BARRY BRUNER

The Growth Curve Of Money

Mandelbrot's Generator

When it comes to markets, relationships change. But does the behavior that creates price patterns change?

by Jay Norris

When I first read a book titled *The (Mis)Behavior Of Markets*, I was not sure if I had wasted my time. I did dog-ear a page and wrote a single note on another. I reread the book several years later, which was fortunate, because I got another, new impression of what author Benoit Mandelbrot called a "generator," which defines the base component, or characteristic, of price movement.

The generator was such a completely simplified tool that Mandelbrot gave himself a professional caveat before introducing it, saying it was so uncomplicated that he hesitated to call it a "model," instead calling it a "cartoon."

The generator is a straight line with a zigzag placed over it (Figure 1). The straight line represents the trajectory of price over time, while the zigzag provides a model for price pattern. The pattern created by the generator is scalable, and fractal in nature in that it both reproduces itself in like form based on the larger time frame pattern and it creates or "generates" smaller patterns of itself on the lower time frames (Figure 2). A fractal is a pattern or shape whose parts echo the whole; and the smaller that part or pattern, the more complex the construction.

FRACTAL GEOMETRY AND MARKET BEHAVIOR

Figure 3 is a weekly chart of the Standard & Poor's 500 as of January 2012, with different generators overlaid over several time periods.

Mandelbrot used a frond of a fern as an example in defining a fractal by showing how each fern frond is itself a fractal and made up of still-smaller leaf clusters — smaller fractals. As the plant grows, it generates more fronds,

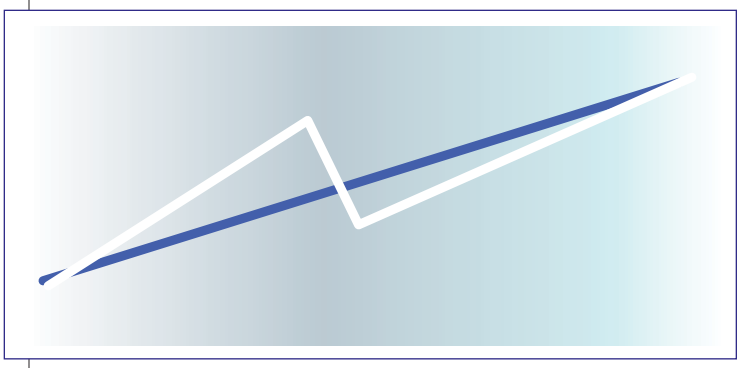


FIGURE 1: MANDELBROT'S GENERATOR. This is a simplified tool of the price movement. It is a straight line with a zigzag placed over it. The straight line represents the trajectory of price over time, while the zigzag provides a model for price pattern.

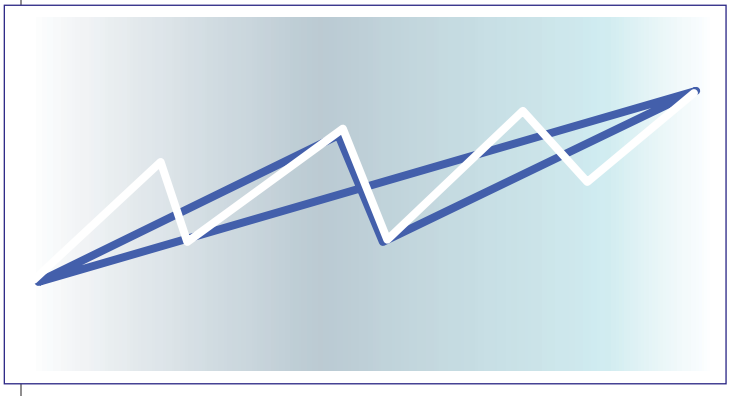
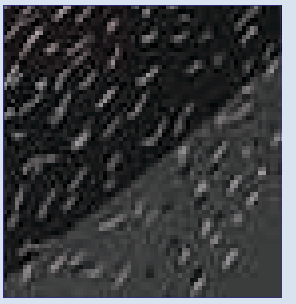


FIGURE 2: MANDELBROT'S GENERATOR AFTER REPLICATING ITSELF. The zigzag pattern created by the generator is scalable and fractal in nature in that it reproduces itself in like form based on the larger time frame pattern and it creates patterns of itself on the lower time frame.

A fractal is a pattern or shape whose parts echo the whole; the smaller that part, the more complex the construction.



which grow into shoots, which grow into mature branches of the plant — larger fractals.

While his use of the fern to help us grasp the definition of a fractal was both helpful and insightful and his generator a great model for identifying and measuring price action, he did not, in my view, make the next step clear enough and show how both markets and plants exhibit similar growth curves.

Benoit Mandelbrot was a mathematician, not a biologist. Nature in the form of the golden mean provides many excellent examples of perfectly symmetrical growth curves, particularly when the environment — that is, growing conditions — are favorable.

And while the patterns that stock and currency markets create will never be as perfect as those of nature because of the human element, markets — asset class markets in particular — do create price patterns that lend themselves to predictability, particularly when growth increases in line with historical patterns. We can see this from the equiangular patterns in the Standard & Poor's 500 chart in

FIGURE 3: GENERATORS OVERLAID ON WEEKLY CHART OF S&P 500. Here you see different generators overlaid over several time periods.

FIGURE 4: PRICE PATTERNS AND FIBONACCI SERIES. Markets do create like price patterns, which lend themselves to predictability, especially when growth increases in line with historical patterns. On this chart, the smaller micro patterns on the right side of the chart are slightly shallower replications of the larger day-to-day pattern on the left side of the chart.

the winter of 2011–12 in Figure 4. The smaller micro patterns on the right side of the chart are slightly shallower replications of the larger day-to-day pattern on the left side of the chart.

This behavior is more likely to show up in widely held, heavily traded markets, such as those accumulated by institutional investors and individual savers. Markets like the S&P 500 with its dividends and global footprint, and carry markets such as the Australian dollar/US dollar (see Figure 5) and Australian dollar/yen, with their healthy yield, or carry, are good examples. The beauty of the patterns is that everything from a sociopolitical, natural, and economic standpoint is already reflected in the current direction and price.

But on some level, some part of us holds back at marveling at the symmetry on the charts. Why? Why does price

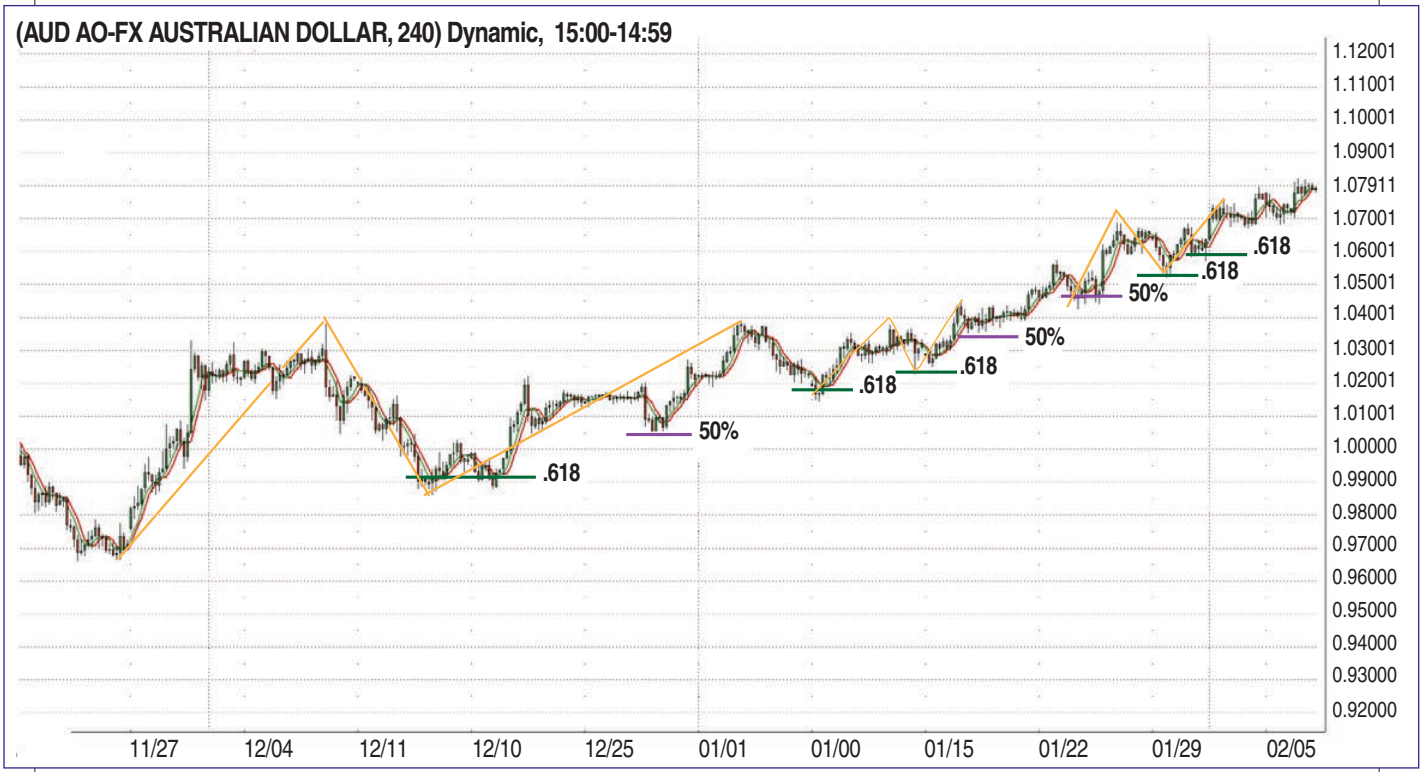


FIGURE 5: REPLICATIONS OF LARGER PATTERNS. On the chart of the Australian dollar/US dollar, you can see that what happens on the left side of the chart is replicated on the right side.

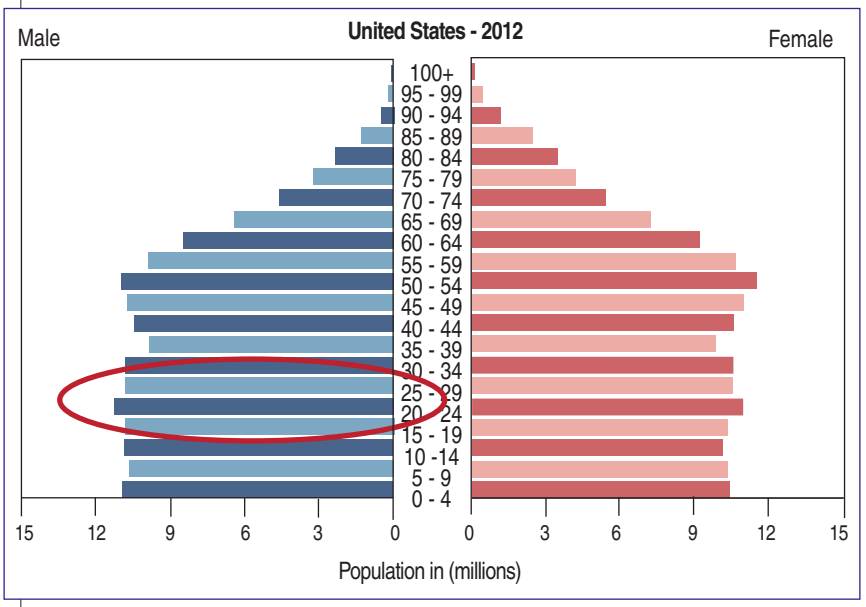


FIGURE 6: WHICH AGE REPRESENTS THE LARGEST IN THE US?

do what it does? And even if we have it figured out to date, what's to say that something won't change in the behavior of the market?

THE 26-YEAR-OLD FRACTAL

William is a 26-year-old engineer for an energy company in suburban Chicago. His employers own and manage wind farms in the Midwest and are principals in an oil pipeline outlet operation in St. Louis, MO. William makes $65,000 per year, and his company matches up to 6% of his 401K. He elects to deposit 10% of his salary into the 401K for a total annual savings of $10,400, or $866 per month.

What makes William of note to investors and traders is that he is representative of his educational and age demographic. William is a fractal who puts $866 per month to work in the marketplace. He is mimicking the behavior of older workers, and his actions will be replicated in turn by future workers. In fact, his behavior is akin to not just his demographic but to all workers in all demographics.

As long as companies make payroll every two weeks, there will be workers saving/investing their earnings in asset class markets. And do you know which age group currently represents the largest in the US? Twenty- to 25-year-old males (Figure 6).

RELATIONSHIPS CHANGE, BEHAVIOR DOES NOT

I have a friend who sometimes sees the world in a way different from others, which sometimes leads to bouts of countertrend trading the S&P emini and currency markets. I was telling him about William the fractal. My friend asked, "What if there was a pandemic? Would he get paid then?"

After a few minutes of speculation, we came to the conclusion that as long as the world continued to turn, there would be people going to work and William would continue to get paid. And it is specifically the paychecks created by this activity that fuels the growth curve of money and markets.

When it comes to markets, relationships can change, but it is unlikely that the behavior patterns will.

When the flow slows, it shows up as a negative growth pattern. The bullish day-to-day generators in the S&P 500 cease to produce bullish micro generators. Instead, the market would start producing bearish micro generators. These bearish micros could grow into bearish day-to-day generators, and even bearish secondary generators. But that cannot happen until the last bullish micro generator reverses itself first, which is a measurable event.

From a fractal perspective, it cannot be any other way. The pattern is a reflection of the environment, and what happens on the right side of the chart is a reflection of what has occurred on the left side, and what happens in the future evolves from the current patterns.

As long as a market is producing measured retracements at predetermined levels, its growth pattern is obvious and we need to trade in that same direction. Just as we can look at tree rings and see which years saw drought, we can look at a price chart and see which years brought panic and which brought plenty.

From a statistical perspective, we would not use tree rings to predict droughts but to understand the importance of making hay when the sun shines, which from an economic perspective over the last 50 years is most of the time.

When it comes to markets, yes, relationships can change, but it is very unlikely that the behavior that creates price patterns will — at least, not in our lifetime.

Jay Norris is an instructor at Trading-u.com and author of Mastering Trade Selection And Management, *and* Mastering The Currency Market. *He can be reached at jnorris@trading-u.com.*

SUGGESTED READING

Mandelbrot, Benoit, and Richard L. Hudson [2004]. *The (Mis) Behavior Of Markets*, Basic Books.

Norris, Jay [2011], *Mastering Trade Selection And Management*, McGraw-Hill.

_____ [2009]. *Mastering The Currency Market*, McGraw-Hill.

‡eSignal ‡US Census Bureau