It's A Stochastic

Higher Highs & Lower Lows

Spotting emerging trends, defining correction periods, and anticipating reversals can benefit your trading in many ways. Here's a look at a trading system that uses momentum indicators to define trend direction.

by Vitali Apirine

The *higher high lower low stochastic* (HHLLS) is a momentum indicator–based system that helps determine the direction of a trend. It is made up of two separate indicators: the higher high stochastic (HHS) and lower low stochastic (LLS). These two indicators can be used to spot emerging trends, define correction periods, and anticipate reversals. Signals can also be generated by looking for divergences and crossovers. Because the HHLLS is range-bound, it can also be used to identify overbought and oversold levels.

Calculation

HHS is based on price highs, while LLS is based on price lows. These two indicators are plotted side by side so they can be easily compared. The default parameter setting is 20 and you'll notice that the example shown in the sidebar "Calculating HHLLS" is based on 20 days. The MetaStock code for HHS and LLS can be found in the sidebar "MetaStock Code For HHS & LLS."

Interpretation

HS reflects how high the higher high is relative to the lowest high in a specific lookback period. In contrast, LS reflects the level of the lower low relative to the highest low. The HS formula is similar to the stochastic oscillator, which was developed by George C. Lane. The LS formula is analogous to Williams %R, which was developed by Larry Williams.

- The HHS and LLS are 20-day exponential moving averages (EMA) of HS and LS. Thus, the HHLLS indicator is more sensitive to recent higher highs or lower lows.
- The HHS and LLS are bound between zero and 100.

Rarely, if ever, will the HHLLS indicator reach these extremes. It would take 20 consecutive highest highs (lowest lows) for the 20-day HHS/LLS to reach 100. It would take 20 consecutive lower or equal highs (higher or equal lows) for the 20-day HHS/LLS to reach zero. Typically, the HHS/LLS is considered overbought when above 60 and oversold when below 10.

These levels can be adjusted to suit analytical needs and security characteristics. At its most basic, the bulls have the edge when the HHS is above 50 and the LLS is below 50. Conversely, the bears have the edge when the HHS is below 50 and the LLS is above 50. Consistently high readings mean prices are regularly hitting new higher highs or new lower lows for the specified period. Conversely, consistently low readings indicate that prices are seldom hitting new higher highs or lower lows.

To get a better understanding of how the HHS and LLS

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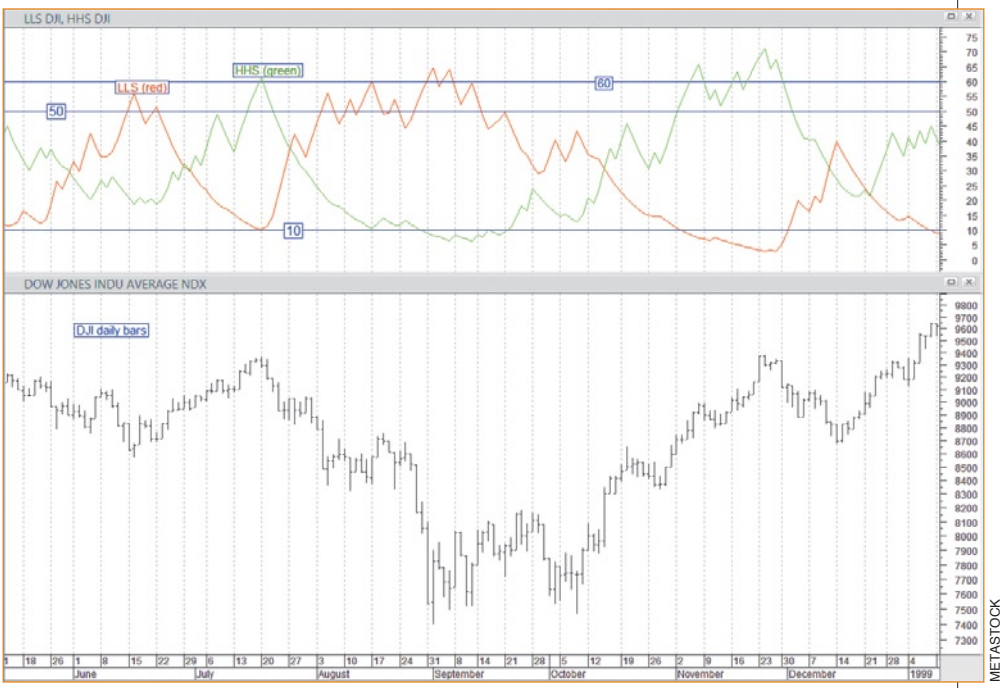
work, take a look at the chart in Figure 1. The chart displays the DJIA with its 20-day HHS/LLS from May 1998 to January 1999. The HHS is represented by the green line and the LLS, the red line. There are different ways to use the HHLLS indicators.



METASTOCK

FIGURE 1: DOW JONES INDUSTRIAL AVERAGE (DJIA) WITH 20-DAY HHS/LLS (MAY 1998–JANUARY 1999). Notice how when the HHS moves above the 50 level, the DJIA is in a bullish trend. When the LLS moves above 50, the index is in a bearish trend.

ANTICIPATE REVERSALS

Divergences form when a new high or low in price is not confirmed by the HHLLS indicators. A bullish divergence forms when price records a lower low but the LLS forms a higher high. This shows less downside momentum, which could foreshadow a bullish reversal. A bearish divergence occurs when price records a higher high but the HHS forms a lower high. This shows less upside momentum and could foreshadow a bearish reversal.

Chartists should look for a confirmation to signal an actual reversal. A bearish divergence can be confirmed with a break of a support level on the price chart or an LLS break above 50. A bullish divergence can be confirmed with a break of a resistance level on the price chart or an HHS break above 50.

UPTREND

The chart in Figure 2 shows the S&P 500 index from August 2014 to November 2015, which happens to be a major uptrend in the index. The display above the chart is of the 20-day HHS/LLS. During September 2014, the HHS formed a lower high (bearish divergence) and LLS formed a higher low. They didn't confirm the SPX 52-week high and foreshadowed the SPX pullback in September–October 2014. LLS broke above 50 in the middle of October 2014 (red ellipse). This signal was negated when the HHS exceeded 50 (green ellipse) at the end of the same month. Another HHS lower high (bearish divergence) and LLS higher low formed in December 2014. It foreshadowed the choppy market move from the beginning of January to the first half of February 2015.

When the market exceeded its late January high and HHS broke above LLS (see blue lines), SPX started to rise again. Before the market correction (second half of August 2015 to first half of October 2015) LLS started to rise from the second half of May 2015 (see blue line). HHS made a lower high (blue line) when the index formed a double top (May–

FIGURE 2: UPTREND. Here you see the S&P 500 index from August 2014 to November 2015 with its 20-day HHS/LLS. Note how divergences between the index and the HHS/LLS and the breaks of support levels can contribute to anticipating reversals, spotting emerging trends, and defining correction periods.

FIGURE 3: CORRECTION PERIODS. On this chart of the DJIA from June 2011 through December 2011, you see how the decline in LLS and bearish divergence between the index and HHS didn't confirm the top reached by the DJIA.

CORRECTION PERIODS

The chart in Figure 3 shows the DJIA from June 2011 to December 2011 with its 20-day HHS/LLS. The LLS drop and HHS rise (second half of June 2011) foreshadowed the bounce in the DJIA. HHS made a lower high (bearish divergence) and didn't confirm the DJIA top of July 2011. This top that formed was a double top, which would have been another indication that a correction was forthcoming. The DJIA broke its support level and LLS broke above 50 (dashed vertical red line). This signaled the start of a correction (beginning of August 2011). The LLS lower high (bullish divergence) and HHS higher low didn't confirm the DJIA lower low (August–October 2011). After the trendline break in the DJIA (blue line), the index started to bounce (October–November 2011). The index trendline breakout and HHS break above 50 in December 2011 signaled the end of the correction (dashed green vertical line).

July 2015). SPX broke support on August 20, 2015 and four days later, LLS moved above 50 (see red ellipse). When the stock market exceeded its mid-September peak on October 13, 2015 and the HHS exceeded 50 three days later (green ellipse), it negated the LLS bearish signal.

DOWNTREND

The chart in Figure 4 shows the S&P 500 index from May 2008 to April 2009 with its 20-day HHS/LLS. When LLS broke above 50 in the second half of June 2008 it generated a sell signal (red vertical dashed line). Lower highs in the LLS and higher lows in HHS didn't confirm the index lower lows (October–November 2008) and foreshadowed the S&P 500 bounce (November 2008–January 2009). HHS broke above 50 (green vertical dashed line) and signaled the end of the correction at the end of March 2009.

Typically, an HHS cross above 50 works well during an uptrend. Conversely, an LLS cross above 50 works better in a downtrend.

FIGURE 4: APPLYING HHS/LLS IN A DOWNTREND. On the chart of the S&P 500 index (May 2008–April 2009), lower highs in LLS and higher lows in HHS didn't confirm the lower lows in the index. Sure enough, the index continued lower.

HHS/LLS CROSSOVERS

The chart in Figure 5 is of the Russell 2000 index from January to December 2001 with its 20-day HHS/LLS. This was during the 2001–2003 bear market. The green and red arrows indicate buy/sell signals based on HHS/LLS crossovers.

Each of those signals could have generated profitable trades.

EMERGING TRENDS

There are two stages to an emerging trend signal. One is the crossing of the HHLLS lines. The other is the HHLLS lines crossing above 50. For example, the first stage of an uptrend signal is when HHS moves above LLS. This shows that new higher highs are more recent than new lower lows. The second stage is when HHS moves above 50 and LLS moves below 50. The first and second stages do not always occur in that order. Sometimes HHS will break above 50 and then above LLS. Conversely, LLS will rise above 50 and then break above HHS to generate the emerging downtrend signal.

FIGURE 5: HHS/LLS CROSSOVERS. Crossovers of the HHS and LLS can generate profitable buy/sell signals.

The chart in Figure 6 shows the S&P 500 index from May 2002 to January 2010 with its 20-week HHS/LLS. You can see on the chart that before the start of a bull market, the LLS starts to drop and HHS starts to rise. This took place from October 2002–April 2003 and was confirmed by the S&P 500 breaking above its resistance level at the end of May 2003 together with the HHS break above 50 (green dashed line) at the beginning of June 2003. The falling channel in the S&P 500 from January to October 2004 was broken by SPX at the beginning of November 2004 and confirmed by an HHS break above 50 (green ellipse) in the middle of November 2004. The end of the pullback (May–September 2006) was indicated when HHS exceeded LLS (blue line) in the beginning of September 2006 and when the S&P 500 index moved above the May 52-week high three weeks later. The HHS lower high (bearish divergence) and LLS higher low foreshadowed the 2007 market top, which was confirmed by the index breaking its support level in the middle of January 2008 and the LLS break above 50 (red dashed line) at the end of the same month. The end of the bear market was signaled when HHS exceeded 50 (green dashed line) at the end of July 2009 and the S&P 500 index broke its resistance level at the start of August 2009.

CONCLUSIONS

The HHS and LLS are momentum indicators. They are shown together so it is easy to identify the stronger of the two and determine the trend bias. A surge in HHS combined

FIGURE 6: EMERGING TRENDS. Divergences between LLS and HHS; crossovers between HHS and LLS; the HHS and LLS crossing above 50; breakouts in the index above resistance; and breaks below support all play a role in identifying emerging trends.

Calculating HHLLS

The spreadsheet in Sidebar Figure 1 shows an example of how the 20-day HHLLS is calculated for the Dow Jones Industrial Average (DJIA) using Excel.

- The lowest and highest highs are the lowest and highest high for 20 days
- The lowest and highest lows are the lowest and the highest low for 20 days.

The first entered exponential moving averages (EMA) of HS and LS are averages of the first 20 HS and LS values, respectively. The real HHLLS formula does not kick in until day 21 (see blue rows). EMA(HS,20) and EMA(LS,20) are multiplied by 100 to move the decimal point two places. Note that the spreadsheet values for a small subset of data may not match exactly with what is seen on the price chart. Decimal rounding can also affect HHLLS values slightly.

—V. Apirine

Date	Close	High	Highest high	Lowest high	HS	EMA(HS,20)	HHS	Low	Highest low	Lowest low	LS	EMA(LS,20)	LLS
7/1/1998	9048.67	9049.17						8958.99					
7/2/1998	9025.26	9047.68						9003.33					
7/6/1998	9091.77	9091.77						9000.59					
7/7/1998	9085.04	9150.81						9067.11					
7/8/1998	9174.97	9184.44						9084.30					
7/9/1998	9089.78	9174.97						9065.61					
7/10/1998	9105.74	9135.60						9029.79					
7/13/1998	9096.21	9132.77						9073.30					
7/14/1998	9245.54	9256.61						9098.53					
7/15/1998	9234.47	9305.53						9228.03					
7/16/1998	9328.19	9332.31						9206.15					
7/17/1998	9337.97	9354.71						9310.17					
7/20/1998	9295.75	9367.84						9264.59					
7/21/1998	9190.19	9344.67						9173.97					
7/22/1998	9128.91	9186.37						9075.10					
7/23/1998	8932.98	9156.46						8932.98					
7/24/1998	8937.36	8998.38						8863.21					
7/27/1998	9028.24	9028.24						8855.74					
7/28/1998	8934.78	9028.50						8816.09					
7/29/1998	8914.96	9001.21	9367.84	8998.38	0.00			8880.71	9310.17	8816.09	0.00		
7/30/1998	9026.95	9041.37	9367.84	8998.38	0.12			8913.41	9310.17	8816.09	0.00		
7/31/1998	8883.29	9030.04	9367.84	8998.38	0.00			8828.19	9310.17	8816.09	0.98		
8/3/1998	8786.74	8886.12	9367.84	8886.12	0.00			8785.97	9310.17	8785.97	1.00		
8/4/1998	8487.31	8857.03	9367.84	8857.03	0.00			8487.31	9310.17	8487.31	1.00		
8/5/1998	8546.70	8574.85	9367.84	8574.85	0.00			8361.92	9310.17	8361.92	1.00		
8/6/1998	8577.68	8593.38	9367.84	8574.85	0.02			8486.02	9310.17	8361.92	0.00		
8/7/1998	8598.02	8710.02	9367.84	8574.85	0.17			8552.96	9310.17	8361.92	0.00		
8/10/1998	8574.85	8635.35	9367.84	8574.85	0.00			8543.18	9310.17	8361.92	0.81		
8/11/1998	8462.85	8570.84	9367.84	8570.84	0.00			8316.87	9310.17	8316.87	1.00		
8/12/1998	8552.96	8564.55	9367.84	8564.55	0.00			8460.06	9310.17	8316.87	0.00		
8/13/1998	8459.50	8603.43	9367.84	8564.55	0.05			8459.50	9310.17	8316.87	0.86		
8/14/1998	8425.00	8556.57	9367.84	8556.57	0.00			8380.72	9264.59	8316.87	0.93		
8/17/1998	8574.85	8574.85	9344.67	8556.57	0.02			8368.62	9173.97	8316.87	0.94		
8/18/1998	8714.65	8730.61	9186.37	8556.57	0.28			8568.11	9075.10	8316.87	0.00		
8/19/1998	8693.28	8753.78	9156.46	8556.57	0.33			8663.41	8932.98	8316.87	0.00		
8/20/1998	8611.41	8694.57	9041.37	8556.57	0.00			8604.97	8913.41	8316.87	0.52		
8/21/1998	8533.65	8608.06	9041.37	8556.57	0.00			8328.20	8913.41	8316.87	0.98		
8/24/1998	8566.61	8619.13	9041.37	8556.57	0.13			8502.76	8913.41	8316.87	0.00		
8/25/1998	8602.65	8689.42	9041.37	8556.57	0.27	0.07	6.95	8538.54	8913.41	8316.87	0.00	0.50	50.06
8/26/1998	8523.35	8600.93	9041.37	8556.57	0.00	0.06	6.29	8467.48	8913.41	8316.87	0.75	0.52	52.41
8/27/1998	8165.99	8518.35	9030.04	8518.35	0.00	0.06	5.69	8164.19	8828.19	8164.19	1.00	0.57	56.94
8/28/1998	8051.68	8244.52	8886.12	8244.52	0.00	0.05	5.15	8011.52	8785.97	8011.52	1.00	0.61	61.04
8/31/1998	7539.07	8095.45	8857.03	8095.45	0.00	0.05	4.66	7539.07	8663.41	7539.07	1.00	0.65	64.75
9/1/1998	7827.43	7897.97	8753.78	7897.97	0.00	0.04	4.21	7400.30	8663.41	7400.30	1.00	0.68	68.11
9/2/1998	7782.37	7952.56	8753.78	7897.97	0.06	0.04	4.42	7767.44	8663.41	7400.30	0.00	0.62	61.62
9/3/1998	7682.22	7781.34	8753.78	7781.34	0.00	0.04	4.00	7578.46	8663.41	7400.30	0.86	0.64	63.93
9/4/1998	7640.25	7760.75	8753.78	7760.75	0.00	0.04	3.62	7495.81	8663.41	7400.30	0.92	0.67	66.65
9/8/1998	8020.78	8033.14	8753.78	7760.75	0.27	0.06	5.89	7645.14	8663.41	7400.30	0.00	0.60	60.30
9/9/1998	7865.02	8030.57	8753.78	7760.75	0.00	0.05	5.33	7851.89	8663.41	7400.30	0.00	0.55	54.56
9/10/1998	7615.54	7858.07	8753.78	7760.75	0.00	0.05	4.82	7519.50	8663.41	7400.30	0.91	0.58	57.99
9/11/1998	7795.50	7817.39	8753.78	7760.75	0.00	0.04	4.36	7518.99	8663.41	7400.30	0.91	0.61	61.09
9/14/1998	7945.35	8039.06	8753.78	7760.75	0.28	0.07	6.61	7796.53	8663.41	7400.30	0.00	0.55	55.27
9/15/1998	8024.39	8035.72	8753.78	7760.75	0.00	0.06	5.98	7881.50	8663.41	7400.30	0.00	0.50	50.01
9/16/1998	8089.78	8102.92	8753.78	7760.75	0.34	0.09	8.70	7962.85	8663.41	7400.30	0.00	0.45	45.25
9/17/1998	7873.77	8078.15	8694.57	7760.75	0.00	0.08	7.87	7854.46	8604.97	7400.30	0.62	0.47	46.87
9/18/1998	7895.66	7930.67	8689.42	7760.75	0.00	0.07	7.12	7827.94	8538.54	7400.30	0.62	0.48	48.35
9/21/1998	7933.25	7945.35	8689.42	7760.75	0.20	0.08	8.33	7711.05	8538.54	7400.30	0.73	0.51	50.67
9/22/1998	7897.20	7906.80	8689.42	7760.75	0.24	0.10	9.86	7855.75	8538.54	7400.30	0.00	0.46	45.85
9/23/1998	8154.41	8160.59	8600.93	7760.75	0.48	0.13	13.45	7896.43	8467.48	7400.30	0.00	0.41	41.48
9/24/1998	8001.99	8182.47	8518.35	7760.75	0.56	0.17	17.47	7935.82	8164.19	7400.30	0.00	0.38	37.53
9/25/1998	8028.77	8086.44	8244.52	7760.75	0.00	0.16	15.81	7889.99	8011.52	7400.30	0.20	0.36	35.85
9/28/1998	8108.84	8160.33	8182.47	7760.75	0.95	0.23	23.33	8026.17	8026.17	7400.30	0.00	0.32	32.43
9/29/1998	8080.52	8150.55	8182.47	7760.75	0.00	0.21	21.10	8015.63	8026.17	7400.30	0.02	0.30	29.51
9/30/1998	7842.62	8079.49	8182.47	7760.75	0.00	0.19	19.09	7825.37	8026.17	7495.81	0.30	0.30	30.30

SIDEBAR FIGURE 1: CALCULATING 20-DAY HHLLS USING EXCEL

If the current high is above the prior high then:
HS = (Current High - Lowest High)/(Highest High - Lowest High)

If the current high equals or is below the prior high then:
HS = 0

Lowest High = Lowest high for 20 days
Highest High = Highest high for 20 days

If the current low is below the prior low then:
LS = (Highest Low - Current Low)/(Highest Low - Lowest Low)

If the current low equals or is above the prior low then:
LS = 0

Lowest Low = Lowest low for 20 days
Highest Low = Highest low for 20 days

HHS: 20-day EMA of HS
LLS: 20-day EMA of LS

HHS/LLS is multiplied by 100 to move the decimal point two places.

MetaStock Code For HHS & LLS

MetaStock code for HHS:

```
HH:= Security(".SPX",H);
HHH:=If(HH>Ref(HH,-1),(HH-LLV(HH,20))/(HHV(HH,20)-
  LLV(HH,20)),0);
Mov(HHH,20,E)*100;
```

MetaStock code for LLS:

```
LL:= Security(".SPX",L);
LLL:=If(LL<Ref(LL,-1),(HHV(LL,20)-LL)/(HHV(LL,20)-
  LLV(LL,20)),0);
Mov(LLL,20,E)*100;
```

with a decline in LLS signals the emergence of an uptrend. Conversely, a surge in LLS combined with a decline in HHS signals the start of a downtrend.

The HHS/LLS divergences can be used to foreshadow reversals. Combining the HHLLS with other technical analysis tools such as support & resistance levels can make it a useful indicator for confirming your entry and exit decisions.

Vitali Apirine is a programmer engineer with an interest in technical analysis, especially the application of relative strength index to trading. He may be reached at vitapirine@mediacombb.net.

The HHS and LLS are momentum indicators, which, when combined, make it easy to determine trend bias.

*The code given in this article is available at the Subscriber Area at our website, www.Traders.com, in the **Article Code** area.*

*See our **Traders' Tips** section beginning on page 50 for commentary on implementation of Apirine's technique in various technical analysis programs. Accompanying program code can be found in the Traders' Tips area at Traders.com.*

FURTHER READING

Apirine, Vitali [2015]. "The Money Flow Oscillator," *Technical Analysis of* STOCKS & COMMODITIES, Volume 33: October.

_____ [2015]. "The Slow Volume Strength Index," *Technical Analysis of* STOCKS & COMMODITIES, Volume 33: June.

‡MetaStock

‡See Editorial Resource Index