

Of Physics and Finance

Borrowing a tool from Niels Bohr's quantum toolbox

By Jon Shayne

Business TN, September 2007 (revised)

Investment management is like physics. Both fields use mathematics to track a conserved, abstract quantity. In physics, you follow energy; in the financial world, money.

Investors can learn from their "colleagues" in physics. Fortunately, the math in finance is easier. Niels Bohr, the great Danish physicist and one of the founders of quantum mechanics, gave us one of the more useful tools to borrow. Bohr, a Nobel laureate in 1922, emphasized the importance of embracing seemingly contradictory ideas. He called this complementarity. The classic example is the wave-particle duality: sometimes light, for instance, behaves like a particle, and sometimes like a wave. To say that light is a wave, or that it is a particle, one to the exclusion of the other, limits the ability to model its behavior. It is both, and neither. It is important to keep and use both pictures because the type of behavior you find depends on the type of experiment being done.

The same duality comes into play when an investor tries to determine what an investment security is worth. You can think about the price, or its value. If you are really good, you'll think about both. Simply put, price is what you pay for an investment, and value is what you get. Price is what a stock or bond sells for in the market. It is the summation of others' opinion as to worth. Value, on the other hand, is what something is intrinsically worth to an idealized investor, one who is rational economically and plans to hold forever.

Given that "price" and "value" are different, it is possible that the market quotation for an investment, its price, may be higher or lower than value. That sounds obvious, but so many people, both professionals and, especially, academics, ignore this—as if there were not even a risk that price and value might diverge.

Investors tend strongly to fall into one of two camps. Most primarily see publicly traded stocks, for example, as something akin to baseball trading cards. They are focused on price, not the underlying economics. On the other hand, value believers see stocks as real pieces of real businesses, with an intrinsic worth independent of what others say.

Bohr's idea of complementarity, honed in the far more rigorous field of quantum physics, suggests that each of these views has its place. Whether it is better to think price, or value, depends on the "experiment" you are doing.

If you have to sell in a hurry, it is impossible to deny that you are in the hands of others. Think price, because at any given moment, you will realize no more than the highest price someone else will pay for it. If you are borrowing against stocks or holding them for a near-term bill, such as a tuition payment, the intrinsic value may matter very little, and the price will depend, as

always, on whether the market's mood is more manic than panic. The views of others can change rapidly, and largely unpredictably.

In contrast, the "value" perspective yields the wisdom that a stock represents a real piece of a real business. As an owner, you have certain rights, like voting, electing directors, and getting your share of a dividend or liquidation. In the very long run, shareholders necessarily earn what the business earns.

When buying a stock, imagine that you will be forced to hold it for many years. Popularity is fickle in how it wanes and waxes, so it is best to anticipate some bad years ahead. Reality asserts itself eventually, as cheap businesses get taken private and dear ones sold. The self-cancellation of crazy or random fluctuations, over time, is what makes buying and holding based on intrinsic value successful. Buy something with an intrinsic value that is likely to grow, do not overpay, and make sure you have enough cash to hang on during bad markets.

So when investing, don't be afraid to borrow a tool or two from Niels Bohr, and remember the dual nature of photons. Doing so may help shine a little light on your investment thinking.

Jon Shayne manages portfolios for clients through Shayne & Co. LLC, a Nashville investment management firm.