



Aaron Brown

# I Ain't Missing You at All

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**T**he title of Eric Falkenstein's new book, *The Missing Risk Premium*, sounds like season two of an Ashley Judd television series and the subtitle, *Why Low Volatility Investing Works*, sounds like a sales pitch for a newly popular investment technique. In fact, the book is an important contribution to financial thinking. Every serious investor should read it.

Over the last 60 years, the concept of risk premium has embedded itself so deeply in finance that it is hard to think of investing without relying upon it. Like the man who drinks water all his life and so thinks it has no taste, many people treat arguments based on risk premium as obvious because they have been ubiquitous in finance for so long. For example, many people wouldn't think twice before agreeing to statements like:

- Since conservative investors prefer low-risk portfolios, assets that add a lot of risk to portfolios have to carry a higher average return than assets that are either low-risk or uncorrelated with conservative portfolios.
- Since leveraging an investment increases its risk, it should also increase its expected return.
- If the risk of an investment goes up



What Nietzsche learned on the other side ...

and there is no change to its expected future value, its price today should go down.

It's important to separate this idea from merely keeping expected value constant. If a risk-free ten-year bond pays 5 percent interest, a bond with a 10 percent chance of default must pay approximately 6 percent (the exact number depends on the timing of potential defaults and the size of potential recoveries) just to have the same expected value as the risk-free bond. To have a risk premium, the risky bond would have to pay more than 6 percent, so that its expected return was higher than that of the risk-free bond. In other words, the fact that junk bonds sell for higher yields than investment-grade

bonds does not prove that there is a risk premium. We would need to show that portfolios of junk bonds had higher long-term average returns than portfolios of investment-grade bonds.

Falkenstein argues that there is no risk premium, and never was, so conventional investing advice is deeply misguided. More important, he has developed a consistent and plausible alternative explanation. This is a very valuable argument, even if it is ultimately not correct. You cannot understand risk premium if you think it is obvious; you need to see why it might not exist, to see how to look for it. And, of course, if the argument is correct, it is even more valuable.

The book also describes an investment approach, a version of what is generally called

'low-volatility investing.' The author is among the pioneers in this area and he advocates a reasonable version of it. However, you need not accept his argument to take advantage of the insights that led to the general development of low-volatility investments. There are different theories out there to explain why it works. Falkenstein, in my opinion, has the boldest plausible explanation but, even if he is correct, that doesn't mean it leads to the best practical portfolio advice or the best investment products (of course, it also doesn't mean the contrary). Theory is important, but implementation details like fees, expenses, taxes, execution quality, data quality, and dozens of others are more important. So, just because you like this book doesn't mean low-volatility investing is for you, and just because you like low-volatility investing doesn't mean you have to like this book.

## Four times four

The Missing Risk Premium rates four stars on each of the following four scales:

### Writer's qualifications

Zero stars – None, crook, or idiot

★ – None, but an intelligent, honest person (journalist for example)

★★ – Academic qualifications, professor or Ph.D. in finance with extensive academic and professional articles

★★★ – Successful professional investor who has developed and used the ideas in the book

★★★★ – Criteria for 2 and 3 stars both

### Writer's motivation

Zero stars – Cheat readers

★ – Sell books

★★ – Help readers to improve their finances

★★★ – Educate readers and help them to improve their finances

★★★★ – Make readers smarter, educate them, and help them to improve their finances

### Ideas

Zero stars – Incomprehensible or known to be false

★ – Unsupported by theory or evidence

★★ – Advice based on common sense or dated theory, now known to be deficient in some major ways

★★★ – Consistent with the best current investment practice

★★★★ – Consistent with the best current investment practice and offering important insights about future improvements

### Scope

Zero stars – Nothing actionable

★ – Explains what to do, but not in enough detail to be useful

★★ – Explains what to do, with all important details

★★★ – Explains what to do, with all important details, plus explains why to do it

★★★★ – Explains what to do, with all important details, plus explains why to do it, plus offers deeper insights that go beyond investing

There aren't many quadruple four-star books out there, which automatically makes this interesting. It's also a bargain, at \$14.95. When I reviewed the author's first book, *Finding Alpha: The Search for Alpha When Risk and Return Break Down*, I complained about the \$95 list price and suggested that it should be \$25 list, to sell for \$15 at Amazon. I don't know if he was paying attention but, if he was, he traded through my bid by a nickel. Unfortunately, he didn't listen to my complaints about the copyediting and production values.

### Problems

There are numerous typos, including at least one where he reverses the meaning in a manner that will confuse most readers and destroy the point he's trying to make. For example, on page 81 he writes, "Changes in inflation adversely affect the roll returns from normal backwardization while adversely affecting the roll returns for contango." Readers sophisticated enough to spot the multiple errors in this sentence likely knew the information already. Less sophisticated readers will realize something is wrong, but be unable to figure out the correct statement. The least sophisticated readers will decide they cannot understand the book, which is unfortunate.

That's why it's essential to get these kinds of technical sentences correct.

For the record, the sentence cannot start with "changes" in inflation; it has to specify either increases or decreases, and should say that the changes are unexpected (expected changes have no effect on returns because they are already factored in). Next, the point is not whether the commodity in question is in backwardation or contango, but whether the roll returns consist of buying spot and selling forward (or buying near month and selling far month) or the reverse. It's true that roll investors generally do the former for commodities in contango and the reverse for commodities in backwardation – that is, they buy the cheap and sell the expensive – but that is by no means always the case. If the expected future inflation increases, prices for future delivery should increase, so, at a first guess, the person who sold forward (contango) loses and the person who bought forward (backwardation) gains. In reality, inflation affects both spot and forward prices in complex ways that differ by commodity.

Another example of a conceptual error is in endnote 152, "Finding all the patterns is an NP-complete problem, meaning they are infinitely easier to confirm than to discover." An NP-complete problem is one for which an algorithm is known to verify solutions in polynomial time, but for which no algorithm is known to find solutions in polynomial time (a fascinating result is that if any NP-complete solution can be found in polynomial time, all NP-complete solutions can be found in polynomial time). The fact that no algorithm is known to find patterns in polynomial time does not mean one does not exist. Moreover, even if there is no polynomial-time algorithm to find patterns, there could be very fast algorithms to find patterns in very big problems. All we know is that if you increase the number of the dimensions of the problem enough, eventually you will get to a point where it is easier to verify solutions than to find them.

The graphs and tables are important to the argument, but of low quality, and they assume the reader can guess what things like *AnnStDev* or *AvgGeoRet* mean. There's not a lot of jargon compared to many books, but too much given

the simple elegance of the argument. There is no index. However, all these are petty complaints about a great book (I do have a few more substantive complaints later).

## Going back

What is the risk premium and why is it missing? Falkenstein's account begins in the 1950s, but we can go even farther back. Humans have an evolutionary program to assign causes to everything. If you hear a rustling in the grass, you ask yourself, "Is it wind or a dangerous predator or potential prey?" The option of 'uncaused noise' is not salient. Assigning a cause to a random event, or to one whose real cause is much too complicated to be of use, results in a small loss. Failing to assign a cause that would be useful is often fatal and, even if survivable in the short term, represents an evolutionary disadvantage and so will be selected out over generations.

This results in lots of local demigods, dead ancestors, and superstitions to explain lightning, seasons, illness, and the gigantic variety of important phenomena. Because these things are so unpredictable, the gods had to be capricious and mysterious.

The effort in ancient Greece to understand the world rationally, combined with the movement toward monotheism, challenged the multiplicity and whimsy of supernatural causes. Entities like angels, demons, and saints, along with superstitions, helped (and still help most people) but in the Enlightenment a small group of educated people sought a purer explanation of the universe. This movement would lead to the scientific revolution.

Traditional authorities posed obstacles to Enlightenment, as you would expect. More surprisingly, gamblers were a problem. What place did dice have in a universe of causal laws? The mathematical analysis of probability is traditionally dated to a 1654 exchange of letters between the great French mathematicians Blaise Pascal and Pierre de Fermat. While the importance of the letters (which never mention probability) is overstated, it is true that scientific thinking about randomness changed dramatically in a decade beginning in the mid-1650s. For the first time, people clearly conceived of events that were entirely

unpredictable individually, but whose long-term frequencies could be tabulated precisely.

This led to the idea we now call 'expected value,' the average value of the long-term frequency. For example, if an investment has a 0 percent return half the time and a 10 percent return the other half, its expected return is 5 percent. People insisted that it was always rational to choose the option with the highest expected value.

Unfortunately, that implied that a person should be willing to accept a coin flip; heads he tripled his wealth and tails he lost everything he owned. In 1728, Swiss mathematician Gabriel Cramer, in a letter to Nicolas Bernoulli, hit on a solution, "The mathematicians estimate money in proportion to its quantity, and men of good sense in proportion to the usage that they may make of it."

Ten years later, Nicolas' cousin, Daniel Bernoulli, published the first formal statement of utility theory. It was based on the argument that as you get more money (or anything else), each new amount goes to less important uses. You might spend your first dollars on food to stay alive, then, when you've had enough to eat, perhaps on clothes and better food, then on shelter and better food and clothes, and so on until you're buying things you have no real use for at all. For a comfortable person, tripling wealth could mean having more luxurious versions of what she already had, while losing everything could be a disaster. The utility of three times your wealth might be only, say, 20 percent higher than what you get from your current wealth.

This creates the idea of a risk premium. The person above would accept a bet that either tripled her wealth or left them penniless, but she would require at least five chances in six of winning (say, the throw of a die in which she triples their wealth for any number but 1). The expected value of this gamble is 2.5 times the bettor's current wealth, so we can say the investor demands a premium of 1.5 times her wealth to take this risk.

This historical digression beyond what is in the book has a point. There was never ever any empirical or theoretical basis for asserting the existence of a risk premium. It was necessary to plug a hole in the Enlightenment worldview. It allowed description of the universe in terms

of laws that mortals could comprehend, that allowed for unpredictable and unexplainable events without invoking capricious deities either to create or constantly meddle in the physical universe. It justified living life for personal satisfaction, rather than to honor God or King or some grand purpose incompatible with human happiness, and showed how hedonism could lead to sensible balance rather than jaded excess. Risk premium could be invoked to support experimentation, innovation, and daring, to treat failure as a necessary component of success. Declining marginal utility and its cousin, increasing marginal cost (usually U-shaped, but eventually increasing), were necessary for stability and equilibrium. Risk premium is closely related to the ideas that explained experimental noise, evolution, thermodynamics, quantum mechanics, and game theory among other essential pillars of modern scientific philosophy.

## Back to the book

Prior to 1950, when the main historical portion of *The Missing Risk Premium* begins, there was not much consideration of risk premium in finance. There were a few exceptions, such as Louis Bachelier, but to mainstream financiers, a good stock was a stock that went up and a bad stock was a stock that went down. People knew it was hard to tell the difference, so even a good investor bought lots of bad stocks, but those were mistakes rather than the result of risk for which the investor would be compensated in the long run. Investment research meant studying investment fundamentals to pick sound securities, not estimating probability distributions to optimize portfolios. Randomness was noise that made investing more difficult, not the essential basis of investing.

In the conventional account, from 1950 to 1975, starting with Harry Markowitz and ending with Eugene Fama, modern finance discovered and verified a single, universal risk premium that explained everything, leading to a financial version of the Enlightenment. Old wisdom was thoroughly overturned and a new, rational, empirically validated theory explained everything. Even better, this theory fit seamlessly into the current views in economics and meshed with some quantitative researchers in other social sciences. It was

beautiful, mathematically consistent, and true.

Falkenstein retells this story, armed with a skeptical mind and knowledge of subsequent discoveries. It is a selective account, as it has to be, to fit into half of a small book, but it is not unfairly selective. That is, while he leaves out many nuances and simplifies much of the argument, he does confront the strongest points in favor of a risk premium. In this version, researchers were drawn to the idea of risk premium for theoretical reasons. Results that confirmed risk premium were cheered without skepticism; results that contradicted it were subjected to vigorous challenge that eventually overturned them.

This is an account everyone interested in quantitative finance should read because it gives a fresh and important look at the formative years of the field. Personally, I wish it had been higher-minded. There is no mention of the attacks on the field from economists and practitioners, and the tremendous practical good done by the research. It suggests a group of self-satisfied ideologues blindly creating evidence for an obviously false theory. In fact, this was a group of brilliant, hard-working, skeptical people who questioned every assumption as rigorously as Falkenstein does, but without his benefit of hindsight, and who read and debated internal and external criticism. That the result has so many flaws by modern lights is not a criticism of the researchers but a testament to how hard it is to say anything at all about expected return.

### Survey course

Next, Falkenstein surveys 31 asset classes and investment spreads and finds evidence for positive risk premium in only four (REITs, equities versus risk-free debt, high-yield bonds versus high quality bonds, and short-term versus longer term treasuries). Thirteen show zero risk premium, and 14 show a negative return premium (including high-risk versus low-risk stocks). This is a valuable study, informative, and interesting to read. I disagree with some of the specifics, but the overall picture is worth considering.

The book moves on to a more general historical and philosophic context. Why should mere exposure to risk be rewarded? There are always lots of people willing to do it. Some may even

like it; after all, people gamble, apparently for pleasure, in casinos and dangerous sports and bar fights and lots of other areas in life. But, even if everyone found risk distasteful, if people got paid for doing distasteful work then people who clean toilets would make more than professional athletes and movie stars.

Even if people did get paid for taking risk, it would not be for well-understood statistical risk, like buying a volatile stock. Real risk is walking into complicated and uncertain situations, for which probability distributions are unknown. And losing money (especially other people's

money) is nothing like the pain of being thought an idiot. Defying convention, underperforming the benchmark, being wrong while looking stupid; these are the unpopular forms of pain.

The single most important message in the book, which is also in *Finding Alpha*, is that expected return is not something you get for passive exposure to known unpleasantness; it is a niche in which you have advantages over other people. Success does not come from combining well-known bets a little better; it comes from making your own bets.

Finally, Falkenstein works out the mathematics of a market in which risk consists of underperforming the average rather than poor gross returns. He justifies this with a variety of arguments, and shows that it results in a zero premium for risk. This is an important result, even if you disagree with the assumptions or think the empirical predictions are false.

Even more interesting, he addresses the flaw that sinks most models without risk premia; he shows that rational, risk-averse investors will not offset the actions of irrational or risk-loving investors. In conventional models, if some investors bid up the price of an asset beyond equilibrium values, smart investors will reduce holdings or

short the asset, quickly restoring equilibrium. In Falkenstein's model, arbitrageurs may reduce holdings in the overpriced assets, but will not short them, and will not reduce holdings enough to restore the equilibrium price. I believe this is an accurate description of financial markets, although I'm not sure that Falkenstein's model for it is correct.

One interesting thing to me is Falkenstein's equation 5.34, which shows that the expected return that investors demand on an asset increases with the fraction held by other investors. I come up with the identical formula in Chapter 5

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of *Red-Blooded Risk*. Mine is stated inversely; I show that the expected return decreases with the fraction that the investors themselves hold. The two are mathematically equivalent. Falkenstein's version is a consequence of investors caring only about relative performance. My version comes from the assumption that investors hold Kelly-optimal portfolios and ignore not only all other investors, but all other potential investments. I doubt there is a deep economic connection between our models; I suspect it is a case that certain simple relations pop up in different contexts. Like most applied mathematicians, however, I instinctively trust work when familiar relations appear naturally. It doesn't mean you're right, but when you are right, you usually get things with obvious parallels to other right things.

*The Missing Risk Premium* is an important book. At worst, the effort you expend to refute its claims will deepen your understanding of conventional models. At best, it will be a breakthrough to a new understanding of financial markets and better investment results. I suspect you'll end up somewhere in the middle, which is a good place to be, especially if you hate to deviate from the benchmark.