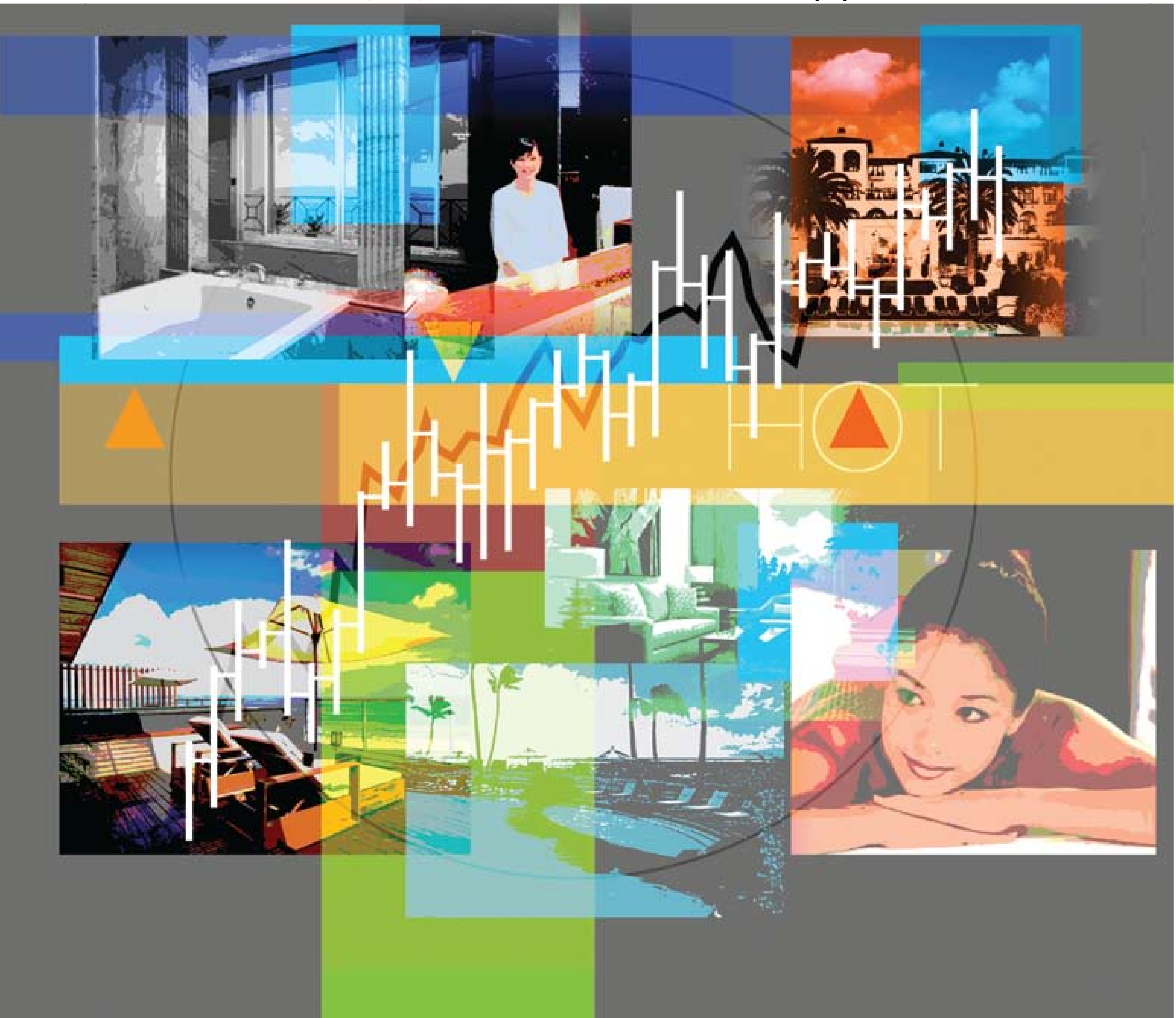

ROY WEIMANN

Clarity In Decision-Making

A Smoothed RSI Inverse Fisher Transform

This indicator gives clear entry and exit signals, so your trading decisions are easier.

by Sylvain Vervoort

The Fisher transform has been a familiar concept to STOCKS & COMMODITIES readers in recent years following its introduction in 2002 by frequent S&C contributor John Ehlers. Its creator, Ronald Fisher, was one of the leading scientists of the 20th century, making major contributions to statistics, evolutionary biology, and genetics. Ehlers' 2004 followup applied an inverse Fisher transform to the relative strength index (RSI), changing what was a good turning-point indicator to one that fine-tuned the timing of possible entry and exit points. Here is the inverse Fisher transform formula:

y = (Exp(2 * x) - 1)/(Exp(2 * x) + 1)

where x is the input value and y is the transformed value.

Figure 1 shows a plot of the inverse Fisher transform. The transform creates boundaries to keep the output value in the range between -1 to +1. Input values larger than 2 generate a result close to 1, while input values less than -2 generate a

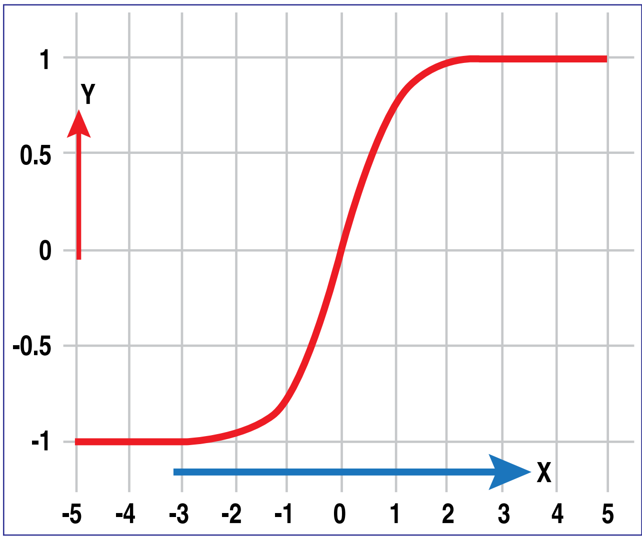

FIGURE 1: INVERSE FISHER TRANSFORM. The transform creates boundaries to keep the output value in the range of -1 to +1. Input values larger than 2 generate a result close to 1, and input values less than -2 generate a result close to -1. This boundary characteristic is useful with any indicator moving between two fixed values, like the RSI.

result close to -1. This boundary characteristic is useful with any indicator moving between two fixed values, like the relative strength index (RSI).

But the input data for the inverse Fisher transform formula needs to be in the range of -5 to +5. The normal RSI is in the range of zero to 100, but we can convert this to a range of -5 to 5, using the following formula:

$$x = 0.1 * (\text{RSI value} - 50)$$

If required, you can convert the output of the inverse Fisher transform back to the range of zero to 100 using this formula:

$$\text{RSI normalized} = 50 * (y + 1)$$

This makes it easier to compare the normalized RSI data with the original RSI input data when overplayed in the same window.

RSI TO INVERSE FISHER TRANSFORM

Figure 2 illustrates the conversion of RSI data to an inverse Fisher transform output and back to a normalized RSI value output. Comparing the first and last columns, you can see how original RSI values will be plotted after applying the inverse transform.

RSI values above 60 will be squeezed into the top 12% of the range, and RSI values below 40 will be squeezed into the bottom 12% of the range. The transform causes the RSI transition from 40 to 60, to be plotted as a very sharp swing.

In Figure 3 you see a chart starting with a flat price move, followed by an up and down price move. You can compare the original RSI in blue with its inverse Fisher transform in red (first and second graphs below the price plot).

In his 2004 article, John Ehlers used a nine-day weighted moving average on the inverse Fisher transform with a five-day RSI to create clearer buy and sell points. This is the green

RSI value	X-input	Y-output	Normalized
100	5.0	1.00	100
90	4.0	1.00	100
80	3.0	1.00	100
70	2.0	0.96	98
65	1.5	0.91	95
60	1.0	0.76	88
55	0.5	0.46	73
50	0.0	0.00	50
45	-0.5	-0.46	27
40	-1.0	-0.76	12
35	-1.5	-0.91	5
30	-2.0	-0.96	2
20	-3.0	-1.00	0
10	-4.0	-1.00	0
0	-5.0	-1.00	0

FIGURE 2: CONVERSION OF RSI DATA. Here you see the conversion of RSI data to an inverse Fisher transform output and back to a normalized RSI value output. Comparing the first and last columns, you can see how original RSI values will be plotted after applying the inverse Fisher transform.

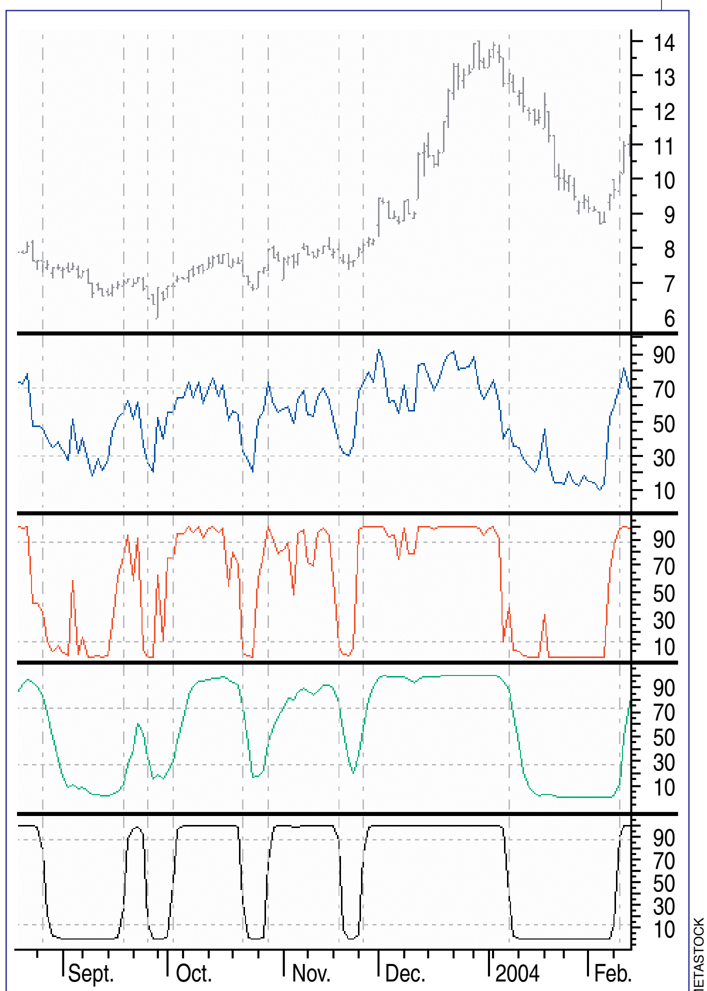

FIGURE 3: RSI TO SVE INVERSE FISHER RSI. Here you see the RSI, inverse Fisher transform, John Ehlers' inverse Fisher transform, and the SVE inverse Fisher RSI. Which one gives you faster buy and sell signals with clear turning points?

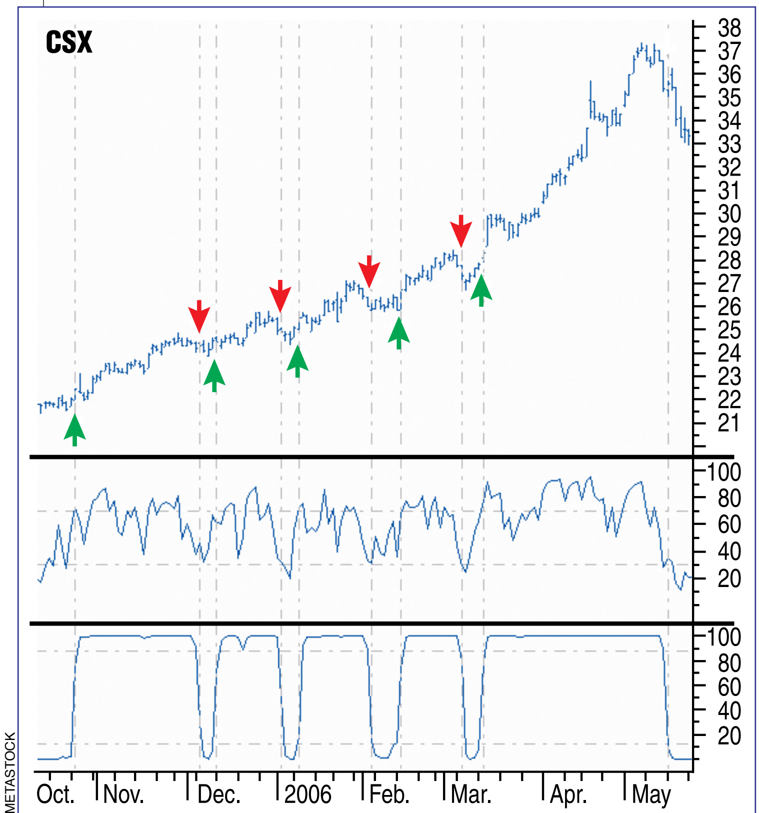

FIGURE 4: SVE INVERSE FISHER RSI IN ACTION. Note how the SVE inverse Fisher RSI transform gives very clear buy and sell signals. This makes it easier for medium- to longer-term traders to find additional entry points in a medium-term up move.

curve in Figure 3 (the third graph below the price plot). When the curve crosses above 27, it is a buying point, and when it falls below 73, it is a selling point.

What I want to achieve is the last black curve that you can see on the bottom pane. If you compare this curve with the green one, you will see that you generally get faster buy and sell signals with very clear turning points reaching the zero and 100 levels.

To create this black curve, I first tried using smoother input values and not just the closing price for calculating the RSI value. I tried a number of different smoothing techniques using the median price, the typical price, and even the average heikin-ashi closing price. I got the best result with a smoothed price, based on the rainbow chart.

DERIVING THE INVERSE FISHER RSI WITH RAINBOW CHARTS

In the July 1997 S&C, Mel Widner presented rainbow charts, and the Traders' Tips in that issue provided the formulas for them. The MetaStock formula language shown is the basic averaging technique I use to smooth the closing price. Because I want to avoid the lagging effect as a result of this smoothing as much as possible, I use a weighted moving average and give extra weight to the less smoothing part of the formula. I call this formula the "SVE_Rainbow_Weighted."

```
{SVE_Rainbow_Weighted}
(5*Mov(C,2,W) +
4*Mov(Mov(C,2,W),2,W) +
3*Mov(Mov(Mov(C,2,W),2,W),2,W) +
2*Mov(Mov(Mov(Mov(C,2,W),2,W),2,W),2,W) +
Mov(Mov(Mov(Mov(Mov(C,2,W),2,W),2,W),2,W),2
  ,W)+
Mov(Mov(Mov(Mov(Mov(Mov(C,2,W),2,W),2,W),2,
  W),2,W),2,W)+
Mov(Mov(Mov(Mov(Mov(Mov(Mov(C,2,W),2,W),2,W
  ),2,W),2,W),2,W),2,W)+
Mov(Mov(Mov(Mov(Mov(Mov(Mov(Mov(C,2,W),2,W
  ),2,W),2,W),2,W),2,W),2,W),2,W)+
Mov(Mov(Mov(Mov(Mov(Mov(Mov(Mov(Mov(C,2,W),
  2,W),2,W),2,W),2,W),2,W),2,W),2,W),2,W)+
Mov(Mov(Mov(Mov(Mov(Mov(Mov(Mov(Mov(Mov(
  C,2,W),2,W),2,W),2,W),2,W),2,W),2,W),2,W),2,W
  ),2,W)) / 20
```

I will make the RSI period a free input choice with a default value of 4:

```
RSIper := Input("RSI Period?",2,30,4);
```

Next, I call the SVE_Rainbow_Weighted function to get the smoothed closing price data:

```
RbW:=Fml("SVE_Rainbow_weighted");
```

Now, I create the RSI of the SVE_Rainbow_Weighted data and convert the normal RSI swing between zero and 100 to a value that makes a limited swing between -5 and +5 only:

```
x:= 0.1*(RSI(RbW,RSIper)-50);
```

An extra measure you can take to limit the lagging even more is to make use of the zero-lagging principle introduced by Joe Sharp in his January 2000 S&C article. I will make the value of the exponential moving average (EMA) also a free input choice and calculate the zero-lagging value for the inverse Fisher transform with the following formula:

```
EMAper := Input("Exponential Moving Average period?",1,100,4);
EMA1:= Mov(x,EMAper,Exponential);
EMA2:= Mov(EMA1,EMAper,Exponential);
Difference:= EMA1 - EMA2;
ZeroLagEma:= EMA1 + Difference;
```

The only thing left now is to calculate the inverse Fisher transform itself and let it swing between the standard RSI values of zero and 100:

```
invfish:=((Exp(2*ZlEma)-1)/(Exp(2*ZlEma)+1)+1)*50;
invfish
```

Let's put it all together and shorten the rainbow average to obtain the SVE_InvFisher_RSI formula:

```
{SVE_InvFisher_RSI}
RSIper := Input("RSI Period?",2,30,4);
EMAper := Input("Exponential Moving Average Pe-
riod?",1,100,4);
ma1:= Mov(C,2,W);
ma2:= Mov(ma1,2,W);
ma3:= Mov(ma2,2,W);
ma4:= Mov(ma3,2,W);
ma5:= Mov(ma4,2,W);
ma6:= Mov(ma5,2,W);
ma7:= Mov(ma6,2,W);
ma8:= Mov(ma7,2,W);
ma9:= Mov(ma8,2,W);
ma10:= Mov(ma9,2,W);
RainbW:= (5*ma1+4*ma2+3*ma3+2*ma4+ma5+ma6+ma
7+ma8+ma9+ma10)/20;
x:= .1*(RSI(RainbW,RSIper)-50);
EMA1:= Mov(x,EMAper,Exponential);
EMA2:= Mov(EMA1,EMAper,Exponential);
Difference:= EMA1 - EMA2;
ZlEma:= EMA1 + Difference;
invfish:=((Exp(2*ZlEma)-1)/(Exp(2*ZlEma)+1)+1)*50;
invfish
```

I am using a default value of four periods for the RSI and the zero-lagging moving average. These values give clear turning points, which are often clearer and faster than the five-period RSI original formula.

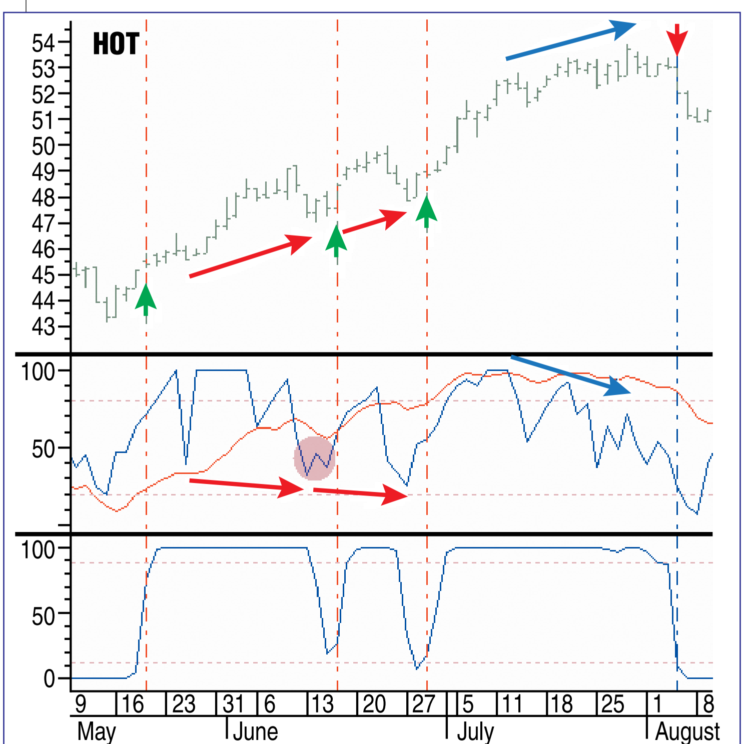

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FIGURE 5: COMBINING SVE INVERSE FISHER RSI TRANSFORM WITH OTHER INDICATORS. Here you see the eight-period asymmetrical RSI and a slow standard 50-period stochastic oscillator with a three-period slowing. The blue curve at the bottom is the SVE inverse RSI Fisher transform with a four-period RSI and a four-period zero-lagging exponential moving average. Combining these indicators gives very clear buy and sell signals.

SVE inverse Fisher RSI transform in action

On the chart of CSX Corp. in Figure 4, it is clear that a swing trader looking at price and the four-period RSI below the price is not going to have an easy time finding entry and exit points in this up move. But after treating the RSI with my inverse Fisher transform, you get very clear buy and sell signals. That also makes it easier for medium- to longer-term traders to find additional entry points in the medium-term up move.

Note that the inverse Fisher transform RSI is not meant to be used as an automatic trading system. The idea is to offer you clear short-term turning points as much as possible. We are not living in an ideal world, so the SVE_InvFish_RSI will not always move perfectly between the zero and 100 levels.

Combining it with other indicators

I suggest using two additional indicators with the inverse Fisher RSI. One is my fast short-term ARSI (asymmetrical RSI), described in the S&C October 2008, to find short-term reversal points based on divergences. The other indicator is a medium-term stochastic oscillator to track the medium-term price moves.

Here is the MetaStock formula for the ARSI:

```
{ARSI}
Period:=Input("ARSI Time Period  ->",1,50,8);
UpCount:=Sum(If(ROC(C,1,$)>=0,1,0),Period);
DnCount:=Period-UpCount;
UpMove:=ExtFml("Forum.MOV",If(ROC(C,1,$)>=0,
ROC(C,1,$),0),UpCount*2-1,E);
DnMove:=ExtFml("Forum.MOV",If(ROC(C,1,$)<0,A
bs(ROC(C,1,$)),0),DnCount*2-1,E);
RS:=UpMove/(DnMove+0.0001);
100-(100/(1+RS));
```

Remember to install the external forum.dll file that has a function for a dynamic moving average. You can find this file on the Equis forum (http://forum.equis.com/).

To explain the combined use of these indicators I will use Figure 5, which displays a chart of the Starwood Hotels and Resorts World (HOT) stock from May to July 2005.

The blue curve below the price plot is an eight-period ARSI. The red curve in the same window is a slow standard 50-period stochastic oscillator with three-period slowing. The blue curve at the bottom is my inverse Fisher RSI transform with a four-period RSI and a four-period zero-lagging EMA.

At the first vertical dash-dotted line, the SVE_InvFish_RSI crosses above 12. This is basically a buy signal. The stochastic moving up from a bottom level confirms that this is probably the start of a medium-term up move.

As a swing trader, you would probably take a profit when the SVE_InvFish_RSI turns down, crossing the 88 level. Because of the limited correction, SVE_InvFish_RSI does not reach the zero level and turns back up only a couple of days later (second vertical red dash-dotted line). Should you enter here for another long position?

Yes, you should. First, the turning-up of SVE_InvFish_RSI is confirmed by a hidden divergence between price with higher bottoms and ARSI with lower bottoms, pointing in the direction of a continuation of the previous uptrend. There is also a small W-pattern indicating a short-term reversal. Second, the slow stochastic is not yet in its overbought area and is turning up to continue the uptrend.

About two weeks later, there is another down move of SVE_InvFish_RSI. You probably would not close an open long position here yet because of the nearby support from the previous up turning point (marked by the second arrow). Again, just a couple of days later, SVE_InvFish_RSI turns up once more (third vertical red dash-dotted line). So should you enter here for another long position or hold on to an open position?

Absolutely! First of all, the turning-up of SVE_InvFish_RSI is once again confirmed by a hidden divergence between price with higher bottoms and ARSI with lower bottoms, pointing in the direction of a continuation of the previous uptrend. Second, the slow stochastic is not yet overbought and still moving up.

Finally, the SVE_InvFish_RSI turns down again, breaking the 88 level (the blue vertical dash-dotted line). Should you interpret this as a medium-term selling signal? Yes! You can now see a negative divergence with higher tops in price and lower tops in ARSI. The slow stochastic has been moving in its overbought area for some time and is turning down. Now is a good time to take a profit.

CLEAR BUY AND SELL DECISIONS

The clear entry and exit signals given by SVE_InvFish_RSI, in combination with the short-term ARSI divergences and the medium-term stochastic oscillator turning in oversold or overbought area, can make your decision to buy or sell a lot easier. I would encourage you to try this method on several charts. I am confident you will see an improvement in your trading results.

Sylvain Vervoort is a retired electronics engineer who has been studying and using technical analysis for more than 30 years. His book, Capturing Profit With Technical Analysis, *published by Marketplace Books, focuses on applied technical analysis and introduces the Lockit trading method featuring his own techniques and proprietary indicators. Vervoort may be reached at* sve.vervoort@scarlet.be *or via his website at* http://stocata.org/.

SUGGESTED READING

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