

Markets at Risk:

The Limits of Modern Portfolio Theory

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IN THE FACE OF ONE OF THE GREATEST financial and economic crises of the past 100 years, legislators and regulators are deciding what new steps need to be taken to keep the abuses that have provoked such situations from recurring. They are, understandably, focusing on the supply side: the host of new, highly risky financial products and practices around the world that need to be reined in and brought under control.

Unfortunately, not as much attention is directed at the demand side: the apparently insatiable demand for risky products coming from our largest and most sophisticated institutional investors. Those demanding these risky products have been as responsible for their spread around the world as have those providing the supply. Regulating that demand—tempering it, restraining it, controlling it—is as likely to prevent the recurrence of future financial crises as is trying to prevent super-smart money managers from finding fancy ways to package risk in today’s marketplace.

Not more than forty or fifty years ago this demand was easily controlled. Fiduciaries—the largest institutional investors of today: pension funds, mutual funds, and trust officers—were by and large limited in their abilities to invest in stocks because they were too risky, not to mention mortgage-backed securities, synthetic collateralized debt obligations, credit default swaps, double-barrier foreign exchange options and their like. A true fiduciary did not take risks with other people’s money. The security and

modest returns from buying and holding triple-A bonds to maturity were more than enough reward.

Modern Portfolio Theory, or MPT as it is most often referred to, has been a crucial element in the unleashing of this recent wave of demand for risk. It may not be difficult to understand how MPT, with its sophistication, elegance, and complexities, has succeeded in persuading investors that large risks can be controlled. Putting the genie of MPT back in the bottle, however, will be a more difficult task. Fixing MPT, correcting its flaws, is not sufficient to this task. We will need an entirely new theory to underpin investment practice if we hope to tame this powerful force that has been set free in the financial world.

Even the most casual, unsophisticated observer can intuitively understand that financially risky products are at the heart of today’s financial crisis. It is easy to see that it was a \$450 billion bet on credit default swaps that brought down AIG, the largest insurance company in the world; that highly risky subprime mortgages broke the back of Washington Mutual, one of the fast growing regional banks in the United States; that out-of-control hedge managers bankrupted Bear Stearns; and that highly leveraged real estate deals contributed to the downfall of Lehman Brothers. Risk-taking has devastated financial institutions around the world and brought whole national economies—Iceland is the most dramatic example—to the brink of fiscal collapse.

These risky products purveyed by reckless financial institutions existed in part because there was a willing market—and institutional investors bound by fiduciary principles of prudence to their beneficiaries were part and parcel of that market. These institutions are among the largest investors in the world. Pension funds around the world control some \$25 trillion in assets. (Watson Wyatt 2008) In the United States, endowments of universities alone exceeded \$400 billion in assets as of 2008. (NACUBO 2009) Some of the most technically expert investment professionals in the world clearly thought the investments they were making were prudent, and the reason they thought so was MPT.

To understand the front-page headlines about today's financial crises we must step behind the scenes to understand some of those fundamental precepts of MPT that have been so influential. Although a full exposition of MPT—its origins, its primary elements, and the debates about its various hypotheses—is not attempted here, the following highlights a number of its most important contentions and theories and examines their implications for investment practices today.

ORIGINS OF MODERN PORTFOLIO THEORY

The progenitors of MPT were academics who, starting in the 1950s, set out to solve a relatively simple problem: how to justify investing in risky stocks. In the late 19th and early 20th centuries, stocks were an unregulated, highly risky, speculative investment prone to boom and bust—and consequently were off limits to prudent investors. The risks of investing in stocks were made painfully clear during the crash of 1929 when the stock market lost almost 90% of its value over three years.

Initial attempts to legitimize investing in the stock market were made during the depths of the Great Depression. Among the most important were increased transparency and government regulation. The Securities and Exchange Commission was created in 1933 and 1934 and directed to oversee the stock markets. Companies were, for the first time, required to disclose audited financial statements. Also in 1934, Benjamin Graham and David Dodd published their still popular classic *Securities Analysis: Principles and Techniques*, which laid out convincingly principles for purchasing stocks at reasonable prices. (Mitchell forthcoming)

This combination of regulatory initiatives and academic advice helped legitimize investing in stocks, but essentially wasn't sufficient to justify fiduciaries taking the plunge into the equities markets because it provided no *theoretical* reason why stocks should be viewed as safe.

It wasn't until the mid-1950s, when the stock market once again reached its 1929 highs, that academics tackled the task of

developing a *theoretical* rationale for the “prudent man” to invest in stocks. MPT provided that theoretical framework. (Bernstein 2005) It demonstrated that the risks inherent in investing in stocks could be measured and controlled at a portfolio level during normal market conditions.

The origins of MPT can be traced to the seminal work of Harry Markowitz. In a 1952 article in the *Journal of Finance*, Markowitz pioneered the concept of controlling risk at a portfolio level through diversification. Markowitz's work was revolutionary because it viewed risk as a portfolio problem, not a problem in individual security selection. Investing in countercyclical stocks was the key to controlling risk. If companies involved in home repair thrive when those that build new houses struggle, then a portfolio of the stocks of both companies will be less risky than investments in either company alone. Investing in one risky stock might be unwise, but investing in two risky stocks—each risky in its own way—can be prudent. (Markowitz 1952, 1959)

Increasing the opportunities to invest in risky securities is crucial to investment managers today because the greater the risks the greater the potential rewards. By diversifying risk throughout a portfolio, managers can achieve greater portfolio returns without taking greater overall portfolio risks. Diversification techniques are what Peter Bernstein calls “the closest thing to a free lunch” that there is in investing. (Bernstein 2005)

In the 1960s Eugene Fama, Sidney Alexander, and others developed a second mainstay of MPT: the efficient market hypothesis. In its various forms this hypothesis asserts that the stock market essentially reflects all available information at any given time. This implies that stocks are appropriately—or “efficiently”—priced. In addition, this theory implies that a money manager cannot beat the market—at least not all the time—because the market knows more and is “smarter” than any one individual. (Fama 1970)

A crucial variation on this theme was necessary as well to account for the fact that markets bounce around irrationally day

to day. MPT concedes that stocks can be temporarily mispriced. These momentary lapses in the otherwise efficient markets give better-informed investors an opportunity to take advantage of temporary market anomalies and, brief as these anomalies might be, to buy or sell stocks before they revert to their true mean.

Simultaneously, William Sharpe, James Tobin and others were developing the Capital Asset Pricing Model, which provides a means of measuring expected returns on any given investment of a particular level of risk. This formula—and it is an algebraic formula—allows investors to measure the success of their investments. That is to say, it allows them to assess whether they have achieved an appropriate level of return for the level of risk they have taken. (Sharpe 1970)

Crucial to this theory is the definition of risk as the volatility of a stock's returns relative to the market. A stock is risky if its price goes up or down more than the price of its peers. This simple, narrow definition has led to the creation of innumerable benchmarks that define the markets against which investment success can be measured. More important, once this definition of success is accepted, it leads to the logical conclusion that the duty—the fiduciary duty—of an investor is to “beat the market,” that is, to achieve returns that are better than a benchmark given comparable levels of risk—or at least, to match the market's performance while minimizing expenses.

The final piece of the MPT theory was provided by Fischer Black and Myron Scholes when in 1973 they developed the formula—the Black-Scholes Model—to price options and other derivatives. This formula is crucial because it enabled investors to use derivatives in their portfolios for hedging—and hedging is the simplest means to control risk. This model made risk control, if not necessarily child's play for mere mortals, at least child's play for the highly quantitative mathematicians and scientists hired by Wall Street to show institutional investors how risk can be controlled. Derivatives are viewed as so foolproof a method of controlling risk that they are often referred to as “insurance.” (Black and Scholes 1973)

MODERN PORTFOLIO THEORY IN PRACTICE

Thus, all the elements of MPT were effectively in place by the mid-1970s, but it took some twenty years for its basic precepts to be widely disseminated and accepted among institutional investors. The conservative investor of the 1970s and 1980s, who had been told time and time again that one of the primary duties of a fiduciary was to avoid undue risk initially greeted MPT's brilliant academic proponents with doubt and skepticism. (Bernstein 2007)

The tide turned gradually in the 1980s and early 1990s, as the proponents of this theory received increasingly widespread recognition—many were eventually awarded a Nobel Prize in Economics¹—and as the technology and practical tools for measuring and controlling risk in investment portfolios were developed. But it wasn't until the late 1990s that the floodgates truly opened and fiduciaries in charge of institutional investments embraced MPT wholesale.

Not only did MPT free fiduciaries to invest in blue-chip stocks formerly deemed excessively risky, but it has further led to the embrace of the even more risky stocks of small firms and in the stocks on the exchanges of emerging markets around the world. Other asset classes, whatever their apparent risk, have also become fair game. Private equity, hedge funds, real estate, commodities, currencies—virtually any investment for which there is a market—are now not only available to fiduciaries, but frequently promoted as a necessary investment if they are to keep up with their peers and “beat the market.” Previously, the thought of investing in these asset classes was inconceivable—they were seen as reckless and imprudent—now they are a necessary tool for the sophisticated investor.

Once investors accept these four principles of MPT—1) that greater returns come from securities with greater risks; 2) that the risks of individual securities can be diversified away at the portfolio level; 3) that returns are most meaningfully measured against market benchmarks; and 4) that derivatives can be meaningfully priced—then fiduciaries are virtually forced to seek out risky products in

order to maximize their returns relative to their peers. That is why MPT has changed the face of investment. That is why investing today inevitably and dramatically increases the demand for risky products in the financial markets.

LIMITATIONS OF MODERN PORTFOLIO THEORY

Despite its current wide acceptance in the marketplace, MPT has severe limitations that are recognized by many mainstream investors. Here, for example, is what Gao Xiqing, president of the China Investment Corporation, one of the largest sovereign wealth funds in the world with some \$200 billion under management has to say about derivatives—one of the keystones of MPT. When James Fallows, interviewing him for *The Atlantic*, asked what he thought about these risky products, he answered:

“If you look at every one of these [derivative] products, they make sense. But in aggregate, they are bullshit. They are crap. They serve to cheat people.” (Fallows 2008)

This is a remarkably concise statement of three crucial and somewhat surprising points. First is the recognition that MPT when applied “locally”—that is, at the portfolio level (it is, after all, called *Modern Portfolio Theory*)—works. The second assertion, however, is counterintuitive: when the tools of MPT are widely used—that is to say, when these theories are put *systematically* into practice—they break down. Not only do these tools break down, but they can have a destructive impact on financial markets as a whole.

The third assertion is even more surprising. When Xiqing says derivatives “cheat” people, I believe he means that those who sell these products to institutional investors know full well that they don’t work if everyone uses them. They are not quite Ponzi schemes. They are not outright fraud. They are not illegal. But at crucial times they are ineffective, unreliable, and ultimately dangerous.

- The assertion that the specifics of MPT when applied generally are dangerous can be put several different ways.
- The more investors control *portfolio* risks, the greater the *market* risks.

- The more investors control *financial* risks, the greater the *societal and environmental* risks.

- The more investors *hedge* their portfolio bets, the more likely markets are to *go bust*. The more *convinced* investors are that they can control risk, the easier they are to *con*.

While it may seem intuitively self-evident that the more risky products investors demand, the more risky financial markets will become, MPT’s assertion that risk can be controlled cannot be casually dismissed. It is not by accident that MPT has become a fundamental and powerful principle of investment today. Its virtues must be fully appreciated and acknowledged before its weaknesses can be accurately analyzed.

MPT needs to be treated with respect not simply because many of its progenitors are Nobel Prize recipients—although that certainly commands respect— but because it has been so widely embraced by so many in powerful positions. Its virtues need to be understood not simply because it has contributed valuable insights to the art of investing, but because it has made many rich. Its weaknesses need to be carefully analyzed not simply because they are apparently inadequately recognized, but because it will take an alternative theory to replace this theory and reform current financial practices. Understanding where MPT is strong and where it is weak is the first step toward building a new theory.

Let’s be clear. MPT is an elegant, highly sophisticated set of principles and practices that accomplishes exactly what it sets out to do—control risk at a portfolio level. It can identify and measure risk (defined most simply as volatility) within a portfolio. It can adjust the level of that risk up or down throughout portfolios through a variety of sophisticated techniques. It can compare risks taken to returns achieved and determine if the returns are appropriate to that level of risk. It can measure and compare the capabilities of different managers with different investment styles in achieving these risk-adjusted returns. What’s more, it can apply these principles not just to stocks, but to virtually any asset class for which there is a developed market. In its

own terms, within the limited boundaries it sets for itself, MPT is a wonderful and undeniable success.²

Controlling risk at a portfolio level allows investors to hold an increased number of risky securities. The importance of this concept cannot be overstated. It is the path that leads to greater portfolio returns without greater portfolio risks. It is a theory and a practice that sound too good to be true. And unfortunately, at a market level, that is precisely the case.

Within the context of the financial markets, two things happen when substantial numbers of investors put this theory into practice. The first is that, as the demand for risky products increases, the overall quantity of risky products in the marketplace increases. The dangers of this increase are obscured by the fact that the risk of each portfolio, when viewed individually, is apparently negligible. (In Gao Xiquin's words, "If you look at every one of these products, they make sense.")

At a portfolio level, risk can be diversified away by purchasing securities or asset classes with countercyclical risks; by securitizing and redistributing risky securities to others, as in the case of speculative mortgages or commercial real estate loans; or by hedging against risks through the purchases of derivatives. Hedging in particular is the most elegant and most immediately effective way to deal with risk. That is why the notional value of derivatives in the marketplace stood at \$683 trillion as of June 2008. (Bank for International Settlements 2008)

Risky products designed to control risk—and risky debt (or, as it is often referred to in the financial community, "leverage") used to multiply the returns from these risky products—now dominate the investment landscape. When they start to fail, they fail spectacularly—as the current financial crises that have brought the largest, most sophisticated financial institutions in the world to their knees amply demonstrate. ("But in the aggregate, they are bullshit. They are crap.")

A second limitation of MPT is that its definition of risk is purely financial—that is to say, purely related to the price volatility

of a security relative to a benchmark index. By limiting the definition of risk to price volatility, MPT ignores the possibility that investments can either pose social and environmental risks or, because reward is the flip side of the risk coin, that investments can create social and environmental benefits.

Addressing this limitation forces us to recognize that the act of investing—the allocation of assets to specific institutions for specific purposes—creates products and services that impact society. This may sound like a self-evident truth, but it is one that is ignored by MPT. When investors pour money into the fossil fuel industry because a skyrocketing price of oil makes these companies momentarily profitable, MPT is of great help in measuring their financial returns versus their financial risks, but its formulas are of no help when it comes to, for example, the risks of climate change. On the flip side—that of measuring rewards—when investors allocate dollars to microlending programs that enhance the abilities of large segments of the world's population who have not previously had access to financial services to take at least tentative steps out of poverty, MPT has no calculus for these benefits to society.

In addition, for every investment made there is not only a potential societal risk and reward, but there is an opportunity cost for which there is no place in MPT's equations. Every dollar invested in oil companies is a dollar not invested in alternative energy. Every decision to invest in the development of high-cost and high-margin drugs to treat the chronic ills of the developed world is a decision not to invest in cures for malaria, sleeping-sickness, tuberculosis, AIDS, and other scourges of the developing world, not to mention vaccines.

Furthermore, MPT's ignorance of the societal and environmental implications of investment decisions also short-circuits debates about government's role in the creation of public goods. By focusing the concept of investment narrowly on market-based returns, MPT distracts attention from the contribution of investments provided through the governmental, quasigovernmental, and nonprofit sectors

in such areas as infrastructure, education, health care, housing, security, and other public goods. These goods are provided by non-market-based institutions precisely because the profit-motive is too short-sighted to allocate assets efficiently to these endeavors.

Put most simply—MPT fails to grapple with the complicated task of valuing the societal and environmental implications of investments, or even to give them the minimal respect of a passing glance.

The third weakness of MPT is that it fails to account for the possibility that markets may be in practice more dishonest and dangerous than they appear in theory. Nassim Nicholas Taleb, in his recent rant against current financial practices, tells a fictional tale about asking a professor what the odds of a coin that has been flipped 99 times and comes up heads each time would be of coming up heads again on the hundredth flip. The professor's answer is 50-50, because odds do not change simply because of chance variations. When he asks the same question to his street-wise friend Fat Tony, however, he gets a very different answer. Fat Tony would give you only a one-in-a-hundred odds of heads coming up the next time. Why? Because "The coin is clearly rigged. It can't be a fair game." (Taleb 2007)

The point of this story is that, while many of the risk-control techniques that have been sold to the financial community as insurance are theoretically sound, they don't work when widely used. What's worse, they can actually increase the chances of systemic collapse. For example, a set of hedging techniques were developed by two academics from the University of California, and widely marketed to the financial community in the early 1980s as "portfolio insurance." By early 1987, some \$70 billion in assets were theoretically insured against market declines of theoretically predictable magnitude. However, during the precipitous stock market crash of October of that year, these insurance policies not only failed to protect investors against large losses, but even contributed to the size and speed of the crash. The more investors used this insurance technique, the greater the chance

it would fail in exceptional circumstances. (Bernstein 2005; Bookstaber 2007)

The same is true for other derivatives. For example, credit default swaps (CDSs) are often billed as a form of insurance. This esoteric product, developed within the past decade to help lenders control the riskiness of their loans, had become so popular that as of 2008 some \$65 billion in notional assets were so insured. Here's one example of how a CDS might work. A bank lending \$10 million to a major U.S. corporation can enter into a credit default swap with a hedge fund. The hedge fund agrees to pay the bank the \$10 million if the corporation defaults on this loan any time within the next five years. In consideration for this service, the bank pays an "insurance" premium to the hedge fund each year, nominal if the chances of the corporation defaulting are minimal, or greater if the corporation is in financial difficulty.

If I'm a speculative and profit-minded banker, however, I might decide to enter into two or three CDSs for this loan, instead of just the one. After all, if the corporation defaults I am now not only protected against a loss, but stand to make a tidy profit. In fact, the next time that corporation comes to me for a loan, I might be willing to make one that is more risky at a higher interest rate because, using CDSs, I can make more money whether the loan is paid off or not.

The problem with this scenario—which one might view as a win/win for both the corporate community and the bank (corporations have access to risky loans, the banks are protected against default)—is that as more and more investors take out CDSs on risky loans the less likely the hedge funds or other third parties are to be able to pay if these corporations actually default. (Sarra 2008)

Michael Lewis has said of the credit default swap, "Call it insurance if you like, but it's not insurance most people know. It's more like buying fire insurance on your neighbor's house, possibly for many times the value of that house—from a company that probably doesn't have any real ability to pay you if someone sets fire to the whole neighborhood." (Lewis and Einhorn 2009)

This is true of many hedging techniques in the financial world. They are sold as

insurance, but they are no such thing. They work only if limited numbers of investors use them. As more investors pile onto the risk control techniques that have been developed to implement MPT, the more likely they are not to work. This is why Gao Xiquin says they “cheat people.”

IT TAKES AN ALTERNATIVE THEORY

MPT’s assertions about risk control are in many senses too good to be true. It is this attractiveness—the promise of a free lunch—that has made them so popular within the institutional investment community.

Investors always have a difficult time saying no to a good deal. Those that invested in an outright fraud, such as the Ponzi scheme run by Bernard Madoff, should have known better, should have done their due diligence more thoroughly, and should have seen that the promise of an unbroken series of positive returns could not be kept. The remedy for this kind of abuse is straightforward—as a fiduciary, do your job, don’t be seduced by fraud.

The problem posed by a world of institutional investors exercising their fiduciary duties under the precepts of MPT is more complicated. MPT is progress in the sense that it works for some investors all the time, and all investors some of the time, but it doesn’t work for all investors all the time—and it cannot. It cannot because it is the right answer to the wrong problem.

The question responsible investors should be asking themselves is not “How can risk be controlled at the portfolio level?” A better question for MPT to have addressed might have been “How can risk be controlled at the market level?” But even that question isn’t the right one—because risk cannot be controlled. Risk and speculation are part of the investment process and they can no more be eliminated from it than death can be eliminated from life.

It is as if fiduciaries were persuaded to enter a casino by some smart people with promises of a system to beat the house. Their initial allocation of assets to slot machines and the roulette wheel paid off handsomely, but now everyone seems to be using the system and it is breaking down. The problem

isn’t that these investors need a better system or even a better casino. What they need is a better theory of what to do with their investment funds to begin with.

In order to develop a theory that will compete successfully with the allures of MPT, the definition of the goal of investing must be changed. As long as success in investing is defined as controlling risk and beating price-based benchmarks, risk-taking and speculation will become irresistible to investors at some point and the markets will again find a way to fill that demand.

A theory of investment that can stand up to MPT will, I believe, relate success in investing to the social and environmental purposes for which particular investment asset classes were created.

After all, banks were not created so that depositors could earn interest. They were created to help support family-owned businesses and local economies. The purpose of issuing bonds is not to help citizens make money, but to fund the creation of public goods by governments acting in the public interest. Stock markets didn’t come into being so that investors could beat benchmarks, but to fund large-scale business enterprises providing useful products and profits for a community of stakeholders. A conception of success in investing solely as achieving better returns than those of your neighbor, no matter what the asset class in which you are investing, is limited, impoverished, and anemic.

An alternative to MPT and current financial practices needs to be built on a foundation of investments that maximize the societal goods they are best at creating. This necessitates understanding the risks involved—risks certainly cannot be ignored. More importantly, however, it involves understanding the specific needs that investments fill, the specific goods they create, and the specific rewards they bring to the society and environment in which we live.

Successful, effective investment is as much about particular rewards as it is about generalized returns. Understanding how investments relate to the asset classes through which they are made will promote a world of lesser risks—financial, societal,

and environmental—and greater long-term rewards. Defining the purpose of investment as achieving these ends is a short, quick road to creating the demand that will help stabilize financial markets and sustain long-term societal wealth.

The current economic crisis is a rare moment of opportunity to rethink the fundamental purpose of investing and to invent the tools that serve this purpose. The key to such rethinking is to define investment as a means to socially purposeful outcomes rather than a numbers game built on a societally inadequate theory. ■

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ENDNOTES

1 What is frequently referred to as the Nobel Prize in Economics is technically the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, which has been awarded annually since 1968 by the Swedish national bank. The Nobel Prizes for achievements in physics, chemistry, medicine, literature and for peace have been awarded by the Nobel Foundation since 1901.

2 MPT has also succeeded in converting investing from an art into a science, in the sense that investing

according to MPT has become a highly complicated, rigorously quantitative exercise for which physicists and mathematicians at the highest levels (the proverbial rocket scientists) are necessary. In making this conversion, MPT has achieved an underlying goal of taking personal preference and politics out of the investment process. The assertion that the personal and political should have no role in investment is not simply a practical consequence of MPT's rules, it is a dogmatic belief fundamental to its religion. This making over of investment into an impersonal science has the virtue of restraining conflicts of interest and opening up the investment world to merit and skills that are independent of class and entrenched power. Discussing the strengths and weaknesses of this other aspect of MPT, unrelated to its attitudes toward risk, is a separate topic not dealt with here.