Profiting with Synthetic Annuities
Options Strategies to Increase Yield and Control Portfolio Risk
Michael Lovelady
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# Contents

Preface ........................................ viii

Chapter 1  Introduction  ............................... 1

Chapter 2  Synthetic Annuity Design .................. 25

Chapter 3  Tracking Performance ...................... 53

Chapter 4  Covered Synthetic Annuities .............. 69

Chapter 5  Managing a Covered Synthetic Annuity .... 99

Chapter 6  Generalized Synthetic Annuities .......... 127

Chapter 7  Managing a Generalized SynA .......... 151

Chapter 8  Synthetic Annuities for High-Yielding Stocks 169

Chapter 9  Synthetic Annuities for the Bond Market . 183

Chapter 10 Synthetic Annuities for the Volatility Market 207

Index ........................................... 225
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Above all, for life itself, the Triune God of Creation—I always remember.
About the Author

**Michael Lovelady**, CFA, ASA, EA, is the investment strategist and portfolio manager for Oceans 4 Capital Group LLC. Michael designs and implements reduced-volatility and theta-generating hedge fund investment strategies. He developed the “synthetic annuity” (SynA) and uses it extensively in portfolio management.

Prior to founding Oceans 4, Michael worked as a consulting actuary for Towers Watson and PricewaterhouseCoopers. Much of his work was related to design issues at a time when many employers were moving away from traditional defined benefit plans. Michael worked with clients to consider and implement alternatives ranging from defined contribution to hybrid DB/DC plans. His experience with retirement income strategies, from both the liability and asset sides, has given him a unique perspective.

Michael has also been involved in teaching and creating new methods for making quantitative investing more accessible to students, trustees, and others without math or finance backgrounds. He developed the investment profile—a graphical representation of investments and the basis of a simplified option pricing model, and visually intuitive presentations of structured securities.

Michael has served various organizations, including Hughes Aircraft, Boeing, Global Santa Fe, Dresser Industries, the Screen Actors Guild, The Walt Disney Company, Hilton Hotels, CSC, and the Depository Trust Company. He is a CFA charterholder, an Associate of the Society of Actuaries, and an ERISA Enrolled Actuary. He currently lives in Los Angeles.
Preface

Profiting with Synthetic Annuities is about the use of options in investing and portfolio management. This book is written for experienced investors who are considering option strategies, for experienced option traders, and for institutional investors interested in alternative strategies.

Synthetic annuities are structured securities that use options and management rules to customize the risk/return profile of investments. Options are used to create a synthetic risk-smoothing mechanism and annuity-like cash flows. The management rules are designed to mitigate risk and maximize income over the long term. Together, the options structure and management rules address several emerging issues in investment management:

- The explicit use of hedging, insurance, and risk allocations in risk management instead of reliance on traditional portfolio models
- The desire for greater yields not related to market direction
- A recognition of behavioral influences on investor performance
- The growing importance of volatility-reducing quantitative methods, particularly those related to stock options
- The desire of many investors for annuity-like income streams.

Unlike many books on options and options strategies that deal mainly with tactical trading, Profiting with Synthetic Annuities is about the strategic use of options as integral components of investment portfolios. Synthetic annuities treat options as permanent components of an investment position. The goal is to create a hybrid architecture that balances the long-term investor perspective of mean-variance portfolios and the risk discipline of quantitative-based strategies.
In terms of presentation, Profiting with Synthetic Annuities uses a unique visual representation of structured securities. As a result, few formulas appear in the book; instead, graphical interpretations communicate the ideas and compare alternative investments.
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Introduction

If you Google the term *synthetic annuity*, you won’t find much. There is a reference to an obscure tax issue, as well as an article about design projects by several investment firms and insurers who believe the next Holy Grail is an annuity-like product for 401(k) plans that allows participants to convert highly volatile assets into defined benefit type payments.

According to the article, the product rollouts are moving slowly, despite the names behind them: Alliance Berstein, AXA, Barclays Global Investors, John Hancock, MetLife, and Prudential. The products, called hybrid 401(k)s, combine investment portfolios with annuity contracts. The annuities are purchased gradually over time. As plan participants get closer to retirement, the annuities become a larger portion of the total portfolio, providing more stability in later years. The idea behind the product is great, especially considering the massive shift from defined benefit (DB) plans (traditional pension plans) to defined contribution (DC) plans.

The problem is, few people are interested. Because interest rates are currently so low, annuity prices, which move in the opposite direction from interest rates, are some of the highest in two generations. And the hybrids won’t protect investors against market crashes, at least for the portfolio assets.¹

DC plans such as 401(k)s and IRAs already have about $3½ trillion in assets and are growing fast. Retirement experts believe the growing DC asset base and lack of protection against market risk is a
critical problem. The model of retirement income for the last generation involved three primary legs: defined benefit pension plans and Social Security for the two stable core elements, and 401(k) plans as a savings supplement. But with companies shutting down DB plans that leaves DC plans as the primary source of private retirement income, a role they were never really intended to play. It is estimated that in less than ten years, DC plans will have three times the assets of corporate pension plans. And the market risk of those assets will belong to the individual rather than being backstopped by corporate sponsorship.

The transfer of market risk is happening at a bad time. Low interest rates are limiting what can be done in new product design, 70 million Baby Boomers are getting ready to retire and there is no obvious successor to modern portfolio theory (MPT) for building risk-controlled portfolios.

Current low interest rates are also causing managers to rethink asset allocations. In most portfolios, reducing risk means allocating more of the portfolio to bonds, a traditionally less volatile asset class. But in today’s market, with interest rates at 50- to 60-year lows, high allocations to bonds might be the most risky thing an investor can do. At the short end of the yield curve the risk is created by near-zero yields, causing investors to fall behind accumulation goals. At the long end of the curve, the risk is that interest rates might start to go up, causing the value of the bonds to go down. Bond markets can experience the same kind of extended bear markets as equities. From the 1940s until the 1980s, Treasury bonds lost about two-thirds of their value as rates increased, making this one of the worst bear markets in any asset class. Warren Buffett said recently that bonds should come with a warning label.

In terms of building risk-controlled portfolios, MPT has failed repeatedly to protect investors during market crashes, which we saw again during the 2008-2009 financial crisis. Diversification, the main risk-management mechanism of MPT, breaks down during extreme events. With MPT behind both institutional portfolios and today’s
most popular retail products such as balanced mutual funds, target date and life-cycle plans, corporations and individuals are facing the same challenges. How to generate yield in a low interest rate environment? How to control volatility in the equity markets? And how to construct portfolios with limited downside?

These are industry-wide issues. The need to focus not only on accumulating wealth, but also on products that offer yield and protection against market risks has been identified as a major trend. In a 2010 report, The Research Foundation of the CFA Institute said “As the world moves from DB to DC plans, the financial services industry will have to meet two big challenges: to engineer products that offer some sort of downside protection and to reduce the overall cost to the beneficiary.”

Working within the constraints of low bond yields and traditional design tools is unlikely to produce anything investors will get excited about. That is why these are described as big challenges. They require moving outside the current design sets. The challenge of providing downside protection is not simple. There are theoretical and practical obstacles that have become engrained in investment practice. Reducing the overall cost to the beneficiary means finding higher yields than are currently available in the bond markets.

This book presents an approach to meeting these challenges by adding options to the design set—not as trading devices, but as structural long-term components of securities and portfolios. Options-based strategies are exciting today for many reasons. For active traders, options create incredible flexibility for taking advantage of tactical opportunities. For investors and portfolio managers, options create new yield and risk management capabilities. For asset managers and insurance companies designing products, options offer new ways of translating design principles into product offerings.

The next section looks at the design principles used for a fairly conservative, long-term investor form of synthetic annuity. The remainder of this chapter puts the two big challenges in historical and
theoretical context in order to understand why these problems have persisted for so long and why it is difficult to find solutions.

What a Synthetic Annuity Is—and Is Not

Normally in finance, the term *synthetic* describes a look-alike security. For instance, if you want to create a stock position without holding stock, you buy a call option, sell a put option, and hold a specific bond. Because the payoff of this combination is the same as that of the stock, it is referred to as a synthetic stock.

The synthetic annuity described in this book, the SynA, is not a true synthetic in that sense. It is not designed to replicate the guaranteed cash flows of a simple annuity, although it does have features similar to those of an equity-indexed annuity, and it attempts to accomplish some of the same objectives as the hybrid 401(k). Instead of looking at the SynA as, well, a synthetic annuity, I view it more as a style of investing that reflects the following beliefs:

- Market volatility is damaging to investment results; having a mechanism other than diversification alone for managing it is important.
- Dividends have played a critical role in total returns; there are effective ways to increase them for dividend-paying stocks and manufacture them for non-dividend-paying stocks.
- Current methods of *measuring* risk, such as backward-looking volatility of returns, are limited. Real-time and forward-looking measures are needed to dynamically *manage* risk.
- Risk allocations and risk budgeting offer new ways to limit losses by including elements of hedging and insurance.
- Behavioral finance is useful in recognizing behavioral influences on decision-making and the value we place on investment outcomes.
By using options in combination with underlying securities, you can emphasize any or all of these objectives to create SynAs ranging from conservative to aggressive. And you will be able to quantify exactly how much volatility is in the position, how much current income is being generated, and how stable the position is.

In its most simple form, a SynA translates beliefs and objectives into investable securities. In its generalized form, it can be used to encompass almost any options strategy and simplify them into basic metrics. Rather than having to think about many different strategies, SynAs use a common language of payback periods, market exposure and stability, the properties that are common to all structured securities.

**Background**

In 1987, I went to work as a pension actuary for consulting firm Towers Perrin (now Towers Watson). While I was still finding my way to the office coffee machine, my newly assigned client lost $1 billion in pension assets in one day. It was October 19, 1987, Black Monday.

After Black Monday, everyone began talking about risk management. On the institutional side, portfolios were hard hit just when new accounting standards required that pension plans be reflected in corporate earnings. Some of the discussion was on practical ways to immunize corporate earnings from the negative impacts of pension asset declines. But a lot of the discussion was about MPT and the most common portfolio structures, mean-variance-optimized (MVO) portfolios.

In an investigation into the causes of the 1987 crash, much of the blame was aimed at Leland O’Brien and Rubinstein (LOR), the inventors of portfolio insurance, a product designed to reduce the risk in pension and other institutional funds. LOR was accused of contributing to the crash with program trading that reduced exposure
to assets as those assets declined in value. The idea was good, but in execution, it created a cycle of selling that couldn’t be stopped once it got started. Because the bull market that began in 1982 was still intact and the issues were more technical than structural, the market recovered quickly.

Portfolio insurance was part of a growing trend toward hedging market risk. There also seemed to be a growing division between those who thought MVO was still the best way to structure portfolios and those who saw a fatal flaw in the application of the theory. Proponents of MPT thought it could be fixed. They recommended some changes to improve the model, such as expanding the portfolio universe to include more asset types and geographies and improvements in the way correlation coefficients were calculated.

The critics disagreed. They pointed to past market crashes and said there was a clear history of correlation coefficients converging. They said that the diversification model breaks down under stress and, in market crashes, that “correlations go to one,” eliminating the benefits of diversification.

The 1997 Echo Crash and 1998 Asian Currency Crisis

Ten years after the 1987 crash, I started a hedge fund just before what was called the “echo crash.” On October 27, 1997, the Dow Jones Industrial Average fell 554 points, the largest point drop in the history of the index at the time.

This time, the macro economic story was more complicated. The market was already nervous about global issues such as the developing currency crisis in Asia and debt levels in Russia. In the United States, the beginning signs of structural issues were showing and nervousness about a possible inflection point in one of the longest-running bull markets in history. (The bull market started in 1982 with the Dow Jones Industrial Average at just over 800 and ran through January 2000, when it reached almost 12,000.)
The following year, 1998, Asia did in fact experience a currency crisis and Russia defaulted on its debt. The extent to which the U.S. markets were affected proved how interconnected the global economy had become. Also in 1998, a group of Nobel Prize winners and quantitative investors at Long Term Capital Management (LTCM) almost collapsed the U.S. financial system. I had been through the savings and loan crisis as a consultant, but LTCM was my first experience with a systemic crisis as an asset manager. The Federal Reserve eventually stepped in to coordinate a bailout that avoided a larger banking contagion.

The arguments over MPT and portfolio construction continued. In fund management, there were incremental changes. The methods used to optimize allocations and define efficient frontiers were evolving, and hedge funds were making their way into more institutional portfolios and gaining popularity as an asset class.

The 2000–2002 Internet Bubble Crash

The turbulence in 1997 and 1998 turned out to be just warm-ups to the real show that began in early 2000. From March 2000 until the third quarter of 2002, the S&P 500 fell 49%. That was good compared to the NASDAQ. It fell 78%.

In 1999, before the problems started, I had already begun using a volatility-reducing strategy. The 1998 market had convinced me to start experimenting with hedging and various sell disciplines. The problem I was having, along with a lot of other people, was not letting investment-oriented risk management transform into pure trading. Especially since my fund was heavily weighted in emerging technology companies.

In late 1999 and early 2000, I started getting defensive and announced to my clients that our portfolios were prepared for as much as a 30% decline. I underestimated. During the brutal months ahead, many of our investments lost 50%—some much more.
In the asset management industry, this period seemed to me to represent a turning point. The severity of the broad market decline, combined with what was going on in Japan where equity markets were entering a second decade of decline, would, I thought, cause a serious reevaluation of risk management practices. For me personally, it certainly did.

With regard to portfolio theory, the evolution continued with new innovations—global tactical asset allocation (GTAA), global dynamic asset allocation (GDAA), further expansion of the asset universe, newer ways of optimizing allocations and core-satellite separation. The same ideas were filtering down to the retail investor and 401(k) plans in the form of target date and life-cycle plans.

The critics repeated what they had been saying all along: The structure was broken, and no amount of “tortured re-optimization” and other fine-tuning would do anything to solve the problem. What happened in 2008 proved they were right.

**The 2008-2009 Global Financial Crisis**

From its peak in 2008 to March 2009, the S&P 500 index fell by 57%. After this event, the climate of critical review seemed to change. The damage from the crisis was so deep and so widespread, people were determined to look at the event more realistically. Lawrence Siegel wrote a guest editorial for the *Financial Analysts Journal* in 2010 called “Black Turkeys”:

Nassim Nicholas Taleb has an elegant explanation for the global financial crisis of 2007–2009. It was a black swan. A black swan is a very bad event that is not easily foreseeable—because prior examples of it are not in the historical data record—but that happens anyway. My explanation is more prosaic: the crisis was a black turkey, an event that is everywhere in the data—it happens all the time—but to which one is willfully blind.3
Siegel gave several examples of major asset classes that experienced severe bear markets. The Dow Jones Industrial Average dropped 89 percent from 1929 to 1932, Japanese stocks dropped 82 percent from 1990 through 2009, the NASDAQ dropped 78 percent from 2000 to 2002, UK equities dropped 74 percent from 1972 to 1974, and others. The one that surprised me most was the 67 percent decline in long US Treasury bonds between 1941 and 1981.

Looking at the S&P 500 index decline of 57% in historical context, Siegel said, “There is no mystery to be explained. Markets fluctuate, often violently, and sometimes assets are worth a fraction of what you paid for them.” Earlier, before the crisis, Reinhart and Rogoff (2008) had released their report on major financial crises in 66 countries over a period of 800 years and found an average equity market decline of 55%.4

As a fund manager, I knew part of the problem I was facing was the severity of asset declines, but another part involved psychological reactions to market ups-and-downs. I knew volatility was having a dramatic effect on fund performance. What I did not realize was the magnitude of what volatility was doing to individual investor returns.

The Effects of Volatility on Investor Returns

The mutual fund research group at Morningstar measures the impact of volatility on investor returns. They compare the performance of various funds to the performance of investors in those funds. The difference captures the cost to investors of volatility-related market timing. Table 1.1 shows the average cost for midcap growth and midcap value sectors, the CGM Focus Fund (highly volatile), and the T. Rowe Price Equity Income Fund (highly stable).
Table 1.1 Cost of Volatility

<table>
<thead>
<tr>
<th>Fund</th>
<th>Reported Return</th>
<th>Actual Return</th>
<th>Cost to Investor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-Cap</td>
<td>3.1%</td>
<td>0.2%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Mid-Cap Value</td>
<td>6.4%</td>
<td>2.3%</td>
<td>4.1%</td>
</tr>
<tr>
<td>T.Rowe Price Equity Income</td>
<td>2.1%</td>
<td>1.3%</td>
<td>0.8%</td>
</tr>
<tr>
<td>CGM Focus Fund</td>
<td>17.8%</td>
<td>-16.8%</td>
<td>34.6%</td>
</tr>
</tbody>
</table>

Annualized returns for the funds for the ten-year period ending July 2009 were compared to the actual returns of the average investor. Except for the Equity Income Fund, the average investor gave up most of the gains. In the case of the most volatile fund, the CGM Focus Fund, investors actually lost 16.8%, compared to a gain of 17.8% for the fund itself.5

The conclusion, consistent with behavioral finance, is that investors stay in less volatile funds, pocketing most of what the managers produce. The opposite is true for volatile funds: people jump into the funds during good times and bail out during bad times.

The same tendencies apply to investors managing individual securities and for anyone trying to impose risk controls such as drawdown limits on positions or portfolios. The more volatile the market, the more often defensive emotions and sell disciplines are triggered.

TrimTabs and others who keep track of money flows say that the real money is now going straight under the mattress. From January to November 2011, $889 billion went into savings and checking, with only $109 going into stock and bond funds. Many investors look at day-to-day volatility and decide they are just not interested.

**Revisiting Modern Portfolio Theory**

Modern portfolio theory is the dominant force in investing. It extends from simple statistical relationships to statements about the pricing of assets in the form of the Capital Asset Pricing Model (CAPM)
to methods for building portfolios. For institutions seeking to maximize gains for a given level of risk, mean-variance optimized (MVO) portfolios are the standard. In retail products, the same principles have filtered down into balanced mutual funds, life cycle and target date plans. It is hard to overstate the influence of MPT or its connection to deeply held beliefs about market behavior and prudent ways to invest.

But time after time, it fails to provide any real protection. After each new market crisis, no matter how disappointed we get, we always come back to it. Maybe because it is beautiful, it is everywhere and there is no obvious better choice.

In his book *Capital Ideas Evolving* (2007), Peter Bernstein talks about reliance on the CAPM as a paradox. He thinks the CAPM has turned into the most fascinating and influential of all the theoretical developments in investing today: “Yet repeated empirical tests of the CAPM, dating all the way back to the 1960s, have failed to demonstrate that the theoretical model works in practice.” In researching the book, Bernstein interviewed Markowitz to get an update on what he was working on. Markowitz told him, “You will be completely surprised if I tell you about my latest research.” Bernstein said, “He is no longer the same Harry Markowitz whose view [of securities] put Bill Sharpe to work on the [CAPM]. Markowitz has lost faith in what he terms the traditional neoclassical ‘equilibrium models.’”

A lot of people have lost faith. Richard Ennis, in his article “Parsimonious Asset Allocation,” wrote:

Over the past 25 years, institutional investors have become increasingly reliant on asset allocation models that use a complex set of assumptions about the future. … As a result, institutional investors of all types experienced losses far greater than the “worst-case” outcomes predicted by their asset allocation models. It is important to realize that, over time, asset-class return correlations are unstable—really unstable. … What good is a system of risk control that fails when you need it most?
Psychologically, it is hard to accept that a system that works so well 90% of the time is not going to help the other 10% of the time. Even if you accept that markets crash, that the declines are severe, and risk control fails, there is still the possibility that something was missed in execution or that next time will be different. To make progress, it is helpful to understand why the system breaks down. Otherwise, it is hard to know if and how to work with it. At this point, there is a great deal of research that fills in the details. It is widely known that severe markets events can cause all asset classes to decline at the same time, a form of contagion that eliminates any positive effect of diversification. Looking closer at this behavior, there are two related issues, implicit beta exposure and optimistic correlation matrix construction.

Martin Leibowitz, in his work with institutional investors, identified what he calls implicit beta exposure. He noticed that as endowments and others began to add alternative investments, the portfolios looked dramatically different from each other, but performed about the same. In trying to understand why these portfolios act like each other, and much like a traditional 60% equity/40% bond portfolio, he realized it is because so many assets are linked, either directly or indirectly, to the U.S. equity markets. Because of the linkage, many of the changes were having no real effect on the overall returns or risk measures.

Optimistic correlation matrix construction refers to the use of “average” correlations between asset classes to estimate future losses rather than using the “stress” correlations that existed during prior market crashes. Average correlations may work well across market cycles, but it doesn’t make sense to use these same correlations to estimate the magnitude of losses in market crashes. Continuing to set risk policy using average correlations is something like building a house in an earthquake zone and assuming there will be no earthquakes.

But, regardless of the mechanics of the failure, the ability to accept that failure occurs is important to making a commitment to change. Sometimes, it is best just to see a flat statement. In the
monograph from The Research Foundation of the CFA Institute, *Investment Management after the Global Financial Crisis*, the limitations of MPT are stated bluntly. “MPT does not offer the promise of eliminating losses—even large losses—even under the most favorable assumptions.”

**Moving Forward**

It would seem that knowledge of the limitations and the empirical facts of the last decade would have forced change by now. But it hasn’t. An industry survey published in 2011 says that despite the renewed focus on risk management, a wide gap still exists between mean-variance and quantitative strategies.

Investment managers at financial institutions know, in principle, that basic mean-variance portfolio theory has its limits, but our findings clearly show that, in practice, mean-variance analysis is still the industry workhorse. Possibly to blame for this state of affairs is an absence of consensus on the most appropriate model.

If we cannot rely on current practice and there is no consensus on how to move forward, what is the next step? How do you frame the possibilities? In the end, maybe it is a matter of taking a step back and asking the fundamental questions. The most basic question is: as investors what do we want and what tradeoffs are we willing to make? One of the answers that I think frames the issue as well as any I have seen is from the Ennis article mentioned above.

Investors want three things. They want some downside protection. They want to capture the equity risk premium to the maximum extent consistent with their preference for downside protection. And most would also like to garner excess return (alpha), although we know that, by definition, only about half do so over any particular span of time.
I think he is exactly right. Downside protection will always be in demand. Equity risk premiums have historically been 2% to 3% over bond returns. Over long periods of time, this risk premium has been responsible for incredible wealth creation. And with research and other techniques, investors will always look for investments that will outperform market averages. Of course, different investors will put more or less weight on each objective. For example, institutional strategists may play more heavily in risk premiums. Aggressive traders will emphasize alpha and quantitative risk control, but the basic elements are there to describe a wide range of investor goals.

Taken together, the three objectives seem very reasonable. But in practice, it is hard to get them—at least, with any sizeable exposure to equities (and bonds too at this point).

Why is this? For one, there is a natural tradeoff between the goals of providing downside protection and capturing risk premiums. When I first started looking at this issue, I didn’t understand why it is so difficult to add a risk budget or drawdown limit to a diversification framework. At some point, the incompatibility began to dawn on me.

If you try to impose a drawdown limit, it interferes with equilibrium. If you rely on equilibrium, it is never obvious how much downside there is. A gap seems to exist between modern portfolio theory and related mean-variance portfolios—which are great at capturing risk premiums over the long term but lack a risk discipline—and quantitative strategies that have great risk disciplines but are not so good at capturing risk premiums.

The question is whether it is possible to bridge the gap and at what cost? And if you try to find a middle ground between premium capture and risk control, how do you do it?

Imagine you are a trustee of an endowment, and the fund is down 10% for the year. You were hoping for a return of 8%, so now you’re off almost 20% from where you expected to be. You may have to start looking at spending cuts. You know that if the fund drops another
10%, it will threaten core functions. If the fund drops another 20%, it is difficult to think about what will happen. What do you do? Do you sell assets now to slow the rate of decline? Or do you hold on and hope for a rebound?

Institutions normally have a policy statement to guide trustees through this decision. The policy statement is a strategic plan written in anticipation of market ups and downs. Most encourage riding out the rough times. As part of maintaining the strategic allocations between asset classes, most recommend adding to underperforming assets during a downturn. The plan realizes that rebalancing involves doing the opposite of what most people will feel like doing. For instance, if the equity market is declining, instead of selling equities into market weakness, the plan tells you to maintain the proportion of equities to fixed income. That means buying more equities. However, buying more equities actually accelerates the losses if the market continues to go down.

According to equilibrium models, this makes sense because it is the best way to capture risk premiums. When the market recovers, or restores equilibrium between asset class valuations, you make more by having bought the cheaper asset. But it is not the best way to provide downside protection.

**Objective 1. Some Downside Protection**

The Harvard experience during the financial crisis is particularly important, as described in this press release:

**Harvard Endowment Hires New Chief Investment Officer, January 14, 2010**

Boston – Harvard University named a new CIO after the school’s endowment dropped $26 billion last year. Long admired for its investment savvy, Harvard was forced into heavy cost cuts and interrupted its high-profile campus expansion.
I think what happened at Harvard happened to a lot of institutions and people. At some point, losses get too heavy and there is nothing you can do other than start hoping for a turnaround. Once you are down 20%, it seems too late to start managing risk. Instead, you start reminding yourself of deeply held beliefs such as “don’t time the market,” “buy on the dips,” and “think long-term.”

Harvard has been at the center of academic theory and practical implementation. It has taken modern portfolio theory to its limits, and most of the time it has paid off. However, sometimes the only way to avoid a 30% loss is to start doing something about it when you are only down 5% or 10%.

**Objective 2. Capture Risk Premiums in Line with Risk Tolerance**

In trying to explain why many portfolios lost more than the worst-case outcomes predicted by asset allocation models, one researcher looked at how much risk is really in a mean-variance portfolio. He modeled portfolios under stress using a typical correlation matrix. Then he compared the predicted performance to the actual performance of these portfolios in market crashes. The two weren’t even close. So he tried it again, this time using a correlation matrix built from information about asset behavior during prior market crashes. This time, the results matched almost perfectly. The problem was the way the correlation matrix was estimated, using average rather than stress relationships.

Why doesn’t everybody use a correctly constructed matrix? Because it can mean cutting equity allocations by as much as 75%, and few funds are willing to do this. Especially now. Giving up the opportunity for equity risk premiums at a time when bonds are so highly priced might be more risky than doing nothing. If equity allocations are reduced, current low yields on fixed income will not support the promises of pension plans and other institutional sponsors that have assumed annual returns of 7% to 9% or the retirement income needs of many individuals.
**Objective 3. Some Alpha Opportunities**

Going after alpha opportunities is almost irresistible. The history of Wall Street is the history of story telling—whether it is an undervalued stock, a reversal in a trend, or a chart pattern—and nothing has changed. I love a good story too. It is part of being an investor and an optimist.

There are two interesting issues related to alpha. One, the Efficient Market Hypothesis (EMH), has been debated for decades. The other, idiosyncratic risk, seems to be fairly well accepted. EMH addresses the effectiveness of active management such as stock picking, compared to broad asset class exposure. In other words alpha versus beta. Probably more research has been done and material written on this topic than any other in investing. Tests of the EMH going back over 30 years have consistently shown that beating the market with either technical or fundamental analysis is tough. And if current hiring trends are any indication, then EMH is winning. Stock pickers are out; asset allocators are in. As Ennis says, it only works about half the time for most of us.

Idiosyncratic risk is non-diversified risk. The issue is whether or not you can expect to be compensated for taking this kind of risk. It is generally thought that the market only provides an extra return for taking an extra risk if that particular risk cannot be diversified away. If you want a credit risk premium, the market should reward you if you buy a diversified portfolio of bonds. However, it is not obligated to reward you if you buy one bond that turns out to be bad, such as Enron, Worldcom, or Greece. If you want an equity risk premium, the market should reward you if you have broad exposure to equities, not if you buy an individual company stock. In other words, theoretically compensated risk is diversified risk or beta risk, not alpha. Traders and quantitative investors understand this and therefore don’t rely on equilibrium or mean-reversion to protect them from losses. Because the nature of the risk is different, it makes sense to manage it differently as well.
The first step in moving forward for any investor is to find the right balance between seeking downside protection, capturing risk premiums and finding alpha opportunities. After finding a balance, strategy implementation is really an engineering problem. That is, the decisions about the kinds of investments most likely to meet the objectives and the trading rules to manage them. And to realize that in practice, the objectives often compete with each other.

For instance, if you want downside protection, you could interfere with the capture of risk premiums. If you want alpha, you shouldn’t expect to capture risk premiums or find any protection from equilibrium. If you want to capture risk premiums, how much downside protection can you really expect?

In terms of existing portfolio construction, I am not suggesting diversification models don’t add value—just to recognize what they can and cannot do. The most important decision is when and how to begin managing losses or mitigating volatility. If you don’t want to accept the possibility of large losses, then the strategy needs to manage risk actively so that losses are addressed earlier rather than later.

There are two ways of doing this. The first is to stay within the MPT/MVO framework by adding risk management features other than diversification (such as hedging and insurance) and to find securities that add real diversification when you need it most—during market crashes. The second is to go outside the diversification framework to add more dynamic quantitative elements.

**How Do SynAs Fit into the Picture?**

As structured securities, SynAs start by creating a flexible framework. As part of the framework, options create new design possibilities and help to bridge the gap between mean-variance portfolios and quantitatively managed portfolios. The options, together with management rules, act by:
Increasing yield

Adding hedging

Adding insurance

Adding a mechanism for risk budgeting

Allowing for separate alpha and beta applications

# Increasing Yield

With stocks, bonds, and cash, there are three sources of investment returns: interest, dividends, and capital gains. Adding options to a security structure creates a fourth source: theta. Compared to interest and dividends, theta, the time decay of options, is by far the most powerful source of yield. It is perhaps the most promising building block of new products.

# Adding Hedging to Risk Management

A SynA adds hedging through an options wrapper on individual securities, normally short call options and long put options. The options create a market or delta hedge, making the security less volatile. This means that, in addition to the normal portfolio diversification (accomplished by asset allocation and security selection), the security itself has a new element of diversification.

The long underlying position has an almost perfect negative correlation with the options. So regardless of how the security behaves with regard to the other securities in the portfolio, the security is diversified against itself. Even under extreme conditions, this element of diversification will not break down. The idea is to strengthen the diversification features of MVO without interfering with the equilibrium features responsible for risk premiums unless it is necessary. At the portfolio level (described in Chapter 10), a volatility asset class SynA adds another effective diversifier, again within the framework of MVO.
Hedging can be used as a strategic (long-term) element of the position or for tactical (short-term) trading opportunities. When hedging is used strategically, it lowers the volatility of the position—and low-volatility investing is more efficient, often generating 40 to 60 basis points of improved return without a corresponding increase in risk.11

**Adding Insurance to Risk Management**

A typical SynA reinvests a portion of call option proceeds to purchase puts. Puts are a simple and effective way to add insurance protection to an investment position. The initial setup of a SynA specifies a minimum number of puts. Going forward, the long-term management rules encourage opportunistic financing of additional put protection so that, over time, net principle is fully protected.

**Adding Risk Budgeting or Risk Allocations**

Risk budgeting, or risk allocations, is an extra layer of risk control. A risk budget might be set at 5% to 20% of the amount invested. In traditional portfolios in which the only decisions are buy, sell, or hold, if the risk budget is exceeded, it means that the position is sold to prevent further loss. In the case of SynAs, risk budgets are used to trigger a reduction in the net cost basis rather than a sell of the position itself. This softer form of risk budgeting adds a stronger risk-management mechanism than available with MVO, but also helps to preserve long-term holdings and cut down on portfolio turnover.

**Allowing for Separate Alpha and Beta Applications**

Many institutional portfolios are separated into alpha and beta. Individuals often do the same, treating retirement accounts (beta) and trading accounts (alpha) differently. The beta portion of the portfolio usually contains broad asset class exposures, intended to produce income and capture risk premiums. The alpha portion represents
more targeted investments to take advantage of perceived market inefficiency, or trades based on fundamental or technical analysis.

SynAs can be used in the alpha portion or the beta portion of a portfolio, or both. And they can be customized for each position depending on your views of mean-reversion or minimum values.

In the beta portion of the portfolio, you have the choice of when and by how much to apply risk budgets. Hopefully, the additional diversifiers within the MVO framework make it unnecessary to apply absolute risk controls to the beta portion of the portfolio in most market conditions. In the alpha portion, all the risk-control elements, including risk budgeting, are appropriate. As mentioned earlier, in the pursuit for alpha, there is no theoretical reason to expect risk premiums, so it is important to have the ability to dynamically adjust market exposure. Risk budgeting controls single-security idiosyncratic risk more tightly.

In summary, a SynA works across all three dimensions of risk management: diversification, hedging and insurance. It starts by creating a level of delta hedging on an investment position that makes it less volatile. It also uses a minimum level of insurance to slow down losses during price declines. Then, if necessary, management rules call for adjustments to invested capital to maintain risk budgets. The idea is to let the SynA operate within the Markowitz diversification framework as much as possible by adding diversification features that stand up under stress, and when necessary, beyond it, by adding dynamic hedging.

Reducing Risk, Seeking Returns, or Both?

Because I have talked so much about risk, I might have given the impression that a SynA is a defensive tool. It is, but my objective has always been offense, finding ways to increase returns. I have always thought that the better the risk control, the more opportunities you have to be aggressive.
In “A Qualified Commitment to DB Plans,” (2009) CFO Research Services surveyed plan sponsors of defined benefit plans on a number of topics related to risk management during the 2008–2009 financial crisis. The sponsors were asked, “Going forward, are you more focused on increasing investment returns or decreasing investment risks?” More than three-quarters answered: reducing risk. An interesting aspect of the survey was that the companies that were more interested in increasing returns also had the most sophisticated approach to risk management:

The deep economic recession has battered most defined benefit (DB) pension plans, and many sponsors have been scrambling to address risk. … Consistent with past studies, more than three-quarters of survey respondents say they will focus more on reducing risk than on seeking additional returns. However, those companies that are focused on seeking additional returns are far more likely—by a three-to-one ratio—to already use synthetic hedges than those companies focused more on reducing risk. One conclusion is that those seeking additional returns have already addressed important components of pension risk. To put it another way, reducing risk and seeking returns are not mutually exclusive.12

That is exactly the objective of a SynA: to be aggressive in seeking returns, and do it within a disciplined risk-management framework. To do that, a SynA creates a hybrid architecture that balances the long-term investor perspective of mean-variance portfolios and the risk discipline of quantitative-based strategies.

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Symbols

401(k) plans, 1

A

adjustments
  automatic, 99
  reversioning, 101-103
  security price interaction, 100-101
  trading, 103
CSynA’s
  automatic, 99-103
  cost basis, 104-106
  delta, 106-116
  tactical, 120-124
generalized SynA’s
  cost basis, 151-152
  delta, 152-153
  leverage, 153-158
allocated capital, 171
alpha, 19-21
  opportunities, 17-18
“Alpha Orbits,” 184
alternative SynA’s, 144
  negative delta, 149
  positive delta, 148
Apple, 47, 50
approval level, options, 127
Asian currency crisis (1998), 7
asset allocation models, 16
assets, volatility, 209-210

B

behavioral finance, 4
Benkli, Michael, 132
Bernstein, Peter, 11
beta, 20-21

Black, Fisher, 210
Black Monday (1987), 5
Black-Scholes option pricing formula, 29-31
bonds, 183
  adding yield, 191-192
  low yields, 183
  payback periods, 196
  prices, 195
  cycles, 183-184
  inflation, 194-195
  risks, 185-190
  stress testing, 192
Buffett, Warren, 2
Bullard, James, 199, 201-204
BuyWrite Index (BXM), 94-97

C

calculations, CSynA payback periods, 79-83
Callan Associates, BXM study, 96
call options
  call/put pairs, selling, 156-158
  covered, 27, 72-73
  CSynA’s, 83
  put-call parity, 146-148
call/put pairs, selling, 156-158
Capital Asset Pricing Model (CAPM), 10-11
Capital Ideas Evolving, 11
CAPM (Capital Asset Pricing Model), 10-11
Cherney, Nick, 212
Chesapeake Energy SynA payoff chart, 158-160
  concentrated stocks, 37-47
  contango, 212
  contingent CSynA’s, 85
Index

*cost basis adjustments, 54*
  - CSynA's, 104-106
  - generalized SynA's, 151-152
  - tracking template, 56-57
*cost basis rule, 151*
*covered call options, 69-73*
  - versus SynAs, 27
*covered percentage parameter (CSynA), 93*
*covered synthetic annuities (CSynA's). See CSynA's (covered synthetic annuities)*
*Cramer, Jim, 169*
*CSynA's (covered synthetic annuities), 69, 99, 127*
  - automatic adjustments, 99
    - *reverting, 101-103*
    - *security price interaction, 100-101*
    - *trading, 103*
  - building, 73-76, 79
  - call options, 83
  - contingent, 85
  - cost basis adjustments, 104-106
  - covered calls, 70-73
  - December roll forward, 124-126
  - Deere & Company, 73-88
  - delta adjustments, 106-108
    - *defensive, 109*
    - *offensive, 109-112*
    - *put protection, 112-116*
  - deltas
    - *long-term targets, 87-88*
    - *versus theta, 83-87*
  - dividends, 87
  - monthly roll forward, 116-118, 120
  - natural curve, 141-142
  - payback period, 79-83
  - *volatility, 124-126*
  - standard, 88-89, 93
  - *BXM (BuyWrite Index), 94-97*
  - *covered percentage, 93*
  - *fundamental/technical valuation, 90-91*
  - *lower delta adjustments, 93*
  - *maximum drawdown, 92*
  - *micro-efficient parameter, 91-92*
  - *minimum value, 91*
  - *momentum parameter, 91-92*
  - *parameters, 94-95*
  - *price-related delta, 92*
  - *reverting parameter, 91-92*
  - *upper delta adjustments, 93*
*stock-only, 85*
*strike prices, 83*
*tactical adjustments, 120-124*
*variation, 135*
*cycles, bond prices, 183-184*

D

*DB (defined benefit) plans, 1-2*
*DC (defined contribution) plans, 1-2*
*December roll forward, CSynA's, 124-126*
*Deere & Company*
  - CSynA example, 73-88
  - generalized SynA, 136-138
*defensive delta adjustments, CSynA's, 109*
*defined benefit (DB) plans, 1-2*
*defined contribution (DC) plans, 1-2*
*delta, 62-63*
  - call options, 70-72
  - CSynA's, 76-78, 85-87, 106-108
    - *defensive, 109*
    - *long-term targets, 87-88*
    - *offensive, 109-112*
    - *put protection, 112-116*
  - generalized SynA's, 152-153
  - SynA's, 171
  - targets, price-based, 161
*diversification, portfolios, 207-212*
*dividends, 4*
  - CSynA's, 87
  - ex-dividend dates, generalized
  - SynA's, 166
  - yields, 173-174
*dot.com bubble crash (2000-2002), 7-8*
*drawdown limits, 14*

E–F

*earnings reports, generalized*
  - SynA's, 165
*echo crash (1997), 6*
*Efficient Market Hypothesis (EMH), 17*
*Ennis, Richard, 11, 13*
*Enron, 17*
*equity risk premiums, 14*
*ETFs (exchange traded funds), 186*
*ex-dividend dates, generalized SynA's, 166*
Fidelity Magellan Fund, 169
fundamental/technical valuation high parameter (CSynA), 90-91
fundamental/technical valuation low parameter (CSynA), 90-91

G–H

gamma, 62-63
CSynA’s, 78
generalized SynA, 138-140
GDAAA (global dynamic asset allocation), 8
generalized SynAs, 127-133, 140-141
Deere & Company, 136-138
gamma, 138-140
managing, 151
 adjustment leverage, 153-158
cost basis adjustments, 151-152
delta adjustments, 152-153
earnings reports, 165
ex-dividend dates, 166
intrinsic value, 163-165
iron condor overlay, 162-163
mean reversion, 163-166
price-based delta targets, 161
price preferences, 158-161
theta-to-delta ratios, 167-168
trending triggers, 166
theta, 138-140
targets, 132-135
global dynamic asset allocation (GDAAA), 8
global financial crisis (2008-2009), 8
global tactical asset allocation (GTAA), 8
Greek, 53, 63
Gross, Bill, 194
growth stocks, 169
GTAA (global tactical asset allocation), 8
hedging, 19-20, 185
high-yielding stocks, 170
Hokenson, Richard, 199
hybrid 401(k) plans, 1

I

idiosyncratic risk, 17
implied volatility (VXX), 214
implied volatility (IV), investment profiles, 29-31
inflation, bond prices, 194-195
International Paper (IP), 169-171, 176-177, 180-182
Internet bubble crash (2000-2002), 7-8
intrinsic value, generalized SynA’s, 163-165
Intuitive Surgical (ISRG), 111
Investment Management after the Global Financial Crisis, 13
investment profiles, 25, 28-29
 adjusting for behavioral finance, 34, 37
assigning probabilities, 29-31
options, 32
probability distributions, 25, 29
reshaping, 128-141
stock-only position, 29
versus payoff curves, 25-26
investment thesis, strategy complements, 195-198
IP (International Paper), 169-172, 176-177, 180-182
IRAs (Individual Retirement Accounts), 1
iron condors, 162-163

J–K–L

Kawaller, Geremy, 212
Leibowitz, Martin, 12, 184, 196
Leland O’Brien and Rubinstein (LOR), 5
Level 1 options, 69
leverage
 adjustment leverage, generalized SynA’s, 153-158
theta, 182
Lloyd, William, 212
Long Term Capital Management (LTCM), 7
long-term management, SynA’s, 174-176
LOR (Leland O’Brien and Rubinstein), 5
lower delta adjustments parameter (CSynA), 93
LTCM (Long Term Capital Management), 7
Lynch, Peter, 169
M
macro-inefficiency, 196
Mad Money, 169
managing
CSynA’s, monthly roll forward, 116-120
generalized SynA’s, 151
adjustment leverage, 153-158
cost basis adjustments, 151-152
delta adjustments, 152-153
earnings reports, 165
ex-dividend dates, 166
intrinsic value, 163-165
iron condor overlay, 162-163
mean reversion, 163-166
price-based delta targets, 161
price preferences, 158-161
theta-to-delta ratios, 167-168
trending triggers, 166
SynA’s, long-term, 174-176
managing CSynA’s
automatic adjustments, 99
reverting, 101-103
security price interaction, 100-101
trading, 101-103
cost basis adjustments, 104-106
december roll forward, 124-126
delta adjustments, 106-108
defensive, 109
offensive, 109-112
put protection, 112-116

tactical adjustments, 120-124
markets, turbulent, 47-52
market volatility, 4
investor returns, 9-10
Markowitz, Harry, 11
maximum drawdown parameter (CSynA), 92
mean reversion, generalized SynA’s, 163-166
mean-variance-optimized (MVO) portfolios, 5, 11
micro-efficient parameter (CSynA), 91-92
minimum value parameter (CSynA), 91
modern portfolio theory (MPT), 2-7, 10, 13
momentum parameter (CSynA), 91-92
monthly roll forward, CSynA’s, 116-120
MPT (modern portfolio theory), 2-7, 10, 13
MVO (mean-variance-optimized) portfolios, 5, 11
N–O
negative delta SynA’s, 142-144
alternative form, 149
net options credit, 56
net options premium, 56
non-diversified risk, 17
offensive delta adjustments, CSynA’s, 109-112
options
approval level, 127
call, covered, 72-73
investment profiles, 32
Level 1, 69
prices, volatility, 218-220
security price, 70
selling, 105
Options Analysis Workspace (TradeStation), 58-66
P
parameters (CSynA’s), 89, 94-95
covered percentage, 93
fundamental/technical valuation high, 90-91
fundamental/technical valuation low, 90-91
lower delta adjustments, 93
maximum drawdown, 92
micro-efficient, 91-92
minimum value, 91
momentum, 91-92
price-related delta, 92
reverting, 91-92
upper delta adjustments, 93
“Parsimonious Asset Allocation,” 11
payback period
bonds, 196
CSynA’s, 79-83
volatility, 124-126
tracking template, 57-58
payoff chart, Chesapeake Energy SynA, 158-160
payoff curves versus investment profiles, 25-26
performance, tracking, 53-54, 66
tracking template, 54-58
TradeStation, 59-66
“Portfolio Applications for VIX-Based Instruments,” 212

portfolios
- diversification, volatility market, 207-212
- global dynamic asset allocation (GDAA), 8
- global tactical asset allocation (GTAA), 8
- insurance, 5-6
- mean-variance-optimized (MVO), 5, 11
- modern portfolio theory (MPT), 2-7, 10, 13
- volatility effects, 218-220

positions
- strategic versus tactical, 149-150
- theoretical, 54-63
- positive delta SynA’s, alternative form, 148
- price-related delta parameter (CSynA), 92
- prices
  - bonds, 195
  - cycles, 183-184
  - inflation, 194-195
  - options, volatility, 218-220
- probability distribution, investment profiles, 25, 29

Profiting with Iron Condors, 133
- projected payback period, tracking template, 57-58
- protective puts, 69
- put/call pairs, selling, 156-158
- put-call parity, 146-148
- put protection, financing, 112-116
  - call/put pairs, selling, 156-158
  - put-call parity, 146-148

Q-R

“Qualified Commitment to DB Plans, A,” 22

“Race to Zero, The,” 199
- random variables, 29
- ratios, theta-to-delta, generalized SynA’s, 167-168
- records, 64-66
- retirement accounts, 20-21
- returns, volatility, 9-10
- reverse SynA’s, 142-144
- reverting parameter (CSynA), 91-92

risk
- allocations, 4, 20
- bonds, 185-190
- budgeting, 4, 20
- idiosyncratic, 17
- management, 19-20
- measurements, 4
- non-diversified, 17
- reducing, 21-22
- tolerance, CSynA, 92

rolling out/up, 110

S
- Scholes, Myron, 210
- securities
  - automatic adjustments, 100-101
  - options, 70
  - structured, 25
- selling call/put pairs, 156-158
- “Seven Faces of the Peril,” 199-204
- Sharpe, Bill, 11
- Siegel, Lawrence, 8-9
- stability, generalized SynA’s, 138-140
- standard CSynA’s, 88-89, 93
- BXM (BuyWrite Index), 94-97
- covered percentage, 93
- fundamental/technical valuation, 90-91
- lower delta adjustments, 93
- maximum drawdown, 92
- minimum value, 91
- parameters, 91-95
- price-related delta, 92
- upper delta adjustments, 93
- stochastic math, 29
- stock-only CSynA’s, 85
- stock-only positions versus SynAs, 40-42
- stocks
  - concentrated, 37-47
  - growth, 169
  - high-yielding, 170
- strategic positions, versus tactical, 149-150
- strategies, investment thesis, 195-198
- stress testing
  - bonds, 192
  - volatility SynA’s, 218
- strike prices, CSynA’s, 83
- structured securities, 25
Tactical adjustments, CSynA’s, 120-124
Tactical positions versus strategic, 149-150
TBT (technical barriers to trade), 186-194
Theoretical positions, 54, 60-63
Theta, 63, 78, 85-87
Generalized SynA, 132-140
Leveraging, 182
Theta-to-delta ratios, generalized SynA’s, 167-168
Tracking performance, 53-54, 66
Tracking template, 54
Cost basis, 56
Example, 58
Projected payback period, 57
Trade triggers, 56
TradeStation, 58-66
Tracking template, 54
Cost basis, 56
Example, 58
Projected payback period, 57
Trade triggers, 56
TradeStation, 58-66

Trade triggers, tracking template, 56-58
Trading accounts, 20-21
Transactions, records, 64-66
Trending triggers, generalized SynA’s, 166
Turbulent markets, 47, 50-52

U–V
Upper delta adjustments parameter (CSynA), 93
Utility curve, 34, 37, 42
SynA, applying to, 44-45
Utility functions, 34, 37
Variables, random, 29
VIX
Over 40, building volatility SynA’s, 217-218
Under 20, building volatility SynA’s, 214-217
Volatility, 4
Implied volatility (IV), 29-31
Investor returns, 9-10
Option prices, 218-220
Payback periods, CSynA’s, 124-126
Portfolios, 218-220
Diversification, 207-212
Volatility market, 207
Volatility risk premiums (VRPs), 210-211
Volatility-squared SynA’s, 212-214
High VIX, 217-218
Low VIX, 214-217
Stress testing, 218
VXX, 220-221

W–Z
Whaley, Robert, 96
“Why Are Put Options So Expensive?,” 135
Worldcom, 17
Yields, 173-174
Bonds, 183
Adding, 191-192
Stress testing, 192
Generalized SynA’s, 138-140
Increasing, 19