Convertible Arbitrage

Insights and Techniques for Successful Hedging

NICK P. CALAMOS

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NICK P. CALAMOS
To my wife Kim, my parents Joan and Angelo, and my children, Zach, Katie, Kristie, and Cole
This book’s target audience includes beginner and intermediate convertible specialists, hedge fund consultants, and convertible securities traders. It should also be a useful handbook for retirement and endowment plan sponsors that invest in hedge funds and individual investors who would like to understand more about what their convertible hedge manager is doing and what the risks may be.

I want to thank John Calamos, Sr. for the opportunity he provided me 20 years ago to join Calamos Asset Management, which was then a small specialist convertible securities investment shop managing $35 million in client assets. Today, the firm has grown to become Calamos Investments, one of the largest convertible managers in the country as well as a respected growth-equity, convertible-arbitrage, and high-yield manager with more than $13 billion in assets under management. Over the years John has been a mentor and consultant to me in business as well as in my personal life. He has offered me many opportunities and challenges to grow professionally and his commitment to constant improvement and lifetime learning has been an example that I hope to pass on to my children. Put simply, John’s guidance has been instrumental in my career and provided the foundation for this book.

I also want to thank my wife Kim, as in all things over the past 22 years, for her love, patience, and support during the many weekends, evenings, and vacations spent in my office writing this book.

A number of colleagues at Calamos Investments have had a hand in the completion of this book. I want to thank Jeff Kelley who spent many hours editing and improving my rough draft. His hard work and talent allowed this book to progress quickly and provided much better flow than would otherwise have been the case. I also want to thank Marilyn Dale, who coordinated most of the communication and scheduling with the publisher, and kept me on schedule. Finally, I want to thank Tony Onorati and Chris Hartman who helped with many of the graphs and charts in the book and Jeff Scudieri who reviewed drafts and provided valuable feedback.
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There was a time when the word “arbitrage” brought to mind a picture of a mysterious realm in finance which few people seemed to be inclined or at least to have the knowledge to discuss. I knew in a general way that profits depended upon price differences, but I believed that it was with lightning speed at a nerve-racking pace that computations, purchases, and sales must be executed in order to reap a profit.

—Meyer H. Weinstein, Arbitrage in Securities

CONVERTIBLE ARBITRAGE: A BRIEF HISTORY

The practice of convertible arbitrage includes the traditional purchase of a convertible while shorting its underlying stock, but also includes warrant hedging, reverse hedging, capital structure arbitrage, and various other techniques that exploit the unique nature of the global convertible and warrant marketplace. While the quantitative modeling, arcane mathematics, and hedge fund strategies affiliated with such techniques may make the practice seem a symbol of the latest in financial innovation, it has actually been around for more than a century, practically since the launch of convertible securities. Convertible securities came into being as a way to make securities more attractive to investors. Convertible bonds are not new; issuers and investors have been using them since the 1800s. During the nineteenth century, the United States was what we would now classify as an emerging market. It was not easy to gain access to capital in a rapidly growing country. The convertible clause was added first to mortgage bonds to entice investors to finance the building of the railroads. The Chicago, Milwaukee & St. Paul Railway, for example, used many convertible issues for financing between
1860 and 1880. In 1896, that company had 12 separate convertible issues outstanding, most bearing a 7 percent coupon.

Convertible securities are relatively simple in concept: A convertible bond is a regular corporate bond that has the added feature of being converted into a fixed number of shares of common stock. Conversion terms and conditions are defined by the issuing corporation at issuance. (A convertible security may also be preferred stock, but convertibles are best understood by studying convertible bonds.) The actual terms can vary significantly, but the traditional convertible bond pays a fixed interest rate and has a fixed maturity date. The issuing company guarantees to pay the specified coupon interest, usually semiannually, and the par value, usually $1,000 per bond, upon maturity. Like other nonconvertible bonds, a corporation's failure to pay interest or principal when due results in the first step toward company bankruptcy. Therefore, convertible bonds share with nonconvertible bonds the feature that bond investors consider most precious: principal protection. Convertibles are senior to common stock but may be junior to other long-term debt instruments. Convertibles have one important feature that other corporate bonds do not have: At the holder's option, the bond can be exchanged for the underlying common stock of the company. This feature completely changes the investment characteristics of the bond, and is one of the characteristics that make convertible arbitrage possible.

Meyer Weinstein’s 1931 book, cited above, notes that with the advent of rights, warrant options, and convertible securities that began during the 1860s railroad consolidation, arbitrage in equivalent securities was born. By the 1920s, the practices and techniques established became the focus of Weinstein’s book; while rudimentary, they were effective. Most of the convertible, warrant, and rights arbitrage positions depicted in the book either offered discounts to parity at conversion, or were passive hedges without mathematical precision. Although lacking the exactitude required today, these hedges were driven by the same premise: to successfully exploit the non-linear relationship of the convertible with respect to the underlying stock:

If the price of the stock and the convertible security of a company are not rising and falling together, there is an opportunity for the arbitrageur to take a long position in the convertible security, and a short position in the stock into which the convertible security is convertible. When the convertible security is selling at a price close to its investment value, and the price of the stock into which it is convertible is not at a great discount, the arbitrageur may buy the convertible security and sell one-half of the stock short, leaving himself in a position of being theoretically long and short at the same time. In this form of arbitrage he is hedged against either a rise or
a fall of the stock, and any rise in the convertible security will be a profit. (Weinstein, *Arbitrage in Securities*, p. 151)

Weinstein is describing a classic convertible “market-neutral” hedge, still a cornerstone of contemporary convertible arbitrage practices. Without the benefit of option pricing models or financial calculators, however, the early years of arbitrage resembled more art than science. The author does not attempt to quantify investment values (fixed income components), and most hedging is based on shorting simply “one-quarter,” “one-half,” or “three-quarters” of the stock against the long convertible position. Since the same limits of precision applied to the whole marketplace, presumably greater inefficiencies still left room for successful arbitrage. Despite the simpler nature of the hedging described in this book written more than 70 years ago, it remains remarkably relevant to convertible arbitrage practiced today. The book ventured into some of the pitfalls and basic necessities, including margin, short interest rebates, trading, merger arbitrage, and even international securities arbitrage.

In 1967, Edward O. Thorp’s and Sheen T. Kassouf’s book, *Beat the Market*, became a must read for the convertible and warrant arbitrage community. This may be the first book that approached the convertible arbitrage market in a mathematical format. (Thorp had already made a name for himself as a master of quantitative systems a few years earlier, when his best-selling book, *Beat the Dealer*, introduced card counting to players of Black Jack.) The authors advanced the concept of breaking down convertibles into two components, bond and warrant, and quantifying each separately in order to identify hedging opportunities. Using their approach, they sought to identify a convertible when priced close to its value strictly as a fixed-income instrument (its investment value), while also selling close to its equity value (conversion value). Issues with these attributes tend to be undervalued and offer good downside protection (being priced close to their bond “floor”), along with a high degree of upside participation should the stock price rally. Not content with the returns of a market-neutral strategy, Thorp and Kassouf also looked for the opposite hedge opportunity by identifying overpriced issues and applying a ratio hedge (a strategy to be discussed in Chapter 9). The authors’ portrayals of their successes in ratio and reverse hedging thus promoted using mathematical formats well beyond Weinstein’s less precise market neutral hedges, and signaled the beginnings of the complex quantitative modeling techniques that make up the toolbox of the modern convertible arbitrageur.

John Calamos’ book, *Convertible Securities*, 1985, was the first complete book on convertibles and included option price theory applied to convertible valuation as well as many convertible hedging techniques.

Moving from the conceptual breakthrough of separately valuing a convertible’s bond and option components to the current state of convertible
arbitrage, the range of opportunities is clearly wider than at any time in the past, due largely to the rapid growth in the global convertible market, augmented by improvements in technology, financial models, innovative derivative products, and global information flows. With this unprecedented breadth in the opportunity set comes unprecedented complexity, competition, and even new kinds of risks. During this same period, hedge funds have both benefited from and contributed to the growth of convertible arbitrage: As the benefits of the asset class have become more apparent to issuers and to investors, issuance and liquidity have grown exponentially, with hedge funds providing a large role in demand. Typically, most investors who gain access to the convertible arbitrage arena do so through hedge funds.

Although A.W. Jones founded the first hedge fund in 1949, the concept remained virtually unknown until 1966, when Fortune magazine highlighted Jones’s investment feats. The hedge fund “industry” sprouted up in the next few years as a number of investors (including Warren Buffett) delved into hedging techniques. (The timing of this first wave of hedge funds corresponds with the publication of Beat the Market, and is another example of the emergence of quantitative analysis, which began its dramatic, ongoing influence on the investment community.) During the 1970s, the macro investment hedge funds popularized by George Soros made large bets regarding currency, bond, equity, and commodity markets across the globe. These funds were not necessarily hedged nor were they considered market neutral. The bull market of the 1980s and 1990s helped fuel the hedge fund industry’s growth as investors looked for even better returns or non-correlated return profiles.

The 1990s produced the hedge fund industry’s greatest growth, as it moved from the margins to the mainstream, at least among high-net-worth circles. The globalization of the marketplace, combined with the tremendous wealth creation and technological progress during that decade, all fed the growth of the hedge fund industry. The hedge fund industry today includes funds that specialize in one hedge strategy as well as funds of funds that include a full spectrum of hedge fund strategies. According to Hedge Fund Research Inc., the hedge fund universe was estimated to include less than 200 funds with approximately $20 billion in assets in 1990; by 2000, over 4,500 funds existed with nearly $500 billion in assets—not including leverage. The assets employed in convertible arbitrage strategies have also grown dramatically. According to Tremont Advisors, assets in convertible arbitrage have increased 25-fold over the past nine years. See Figure 1.1.

The hedge fund universe can be roughly divided into two camps: directional strategies that participate in market movements, and non-directional strategies, whose returns are for the most part unaffected by broad market moves. Convertible arbitrage is placed in this second group, along with
Convertible Arbitrage: An Overview

Tremont Advisers, Inc.
555 Theodore Fremd Ave.
Rye, New York 10580
T 914 925 1140

Total Asset History
December 1994 – December 2002

<table>
<thead>
<tr>
<th></th>
<th>Dec-94</th>
<th>Dec-95</th>
<th>Dec-96</th>
<th>Dec-97</th>
<th>Dec-98</th>
<th>Dec-99</th>
<th>Dec-00</th>
<th>Dec-01</th>
<th>Dec-02</th>
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<tr>
<td>Total assets</td>
<td>$798</td>
<td>$1,232</td>
<td>$2,727</td>
<td>$5,276</td>
<td>$6,861</td>
<td>$8,486</td>
<td>$11,912</td>
<td>$20,725</td>
<td>$25,647</td>
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<tr>
<td>Asset flows</td>
<td>$14</td>
<td>$240</td>
<td>$1,188</td>
<td>$1,952</td>
<td>$1,268</td>
<td>$307</td>
<td>$1,698</td>
<td>$7,100</td>
<td>$3,150</td>
</tr>
<tr>
<td>% change</td>
<td>0.0%</td>
<td>161.4%</td>
<td>395.0%</td>
<td>64.3%</td>
<td>-35.0%</td>
<td>-75.8%</td>
<td>453.1%</td>
<td>318.1%</td>
<td>-55.6%</td>
</tr>
</tbody>
</table>

Convertible Arbitrage Market Value
From Dec-94 through Dec-02

![Graph showing convertible arbitrage market value and asset flows]

Source: Tremont Advisers, Inc, used with permission.

**FIGURE 1.1** Convertible Arbitrage Market Value.

Other arbitrage practices that tend to gain more investor attention during sideways or declining markets. For example, during the corporate-scandal-ridden second quarter of 2002, more than half of all new hedge fund inflows went to either equity or convertible arbitrage strategies, according to Tremont Advisors Research. The following list contains the various hedge fund strategies common in the hedge fund universe, divided according to directional and non-directional strategies.
Directional Strategies

1. Global macro—invests in global markets emphasizing macroeconomic changes.
2. Equity (non-hedged)—long only equity with manager’s specialty focus including value stocks, growth stocks, or sector/industry.
3. Short only—short sells equity for companies that are overvalued.
4. Emerging market—invest in global emerging market countries’ debt and/or equity securities.
5. Distressed security—invest in companies that are bankrupt or undergoing reorganization.

Non-Directional Strategies

6. Convertible arbitrage—purchases long convertible securities and shorts the underlying stock with very low equity exposure.
7. Merger arbitrage—generally invests long in the stocks of companies that are being acquired while shorting the stock of the acquiring company.
8. Equity market neutral—long equity and short equity with total net exposure of near zero.
9. Fixed-income arbitrage—includes arbitrage in fixed-income securities, including corporate bonds, government bonds, mortgage-backed bonds, futures, and options. The hedging includes yield curve arbitrage, relative value trades, and swaps.
10. Relative value arbitrage—arbitrage in related securities that temporarily diverge from their expected value or relationship.

WHY HEDGE WITH CONVERTIBLES?

Convertible securities are hybrid issues that have fixed-income and equity characteristics. Convertible arbitrage is popular because of the relatively predictable hedge that can be established between the underlying common stock and the convertible. Convertible arbitrage is often considered a relative-value strategy because convertible arbitrage funds often establish a market-neutral profile with very little correlation to the equity markets. The profit potential is largely a function of relative price inefficiencies between the convertible and common stock along with the series of cash flows derived from the hedge. However, many other techniques are employed that not only rely on the predictability of the relationship between the convertible and its underlying stock but also exploit the convexity of the security as well as the arbitrageur’s other expertise. In fact, convertible hedging should be considered a relative-value strategy on the downside because the hedge is less precise.
and the price inefficiencies are greater, but the value of the short stock and long convertible positions are dependent on each other to varying degrees. While on the upside (when the convertible price is greater than 120 percent of par), the strategy should be considered convergence hedging because of the clear convergence of the convertible and underlying stock.

CONVERTIBLE ARBITRAGE PERFORMANCE

As shown in the list above, the success and dramatic growth in hedge funds over the past decade have been mirrored in the convertible-hedge fund field, and many hedge funds utilize convertible arbitrage techniques. The popularity of convertible arbitrage is attributable to its high risk-adjusted returns with a low degree of equity risk and low correlation to both equity and bond markets.

The performance histories of three well-known convertible arbitrage indexes, each of which includes various managers employing various degrees of leverage and hedging techniques, illustrate the benefits of the strategy. See Table 1.1. The indexes (HFR, CSFB/Tremont, and Hennessee) demonstrate a much lower volatility level (3.5 percent–5.2 percent annual standard deviation) than the global equity index MSCI World (14.1 percent) or the S&P 500 (13.7 percent). More importantly, the Sharpe ratio indicates a much better risk-reward trade-off than the equity markets: HFR’s index posts a Sharpe ratio of 1.96, while the Hennessee index comes in at 1.36. Both of these compare very favorably to the 0.48 Sharpe ratios for the MSCI World index, and the 0.97 for the S&P 500. Furthermore, the convertible arbitrage indexes showed more consistent returns with a smoother wealth-creating process. The equity markets posted negative returns in 32 percent to 36 percent of the months over the 124-month period, while the convertible arbitrage indexes posted negative returns in only 13 percent to 18 percent of the months.

The convertible arbitrage indexes show remarkably low equity sensitivity (Beta) and equity correlations. See Table 1.2. The betas compared to the MSCI World index are only in the range of 0.04 to 0.09, meaning that only 4 percent to 9 percent of the volatility in returns of the hedge indexes can be explained by the changes in the world equity markets. The return distribution has a slight negative skew and the positive kurtosis indicates that the distribution also demonstrates a high degree of peakedness relative to a normal distribution and therefore a tighter distribution of returns is present. The low beta and correlation indicate that the source of returns in convertible arbitrage investing is not a function of taking equity market risks. Obviously, the positive alphas generated by the convertible arbitrage indexes are desirable,
## TABLE 1.1 Convertible Arbitrage Risk and Return

<table>
<thead>
<tr>
<th></th>
<th># of Monthly Returns</th>
<th>Annual Returns (%)</th>
<th>Volatility Annual (%)</th>
<th>Sharpe Ratio</th>
<th>Worst 1-Month Return (%)</th>
<th>Negative Months</th>
<th>Worst 1-Year Return (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P 500 (total return)</td>
<td>124</td>
<td>18.3</td>
<td>13.7</td>
<td>0.97</td>
<td>-14.5</td>
<td>32</td>
<td>-3.1</td>
</tr>
<tr>
<td>MSCI World (total return)</td>
<td>124</td>
<td>11.7</td>
<td>14.1</td>
<td>0.48</td>
<td>-13.3</td>
<td>36</td>
<td>-16.5</td>
</tr>
<tr>
<td>MSCI Europe (total return)</td>
<td>124</td>
<td>13.5</td>
<td>14.7</td>
<td>0.58</td>
<td>-12.6</td>
<td>34</td>
<td>-12.1</td>
</tr>
<tr>
<td>HFRI Convertible Arbitrage Index</td>
<td>124</td>
<td>11.9</td>
<td>3.5</td>
<td>1.96</td>
<td>-3.2</td>
<td>13</td>
<td>-3.8</td>
</tr>
<tr>
<td>Hennessee HF Index—Convertible Arbitrage</td>
<td>88</td>
<td>10.1</td>
<td>3.7</td>
<td>1.36</td>
<td>-3.3</td>
<td>14</td>
<td>-7.1</td>
</tr>
<tr>
<td>CSFB/Tremont Convertible Arbitrage Index</td>
<td>76</td>
<td>9.3</td>
<td>5.2</td>
<td>0.83</td>
<td>-4.7</td>
<td>18</td>
<td>-9.0</td>
</tr>
</tbody>
</table>

*Source: HFR, Hennessee, CSFB/Tremont, Datastream, UBS Warburg calculations, period ending April 2000.*
<table>
<thead>
<tr>
<th></th>
<th>Alpha to MSCI World</th>
<th>Beta to MSCI World</th>
<th>Skew</th>
<th>Excess Kurtosis</th>
<th>Correlation MSCI World</th>
<th>JPM Global Bonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFRI Convertible Arbitrage Index</td>
<td>0.86</td>
<td>0.08</td>
<td>−1.52</td>
<td>3.54</td>
<td>0.330</td>
<td>−0.004</td>
</tr>
<tr>
<td>Hennessee HF Index—Convertible Arbitrage</td>
<td>0.68</td>
<td>0.09</td>
<td>−1.23</td>
<td>3.17</td>
<td>0.308</td>
<td>−0.058</td>
</tr>
<tr>
<td>CSFB/Tremont Convertible Arbitrage</td>
<td>0.71</td>
<td>0.06</td>
<td>−1.66</td>
<td>4.08</td>
<td>0.146</td>
<td>−0.252</td>
</tr>
<tr>
<td>EACM Relative-value Convertible Hedge</td>
<td>0.82</td>
<td>0.04</td>
<td>−1.56</td>
<td>4.46</td>
<td>0.183</td>
<td>−0.457</td>
</tr>
</tbody>
</table>

Source: HFR, Hennessee, CSFB/Tremont, Evaluation Assoc., Datastream, UBS Warburg calculations, period ending April 2000.
but the low beta, low correlation to the debt and equity markets, along with the high Sharpe ratio makes the case very compelling. In fact, the returns are equity-like while the volatility levels are below that of the bond market. It is clear why convertible arbitrage has grown so dramatically in the past decade.

The Capital Market Line (CML) in Figure 1.2 indicates in yet another way the attractive risk-reward tradeoff produced by convertible hedge investing over the 1990s. The CML is used to demonstrate the risk premium assumed in the Capital Asset Pricing Model, or CAPM, and illustrates the expected rates of return of a particular investment based on its beta and in relation to the risk-free rate of return. Here, we see not only the dramatically lower risk than that of the equity market, but also that the annualized returns are well above the expected return implied by the risk premium. In fact, a full 85 percent of the range of distribution lies above the CML. Clearly, over the long term convertible arbitrage has offered an exceptional financial market investment opportunity.

Our experience at Calamos Investments, with convertible arbitrage can be seen in Figures 1.3 and 1.4. The low correlation with the stock and bond markets produces a significant reduction in overall portfolio risk—without sacrificing any return. In fact, this non-levered convertible arbitrage fund has produced returns that have beat the equity market since 1995 with nearly one-quarter of the volatility. The annual returns can also be seen with the

**FIGURE 1.2** Capital Market Line (CML) and Potential Return Distributions.
Convertible Arbitrage: An Overview

January 1, 1995 through December 31, 2002

$2.76
$1.76
$4.00
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00

CAM Market Neutral Fund Strategy
S&P 500 Index

Annualized return: 10.83%
Standard deviation: 14.96%

Annualized return: 11.56%
Standard deviation: 4.42%

FIGURE 1.3 Growth of $1.00: Calamos Market Neutral Fund Strategy versus the S&P 500 Index.

FIGURE 1.4 Distribution Comparison of Annual Calendar Returns: Calamos Market Neutral Fund Strategy versus the S&P 500 Index.
bar chart once again indicating a consistent return profile. See Figure 1.4. The smoother wealth creation process created by blending convertible arbitrage into the asset mix moves investors into the coveted northwest quadrant of the risk-return spectrum. Another reason for the surge in convertible arbitrage in the hedge fund products can be seen by the positive shift in the efficient frontier that has occurred from including convertible arbitrage funds into the asset mix as demonstrated in Figure 1.5.

**WHAT ABOUT RISKS?**

Calling convertible arbitrage a “low-risk” strategy is calling it a low-volatility one, but it should not suggest that the strategy does not encounter types of risk; indeed, the strategy is immersed in risk. It could be said that convertible arbitrage is actually defined by how those risks are recognized, controlled, avoided, or exploited. Investment hedging is an attempt to avoid or lessen a financial risk or loss by making a counterbalancing investment. In practice, hedging techniques create a tradeoff between acceptable and unacceptable risks by managing or attempting to eliminate specific unacceptable
risks. The hedge or counterbalancing position often introduces a new, arguably controlled, risk to the position. Of course the objective would be to control the risks that are predictable or acceptable while retaining risks that are not significant or are very unlikely. In this respect, convertible arbitrage is no different than other hedging practices, as many types of risks and profit opportunities exist. Chapter 3 will further investigate the types of macro risk factors and the convertible arbitrageur’s methods of controlling them, briefly listed here:

1. **Equity Market Risk**—Convertible arbitrageurs control equity volatility by shorting the underlying stock against the long convertible position, producing a very low beta risk and if properly hedged, a market neutral position.

2. **Interest Rate Risk**—Like all corporate bonds, prices of convertible bonds move inversely to interest rate changes. The degree of sensitivity to a change in rates varies, and is a function of how closely the issue trades in relation to the fixed income value of the security. The short stock position provides a degree of hedging against rising interest rates because such a change often precipitates declining stock prices. Also, unlike its fixed income value, a convertible’s embedded option value instead moves in tandem with rate changes and provides some additional interest rate protection. In general, convertible arbitrageurs hedge interest rate risk with treasury futures or interest rate swaps.

3. **Credit Risk**—Convertible arbitrage is exposed to credit risk through the long convertible position. To some extent, the short stock position will hedge a portion of the credit-spread risk because as spreads widen, stock prices generally decline. But to eliminate most of the credit-spread risk with a short stock position, the arbitrageur would need to short considerably more stock than a neutral hedge profile would call for, placing the position at considerable risk should spreads not widen and stock prices appreciate. Convertible arbitrageurs typically hedge credit-spread risk with the use of credit default swaps or by shorting a straight bond or another convertible bond from the same issuer against the long convertible position.

4. **Liquidity Risk**—Convertible arbitrage is subject to various liquidity risks, including the long convertible position not trading well and bid-ask spreads widening, the short stock borrow being called in, or a short squeeze occurring. Lower credit quality convertibles face additional liquidity risks if they fall out of favor during certain market environments. Also, liquidity risk can occur due simply to the size of an issue when issued by small companies or in small amounts. Since hedging liquidity risk is not possible, the arbitrageur must utilize the listed options market, eq-
uty market, and straight corporate market to provide additional protection against the difficult liquidation of a long, or the calling in of a short.

5. **Legal Provision and Prospectus Risks**—The prospectus provides many degrees of potential risks for issues such as early call, take-over protection, special dividends, last interest rate payment in the event of call, and so forth. Convertible arbitrageurs can best protect against these risks by being aware of the potential pitfalls and by adjusting the hedge or type of hedge to address any such risks.

6. **Currency Risks**—Convertible arbitrage opportunities often cross many borders, exposing positions to currency risks. In some convertible structures, multiple currency risks are present. Arbitrageurs generally employ currency futures or forward contracts to hedge this risk.

7. **Leverage Risk**—Financial leverage is one of the major macro risks that exist in the hedge world. Leverage magnifies returns—and mistakes. It is important to understand the degree of leverage employed in the convertible hedge marketplace as well as the entire hedge universe. Shocks to the system often cause a huge exodus out of a particular market or asset type, a situation made all the more severe if leverage is excessive. When short interest rates rise and increase the cost of carry for hedge funds, de-leveraging can have a disruptive market impact. Although arbitrageurs can avoid this problem by hedging against short interest rates, in general all of the above macro risks need to be further hedged if a highly levered market is disrupted.

Another important facet of the convertible market that attracts hedge funds is the ability to establish hedged positions that earn a levered yield while offsetting any equity risk in the underlying stock. In fact, the levered yield hedge profile—in certain interest rate environments with convertibles trading in the money—offers the nearly perfect hedge (this hedge, and the application of leverage in general, is explained further in Chapter 5).

Not all convertible arbitrageurs seek to master all of the above risk opportunities and pitfalls: Convertible-hedge funds will often establish positions that have a fundamental or credit bias as well as an interest-rate bias to take advantage of the skill set or expertise of the particular arbitrage firm, in effect determining which risks to isolate and exploit. Prospective investors should determine which of the macro risks a given hedge fund seeks to manage. Proper disclosure from the convertible arbitrage fund should provide some clarity regarding these macro risks and their approach to them. In addition to their awareness of these macro risk issues, arbitrageurs also analyze the more issue-specific “greek” risks (discussed in detail in Chapter 3) and portfolio level risks (discussed in Chapter 10).
BASICS OF CONVERTIBLE SECURITIES

A primer on convertible bonds may be necessary before jumping into some of the more complex valuation and hedging discussions. The concept promoted by Thorp and Kassouf back in 1967 still provides a foundation for such a primer: Convertible bonds can be thought of as fixed-income securities with an embedded equity option. See Figure 1.6. The convertible security has characteristics of both securities and as a result offers an asymmetrical risk and return profile.

The convertible feature allows a convertible holder to convert the bond into a predetermined number of shares of common stock (known as the conversion ratio, this number is set at a bond’s issuance).

Conversion Ratio = Par Value/Conversion Price
Conversion Price = Par Value/Conversion Ratio

Like traditional fixed-income securities, the convertible bond has a par value and pays coupon interest (usually semiannually for U.S. issues and annually for European issues). Because the convertible bond offers a stream of cash flows and par value at maturity, it is also sensitive to changes in interest rates and credit-quality assessments, as are other fixed-income vehicles. The convertible bonds embedded option or warrant changes the nature of the security, though, making the convertible’s price movements also sensitive to changes in the underlying equity value. Thus, this unique security is sensitive to both equity and fixed-income factors to varying degrees throughout the life of the security. The convertible’s unique structure contributes to the non-linear relationship between it and its underlying security, making it especially suitable for hedging.

Figure 1.7 illustrates the convertible’s structure and risk/reward trade-off: The horizontal axis represents the underlying stock’s price range for the convertible, while the vertical axis represents the convertible bond’s price range. The horizontal line labeled investment value (IV) represents the fixed-
The fixed-income value (investment value) will rise or fall in accordance to changes in either interest rates or credit-quality ratings. Of course, the investment value approaches par value as maturity nears, so it increases in value each year, if all other factors were held constant.

Since each convertible can be converted into a predetermined number of shares of common stock, we can represent this equity value on the graph as a 45-degree line. As the stock price increases, the equity value (conversion value) of the convertible also increases. The investment value and the conversion value become minimum values for the convertible price and represent boundary conditions for convertible valuation. This occurs because if the value of the convertible breaches either of these boundaries, theoretically a risk-free arbitrage would exist with speculators quickly correcting such an inefficiency. In reality, slight discounts to conversion value do occur. Discounts to the investment value may also occur, but only rarely in the invest-

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IV = \sum_{t=1}^{n} \frac{CPN}{(1 + k)^t} + \frac{par}{(1 + k)^n}
\]

CPN = coupon, par = par value, \(k\) = credit adjusted discount rate, \(n\) = number of periods to maturity, \(t\) = current time.