Sharpen Your Trading
with the Fisher Transform

Presented by John Ehlers

Dear Mr. Ehlers,

I want to thank you very much for the **Inverse Fisher Transform** that you presented in the Stock and Commodities Magazine some months ago. I have incorporated it into the Prophet platform that I am using in my trading, together with some other indicators that I find very useful to confirm the **IFT** signals. I call it my **'Fisher only'** trading system :).

I must say that the results are simply incredible: I think that if there should be a Nobel prize for Technical Analysis in the future, it should be given to you !! (I am not kidding). I am now practically using only your indicators to analyse the markets, although i have designed more than 10 different trading systems. So, again, thank you Mr. Ehlers.

Best regards,
Michael Buhler
Independent trader and technical analyst DITA II

Technical Analysis is Based on Probability

- "The market is oversold because the Stochastic has been high, so when it crosses through 80 then . . . . . ."

- "When the head-and-shoulders pattern is complete then . . . . . ."

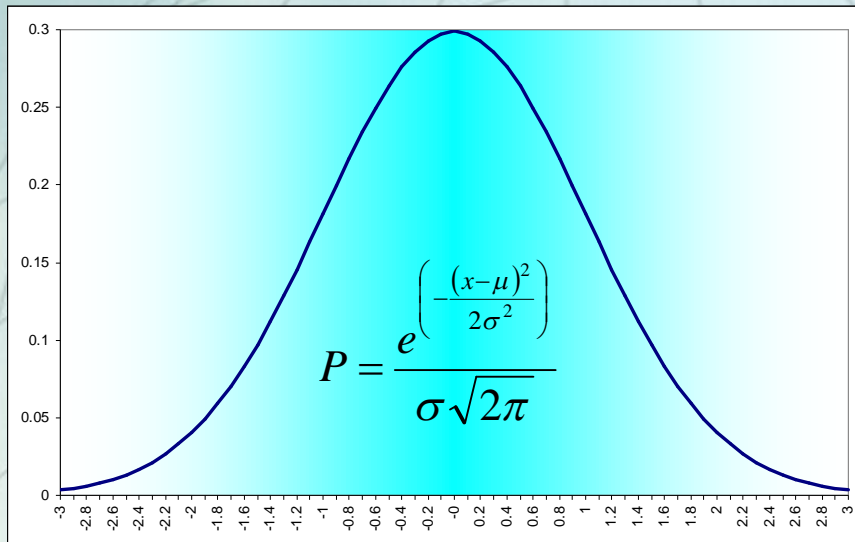- "When the market breaks above the upper channel then . . . . . ."
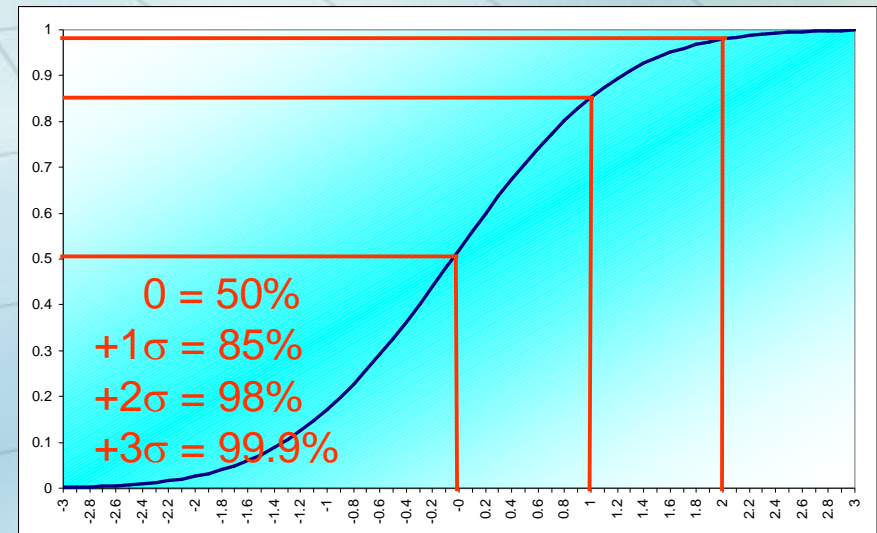
Why fool around with rules?

Let's attack probability directly

Gaussian Probability Distribution Function is Commonly Assumed for Market Data

Gaussian PDF

CumulativeGaussian PDF

$$P = \frac{e^{\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)}}{\sigma\sqrt{2\pi}}$$
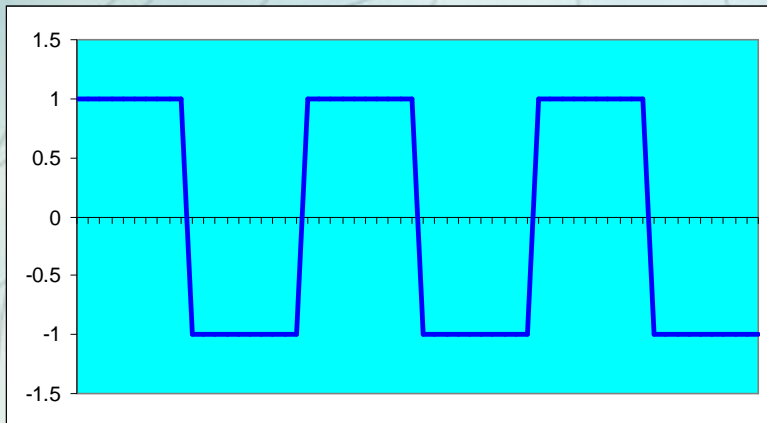
0 = 50%
+1σ = 85%
+2σ = 98%
+3σ = 99.9%

Gaussian PDF is attractive because it can be achieved using several random variables due to the central limit theorem

But is Gaussian the right PDF for market data?
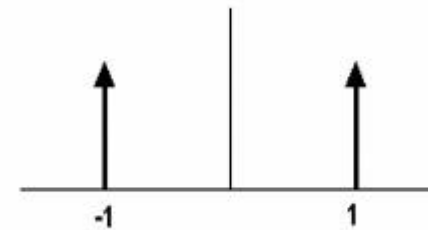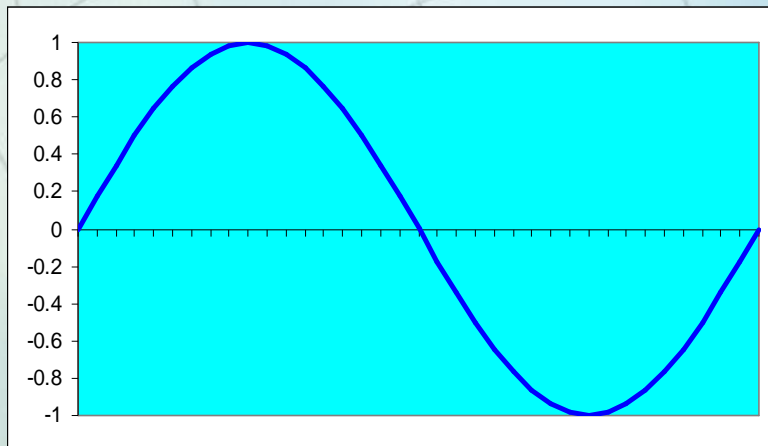
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The PDF Depends on the Market Waveshape
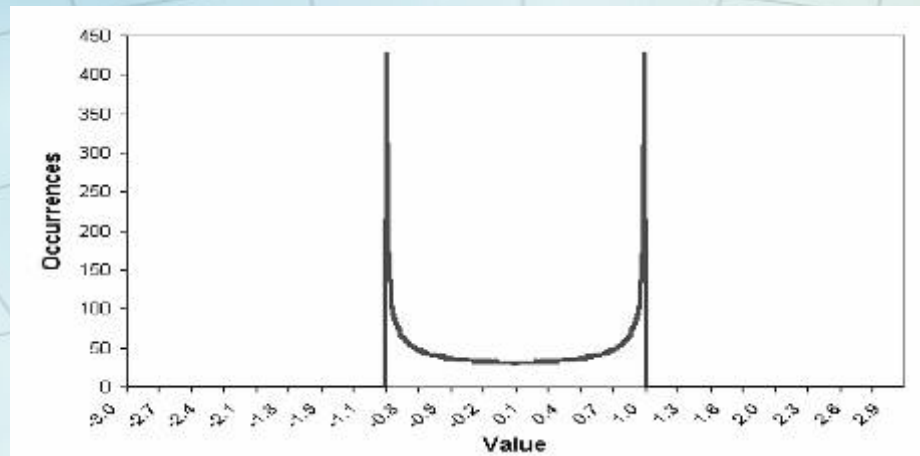
Square Wave

Binary PDF of Square Wave

Sine Wave

Sine Wave PDF

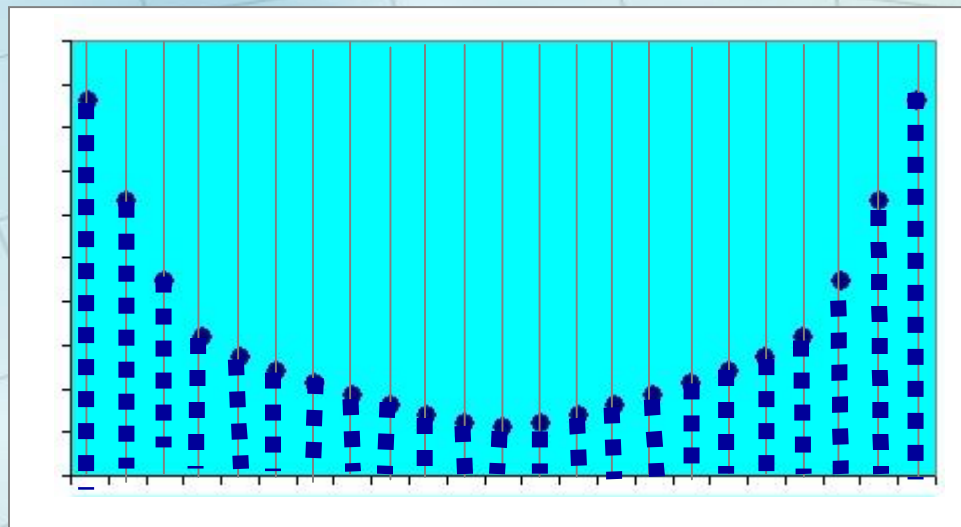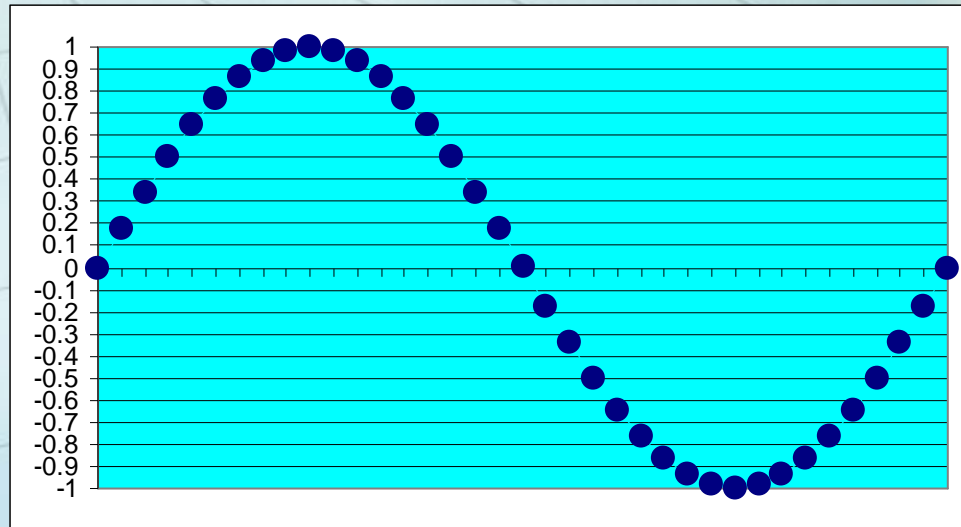
TradeStationWorld

How Do We Determine the Market PDF?

Create the waveform by stringing beads on a horizontal wire frame

Rotate wire frame to enable beads to stack up

Height of the bead stacks is the PDF of the Waveform

TradeStation World

Code to Generate PDF

```
Inputs:      Price((H+L)/2),
             Len(10);

Vars:        MaxH(0),
             MinL(0),
             count(0),
             I(0);

Arrays:      PDF[100](0);

MaxH = Price;
MinL = Price;
For count = 0 to Len - 1 begin
        If Price[count] > MaxH then MaxH = Price[count];
        If Price[count] < MinL then MinL = Price[count];
End;
Value1 = .5*((Price - MinL)/(MaxH - MinL)) + .5*Value1[1];
For I = 0 to 100 begin
        If Value1 >= I/100 and Value1 < I/100 +.01 then PDF[I] = PDF[I] + 1;
End;
If LastBarOnChart then begin
        For I = 0 to 100 begin
                Print(File("C:\TSGrowth\USPDF.CSV"), I/100, ",", PDF[I]);
        End;
End;
```
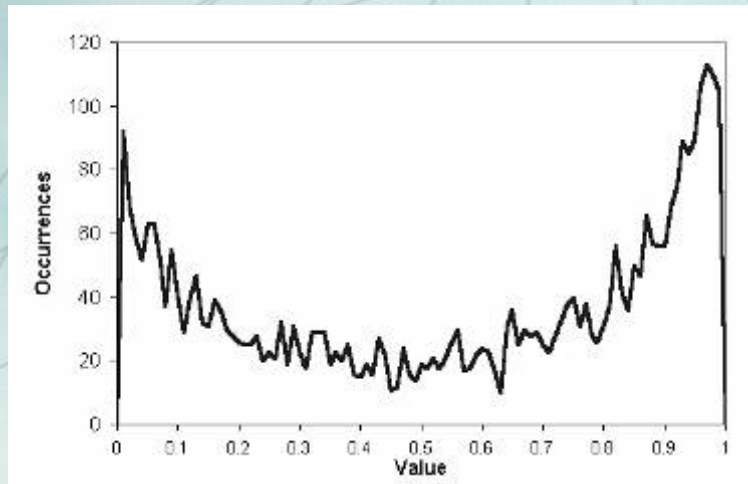
PDF for Treasury Bonds

10 Bar Channel over 15 Years
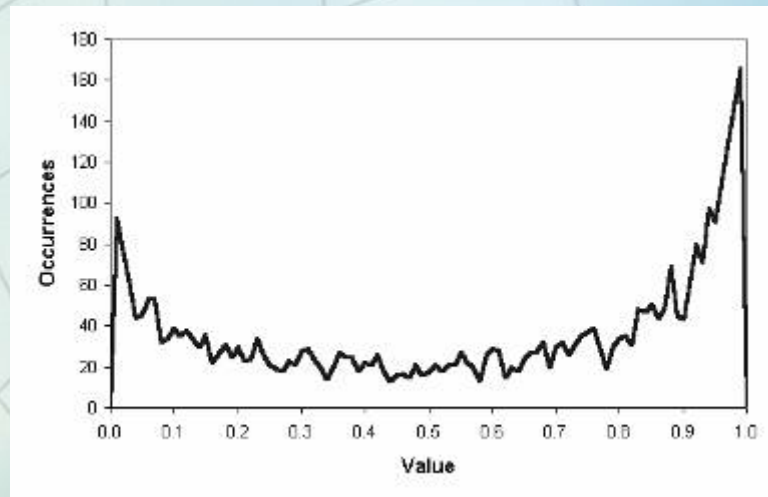
30 Bar Channel over 15 Years

The Fisher Transform

The Purpose of the Fisher Transform
is to Change Values that Result In a Gaussian PDF

$$y = 0.5 * \ln\left(\frac{1+x}{1-x}\right)$$ The Fisher Transform Equation

The Fisher Transform inputs must be limited between -1 and +1

The Fisher Transform Transfer Response is Expansive

Sinewave PDF is Converted To Be Nearly Gaussian by the Fisher Transform

Fisher Transform Code

```
Inputs:        Price((H+L)/2),
               Len(10);

Vars:          MaxH(0),
               MinL(0),
               count(0),
               Fish(0);

MaxH = Price;
MinL = Price;
For count = 0 to Len - 1 begin
               If Value2[count] > MaxH then MaxH = Price[count];
               If Value2[count] < MinL then MinL = Price[count];
End;

Value1 = .5*2*((Price - MinL)/(MaxH - MinL) - .5) + .5*Price[1];
If Value1 > .999 then Value1 = .999;
If Value1 < -.999 then Value1 = -.999;

Fish = .25*Log((1 + Value1)/(1 - Value1)) + .5*Fish[1];

{Plot1(Fish, "Fisher");
Plot2(.9*Fish[1], "Trigger");
```
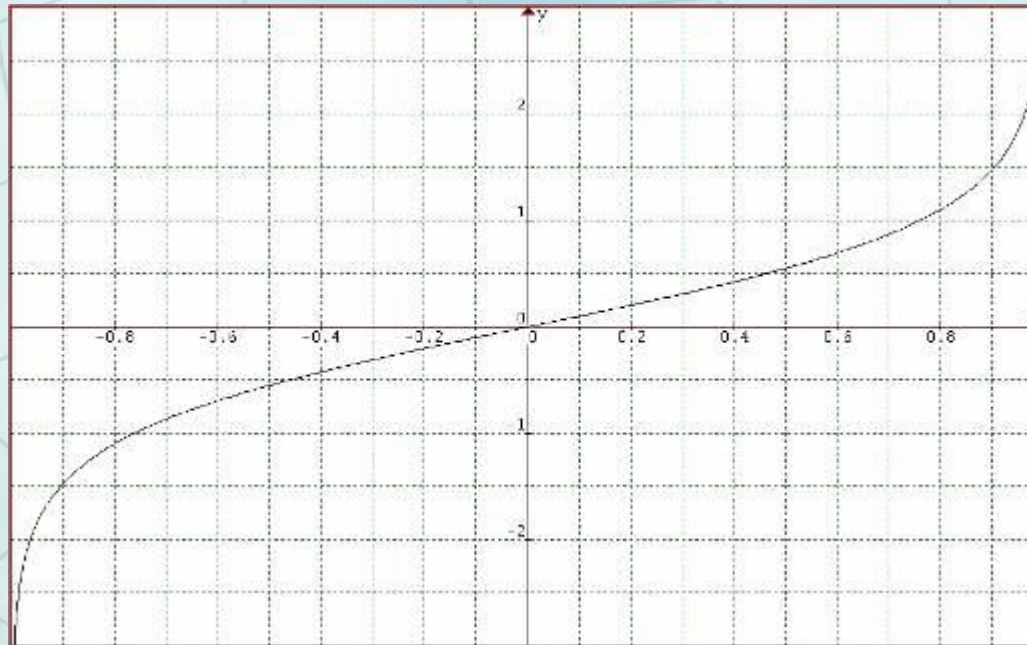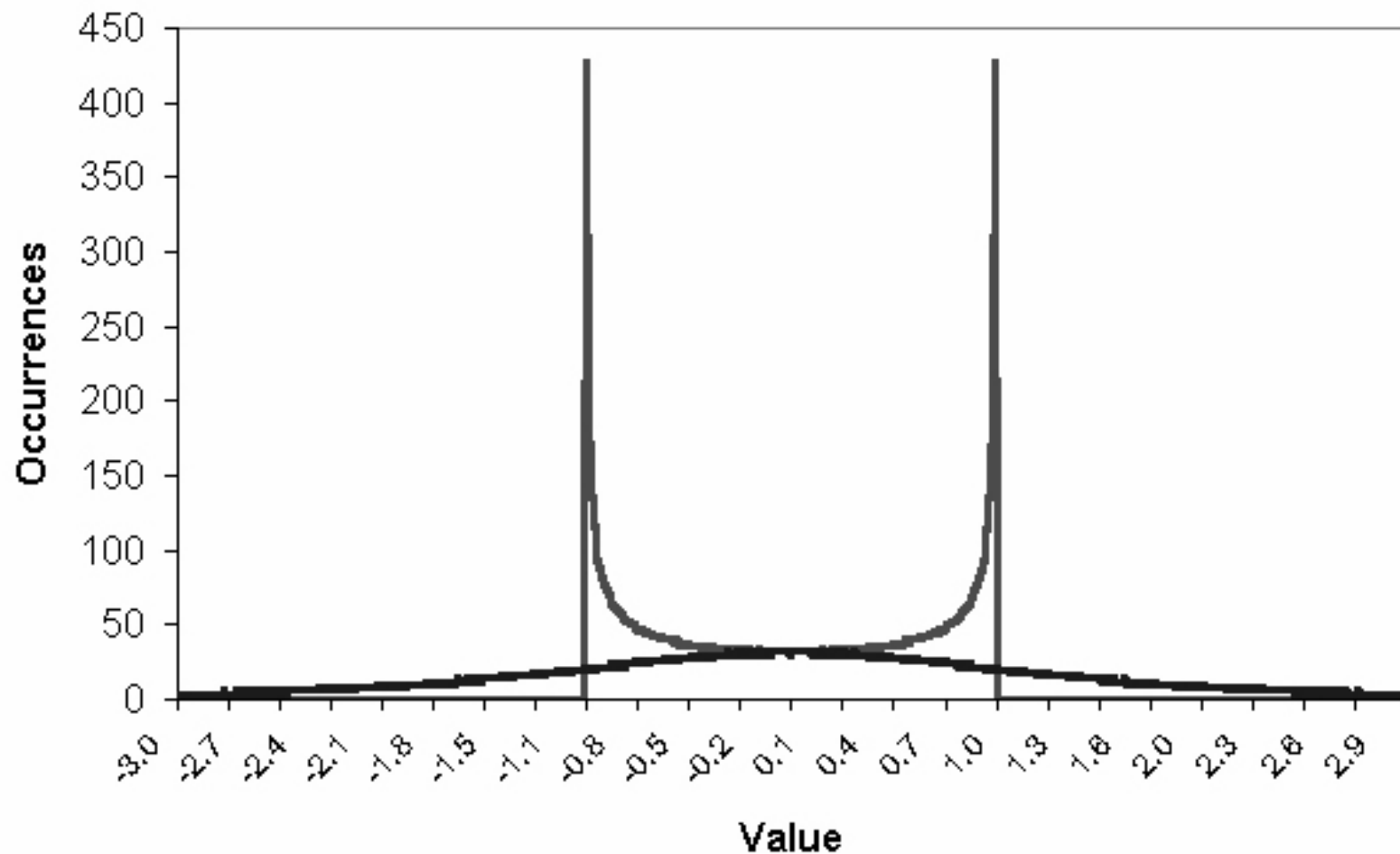
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The Fisher Transform Indicator Gives Sharper and More Timely Turning Point Signals than Most Other Indicators

Fisher Transform Strategy

```
Inputs:        Price((H+L)/2),
               Len(10);

Vars:          MaxH(0),
               MinL(0),
               count(0),
               Fish(0);

Value2 = Price;

MaxH = Value2;
MinL = Value2;
For count = 0 to Len - 1 begin
               If Value2[count] > MaxH then MaxH = Value2[count];
               If Value2[count] < MinL then MinL = Value2[count];
End;

Value1 = .5*2*((Value2 - MinL)/(MaxH - MinL) - .5) + .5*Value1[1];
If Value1 > .9999 then Value1 = .9999;
If Value1 < -.9999 then Value1 = -.9999;

Fish = .5*Log((1 + Value1)/(1 - Value1)) + .5*Fish[1];

If Fish[1] < -3 and Fish Crosses Over .9*Fish[1] then Sell Next Bar on Open;
If Fish[1] > 3 and Fish Crosses Under .9*Fish[1] then Buy Next Bar on Open;
```

Idea is to find a trend and then enter a pop in the direction of the trend

DX Performance - Len=4

Performance Summary: All Trades

Total Net Profit	$86,000.00	Open position P/L	$6,070.00
Gross Profit	$135,880.00	Gross Loss	($49,880.00)
Total # of trades	42	Percent profitable	47.62%
Number winning trades	20	Number losing trades	22
Largest winning trade	$29,830.00	Largest losing trade	($4,800.00)
Average winning trade	$6,794.00	Average losing trade	($2,267.27)
Ratio avg win/avg loss	3.00	Avg trade (win & loss)	$2,047.62
Max consec. Winners	4	Max consec. losers	3
Avg # bars in winners	127	Avg # bars in losers	46
Max intraday drawdown	($19,190.00)		
Profit Factor	2.72	Max # contracts held	1
Account size required	$19,190.00	Return on account	448.15%

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EC Performance - Len=24

Performance Summary: All Trades

Total Net Profit	$29,820.00	Open position P/L	$8,800.00
Gross Profit	$41,760.00	Gross Loss	($11,940.00)
Total # of trades	12	Percent profitable	58.33%
Number winning trades	7	Number losing trades	5
Largest winning trade	$24,530.00	Largest losing trade	($3,460.00)
Average winning trade	$5,965.71	Average losing trade	($2,388.00)
Ratio avg win/avg loss	2.50	Avg trade (win & loss)	$2,485.00
Max consec. Winners	2	Max consec. losers	1
Avg # bars in winners	112	Avg # bars in losers	66
Max intraday drawdown	($6,630.00)		
Profit Factor	3.50	Max # contracts held	1
Account size required	$6,630.00	Return on account	449.77%

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JY Performance - Len=11

Performance Summary: All Trades

Total Net Profit	$129,875.00	Open position P/L	$2,425.00
Gross Profit	$236,925.00	Gross Loss	($107,050.00)
Total # of trades	66	Percent profitable	43.94%
Number winning trades	29	Number losing trades	37
Largest winning trade	$58,837.50	Largest losing trade	($5,712.50)
Average winning trade	$8,169.83	Average losing trade	($2,893.24)
Ratio avg win/avg loss	2.82	Avg trade (win & loss)	$1,967.80
Max consec. Winners	4	Max consec. losers	6
Avg # bars in winners	107	Avg # bars in losers	34
Max intraday drawdown	($27,212.50)		
Profit Factor	2.21	Max # contracts held	1
Account size required	$27,212.50	Return on account	477.26%

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SF Performance - Len=7

Performance Summary: All Trades

Total Net Profit	$122,925.00	Open position P/L	$4,137.50
Gross Profit	$258,000.00	Gross Loss	($135,075.00)
Total # of trades	112	Percent profitable	44.64%
Number winning trades	50	Number losing trades	62
Largest winning trade	$20,925.00	Largest losing trade	($11,325.00)
Average winning trade	$5,160.00	Average losing trade	($2,178.63)
Ratio avg win/avg loss	2.37	Avg trade (win & loss)	$1,097.54
Max consec. Winners	4	Max consec. losers	4
Avg # bars in winners	99	Avg # bars in losers	32
Max intraday drawdown	($22,775.00)		
Profit Factor	1.91	Max # contracts held	1
Account size required	$22,775.00	Return on account	539.74%

The Inverse Fisher Transform

The Stochastic RSI is a Popular Indicator

- First take a standard RSI
- Next, compute the Stochastic of that RSI
- Smooth the result with a Weighted Moving Average
- Typical parameters are: 8, 8, 5

Stochastic RSI EasyLanguage Code

```
Inputs:              RSILength(8),
                     StocLength(8),
                     WMALength(8);

Value1 = RSI(Close, RSILength) - Lowest(RSI(Close, RSILength), StocLength);
Value2 = Highest(RSI(Close, RSILength), StocLength) - Lowest(RSI(Close, RSILength), StocLength);
If Value2 <> 0 then Value3 = Value1 / Value2;
Value4 = 2*(WAverage(Value3, WMALength) - .5);

Plot1(Value4, "StocRSI");
Plot2(Value4[1], "Trig");
```
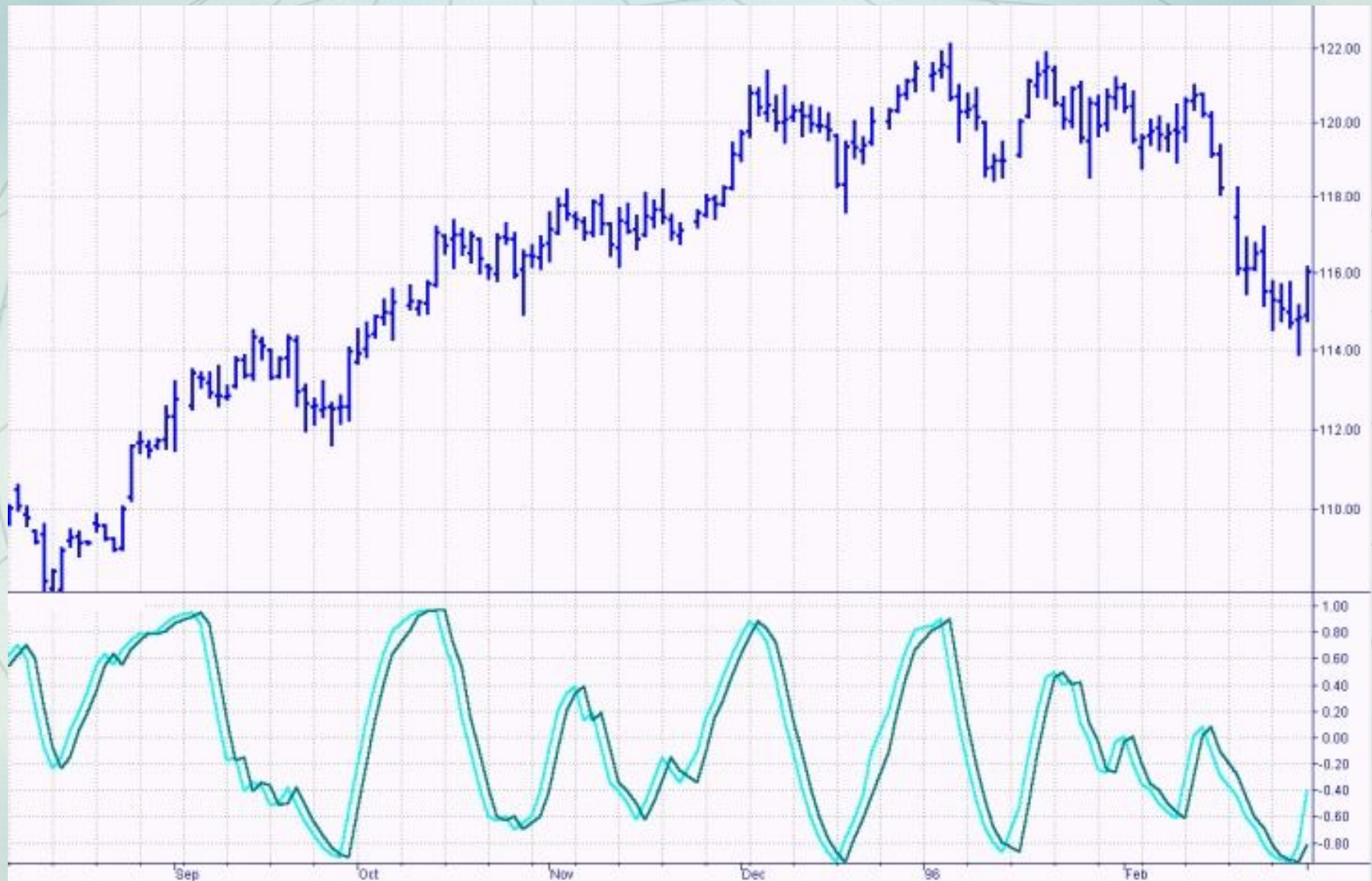
The Stochastic RSI Gives Signals in a Timely Manner

Deriving the Inverse Fisher Transform

$$y = 0.5 * \ln\left(\frac{1+x}{1-x}\right)$$
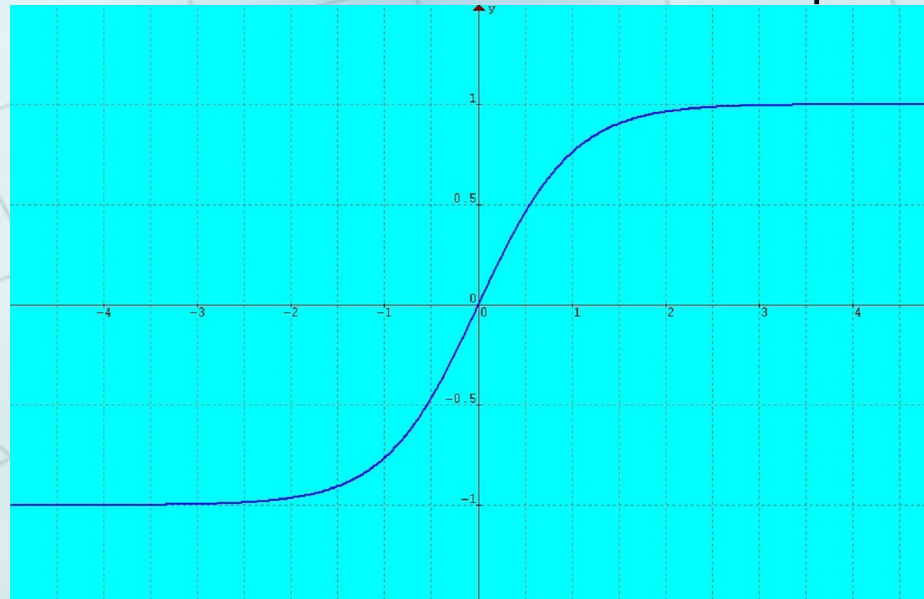
The original Fisher Transform

$$x = \frac{e^{2y} - 1}{e^{2y} + 1}$$

Take the inverse by exponentiating both sides
and rearranging for X

$$y = \frac{e^{2x} - 1}{e^{2x} + 1}$$

Interchange x and y for conventional notation of input and output

The Inverse Fisher Transform is Compressive

Inverse Fisher RSI Code

- Inverse Fisher Transform requires the input amplitude be reasonably limited
- A recentered and rescaled RSI fills the bill

```
Vars:      IFish(0);

Value1 = .1*(RSI(Close, 5) - 50);
Value2 = WAverage(Value1, 9);
IFish = (ExpValue(2*Value2) - 1) / (ExpValue(2*Value2) + 1);

Plot1(IFish, "IFish");
Plot2(0.5, "Sell Ref");
Plot3(-0.5, "Buy Ref");
```
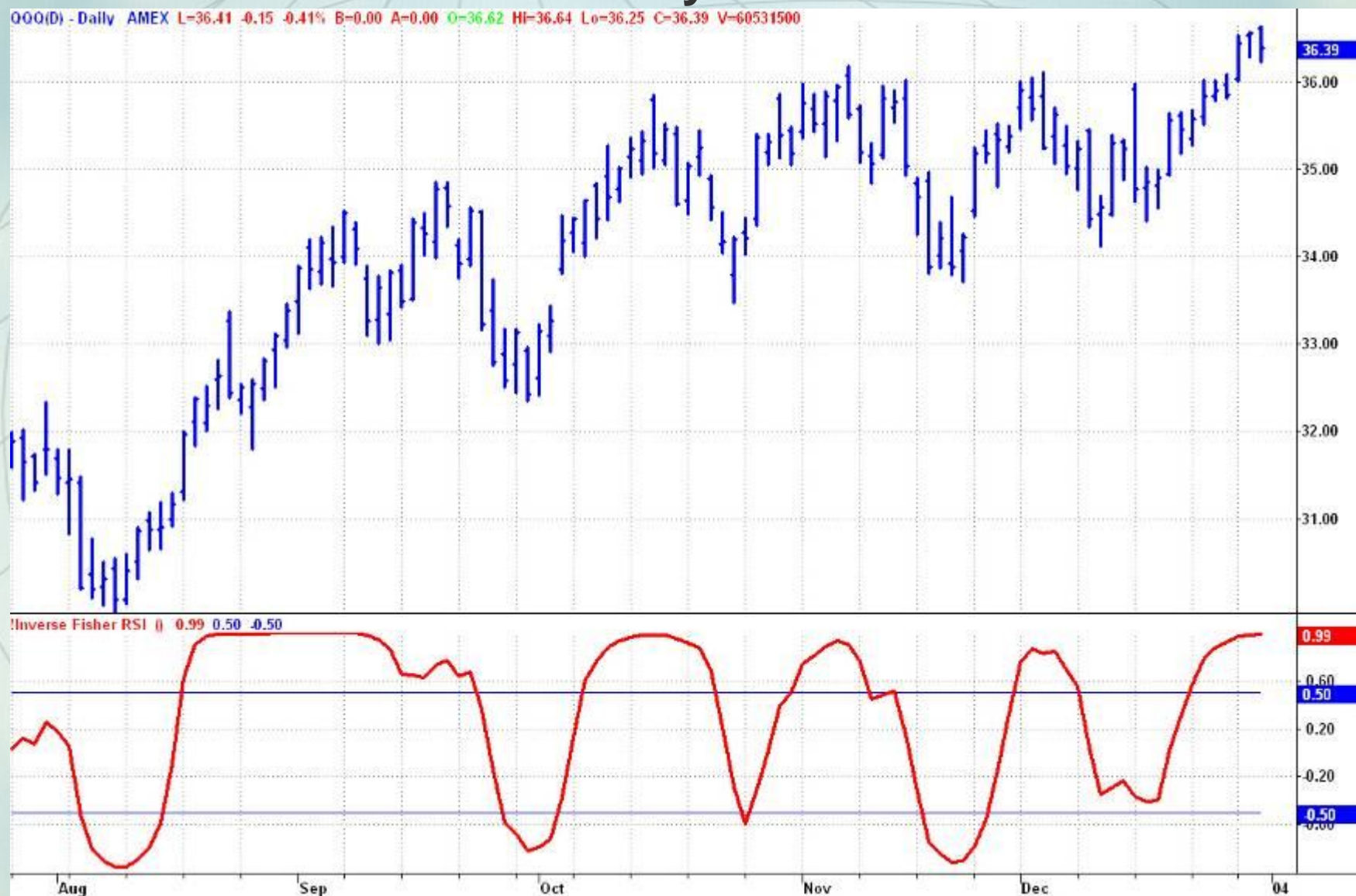
The Inverse Fisher Transform Crossing the Trigger Levels Gives Consistently Profitable Trades

The Inverse Fisher Transform Can Also Be Applied to a Variety of Other Indicators

🌐 My CyberCycle is just one such example

🌐 from "Cybernetic Analysis for Stocks and Futures"

```
Inputs:      Price((H+L)/2),
             alpha(.07);

Vars:        Smooth(0),
             Cycle(0),
             ICycle(0);

Smooth = (Price + 2*Price[1] + 2*Price[2] + Price[3])/6;
Cycle = (1 - .5*alpha)*(1 - .5*alpha)*(Smooth - 2*Smooth[1] + Smooth[2])
          + 2*(1 - alpha)*Cycle[1] - (1 – alpha)*(1 - alpha)*Cycle[2];
If currentbar < 7 then Cycle = (Price - 2*Price[1] + Price[2]) / 4;

ICycle = (ExpValue(2*Cycle) - 1) / (ExpValue(2*Cycle) + 1);

Plot1(ICycle, "Cycle");
Plot2(0.5, "Sell Ref");
Plot3(-0.5, "Buy Ref");
```
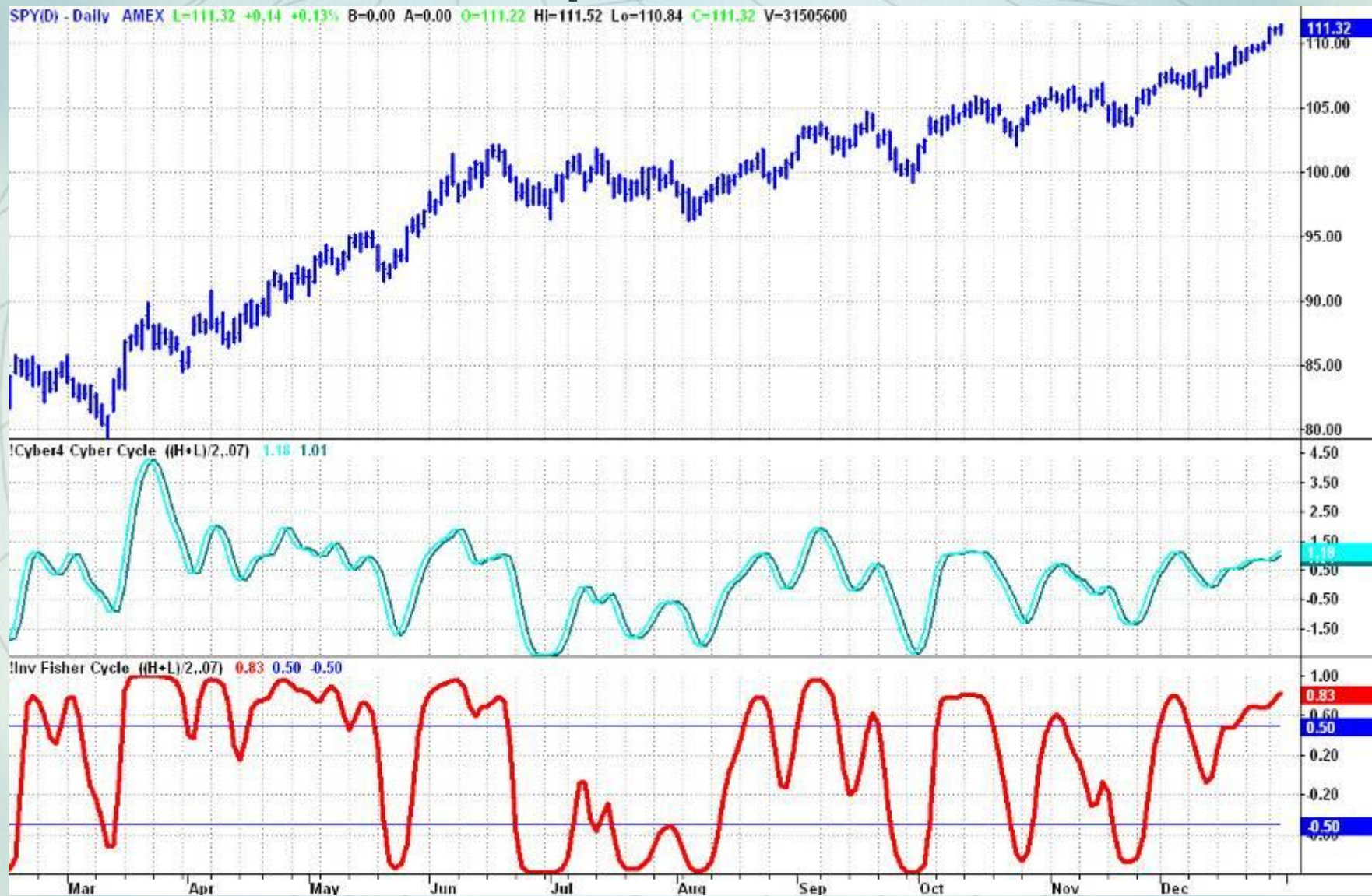
The Inverse Fisher Transform Helps Eliminate Some Whipsaw Trades

SUMMARY

- The Fisher Transform and Inverse Fisher Transform introduce no lag

- The Fisher Transform readjusts the data PDF to give sharp turning point indications

- The Fisher Transform Strategy identifies trends and pops in the direction of the trend

- The Inverse Fisher Transform is an elegant means to improve many existing indicators