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Hammering out a b o t t o m

"Buy low, sell high." Everyone has heard this old stock market adage. In theory at least, Japanese candlestick formations can help realise this goal. The "hammer" formation is a bottoming pattern seen on a candlestick chart, which can signal a potential reversal point in a trend. In order to test the relevance of this bottoming formation, we ran a statistical study on the hammer.

O verall performance in trading depends in part on finding the right entry and exit points for individual trades. In order to enhance trading profitability, one could work toward the goal of the abovementioned stock market adage. One needs to implement strategies that will allow buying closer to the low of a trend and selling near the high. Thus, any patterns or formations that offer early trend reversal signs, can be extremely useful. Traditionally, traders have used the hammer formation to enter a new trend as early as possible.

Daily candle definition

Without a doubt, the hammer formation is one of the most popular patterns within the world of Japanese candlestick charting. This can be attributed to the simple definition and visual picture it offers.

The revealing factor displayed on a candlestick chart is the visual picture, which highlights the relation of the open to the close. If the close is higher than the open, the rectangular body between the price points is white. If the close is lower than the open, then the body is black. Thus, within candlestick terminology, candles are referred to as having a "white body" or "black body." The key factor traders need to understand is that white candles are generally considered bullish, while black candles are seen as bearish. Another important element in candlestick analysis includes the relationship between the price high and low to the body of the candle, which brings us to the hammer formation seen in figure 1.

The hammer is a bottom reversal formation, which appears at the end of a downtrend. Because hammers generally form at the end of a trend, these patterns can offer highly efficient long entry signals. After a hammer has been etched on a chart, prices generally will begin to move higher, as the formation precedes the beginning of a new uptrend.

A hammer formation may also occur at the end of a market's uptrend, but in this instance it is called a "hanging man" pattern. The two formations differ only in the context in which they appear. Hanging man patterns, by definition, offer excellent short position entry signals. In theory, at least, these two formations offer well-timed entry points. Figure 2 reveals a hanging man formation.
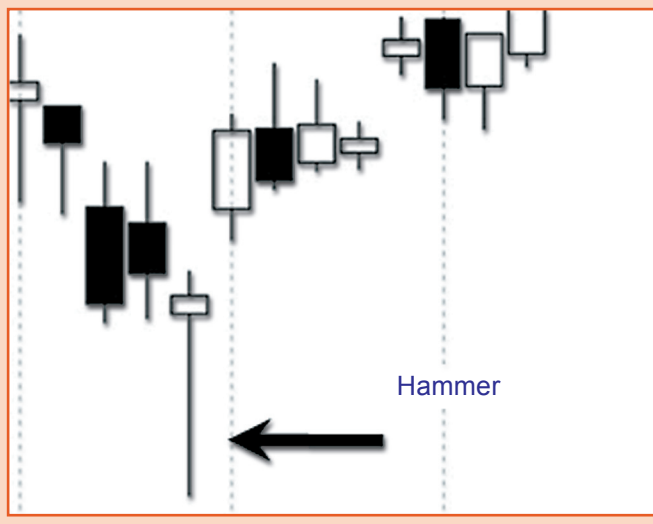
The hammer, seen in figure 1, reveals the psychology behind the market action. In the final day of the downtrend, market players push prices to new daily lows, which creates the bearish part of the hammer. Following the new low, however,

T1) Candle formations

	after 10 days		after 5 days	
All formations	529	100.00%	529	100.00%
Hammers	49	9.26%	74	13.99%
Hanging man	48	9.07%	74	13.99%
Not confirmed	432	81.66%	381	72.02%

buyers appear intraday and push prices up toward the opening price. A hammer can be either white or black. The key element revealed in a hammer is a strong intraday shift of sentiment, which generally precedes a new trend in the days that follow. A spike higher in volume readings, on the day of the hammer, will increase the overall validity and strength of the signal.

Hammer components

The portion of the hammer, which reveals an underlying shift in market psychology, is the most important element of this formation. According to traditional candlestick literature, a hammer formation will have:

- A body located at the upper end of the price range
- A lower shadow, which is at least twice as long as the body
- No upper shadow, or only a very small one

These characteristics are typically seen in hammer formations. Yet, from an objective standpoint, there is some room for interpretation. After all, what exactly is a "very small upper shadow," or what is the meaning of "at the upper end." More often than not, authors writing about candlestick formations fail to address these subjective factors or will refer to the discretionary and instinctual aspect to candlestick analysis. However, the subjective nature of the analysis isn't always helpful to traders. We need a programmable and exact definition of these characteristics. For this reason, we chose 1/8 of the length of the candle as the maximum size of the upper shadow for this study. It was reduced further, but this will be discussed at the end of the article.

Before diving into the statistical results, there are a few other aspects and considerations to outline. Firstly, how do computer programs, in this instance Metastock, identify candle formations? Metastock's software producer Equis has integrated a special identification tool for candlesticks. This is called "Equis candlesticks" in the expert advisor, the section outlining the visual display options for professional signals. The "edit" function opens a candlestick display that can be analysed. In this section, one can select the chosen formation.

Traders should be aware that the order of the appearance of either a hammer or a hanging man is important, if one is using software to search for these formations. This is because the formations appear the same, only the position in the trend makes it either a hammer or a hanging man. Candlestick formations analysed in Metastock´s expert advisor are independent of the current trend of the market. In other words, once a hammer is identified, all of the following hammer or hanging man patterns will be labelled hammer. If a hanging man was identified first, the subsequent pattern would reveal a hanging man, as opposed to a hammer. Therefore, traders need to understand that the software will never signal both a hanging man and a hammer formation in one chart, as there is no analysis of the trend.
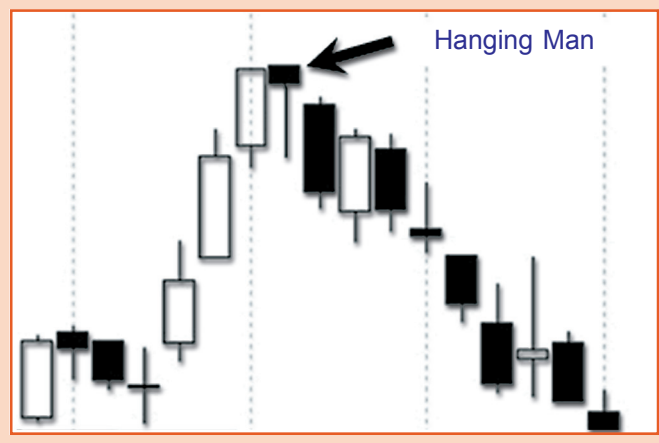
This is not really a fault in the software, but it does reveal the difficulty in defining the short-term trend ahead of one of these formations. This does pose a problem once we look at the interpretation of the two candlestick formations. They are both indicators of a trend reversal, but in opposite directions. Metastock users are forced to add their own trend analysis, which would enable them to differentiate between the hammer and the hanging man.

Statistics

For this study, we analysed the Dax stocks from October 1, 2002 through October 1, 2004, which equalled 15,270 trading days. On 529 of these days, formations of the hammer/hanging
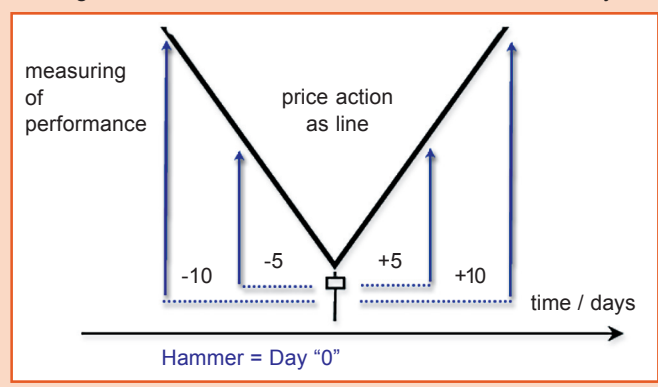
F3) The measuring method

This figure reveals the method used to test the reliability.

measuring of performance

price action as line

-10   -5   +5   +10

time / days

Hammer = Day "0"

As expected, a similar picture is found as with the 5-day downtrends. Just a third of the prices are in the black showing a performance of 3% or better. This value is so low that it may be doubted seriously if a meaningful trading strategy could be developed on an EOD basis.

Identification

Now that we've applied a preceding trend as a filter, another question arises. Is there another factor that distinguishes hammer days and that could improve their signalling quality? For this purpose, we studied daily range and volume. The daily range is defined here as being the average of the last ten days before the hammer.

Unfortunately, the relation between the daily range on the hammer day and the preceding average is negative. Out of the 74 daily ranges on the confirmed hammer patterns, only 22 are larger and 52 smaller. Now, only volume remains as a potential criteria for distinction. However, there is no positive relation either. On 29 hammer days, the volume was larger than the average daily volume of the last ten preceding days. This means that 45 days are smaller. In relation to Dax stocks, one must conclude that trend-confirmed hammer days are not very significant in relation to daily range or volume.

Strength of preceding downtrend is key

Nonetheless, there is one useful hint as to whether a hammer might be able to signal a trading opportunity or not. The strength of the preceding downtrend has a positive relationship with the trading potential of the hammer formation. As a general rule, the stronger the preceding downtrend, the stronger the rebound is after the hammer day. This can be quantified in a statistical manner. But, we will leave the details out here, due to the quantity of data. Looking at the 5-day downtrend prior to the hammer formation, the average downmove was 5.5%. Amazingly, the trading potential over the next 5-day period is about 5.5% as well. The same holds true for the 10-day trends. The preceding downtrend averaged about 10.9%, and the following uptrend equalled about 10.5%. This may be an astounding symmetry of

figures, however, it did vary visibly for different individual stocks.

Another interesting detail was found relating to the question of whether hammers are located exactly at the bottom of the downtrend in a negative peak. Within the 5-day trend-confirmed hammers that tendency is clearly visible. In the majority, the hammers comprise the trend low. In fact, 42 out of the 74 are located exactly at the trend low and another 13 were just one day away. About 74% are actually located at or near the trend low. The other hammers occurring within a trend offer a different picture. In those scenarios, the trend lows range from point zero (the day of the hammer) to the extreme fringe values.

Conclusion

We conclude with a final calculation, which offers additional insight into the data. Assuming there is a probability of 35:65 against us – analogous to the above – and also, assume the average total loss per trade amounts to only 3%, then the assumed win average is 10.54% (empirically calculated from the above figures).

The result for 50 trades would be as follows: (50*65*-3%) + (50*35*10.54%) = 86.95% profit on the average investment per trade. In a Dax portfolio of 30 (stocks) x euro 10,000 = 300,000 euro, the profit would be 8,695 euro in two years, or 2.90% on the portfolio, in theory. For comparison, here are the trading simulation results. Using realistic parameters, a total profit of 6,131 euro or 2.04% on the portfolio, was achieved. A fixed term deposit would have been more profitable. Also, the Dax performance of plus 39.50% during that period should be mentioned here. Given these results, designing a trading system based upon a hammer strategy does not make much sense.

Of course, these figures represent action over a two-year time period and trade simulation results are based upon that space of time. There are no guarantees that the same results will be seen in the future. However, it is doubtful that significantly improved performance would be seen. A look beyond the test period into the past supports the stability of the figures presented here. Traders should remember that the figures are only valid for the Dax stocks and cannot be transferred to other trading vehicles. Additionally, the method which was used for the measurement of the data is just one of many and we cannot claim any special validity or reliability.

Regarding the general definition of the upper shadow being a maximum of 1/8 of the length of the candle, it should be added that this value was not optimal. Through testing, it was established that a smaller value, such as 1/10 or 1/12 could produce better results. Nonetheless, it does not change the basic message.

As far as the Dax stocks are concerned, this study has demonstrated that the hammer formation cannot be directly correlated to trend reversals. In fact, a vast majority of hammers must be considered insignificant. While there are trend-reversing hammer formations, given the small number, it is not recommended that traders rely on this pattern.

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