
The Limits of Convertible Bond Arbitrage: Evidence from the Recent Crash

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Like many investment strategies, convertible bond arbitrage suffered abysmal results in late 2008 following the collapse of Lehman Brothers. Because this strategy is closer to the theoretical concept of arbitrage than many others are, an examination of how convertible bond arbitrage fared during this volatile period offers a case study of how these strategies can break down in times of crisis and the opportunities they offer in the aftermath.

Background

Why do markets go to extremes? Why do they sometimes rise to shocking heights or plunge to extraordinary lows? These questions are a challenge for efficient market theory, in which asset prices cannot move far from fundamental values because any discrepancies between price and value are arbitrated away as they develop. Nevertheless, such opportunities (on both the up and down sides) seem to present themselves occasionally without being quickly arbitrated away. The markets of 1999–2000 and 2007–2009 are cases in point.

To maintain equilibrium—with markets efficient, prices fair, and extraordinary profit opportunities nonexistent—some amount of capital must be committed to arbitrage strategies. But at times, would-be arbitrageurs do not have access to the amount of capital needed to bring prices in line with fair values, particularly when

the market price of a whole asset class is out of whack.¹ Thus, the no-arbitrage condition can sometimes be violated, markets can be inefficient, and investors can earn returns far in excess of what is predicted by general equilibrium theories, such as the capital asset pricing model. In this article, we focus on an example of the limits of arbitrage, namely, the convertible bond market in 2008 and 2009.²

Convertible Bonds and Convertible Bond Arbitrage

A convertible bond is a corporate bond that can, at the option of the holder, be converted into shares of the issuer's common stock. Convertible bonds are hybrid securities—essentially a corporate debt obligation that comes packaged with an equity call option. Each bond has a “conversion price,” which is the stock price at which a convertible bondholder is indifferent between redeeming the bond (i.e., receiving par or face value in most cases) and receiving shares of common stock. For example, if a convertible bond has a face value of \$1,000 to be paid at maturity and the conversion ratio is 50 shares per bond, the convertible bondholder will be indifferent between receiving the \$1,000 face value and receiving 50 shares of common stock when the stock price is \$20 ($\$1,000 \text{ par value} = 50 \text{ shares} \times \20 stock price) at the time of maturity.

The value of a convertible bond is the sum of the value of the debt obligation component and the equity option component. Each component can be valued using market inputs. Combining these valuations results in a “fundamental value” for the bond.

At approximately \$200 billion in the United States,³ the size of the convertible bond market is meaningful, although much smaller than the markets for straight corporate debt or equity. Because of the limited market, convertible bonds tend to be relatively illiquid compared with these other securities (but much more liquid than, for instance, many types of private investments). Many bonds trade infrequently, and often only a few bond dealers are willing to make a market in any given bond. Transaction costs for trading convertible bonds tend to be high, especially outside the narrow universe of large, liquid issues. (Such is not the case, however, at the time of issuance, when companies are actively seeking bondholders and pay the costs associated with a bond underwriting.)

¹This idea was developed in the classic article by Andrei Shleifer and Robert Vishny, “The Limits of Arbitrage,” *Journal of Finance*, vol. 52, no. 1 (March 1997):35–55.

²Our colleagues Mark Mitchell, Lasse Heje Pedersen, and Todd Pulvino produced a similar analysis of the convertible bond market crisis of 2005 in their paper “Slow Moving Capital,” *American Economic Review*, vol. 97, no. 2 (May 2007):215–220.

³Tatyana Hube and Yichao (Alan) Yu, *US Convertible Monthly*, Bank of America/Merrill Lynch (July 2009).

Convertible Bond “Cheapness.” High-risk companies often choose to raise capital by issuing convertible securities. Doing so allows them to “monetize” the volatility of their equity because convertible bonds include an implicit call option on the issuer’s stock. A long-term call option on a volatile stock can be valuable. To entice buyers to provide liquidity to issuing companies, convertible bonds are often issued at prices below their fundamental values (that is, below the values of the straight corporate debt and the embedded call option). Offering convertible bonds at a discount is attractive to issuers because they can access capital quickly (sometimes overnight) and avoid the lengthier process of a traditional equity or straight debt offering. Convertible bonds are attractive to investors because they can often hedge some or all of the underlying equity, credit, and interest rate exposure. After issuance, convertibles are less liquid than other bonds and thus often continue to trade at modest discounts to fundamental values. But when the bonds mature (or are called by the issuer or put by the bondholders), investors realize the current fundamental value of the bond. The disparity between fundamental value and price prior to maturity creates the possibility of arbitrage.

The attractiveness of the arbitrage (the potential return) can be measured by bond “cheapness,” the ratio of current price to fundamental value. This measure is equivalent to the “discount” at which investors are buying the bonds. To determine fundamental value, the necessary inputs are the price and terms of the convertible bond, the issuer’s stock price, the expected volatility of the issuer’s stock, the credit spread associated with the convertible bond, and the term structure of interest rates. The assessment works for an individual bond and also for the market as a whole.

Using a proprietary dataset of U.S. convertible bonds of publicly traded issuers dating back to 1985, we measure the historical attractiveness of convertible bonds by determining cheapness on a bond-by-bond basis. To mitigate the impact of data errors in this large sample, we focus on the discount for the *median* bond in our universe, where the discount is the market price relative to the fundamental value.

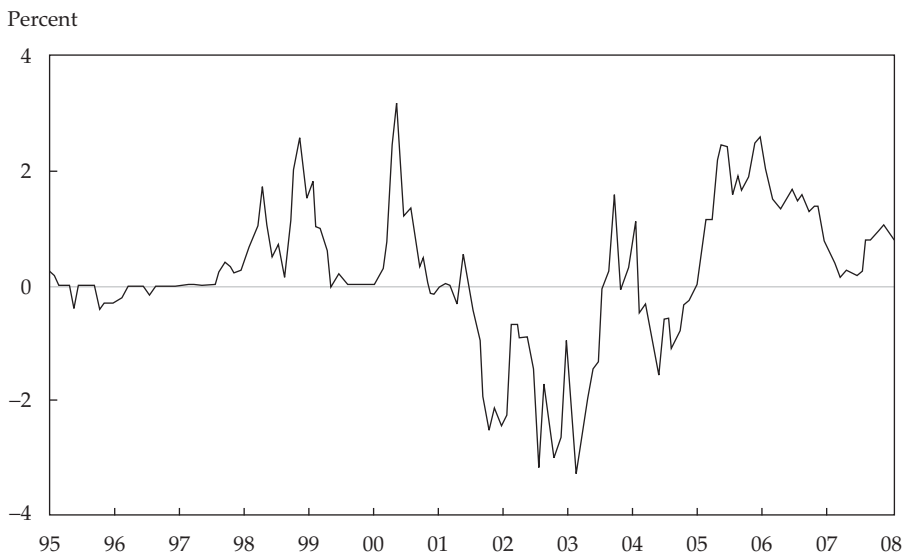
Historically (prior to 2008), convertible bonds in the United States traded between 3 percent rich (i.e., at premium to fundamental value) and 3 percent cheap. Note that cheapness reflects only the discount at which convertible bonds trade relative to their fundamental values.⁴ Such factors as credit rating, equity performance, and interest rates should play little direct role in the cheapness of a bond because these factors affect both the price and the fundamental value of a bond.

⁴Our definition of cheapness is conservative because it excludes the “call cushion.” In theory, issuers should call their bonds as soon as the stock price exceeds the conversion price because doing so minimizes the value of the call option they have sold. In practice, however, issuers often do not call their bonds until their share price exceeds the conversion price by some margin. They do this to protect themselves from price volatility between the time the bonds are called and the time the purchases are settled. This extra window means the call option in a convertible bond is often worth more than the theoretical option value used to determine the fundamental overall value of the bond.

Liquidity, however, plays an important role in bond cheapness. Given the illiquidity of convertible bonds, their typical cheapness relative to fundamental value represents, at least in part, a liquidity premium. (In point of fact, some of the other factors listed have an indirect role because credit rating and equity performance tend to be correlated with liquidity.) Historical variations in the cheapness of convertible bonds simply reflect the willingness of investors to hold convertible bonds (versus their underlying components) at any point in time.⁵ The historical cheapness of convertible bonds through 2007 is shown in **Figure 1**.

Convertible Bond Arbitrage. In constructing a portfolio, convertible arbitrageurs can seek to isolate the cheapness of convertible bonds while limiting their exposure to other unwanted risk factors that might affect the value of their convertible bond portfolios (for example, changes in stock prices, credit ratings, credit spreads, or interest rates).

Figure 1. Median Discount of Convertibles to Their Theoretical Values, 1995–2007



Note: Positive number = convertible bonds cheap; negative number = rich.

Source: Based on AQR/CNH proprietary models.

⁵The variations in cheapness over time may also reflect changing patterns in the typical offering terms of convertible bonds (e.g., takeover protection). Also, one might expect bonds in aggregate to get less cheap as investors are better able to hedge the idiosyncratic credit inherent in convertible bonds (e.g., through credit default swaps).

To minimize these risks, arbitrageurs generally go long a convertible bond and short the component parts of the bond (the straight debt and the equity option). Arbitrageurs can usually hedge the equity option component very easily by shorting stock and can dynamically readjust this hedge (delta hedge) as the stock price changes. The straight debt component may be harder to hedge—particularly because market prices for that debt may be scarce—but arbitrageurs can hedge some credit risk by selling short more equities and can also hedge with credit default swaps.

The fact that equity risk is easier to hedge directly than credit risk drives most convertible arbitrageurs to favor convertible bonds whose value comes more from the equity option and less from the straight debt component. The relative valuation of the equity and debt components of a bond depends on the price of the stock relative to the conversion price. Consider two examples, both based on a convertible bond with a face value of \$1,000 that is convertible at the holder's option into 50 shares of stock, for a conversion price of \$20.

On the one hand, if the stock price is \$200, the fundamental value of the bond (if converted to stock) is \$10,000 (50 shares worth \$200 per share). If the bonds are not immediately convertible, the bond price may be lower than \$10,000, but it will normally be close to \$10,000. Most of the value of the bond will be linked to the equity option.

On the other hand, if the stock price is \$1, then the conversion option is likely to be worthless because converting the \$1,000 bond today realizes only \$50 of stock. Holders of the bonds will simply wait to receive their \$1,000 back at maturity. Most of the value of the bond will be linked to the straight debt.

Convertible bond arbitrageurs who seek to profit from the cheapness of a convertible bond will generally much prefer the first scenario—bonds that are equity sensitive. To measure the attractiveness of convertible bonds at any point in time, we focus on a universe of bonds whose “moneyness” or degree of being in the money (measured by the current stock price divided by the conversion price) is 0.65 or higher. This point tends to be the “sweet spot” for convertible arbitrage. By limiting our universe in this way, we also mitigate errors associated with inaccurate credit spread assumptions because credit spread assumptions are more important for bonds with deep out-of-the-money conversion options, which tend to trade more like distressed debt.

Returns to Convertible Arbitrage. Historically, convertible arbitrage strategies have delivered attractive returns for investors. From 1990 through 2007, the Hedge Fund Research (HFR) convertible arbitrage index delivered annualized returns of 10 percent, with annualized volatility (based on quarterly returns) of 5 percent. The Sharpe ratio of the strategy was 1.2. (By comparison, the S&P 500 Index had an annualized return of 11 percent, an annual volatility of 15 percent, and a Sharpe ratio of 0.4 for the same period.)

These returns benefit from the use of leverage. From 1995 through 2007, convertible bonds traded, on average, 0.8 percent cheap relative to fundamental value. Because properly implemented convertible arbitrage portfolios are immunized from most equity, credit, and interest rate risk, they tend to exhibit very low volatility. This ability to hedge the dominant risks of convertible bonds allowed financing counterparties to maintain low margin requirements, enabling arbitrageurs to substantially leverage their portfolios.

Imperfect Arbitrage. A “perfect arbitrage” is an investment that offers riskless profit. Convertible arbitrage, needless to say, is not perfect. Historically, convertible arbitrageurs generally have lost money in two ways—through default and unwinding.

When a convertible bond defaults, its fundamental value is dramatically reduced. In principle, an arbitrageur’s short exposure (short both the equity option component and the straight debt component) should offset this loss. As noted earlier, however, the straight debt can be difficult to hedge in practice, and basis risk may arise between the straight debt component of the bond and the instrument used to short straight debt exposure. This basis risk can lead to portfolio losses, but the impact of any single bond defaulting can be significantly mitigated by holding a diversified portfolio of convertible bonds, each appropriately hedged. The ultimate loss from an individual convertible bond default depends significantly on the path of the default (a sudden shock versus a slow death) and the ultimate recovery rate realized by bondholders.

Arbitrageurs have also lost money by unwinding (sometimes without choice) their positions prior to realizing the fundamental value of the bonds they hold. In 1998 when the hedge fund Long-Term Capital Management (LTCM) experienced large losses, it was forced to liquidate investments across the entirety of its portfolio, including good investments. The liquidation of LTCM’s convertible arbitrage portfolio caused the prices of bonds held by that fund to decline without corresponding declines in the values of the associated hedges. The losses forced other leveraged holders of convertible bonds to reduce their exposure by selling bonds. A similar situation occurred in 2005 when some investors in hedge funds that invested in convertible bond arbitrage withdrew their capital. To meet these redemption demands, hedge funds began to sell convertible bonds, causing bond prices to fall relative to fundamental values, which led to a subsequent wave of selling and price devaluation. In both cases, it took several months before bond prices returned to more normal levels and rough equilibrium was restored.

Convertible Bonds in the Credit Crisis

As the recent credit crisis unfolded, convertible bonds slowly, but inexorably, cheapened. Median bond cheapness rose from 0.9 percent at the end of 2007 to 1.4

percent at the end of February 2008. Despite the collapse of Bear Stearns in March 2008, the convertible bond market remained relatively healthy, with cheapness only growing to 1.7 percent by the end of March. As investors became more risk averse (and perhaps less willing to hold illiquid credit assets), bonds cheapened dramatically, ending the second quarter at 2.3 percent cheap. At that level, they were about as cheap as they had been during the LTCM crisis of 1998 and the convertible bond sell-off of 2005. By the end of August 2008, the bonds were even cheaper—trading 3.7 percent below fundamental value—representing a significant apparent “arbitrage,” although in reality only foreshadowing the far more substantial events that were yet to come.

Considering the times, this performance is not especially surprising. Risk premiums for virtually all assets were rising over the period as investors became reluctant to hold risky assets and problems at financial institutions grew more serious.

The rising cheapness of bonds made convertible arbitrage an increasingly attractive strategy (because greater cheapness meant higher expected returns when prices ultimately converged to fundamental value). At the same time, the performance of convertible arbitrage managers suffered. The HFR convertible arbitrage index fell 9 percent in the first eight months of 2008.

After Lehman Brothers. The real disaster in convertible bond arbitrage came in September, after the collapse of Lehman Brothers. In the last four months of 2008, the HFR convertible arbitrage index fell 27 percent, to end 2008 down 34 percent. What happened, in essence, was that financing was withdrawn from the convertible bond market, causing problems for arbitrageurs who faced a mismatch between the relative illiquidity of their convertible bond portfolios and the short-term financing that supported those positions.

Going into late 2008, we estimate that 75 percent of convertible bonds outstanding in the United States were held by convertible bond arbitrageurs. Convertible bond arbitrage portfolios were typically run with 3–5× leverage, meaning for every \$100 of capital invested, they owned between \$300 and \$500 of convertible bonds.

The financing for these positions typically was obtained from prime brokers, who resided within large investment or commercial banks. Prime brokers supplied financing to this market at attractive rates and with modest margin requirements because they knew that the relative ease with which convertible bond portfolios could be hedged limited the arbitrageurs’ exposure to the direction of equity markets or interest rates.

The prime brokers, in turn, often raised the cash needed to fund these loans by rehypothecating those same convertible bonds to secure their own borrowings. For the prime brokers, these secured loans, often sourced through European banks, represented the lowest cost source of financing for their customers’ convertible bond

positions. An alternative was to fund them with internal sources of funds, perhaps funds available from the unsecured borrowings of the parent bank. But there is a meaningful difference in the cost of these forms of funding, and in late 2008, that gap became very wide—if unsecured funding was available at all to the prime broker (which it often was not).

When Lehman collapsed, the secured funding mechanisms for convertible bonds broke down. Lehman's secured lenders found that they had to liquidate the collateral Lehman had delivered to them to secure its loans, something they never expected to happen. Much of that collateral was easy for the lenders to liquidate, but some was not, in particular the convertible bond portfolios. Lenders with no expertise trading these assets were forced to sell difficult-to-price collateral in a chaotic environment. They quickly informed remaining bank borrowers that convertible bonds would no longer be accepted as collateral for secured loans. This policy change forced convertible bonds back onto prime broker balance sheets, where they could only be funded through expensive and now extremely scarce internal funds, a scarcity that persisted even past the extreme depths of the crisis as bank balance sheet pressure continued through year-end.

Against this backdrop, prime brokers were forced to push bonds back onto their leveraged customers' own balance sheets by removing financing (essentially raising margin requirements to as high as 100 percent). Because the community of convertible bond arbitrageurs was leveraged and many relied on short-term financing, managers were forced to liquidate their bonds or find new, but now very scarce, sources of funding.

Liquidity Recedes. With virtually no other financing available, most investors had to sell. The most vulnerable were managers of single-strategy convertible bond arbitrage funds. These managers had no other securities to offer as collateral and little other business with prime brokers that might have induced them to continue offering some financing.

Multistrategy managers had some insulation because they could potentially offer other securities (such as stocks) from their portfolios as collateral for loans. They also posed a greater business loss to prime brokers if they were able to take their business elsewhere in the wake of the crisis. Even these managers, however, faced pressure to reduce their leveraged convertible bond portfolios.

In the weeks following Lehman's collapse, we estimate that between selling and price deterioration, convertible arbitrage portfolios shrank by 50 percent or more in aggregate. Some of this selling was self-reinforcing. Prime brokerage financing is based on margin. Lenders limit financing by capping the ratio of the size of arbitrageurs' portfolios to the investment capital deployed. At times, this ratio could be 5× or higher, meaning arbitrageurs with \$100 to invest could buy \$500 of bonds. But in this example, if bond prices fall 5 percent (holding other

factors constant), an investor holding \$500 of bonds with \$100 of capital is quickly in trouble. The \$500 portfolio of bonds is now worth \$475. This \$25 loss depletes the investor's capital base, so the initial \$100 is now only \$75. At a ratio of 5:1, the investor is only permitted to hold \$375 of bonds, so the investor must sell \$100. This sale puts further pressure on prices, and the cycle intensifies.⁶

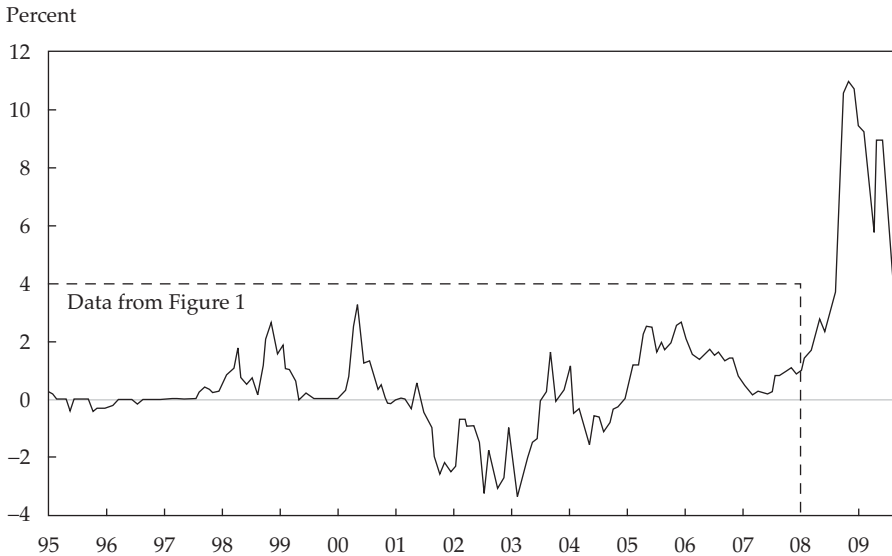
One counterweight to this cycle was the term financing arrangements used by some arbitrageurs and prime brokers. In these arrangements, prime brokers could not simply call back their financing (or change their terms) overnight. Typically, before these terms could change, either the prime broker had to give arbitrageurs advance notice (often 30–90 days) or the borrower or prime broker had to trip certain triggers. This arrangement gave some arbitrageurs time and flexibility, so in practice, all levered investors in convertible bonds did not have to sell in the exact same day or week.

Although the severely impaired financing market for convertible bonds was the dominant driver of price deterioration, other related factors contributed as well. There was a general flight away from illiquid investments (due in no small part to the difficulties in financing them). Competing asset types also had become very cheap, which limited the flow of new capital to convertible bonds. Finally, short-selling bans across a wide range of stocks also hurt the convertible bond market. The bans prevented potential new arbitrageurs (such as multistrategy hedge funds or opportunistic investors) from stepping in to purchase cheap convertible bonds whose equity was on the list of stocks that could not be shorted. Under the bans, arbitrageurs were prohibited from initiating new equity hedges on these bonds, even in cases where they were purchasing the positions from another arbitrageur who already had equity hedges in place. Without new arbitrage capital entering the market, bond prices had to fall far enough to attract interest from other market participants.

Crossover Buyers. Who was willing to buy the bonds that came up for sale? In a normal market, convertible bond arbitrageurs (either hedge funds or bank trading desks) typically step in to buy bonds when there is selling pressure in the market. They are the “buyer of last resort” for the bonds. In late 2008, these buyers became forced sellers. With no natural buyers available, bond prices went into a free fall, driving the cheapness of convertible bonds to new records. Whereas in earlier times cheapness of 2–3 percent was considered a significant dislocation in equity-sensitive convertible bonds, in 2008, the cheapness of these bonds sailed right through 4 percent and 6 percent and 8 percent to bottom out at close to 12 percent cheap, as shown in **Figure 2**.

⁶To get a sense of the magnitude of the selling pressure, consider the following anecdote. In the depths of the crisis (roughly late November 2008), investors in need of cash were offering bonds below their conversion value. In other words, a bond that could contractually (and at any time) be converted into, say, 20 shares of stock worth \$60 per share might be selling below \$1,200. The reason is that the conversion process can sometimes take more than a day or two before the shares are received and can be sold, and managers under pressure could not wait that long for the cash.

Figure 2. Median Discount of Convertibles to Their Theoretical Values, January 1995–August 2009



Note: Positive number = convertible bonds cheap; negative number = rich.

Source: Based on AQR/CNH proprietary models.

Bonds fell until they became cheap enough to attract new buyers, such as investors who usually held few or no convertible bonds but who were willing to commit capital when the expected returns became sufficiently high. Called “crossover” buyers, they included value equity investors (some of whom sold stocks to buy convertible bonds when the risk–return trade-off of bonds became intriguing) and some multistrategy hedge funds that had not previously been big holders of bonds (and so had not been forced to delever).

Perhaps the most interesting crossover buyers were the issuers themselves. At one time, these issuers had gone to the market and been willing to sell bonds below fundamental value in order to raise capital. In late 2008, despite all the pressures on financing and balance sheets, certain convertible bond issuers stepped back into the market to repurchase their own bonds at a large discount to fundamental value. For issuers to make this move, they had to determine that their return on invested capital from buying back bonds would be greater than what they would receive from investing in new projects or business opportunities. It also meant that the return from repurchasing their debt was greater than their own cost of capital across the balance sheet, including equities, bank debt, other bonds issued, and equity capital—a significant hurdle in a liquidity-starved world, particularly with regard to convertible bonds where many issuers have weak credit ratings or no credit ratings at all.

Stabilization. In early 2009, the market began to recover and bonds became less cheap. Notably, this change happened during a period when equity prices were still falling and credit investments also fared poorly. But fundamental values of convertible bonds declined faster than convertible bond prices, so the bonds got “less cheap” and arbitrageurs whose hedges were short stock and credit made money.

A few drivers helped the market stabilize and recover. First, equilibrium began to be restored as prices fell far enough that the supply and demand of convertible bonds were back in better balance. Crossover buyers stepped in to provide new demand. The arbitrageurs that were forced to sell bonds completed their selling, removing the overhang of bonds for sale, and the convertible arbitrage market got smaller, requiring less overall financing from prime brokers. These changes halted the decline in bond prices but were not enough to lead to price appreciation.

For price appreciation to occur, a new wave of buyers had to come into the market. Some investors were willing to buy convertible bonds on the way down, recognizing that the cheapness relative to fundamental value could lead to extraordinary returns. Others were not willing to commit capital to a strategy in a free fall but became more tempted once the price declines abated, but bonds still remained cheap. Still others waited to see some initial signs of a rebound. With stabilization, new buyers emerged. With new buyers, recovery began.

These buyers were all able to buy bonds that, based on our data, were cheaper relative to fundamentals than at any time in recent decades (and perhaps ever). These new buyers, however, had different experiences depending on when they entered the market. When bonds were in a free fall, the supply in the market was enormous. In a market that was traditionally “illiquid,” investors were able to purchase hundreds of millions, if not billions, of dollars of bonds in a single day. Once the market stabilized and began to recover, bonds were still for sale but in smaller quantities.

For the first quarter of 2009, the HFR convertible arbitrage index was up 11 percent.

The Return of Financing. The initial stabilization was somewhat precarious. Even as prices reached equilibrium, market participants recognized that some large players in the market might still be holding substantial positions that they had not yet been forced to unwind. The sell-off in convertible bonds was fast enough that arbitrageurs with term financing of 90 days (or even longer) were potentially able to hold their portfolios through the worst of the crisis. Some investors worried that these bonds represented an “overhang” that could depress prices further if their holders were ultimately forced to sell. Another possible overhang came from investors in hedge funds. The sell-off in bonds happened before many of these investors could redeem their capital. Many managers had raised gates or put into place other redemption restrictions. As these restrictions were relaxed, the possibility existed that investors would demand their capital back, spurring another round of convertible bond liquidation.

Given these concerns, the market's recovery was enhanced by the return of equilibrium in financing markets. The initial pullback by the ultimate lenders to prime brokers was—in hindsight—a panic driven by the fallout of Lehman's collapse. Eventually, lenders realized that they could still have a profitable business making loans to prime brokers with convertible bonds as collateral, provided they made appropriate adjustments ("haircuts") to reflect the difficulty and price pressures they might face in trying to sell convertible bond collateral. As prime brokers' own funding situation stabilized, they were again willing to lend against convertible bonds. Managers who had been told by their prime broker to sell bonds or move their business suddenly found themselves being offered new convertible bond financing.

The return of financing was gradual, but it also came in an environment where the demand for convertible bond financing had dropped sharply. It was not a return to the old days of convertible bond financing. Margin requirements were much stricter (forcing managers to use less leverage), and the borrowing costs charged by prime brokers were meaningfully higher. The panic and forced selling, however, receded.

By the end of April 2009, cheapness was down below 6 percent, almost half the levels at year-end 2008 (but still the cheapest on our record prior to the credit crisis). As the market strengthened through the second quarter of 2009, new convertible bond issuance resumed, which was an encouraging sign because it meant the environment was healthy enough that issuers were willing to pay market prices for financing. At the same time, it put a temporary halt to the decline in bond cheapness. New issues had to attract buyers, and they typically did so by coming to market at prices slightly cheaper than the bonds investors were already holding. Indeed, the universe of bonds actually became somewhat cheaper over the course of the second quarter, albeit under very different circumstances from those of the last quarter of 2008. Panic was largely gone from the market, and the return of financing and issuance suggested that the market had reached a new equilibrium—one that offered investors the prospect of much higher returns from convertible arbitrage than had ever existed before the credit crisis.

By the midpoint of 2009, with the financing situation more stabilized, the HFR convertible arbitrage index had gained 29 percent.

Implications

Convertible arbitrage is an excellent example of a relatively low-risk arbitrage. In theory, a perfect arbitrage is supposed to offer riskless profits. In practice, no perfect arbitrages exist. Still, arbitrage strategies of all stripes offer the *possibility* of profits, generally with low risk relative to the possible return and also with low correlation with the direction of the markets.

Convertible bond arbitrage fits neatly into this category. But the performance of convertible arbitrage during the credit crisis is a case study in the risks and limits of arbitrage. In theory, convertible arbitrage would have worked for investors who

could have held their positions through the crisis. In theory, any investor would have been an aggressive buyer of hedged convertible bonds in late 2008. Unlike so many other “cheap” bets at the time, these were not even a bet on the economy recovering. In practice, however, virtually all arbitrageurs used leverage and faced an asset/liability mismatch between the term of their leverage (mostly 0–90 days) and the term of the convertible bond portfolios being financed. As a result, when the financing environment became extraordinarily tight, virtually all users of leverage were forced to sell, even as assets were becoming cheaper and arbitrage strategies were becoming more attractive.

This case study should be a warning to prospective investors in any type of arbitrage: Strategies based on some type of future “convergence” event are usually lower risk than strategies that depend on the direction of volatile markets, but these strategies are not riskless, particularly where leverage using short-term financing is involved. This does not make them bad investments, but it means investors must understand that their leverage, or the leverage used by other holders of the same assets, presents its own particular set of risks.

Although this crisis exposes a negative lesson, there is also a positive one. The dramatic returns enjoyed by convertible arbitrage investors in 2009 suggest that when arbitrage strategies go bad, opportunistic investors can step in and potentially earn outsize returns. An investor who saw the unprecedented cheapness in convertible bonds at the end of 2008 could have made spectacular profits in the first half of 2009. These profits were not riskless; at the time of investment in 2008, such an investor would still have faced a great deal of uncertainty about the future direction of the convertible bond market, the prospective availability of financing, and the possibility of near-term losses had the remaining leveraged investors been forced to continue selling. But for well-capitalized investors who used only modest leverage, these risks were readily manageable.

Opportunistic investors who balanced these risks against the unprecedented cheapness of the bonds, the expectation of convergence at maturity (typically two to four years out), and the dramatic sell-off that had already occurred would have been very successful.

In general, opportunistic investment strategies seek to provide liquidity to the markets in extreme periods by buying when the rest of the world wants to sell (and vice versa). Implementing these strategies is difficult. By definition, they always appear very risky at the time they emerge (because they tend to be going against the conventional wisdom). They are difficult to time because calling a bottom (or top) in almost any asset class or market is nearly impossible. But investors who can accept these difficulties are often well compensated. (Of course, they must face the possibility of not being compensated or else the opportunities would, by definition, be riskless and investors would pile in.)

Conclusion

The performance of convertible arbitrage during the credit meltdown is a textbook example of a liquidity crunch and the limits of arbitrage. The massive losses remind us that liquidity and financing are the lifeblood of many investment strategies and that such strategies face the risk of periodic panics if they evaporate. The behavior of prime brokers (and their ultimate lenders) reminds us that there can be enormous complexity in the financial system, even for investments that are far less “structured” than the collateralized debt obligations and mortgage securities that garnered so many headlines during the crisis. The substantial gains in 2009 remind us that opportunistic investing can yield impressive results for those with strong stomachs and strong balance sheets. Ultimately, the case of convertible bond arbitrage forces us to acknowledge the risks in financial markets and that with those risks come challenges and opportunities.

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Disclosure

The views and opinions expressed herein are those of the authors and do not necessarily reflect the views of AQR Capital Management, its affiliates, or its employees.