently limits losses. Further, each trade will be entered with a hard stop loss, which is determined by the volatility of the market. If normal market historical volatility dictates 80 pips of noise in the market, then an 80-pip stop loss is set. However, if historical volatility has increased two fold, then the stop loss will be set higher than 80 pips as a factor of volatility.

Implementing the Girth Model requires calculating value at risk (VaR) and to monitor VaR over a floating P/L position. A strong sense of discipline will also be instilled via reporting, which will be performed on a daily, weekly, monthly and yearly basis. A Risk manager will be required to produce updated analyses of volatility,

VaR, average trade length, P/L (cash and floating), maximum drawdowns and any deviations from the trading model.

There is a lot to learn and a lot to implement before the Girth Model can run smoothly. The process has a large risk of human and operational error. This model is particularly profitable in the EUR/USD because of its strong trends. Tight range-bound markets produce poorer results. By following the model's indications, we have identified and profited from recent movements in the EUR. The model also applies a discipline to the traders, which helps to minimize the likelihood of human error.

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