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Convertible Arbitrage Strategy

The convertible arbitrage strategy has produced attractive returns over the past 15 years, which are uncorrelated with traditional equity and bond returns.

What is Convertible Arbitrage?

Convertible arbitrage seeks to generate returns from a convertible security's equity, bond and embedded equity call option features. A typical trade involves being long Company A's convertible security (e.g., a bond or preferred share), and short Company A's stock.¹ There are various approaches to a convertible arbitrage strategy; some managers focus on generating positive cash flow, while others trade the short stock position to optimize the hedge ratio (delta). Some managers "reverse hedge" the trade if the convertible security is overvalued (i.e., sell the convertible bond short and buy the stock), which can be costly if there is negative carry.

What are the Nuts and Bolts of Convertible Arbitrage?

A convertible bond (CB) is a hybrid security with a bond and equity option component linked by the conversion feature, which allows the CB holder to exchange the convertible for common shares at a set conversion price (i.e., based on the embedded call option on the common stock). If investors hold CBs as long-only investments, they provide equity upside with downside bond protection. The bond's value is influenced by interest rates, credit quality and the maturity date, and the equity option's value is influenced by the underlying stock's price, volatility and dividends.

While convertible arbitrage typically involves corporate CBs mainly in the U.S., there are also significant CB markets in Europe and Japan. Niche opportunities also exist in other regional markets, such as Asia (ex-Japan) and Canada.

Corporate treasurers view CBs as a relatively inexpensive financing tool, as the bond's coupon is often much lower than straight debt. Also, CBs can be brought to market more quickly and cheaply than raising equity. The U.S. convertible market was estimated at US\$252.8 billion in October 2005 (see Table 1 below), with more than half of the issuers rated *below* investment grade, or not rated at all.

Note on Key Terms: There is a "Glossary of Key Terms" at the end of the strategy paper on Page 9. The key terms are italicized and underlined in the text.

¹ AIMA Canada's paper *An Overview of Short Stock Selling* summarizes the mechanics of selling stocks short.



The opportunity for arbitrage is based on two key factors:

1. A new CB issue's embedded equity call option is often under-priced.
2. The long-only convertible market systematically undervalues the equity call option.

Today, most CB trading is dominated by hedge funds, and the "new issue" calendar tends to be the strategy's key return driver. Convertible arbitrage allows investors to profit in both up and down equity markets. While the strategy may be viewed as market neutral, there are specific risks, which we address in detail below.

The analysis of a typical convertible arbitrage trade involves the following three steps:

1. Identify undervalued convertible securities.
2. Establish the hedge ratios.
3. Manage the risks.

1. Identify Undervalued Convertible Securities

Convertible arbitrageurs seek undervalued convertibles with good liquidity. Table 2 summarizes the specific attributes of a typical convertible bond arbitrage trade, which is the focus of the rest of this paper.

Table 1: U.S. Convertible Market Capitalization, October 2005²

Credit Rating	Market Cap (US\$ Billion)	%
AAA	0.7	0
AA	15.1	6
A	32.8	13
BBB	53.0	21
BB	35.3	14
B	42.9	17
C	17.6	7
Not Rated	55.4	22
Total	252.8	100

Table 2: Attributes of a Convertible Bond Arbitrage Trade³

Component	Attribute
Stock	<ul style="list-style-type: none"> ▪ Volatile underlying stock price ▪ Low dividend ▪ Available stock to borrow for the short sale
Bond	<ul style="list-style-type: none"> ▪ Low premium to conversion value ▪ Manageable credit quality ▪ Good covenant protection
Call Option on Stock	<ul style="list-style-type: none"> ▪ Participate more in an upward stock move than in a downward stock move (high <i>gamma</i>) ▪ Low implied volatility

² Source: Yaw, Debrah, "Convertible Monthly," Merrill Lynch Global Convertibles Research Group, November 11, 2005, Page 29.

³ Source: Adapted from Calamos, Nick P., "Convertible Arbitrage: Insights and Techniques for Successful Hedging," (New Jersey: John Wiley & Sons, 2003), Page 23.



Depending on their approach, managers focus on specific CB attributes, such as low-premium bonds (i.e., CBs that trade relatively close to or well through their conversion value), or bonds with a high reward-to-risk ratio (i.e., CBs that trade at- or near-the-money of the equity call option, thus having attractive gamma). All managers must be able to borrow stock to short as a hedge, and also need protection against sudden dividend increases.

2. Establish the Hedge Ratios

Once managers select a suitable CB, the appropriate hedge ratio must be determined (i.e., the amount of shares to sell short). With the right hedge ratio, the position can be profitable if the stock rises or falls.

For a “cash-and-carry” strategy (discussed below), the hedge ratio is set so that the position is market neutral (i.e., the CB’s sensitivity to small stock price changes is calculated, and the short stock position established accordingly). This strategy profits from the “static” cash flow return on the arbitrage position, the gain from correctly selecting an undervalued CB, and any rebalancing of the hedge ratio if the underlying stock price moves significantly.

Adjusting the hedge involves selling additional shares as the stock price rises and buying shares as the stock price falls. While volatile underlying stocks are desirable, the position will lose money if the hedge ratio is estimated or traded incorrectly.

3. Manage the Risks

The main bond risks in a convertible arbitrage trade are interest rate risk, call/takeover risk and credit risk, as most CBs are *below* investment grade. Managers must assess these risks and the most cost-effective way to manage them.

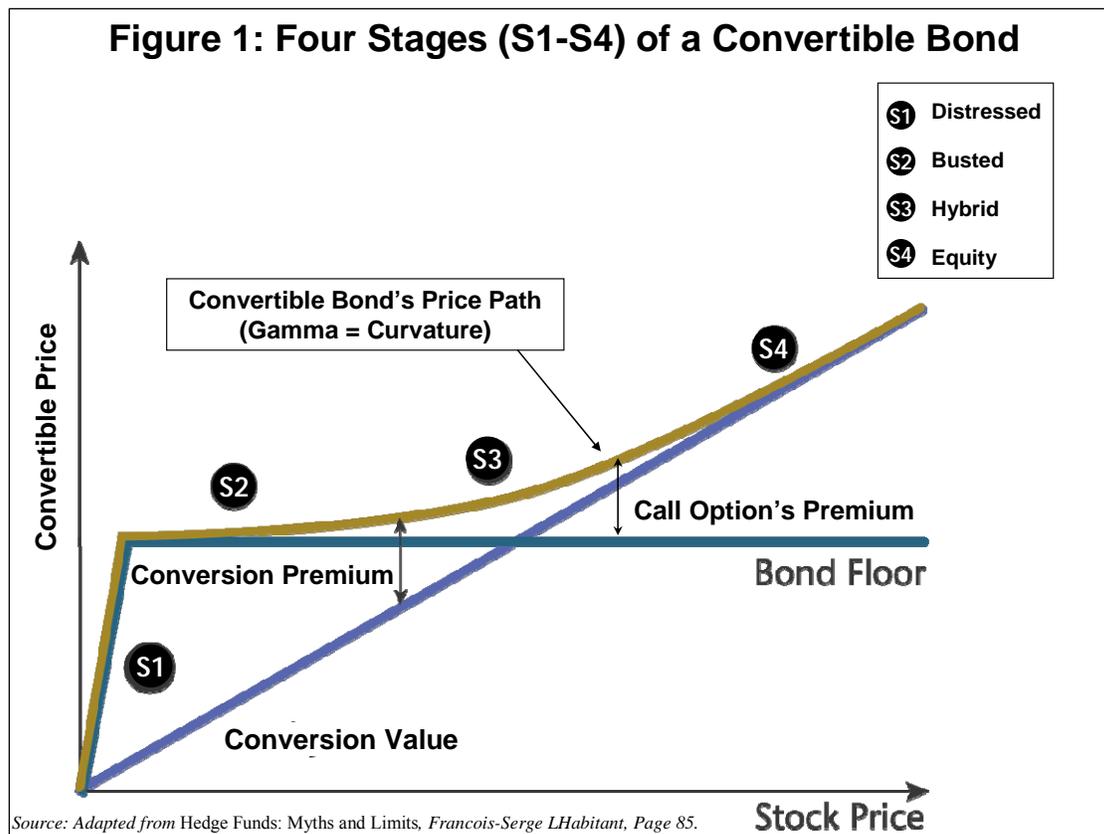
Diversification is the simplest way to address call risk and credit risk. Also, credit derivatives, such as credit

default swaps (CDSs), can be used to hedge credit risk. Call risk is the risk that issuers will call the CB at par, which is far less than where most CBs trade. Takeover risk is the risk that Company A with a volatile stock price, will be taken over either for cash or stock, where the acquiring Company B’s stock price is significantly *less* volatile, resulting in the immediate devaluation of Company A’s convertibles. Further, a convertible arbitrage strategy is exposed to “basis risk,” which is when the entire market appreciates or depreciates together, regardless of the underlying CB valuations. Basis risk was a key factor in the spring of 2005 when the credit rating of both General Motors and Ford’s debt was downgraded from investment grade to junk or high-yield status.

The two basic stock risks in a convertible arbitrage trade are the stock loan (i.e., the ability and the cost to borrow the stock and sell it short) and the accuracy of the hedge ratio. The hedge is eliminated if the shares cannot be borrowed or are called in. Also, the manager’s judgment in trading the short stock is a key profit determinant. (Note: Positions with a high hedge ratio will generally not have a high sensitivity to interest rates as the short stock is a natural hedge.)

What are the Different Approaches to Convertible Arbitrage?

Figure 1 below illustrates the four stages (Stage 1 to Stage 4) of a CB. A convertible arbitrage strategy is very heterogeneous as managers trade different stages of the CB based on its attributes. The three approaches to convertible arbitrage are “cash-and-carry trading,” “volatility trading” and “credit trading,” and these approaches differ in the degree of hedging and the leverage used. Refer to Figure 1 below to cross-reference the different stages (S1 to S4) discussed in each of the three approaches; the “Glossary of Key Terms” explains the terms used in Figure 1.



- A. **Cash-and-carry Trading (Stage 4 [S4]):** Typically involves a high hedge ratio (i.e., the amount of stock sold short against the CB), which could approach 100% and trade like a synthetic put on the stock. Cash-and-carry managers focus on low-premium bonds in the CB's "equity" stage (see S4 in Figure 1). The static cash flow combined with a market-neutral hedge ratio are the key return drivers, though the use of leverage is often the largest contributor to total return (see Figure 2 below).
- B. **Volatility Trading (Stage 3 [S3]):** This approach seeks to constantly alter the hedge ratio based on an assessment of the embedded option's implied volatility. This assessment is typically a combination of proprietary modeling and market experience. Volatility traders usually trade CBs in the "hybrid" stage (see S3 in Figure 1), where they assess which residual risks to accept or hedge (notably credit risk and interest rate risk), and how much to pay for these hedges.
- C. **Credit Trading (Stages 2 and 1 [S2 and S1]):** This approach is increasing in popularity, especially as more specialists enter the "busted" and "distressed" convertible bond market segment (see S2 and S1 in Figure 1). These bonds have a high default probability and the embedded option is significantly out-of-the-money. (Note that a high hedge ratio may be required to hedge the credit risk rather than the equity volatility.)
- Historically, the leverage used for a convertible arbitrage strategy varied considerably by manager, from 4 X to 9 X capital.⁴ However, the average leverage for this strategy was estimated at 2 X capital in June 2004.⁵

⁴ Ibid, Page 120. AIMA Canada's paper *An Overview of Leverage* summarizes the key definitions and types of leverage used by hedge funds.

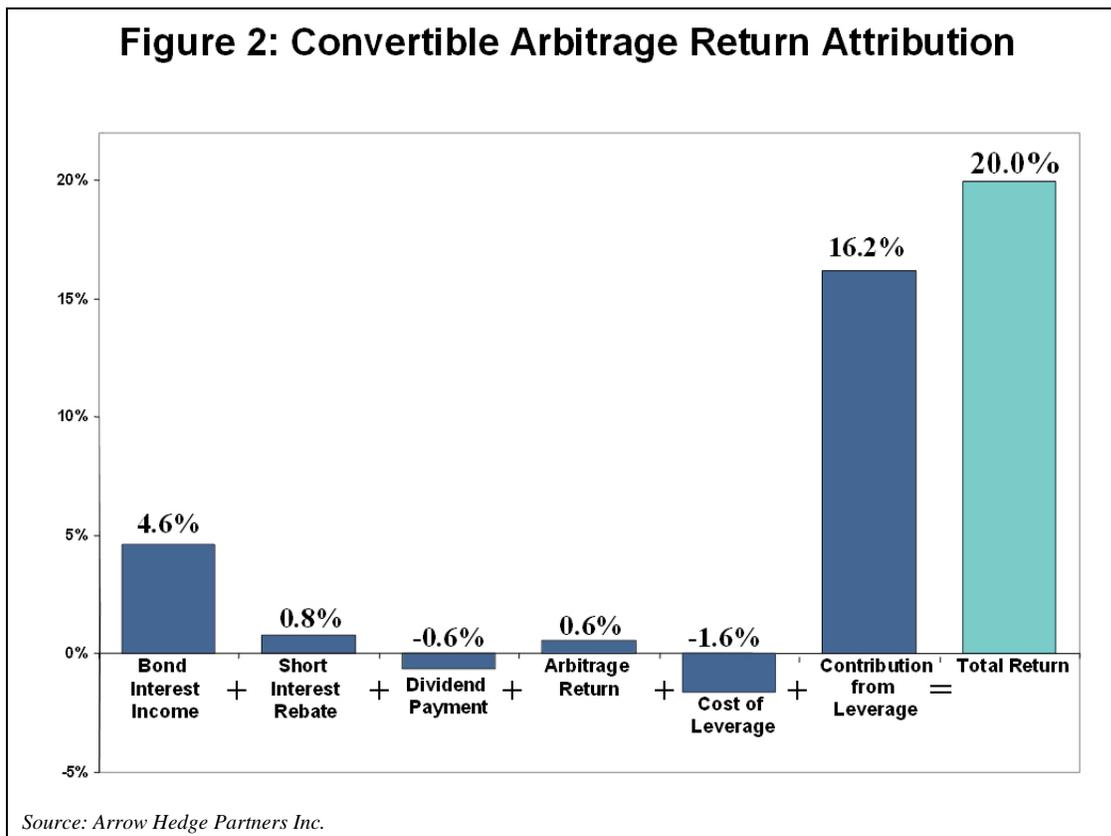
⁵ Source: Scott Lange, Adriana Roitstein, and Dan Sommers, "What is Ailing the US Convertible Market, Part II," Goldman Sachs Global Convertible Strategy Group, June 2004, Page 21.



What are the Sources of Return of Convertible Arbitrage?

A convertible arbitrage strategy's "static" return includes the bond's interest coupon plus the interest rebate from the short stock position *less* borrowing costs and dividends payable. Returns are also generated from

buying undervalued bonds and/or from effectively trading the hedge ratio. Figure 2 illustrates the various return sources, which are summarized below for the three approaches. Cross-reference the sources of return in Figure 2 with the example in Table 4 on Page 8. (Note: The contribution from leverage is a significant source of return for this example.)



- A. **Cash-and-carry Traders (Stage 4):** Use leverage to magnify the long bond/short stock portfolio's cash flow stream while using a relatively high hedge ratio on lower premium bonds to create a synthetic put. The most profitable outcome is usually when the stock price falls sharply.
- B. **Volatility Traders (Stage 3):** Have an edge in assessing the embedded option's implied volatility and/or the position's potential *gamma*. Managers concentrate on higher premium bonds and generally

run a lower, but highly variable *hedge ratio*. The contribution from leverage is generally relatively low with this approach.

- C. **Credit Traders (Stages 2 and 1):** Focus on the capital structure arbitrage between the CB (a more senior security) and the stock (the most junior security), where the issuer is often financially distressed. The returns are more directional and depend on the manager's assessment of the issuer's enterprise value.



As the convertible market matures, it is increasingly dominated by hedge funds who continue to enhance their research capabilities in this area. Today, many hedge funds trading a convertible arbitrage strategy are willing to accept directional exposures to equities, credit, interest rates and/or volatility. However, the average leverage decreased as directional exposures increased.⁶

What are the Key Risk Factors of Convertible Arbitrage?

The following are the key risk factors of a convertible arbitrage strategy:

1. **Credit:** The majority of CBs are below investment grade or not rated, so there is significant default risk. Much of this risk is hedged via short stock positions, but managers with a relatively low *hedge ratio* may need to hedge credit risk using *credit default swaps (CDSs)*.
2. **Interest Rate:** Longer maturity CBs are sensitive to interest rates, and while short stocks are a natural hedge, lower hedge ratios may require additional protection.
3. **Call:** CBs are often bought at premium prices, so call risk generally guarantees a loss on the position as the bond will be called at par. Call risk may diminish as interest rates rise. (Bond indentures typically include protection against other company-specific events, such as mergers and dividend increases.)
4. **Manager:** Managers may incorrectly value a CB and/or short an incorrect amount of stock. If valuations are wrong and/or credit risk increases, the *bond floor* could be reduced or eliminated. (Note: Manager risk also includes the firm's operational risk.)
5. **Leverage:** Borrowed funds magnify returns from the generally stable relationship between the long bond and the short stock. However, borrowed funds also magnify the risk of losses.
6. **Liquidity and Execution:** The manager's ability to enter/exit a position with minimal market impact directly affects profitability.
7. **Stock Loan:** An effective hedge depends on how reliably and cost-effectively shares can be borrowed and sold short. A prime broker well suited to the manager's particular market helps to ensure sound trade execution and secure stock loan.
8. **Counterparty:** Using a large and well-capitalized prime broker assists in minimizing counterparty risk.
9. **Basis Risk:** Since hedge funds are thought to hold more than 60% of the outstanding convertible bonds in the U.S., there is a potential lack of liquidity in down markets. Hence, there is a risk that all CB prices may depreciate together regardless of the underlying CB valuations.

⁶ Ibid, Page 23.



What is the Historical Performance of Convertible Arbitrage?

As Table 3 below highlights, convertible arbitrage has historically produced a stable and attractive return stream, comparing favourably with both stocks and bonds.

Table 3: Convertible Arbitrage Performance Comparison Jan-1990 to Dec-2005 (U.S. Dollars)⁷

Index	Annualized Compound Return	Annualized Standard Deviation	Maximum Drawdown (Loss)	1-month Maximum Gain	1-month Maximum Loss
HFRI Convertible Arbitrage Index	10.0%	3.5%	-7.3%	3.3%	-3.2%
ML High Yield Master II	9.2%	7.0%	-12.0%	8.7%	-7.7%
Lehman Aggregate Bond Index	7.4%	3.9%	-5.2%	3.9%	-3.4%
S&P 500 Total Return Index	10.5%	14.4%	-44.7%	11.4%	-14.5%

Sources: Pertrac and Hedge Fund Research Inc. (Hedge fund data is net of all fees.)

⁷ Source: Pertrac, Hedge Fund Research Inc. (HFRI)



What is a Practical Example of a Convertible Arbitrage Trade?

Table 4 summarizes a hypothetical “cash-and-carry” CB trade. Cash flow clearly dominates the total return to investors in this type of trade, while leverage magnifies the return and is the largest contributor to returns.

Table 4: Example of a U.S. Style “Cash-and-Carry” Convertible Arbitrage Bond Trade

Trade Details: The initial price of the convertible bond is 108. The convertible arbitrage manager makes an initial cash investment of \$202,500 (i.e., initial capital) plus \$877,500 of borrowed funds for a total investment of \$1,080,000 (i.e., the borrowed amount of \$877,500 is just over 4 X the equity of \$202,500). The bond’s *conversion ratio* is for 34.783 common shares. Note that 26,000 shares are initially sold short at a price of \$26.625 (i.e., 26,000/34,783 shares = *hedge ratio* of 75%). We assume a 1-year holding period. (The example is gross of fees.)

I. Determining Total Return		
Return Source	Return	Assumptions/Notes
<i>Cash Flow</i>		
Bond Interest Income (on Long Bond)	50,000	• 5% coupon on \$1,000,000 face amount
Short Interest Rebate (on Short Stock)	8,653	• 1.25% interest on \$692,250 short proceeds, based on initial hedge ratio of approximately 75% (26,000 shares sold short at \$26.625 = \$692,250, relative to 34,783 shares of CB stock equivalency [i.e., 26,000/34,783 shares = <i>Delta</i> of 75%])
<i>Less</i>		
Cost of Leverage	(17,550)	• 2% interest on \$877,500 borrowed funds
Dividend Payment (on Short Stock)	<u>(6,922)</u>	• 1% dividend yield on \$692,250 (i.e., 26,000 shares sold short)
Total Cash Flow (1)	34,181	
<i>Arbitrage Return</i>		
Bond Return	120,000	• Bought at price of 108 and sold at a price of 120 per \$1,000
Stock Return	(113,750)	• Sold stock short at \$26.625 and stock rose to \$31.00 (i.e., loss of \$4.375 x 26,000 shares)
Total Arbitrage Return (2)	<u>6,250</u>	
Total Return (1) + (2)	40,431	(Total dollar return of \$40,431 is a 20% return on equity of \$202,500)
II. Analyzing Return Sources		
Return Source	Contribution	Notes
Bond Interest Income (Long Bond)	4.6%	Interest of \$50,000 earned/bond price of \$1,080,000 x 100 = 4.6%
Short (Interest) Rebate (Short Stock)	0.8%	Interest of \$8,653 earned/bond price of \$1,080,000 x 100 = 0.8%
Dividend Payment (Short Stock)	-0.6%	Dividends \$6,922 paid/bond price of \$1,080,000 X 100 = -0.6%
Cost of Leverage	-1.6%	Interest of \$17,550 paid/bond price of \$1,080,000 X 100 = -1.6%
Arbitrage Return	<u>0.6%</u>	Return of \$6,250 earned/bond price of \$1,080,000 x 100 = 0.6%
Unlevered Return	3.8%	Total return of \$40,431 earned/bond price of \$1,080,000 = 3.8%
Contribution from Leverage	16.2%	The contribution from leverage is significant in this example
Total Return	20.0%	Total return of \$40,431 earned/capital of \$202,500 = 20.0%
<i>Source: Arrow Hedge Partners Inc.</i>		

Conclusion

The convertible arbitrage strategy has produced attractive returns over the past 15 years, which are uncorrelated with traditional equity and bond returns. The principal risk is manager risk rather than directional equity or bond market risk. Further, high leverage is a potential risk factor. In 2005, investor redemptions had a significant impact on the strategy's returns, although the maximum drawdown remains significantly *less* than that of traditional equity and bond markets. This performance contrasts with the good performance for the convertible arbitrage strategy in the volatile equity markets of 2000-2002. The strategy still appears to be a good portfolio hedge if equity markets become more volatile.

Written by Keith Tomlinson CFA, Director of Research, Arrow Hedge Partners Inc.⁸

Glossary of Key Terms

Bond Floor: The bond component of a convertible security, where the convertible's floor trades based on its credit quality, expressed in percent.

Conversion Premium (Price): The additional amount paid for a convertible security over its conversion value measured in percent (price).

Conversion Premium Points: The additional amount paid for a convertible security over its conversion value measured in points, where 1 bond point = \$10.

Conversion Ratio: The number of common shares the convertible holder is entitled to receive for a convertible security upon conversion.

Conversion Value (Parity): The convertible security's value if converted at a given stock price.

Credit Default Swap (CDS): An agreement between a protection buyer and a protection seller whereby the buyer pays a periodic fee to the protection seller in return for a contingent payment by the seller if a specified credit event occurs (e.g., a default on a corporate bond). A CDS is the most widely used credit derivative where the holder of a corporate bond typically buys insurance to hedge the corporate credit risk.

Current Yield: The convertible security's coupon or preferred dividend divided by its current price as measured in percent.

Gamma: The sensitivity of the hedge ratio (delta) to changes in the stock price. A convertible bond (CB)'s gamma is highest when the equity's call option is at-the-money. Gamma refers to the curved shape of the CB price path in Figure 1 (see Page 4). High gamma means the bond price goes up more when the stock price rises, than it goes down when the stock price falls. Conversely, low gamma means a more linear CB response to stock price movements.

⁸ Reviewed by Shad Stastney from Vicis Capital LLC.



Hedge Ratio (Delta): The amount of common stock sold short against a convertible security position, relative to the convertible security's stock equivalency, expressed in percent.

Negative Carry (on Reverse Hedge Trade): A trade in which a hedge fund manager sells the convertible bond short and buys the underlying stock, and where the interest paid on the bond *exceeds* the total return from owning the stock.

Short (Interest) Rebate: A portion of the interest in a T-bill account earned by a hedge fund from shorting a security. When selling a stock short, a hedge fund borrows the stock from a prime broker (who borrows it from an existing shareholder) and the short sale's proceeds are typically held in a T-bill account with the prime broker as collateral. Much of the T-bill interest is then rebated to the hedge fund. (Note: The hedge fund must pay dividends to the original shareholder.)

Notes to Strategy Paper Series:

- **Educational Materials:** This document is designed solely for information and educational purposes. The examples used have generally been simplified in order to convey the key concepts of the hedge fund trading strategy.
- **Hedge Fund Strategy Performance Data:** The statistical data on the hedge fund strategy presented in this paper is both *end-date* sensitive and *period* sensitive. We have used the period and end date in this paper, as it reflects the overall performance of the hedge fund strategy for the longest period to date (at the time of writing), based on available data from Hedge Fund Research Inc. (HFRI). Different periods and end dates may result in different conclusions.
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