



LIMITATIONS OF BACK-TESTING MODEL INDICATORS

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In today's uncertain rate environment, back-testing fixed income models may contribute to trading efficacy. But there are times when a back-tested system will fail, demanding a fluid model that will adjust based on current market action.

Back-testing is used in financial markets when referring to testing a trading strategy or a predictive model using historical data. A portfolio manager uses this methodology to cross validate his thesis or trading strategy. Developed with the benefit of hindsight, back-testing seeks to estimate the performance of a strategy during a past period and assumes that if the strategy worked previously, it has a good chance of working again; conversely, if the concept has not worked well in the past, it may not work well in the future.

In the unconstrained fixed income market, back-testing—in conjunction with a fluid modeling process—can contribute to trading efficacy, especially in today's uncertain rate environment.

Indicators and models have the potential to benefit from a back-test to show:

- Efficacy in reducing drawdown
- Increased return over a buy-and-hold strategy
- Reducing the number of trades to keep transaction costs low
- Increasing the number of winning trades vs. losing ones
- Increasing the average profitable trade/decreasing the average losing trade
- Reducing volatility

Back-Test in All Market Conditions

The primary goal with back-testing is to see if the indicator that is back-tested will replicate results in different types of markets. Will the indicator or model achieve similar results in an "up," "down," or countertrending "sideways" market?

Back-Testing Indicators in Aggregate

Back-testing indicators in a model is not just a two-step procedure to weigh them against one another to generate buy and sell signals. Indicators working together as a unit could be used to create one indicator, which in turn is back-tested in aggregate. As each indicator is back-tested to find its aggregate optimal level of sensitivity over a period of price history, one indicator may be found to do well in some types of markets and not well during other periods. Optimal settings for indicators for the future can be impossible to find with past data alone. This is why back-testing can be used as a guide that helps determine weightings for an indicator but may not be applicable in terms of deciding what indicators to weight at any time in a market cycle.



Advantages of a Fluid Model

A fluid model alleviates the pitfalls of a back-tested set of indicators to weigh in a model or to be grouped together as an aggregation and then back-tested for a one-indicator model. When a market is trending, it may be proper protocol to de-sensitize momentum indicators and to place a higher trailing stop so that one remains in the trade longer.

A model works best if it knows when to switch out of a trend trade and to 'lock-in' a profit. Trend indicators work well in following a directional "up" or "down," but they lag in terms of locking in gains at a market top. Therefore, when the number of momentum indicators signal divergences due to the rate of price change, such as slowing or a movement in an opposite direction, then a reversal of positioning may be warranted to lock in a gain.

One technique in a fluid model would be to attempt to lock in a gain when three or more momentum indicators have signaled divergences. When the weight of evidence from the rate of price change indicator is confirmed with a trailing stop, the two necessary criteria are met to potentially lock in a gain.

Indicators in Non-Volatile and Volatile Markets

Trend and momentum indicators work well in a trending non-volatile market. When high levels of volatility and sideways market movement work in unison, then a trend system will generate multiple moves and thus potentially diminish overall returns. When this scenario takes place, one must look to bypass the trend-following system or wait for the volatility to pass. If one bypasses the trend-following system, then the use of a price grid that identifies oversold and overbought levels is used and one seeks to buy low and sell high with an understanding that the market is in a volatile trading range.

Indicators That Identify Range vs. Trend

The decision to trade a range rather than to wait out volatility until a trend emerges requires the use of indicators that have the potential to identify if the market is in a range and not a trend. These indicators are trend identification and independent guides to instruct the trader when to weight the model to trading indicators.

A fluid model system bypasses trend and trend momentum aspects of the model and switches to a set of indicators that seeks to identify oversold and overbought areas from which to enter and exit positions. It should be noted that it is difficult to identify and trade a range using

overbought and oversold levels found by a price oscillator.

Normally, the price oscillator will be used after one decides on a Bull Tilt or Bear Tilt. The price oscillator would then identify an entry and exit area. For example, if the analyst determines a Bull Tilt, an oversold price oscillator would be a possible entry point at a lower price; assuming that the trend is not on the verge of turning negative.

Consequently, many traders who define themselves as trend followers will stay defensive until the price breaks out of a range and use the duration of the range to identify future resistance levels.

This discussion illustrates our thesis that a back-tested model may have inherent limitations, because it shows that there are times when a back-tested system will fail to navigate a trading range efficiently. This is why we posit that a fluid model would adjust based on current market action and then act when indicators enter a trend or exit one. The rebuttal might be that one has to find an indicator that can navigate different types of markets with optimal efficiency and stay relatively positive during non-trending periods. From experience we know that this is not likely to be in the best interest of the client, especially in periods of high volatility such as 2008 or also late 2011.



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Aggregated Indicators

Implementing trades based on back-tested models that aggregate a set of indicators which then become a single indicator most likely leads to the use of one trend-following indicator with a stop-loss mechanism attached to it that may increase the number of trades and often violates the system's ability to generate profits. This is because to generate future signals based on a back-tested system requires indicators to work in unison; in order for this to happen, a reduction in the number of indicators in a back-tested model must take place or the system with all the combined indicators will not back-test well.

If one has five models that each have one to three indicators and weights each model, then you could call that system back-tested; but the test would need to identify when,

for example, a five model system comprised of the small set of indicators signaled in unison or majority to issue a signal. We concede that this type of system may be possible, but from experience we think that such a system becomes further detached from the current market environment and may not navigate the future price action. It would be much like running indicators on indicators—which if price-based would be removed from the price action itself, and this breaks with a confirmation, a requirement in classic trading methodology.

Shortcomings of Back-Testing

Back-testing can be prone to weaknesses and limitations. Limitations include the requirement of simulating past conditions with sufficient detail, making one limitation of back-testing the need

for detailed historical data. Another limitation is the inability to model strategies that would affect historic prices, and finally, back-testing is limited by potential curve fitting. Meaning, it is possible to find a strategy that would have worked well in the past, but will not work well in the future. Despite these limitations, back-testing provides information not available when models and strategies are tested on synthetic data.

Summary

When using model-based systems, traders should strive to constantly refine methodology by continually studying charts, past and current market movements, patterns, indicators, and other data that can give them an edge. Stock market dynamics constantly change, as evidenced by the elimination of the uptick rule in 2007, Federal policy can change at any time, and the markets can be subject to quantitative easing.

No one model works in every market condition. Ultimately, we view our job as seeking to determine, through back-testing and modeling, how to identify and then systematically make adjustments that capture returns and reduce risk simultaneously.



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