ticular sector because that would make me overly concentrated in that sector.

For instance, I trade five different currencies, but I don't trade the Euro because I trade the Swiss franc and the British pound. The Euro's excluded not because I don't like the Euro, it's just that I have enough exposure in that area.

AT: Just out of curiosity, why not trade the Euro instead of either the franc or pound, especially since the Euro is the most liquid of the three?

BD: The historical data for the Swiss franc and pound goes back further than the Euro.

AT: Can you describe how your Choppiness Index fits into your program?

BD: The Choppiness Index is also derived from the mathematics of fractal geometry (*Figure* 2). All of this, by the way, originated with Benoit Mandelbrot and his book *The Fractal Geometry of Nature* (*see "Related reading," p. 67*).

The Choppiness Index is an adaptation of a certain metric he calls the "fractal dimension." The indicator essentially reflects whether the market's been running or chopping up and down. If it's up one day and down the next, you'll get a high Choppiness Index reading. If price goes up every day for a number of days, or weeks in my case, then you get a low reading.

This indicator is, in fact, parameterized, but it's not parameterized by optimization, since the parameter is derived directly from the characteristic cycles that come out of the Fractal Wave Algorithm.

AT: It sounds like a trend-strength indicator.

BD: Exactly. A certain reading on the Choppiness Index triggers a rule change that moves my stop-loss closer when there's a runaway trend, like the ones we've seen a lot of the past few years.

The Choppiness Index

The Choppiness Index (CI) compares the sum of bar-to-bar price activity (derived from true range) during a given look-back period to the high-low range during that period. The higher the reading (the indicator ranges from zero to 100), the choppier the market; the lower the reading, the trendier the market.

1. Calculate each period's (day, week, hour) true range. (The true high is the higher of this bar's high or the previous bar's close; the true low is the lower of this bar's low or the previous bar's close. The true range is the difference between the two.)
2. Sum the past *n* true ranges.
3. Calculate the true range for the entire *n*-bar period.
4. Divide the sum of the *n* true ranges by the *n*-day true range.
5. Calculate the logarithm (base 10) of the result from step 4.
6. Divide the result from step 5 by the logarithm of *n*.
7. Multiply the result by 100.

In Figure 2, notice the sharp drops in the CI in March-May 2006 and August-October 2007 during periods of rapid price acceleration. Dreiss uses the indicator to adjust his stops.

FIGURE 2: THE CHOPPINESS INDEX

Source: eSignal

AT: I wanted to read something you wrote in February 2008: "Although

futures markets have become more correlated over the years, the markets last year were in virtual lockstep with the U.S. stock market (either positively or negatively). This is due to the spread of systems trading (now called quantitative finance) through the hedge fund and money management industries. As with the CTA industry, natural selection assures that over time trend-following strategies will come to dominate, with the dominant players increasingly using similar trading models."

Wouldn't natural selection actually punish a preponderance of the same type of traders or trading models? Wouldn't it ultimately result in a case of diminishing returns?

BD: First, not everyone is doing the exact same thing. They're trading different time frames and have their own systems, so it's not like my orders are sitting at exactly the same place as someone else's orders. To a certain extent, there's diversity among trend followers.

You might say many trend followers are seduced by the devil in the same way Wall Street has been, as you can see from the current financial situation. There was an excellent article in *The Economist* ("In praise of volatility," *Jan. 15, 2009*) that addressed this. The basic problem with modern investment is that the primary measurement of goodness is the Sharpe Ratio — that is, that the idea is to have the highest possible risk-adjusted return. This drives asset managers to attempt to achieve what Bernard Madoff achieved — a steady return with no, or little, drawdown. Madoff's strategy, and the arb strategies that are so common on Wall Street, are what's called picking up nickels in front of a steamroller.

That steamroller is going to get you — just like it got Long Term Capital Management (*LTCM*), just like it got the stock market in 1987. The arb strategies that are attempting to eliminate risk do nothing more than warehouse risk. That risk shows up — big time — at some point down the road. If you're in the business, this is a point I don't need to make to you because you've seen the whole financial system come down.

If you use the standard doubling-down strategy, you'll always make a steady return — as long as you don't run out of money. This is the con game Wall Street has been running for at least the past couple of decades.

In contrast to that are people such as myself, who are predominantly CTAs. We take risk all the time. I get 20-percent drawdowns on at least an annual basis — that's just part of my business. And it's not just me. John Henry or Keith Campbell (*other trend-following CTAs*), for example, do not have risk-free returns.

You see, we *process* risk in real time. That doesn't mean CTAs don't blow out. But they blow out for different reasons, and a lot less frequently than these other kinds of money managers.

The reason I said it's an evolutionary, survival of the fittest sort of thing, is if you've followed up Mandelbrot's research and done your own on particular markets, as I have, it's clear that markets exhibit persistence, which over the long term favors trend followers and weeds out strategies that rely on mean reversion.

In fact, the research I've done is very similar to what Edgar Peters has done (*see "Related reading," p. 67*). Peters conducts something he calls RS (*Range-Scale*) analysis that essentially measures how far any price series is from a random walk.

If the fractal dimension is 2, the price series is random. If the fractal dimension is greater than 2 — and it probably wouldn't be much greater, probably less than 3 — then the market is exhibiting persistence. All that means is if a market is headed in a certain direction, it's more likely to continue in that direction than it is to go in the other direction, whereas the random walk says it doesn't make any difference — if you take one step to the right, the next step is just as likely to be to the left as it is to the right. Persistence means if you take a step to the right, you're more likely to take your next step to the right than the left.

Anti-persistence, which is what option writers trade, is just the opposite. Volatility, as Peters shows, is anti-persistent, which means there's more of a tendency to come back the way you came than continue in the same direction.

AT: Are you talking about what people usually call mean-reversion?

BD: Yes, but mean reversion is widely misunderstood and abused. The idea was originally developed by Francis Galton to describe the inheritance of physical traits, such as height. Such traits could be described as anti-persistent and result from the fact that the further one is from the mean, the stronger the "force" pulling back toward the mean. For instance, the child of two seven-foot-tall parents is much more likely to be shorter than seven feet, not taller. The same principle applies to option pricing.

Market prices, however, tend to be persistent and reversion does not apply. The same goes for spreads, as LTCM discovered. Applying the Black-Scholes model to spreads is inappropriate, since spreads, which are persistent, do not behave the same as option premiums, which are anti-persistent.

The point is, if you're trading persistent markets, the only strategy that will consistently work is trend following. If you're using an arb strategy, you're trading against the persistence. How can you do that?

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The only long-term survivable strategy — which is also the only long-term honest strategy — is to trade on persistence, which means you're a trend follower.

Suppose you go to Las Vegas, and instead of playing a fair game where the chances are equal that you'll win or lose, you're playing a game that's actually stacked against you a bit. Nevertheless, you can double down and make money, right? Just use the standard doubling-down strategy and you'll always make a steady return — as long as you don't run out of money. This is what Wall Street and many hedge funds do.

But the problem is, every now and then you run out of money. That's what happened to LTCM. When the investment banks came in and bailed it out, they learned to use the same [approach]. It's a great strategy — if you can run it for several years and collect [2-percent management and 20-percent incentive] fees off of it, you can make a fortune. And when the thing blows up, you don't have to pay the money back.

This is the con game Wall Street has been running for at least the past couple of decades, which is now coming apart. Madoff is considered a crook because he ran a Ponzi scheme, but it's all a Ponzi scheme.

AT: It seems like you could extend the Ponzi-scheme analogy through virtually every tendril of the investment industry, right down to the most benign retirement account and mutual fund. Basically, without millions of people automatically investing in their 401(k)s every paycheck, thousands of money managers and funds — most of whom underperform the market, anyway — would find it impossible make a profit, let alone justify their jobs, because the always-open flow of funds that fuels the equity market's upward drift would be closed. That is, without mass participation, the entire system grinds to a halt.

BD: I agree. The only long-term survivable strategy — which is also the only long-term honest strategy — is to trade on persistence, which means you're a trend follower. And in order to do that, you have to take drawdowns. You can't avoid taking drawdowns — there's no possible way to do that and be a trend follower.

AT: The past several years it seems like it became very popular to say "trend-following is dead." And trend-followers did have across-the-board poor performance. What about that period?

BD: Well, I've been in this business for quite a while — I was one of the original CTAs. I got into the business in 1975, and that was after several years of trading and researching.

This story is the commodity version of "This time it's different." Every five or 10 years you hear the same argument: trend following is dead. You heard it back in the early 90s, you heard it in the mid-80s, and so on. Any time it doesn't work for a couple of years, [this kind of talk emerges]. And this gets back to, "We have met the enemy and the enemy is us." It's the public. The public can't handle drawdowns.

A quote that stuck in my mind from Warren Buffet is, "If you can't handle a 50-percent drawdown, you shouldn't be investing." Why has Warren Buffet made so much money? Because he doesn't have to worry about drawdowns. He has investors who will stick with him no matter what he does, so he can invest intelligently and take his drawdowns. And at the end of the day he's made a lot of money. That's the way the world works, and it turns out that most people can't handle it.

People who sell to [the public] have to provide products they'll buy. Because if people are offered a product from Long Term Capital that makes them 30 percent a year with no drawdowns vs. a product that makes them, say, the same return with 30-percent drawdowns, they're going to take Long Term Capital every time — until it blows up.

AT: How similar is your program today to what it was in 1991?

BD: It's virtually identical. There's been some minor tweaking, but it's essentially the same.

AT: What was the incubation period for the program?

BD: Probably five to seven years.

AT: Did you go down any blind alleys before you settled on your eventual approach?

BD: I didn't really; it's always worked. The difficulties I've had have primarily been in marketing. Being a long-term system [trader], I've had some fairly large drawdowns — my maximum is probably close to 40 percent — although I've never blown out. For the past 10 years or so I haven't put much effort into marketing; I've been mostly trading my own money. I'm probably a better trader than I am a businessman.

AT: Can you outline the development of your program — what's the difference between, say, 1975 and 1991?

BD: What I did back in the late-60s and early-70s was go through all the various methods of technical analysis that were available then, but particularly things like Edwards and Magee, various chart patterns — that kind of thing.

I decided all of it was pretty meaningless, except for trendlines. So I developed a daily time frame system that used numerical parameters to determine what I now call zig-zag patterns, which were used to draw trendlines. The basic idea of automating trendlines goes back to my original system.

In the 80s, I added the logic that allowed me to define turning points that

were more firmly grounded on fractal theory and the idea that markets are persistent, and to use a similar technology to incorporate that into a system that was much less prone to parameterization or data fitting than my previous approach.

In general though, for all these years my approach has been based on the idea of automating a system that uses trendlines. Of course, the underlying issue is, what points do you use to draw a trendline? That has evolved to where I use the Fractal Wave Algorithm to determine those points.

AT: Do you use any discretion?

BD: The system itself is purely systematic. However — and this is a consequence of the markets having become increasingly correlated, especially over the past 10 years or so — I've implemented an equity-curve management technique to adjust my leverage and dampen volatility.

The reason markets have become increasingly correlated — not only commodities but in the larger environment — is because there's all this big money that [is] in some sense using similar approaches, and they tend to have similar positions. Plus, on Wall Street there's a lot of herding going on. Certainly, in the past year or six months we've seen the markets move in lockstep.

The only way I've seen to get around this is to apply a type of trading methodology to my equity curve. That is, instead of just expecting to get diversification out of trading a bunch of different commodities, I look at what my overall equity curve is doing and develop strategies to change my leverage. For example, if the markets have made a big run, at some point it makes sense to lighten up. On the other hand, if I've had a big drawdown and the markets have settled down, it makes sense to increase leverage. That's what I've done the past few years to control my drawdowns to a greater extent than I'd been able to in the past.

And even though I have a systematic approach, there's a certain amount of discretion in when to apply that. That's where the discretion comes in — the system itself is purely automatic.

AT: Would your fractal approach be applicable to your equity curve?

BD: No, not really.

AT: But a trend is a trend is a trend, right?

BD: But an equity curve isn't like a price chart — it only goes up, so you don't really have bear markets. If I did, I'd be out of business. There are drawdowns, but overall it's a continuous series of higher highs and higher lows. So if you try to apply the Fractal Wave Algorithm to it, it would get you short or take you out too late. You'd need a pattern that goes the other direction, and by the time that happens you're probably near the bottom of the drawdown and it's time to leverage up again. In some sense, I apply the general view [of trend interpretation] to the equity curve, but the fractal technique itself is not appropriate.

Part of the secret of being a trader is being able to modify your psychology.

AT: What do you think are the implications of what the markets did in 2008? Do you think this is going to be the beginning of a really different environment, or is this just a massive disruption that will, ultimately, be short-lived?

BD: I don't know. I've been trading long enough that, as far as I'm concerned, there's nothing new under the sun. I'll put it this way: Commodities were in a bear market from about 1980 into the late 90s — almost 20 years. And everybody had economic explanations for it — productivity improved and technology improved, and so on and so forth.

Then the markets turned around, for various reasons, and we've essentially had bull markets in commodities up until the last six months to a year, depending on which markets you're looking at. Of course, what we've been hearing all this time from Jim Rogers and T. Boone Pickens is that these markets are going to go up forever. Well, we now know that's not true; now we're in a bear market.

Is this something I'm surprised about (*laughing*)? No, it's not. The commodity markets go up and the commodity markets go down. Right now they're going down, and my guess is they'll probably continue to go down, or at least sideways, for another year or so, depending on what the economy does, and then at some point they'll start to go up again. I'm a trend follower, I don't care either way.

AT: But if they go sideways for a year, that's not good for your style of trading, right?

BD: That's right, as a trend-follower, sideways markets are the periods I don't make money. And those periods, for me, because of the way I trade, might last a year or a year and a half. At the end of that period you'll hear people say, "Trend-following is dead." No — sometimes the market's trend and sometimes they don't.

You know how much money CTAs have made this year — it's been worth the wait. I was slightly better than breakeven in 2007. In 2008 I gained more than 100 percent — that's a pretty good rate of return averaged over two years. That's just the nature of the commodity markets. They go up and they go down.

The other thing I might say is that, generally speaking, commodity markets tend to be a lagging indicator relative to the economy, so if the economy picks up, it will likely take longer for commodities to pick up — at least that's been true over the longer term. But it also depends on the extent to which all the money that has been pumped into the system stays in it. If we get into an inflationary environment, then of course commodities will go up. But that's not going to happen tomorrow, that's for sure.

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AT: Have you ever experimented with shorter-term techniques?

BD: Yes. I could trade my system on daily charts, or on hourly charts, for that matter — it's a fractal system. The main parameter is the time frame on which I choose to trade the system. The reason I trade it on weekly charts rather than, say, daily charts, is because the transaction costs are lower.

AT: So have you enjoyed the recent run, especially after a flat year like 2007?

BD: It's strange, it's almost as if — and this is partly because I've been trading for so long — part of the secret of being a trader is being able to modify your psychology somewhat from what you're born with. In some ways I find it more stressful when I'm making money than when I'm losing money. And when everything's going sideways, everything's pretty boring and I'm thinking about going surfing and doing the other things I like to do.

The past few months in many ways have been high stress, even though it's been very profitable. I've had to pay a lot of attention and be concerned about getting caught in the wrong direction, and that sort of thing. As I said before, if you're trying to manage your leverage, at some point you have to make some decisions about how far you think it's going to run. And for me at least, it can be more stressful making money than losing it, because on the downside I have a reasonably good idea of where it's going to settle and what's it's going to look like when it gets there.

When you're in a run like the one of the past few months, the volatility goes crazy and every day you're making and losing enormous amounts of money, so it's a little more difficult to detach.

Related reading

The Fractal Geometry of Nature
by Benoit Mandelbrot.
(W. H. Freeman, 1983).

The Misbehavior of Markets: A Fractal View of Financial Turbulence
by Benoit Mandelbrot
and Richard L. Hudson
(Basic Books, 2006)

Fractals and Scaling In Finance
by Benoit B. Mandelbrot,
R.E. Gomory, P.H.
Cootner, and E.F. Fama
(Springer, 1997)

Fractal Market Analysis: Applying Chaos Theory to Investment and Economics
by Edgar E. Peters
(Wiley, 1994)

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