PART

One

The Arbitrage Process

COPYRIGHTED MATERIAL
http://www.pbookshop.com

http://www.pbookshop.com

CHAPTER 1

Introduction to Merger Arbitrage

Arbitrage is one of the oldest forms of commercial activity. *Merriam-Webster's 11th Collegiate Dictionary* defines it as:

1. The nearly simultaneous purchase and sale of securities or foreign exchange in different markets in order to profit from price discrepancies
2. The purchase of the stock of a takeover target especially with a view to selling it profitably to the raider

Unfortunately, both definitions fail to describe arbitrage properly. In a world of instant global communications, the first type of arbitrage is rarely viable. A much better definition of arbitrage is that used by economists, who define arbitrage as a "free lunch": an investment strategy that generates a risk-free profit. Academic finance theory formalizes this definition as a self-financing trading strategy that generates a positive return without risk. Three different degrees of arbitrage can be distinguished, as shown in Table 1.1.

A simple location arbitrage in commodities would be the purchase of crude oil in Rotterdam, the rental of a tanker, and the simultaneous resale of the oil in New York. Today, most arbitrage activity occurs in financial markets. An arbitrageur might take positions in a currency spot rate, forward rate, and two interest rates. Arbitrage transactions of this type are known as cash-and-carry arbitrage. This type of arbitrage can be understood easily as the purchase of oil and the simultaneous sale of an oil futures contract for the delivery of that oil at a later time. (An arbitrageur would also have to arrange for storage.) In practice, few such simple arbitrage opportunities are available in today's markets. The key idea in arbitrage is the absence of risk. Arbitrageurs eliminate risk by taking positions that in the aggregate offset each other and compensate arbitrageurs for their efforts with a profit.

http://www.pbookshop.com

TABLE 1.1 Orders of Arbitrage

Degree	Definition	Example
First order	A strong, locked-in mechanical relationship in same instrument	Currency triangular arbitrage Location arbitrage Conversions and reversals for European options "Crush" and "crack"
Second order	Different instruments, same underlying security	Cash-future arbitrage Program trading Delivery arbitrage Distributional arbitrage (option spreading) Stripping
Second order	Different (but related) underlying securities, same instrument	"Value" trading Bond arbitrage Forward trading Volatility trading
Third order	Different securities, different instruments, deemed to behave in related manner (correlation-based hedging)	Bond against swaps (asset spread) Cross-market relationships Cross-volatility plays Cross-currency yield curve arbitrage

Source: Nassim Taleb, *Dynamic Hedging: Managing Vanilla and Exotic Options* (New York: John Wiley & Sons, Inc., 1997). Reprinted with permission of John Wiley & Sons, Inc.

http://www.pbookshop.com

Arbitrageurs are often referred to affectionately through the abbreviation "arb."

Arbitrage in general plays an important economic function because it makes markets more efficient. Whenever a price discrepancy arises between two similar instruments or products, arbitrageurs will seek to profit from the discrepancy. Such discrepancies can arise temporarily in any market—oranges, stocks, lease rates for dry bulk carrier vessels, or sophisticated financial derivatives. As soon as arbitrageurs identify a price discrepancy, they will buy in the cheaper market and sell in the more expensive one. Through their actions, they increase the price in the cheap market and reduce the price in the more expensive market. In due time, prices in the two markets will return to balance. Ultimately this benefits all other market participants, who know that prices will never diverge significantly from their fair value.

Suppose government regulations were introduced to curtail the activities of arbitrageurs. This would leave market participants with two options:

1. Accept the price in their local market and risk overpaying.
2. Research all other markets to find the "true" value of the product.

In either case, there are costs involved—either the cost of overpaying (or underselling) or the information cost of price discovery. Both outcomes are not optimal and will make markets less efficient.

It is also important to recognize that arbitrage is not a synonym for speculation. Speculators assume market risk in their trades. They will acquire an asset with the hope of reselling it at a higher price in the future. There are two differences between speculation and arbitrage:

1. In speculation, the purchase and acquisition are not made simultaneously, so speculators face prices that can change with the passage of time. They assume full market risk until they sell. Arbitrageurs, however, will execute the purchase and sale simultaneously.
2. Speculators do not know at which price they will be able to sell. There is no guarantee that they will be able to sell at a higher price. Arbitrageurs, however, know exactly at which price they can sell, because the purchase and sale transactions are executed simultaneously.

http://www.pbookshop.com

Similar observations can be made about the difference between arbitrage and price scalping.

In theory, arbitrage is a completely risk-free undertaking. However, most trades referred to as arbitrage in reality involve some risk and should really be referred to as quasi-arbitrage trades. Basis trades in bond futures are one such example. In a basis trade, an arbitrageur buys a bond, sells a bond futures contract, and then delivers the bond upon expiration of the futures contract to the clearinghouse. In reality, the opportunity for a risk-free delivery of a bond into a futures contract, known as a positive net basis in bond parlance, hardly ever exists. Instead, basis traders focus on trading the negative net basis, and they profit as long as they anticipate the cheapest-to-deliver bond correctly. Readers interested in a more detailed description of bond futures basis trades should consult the extensive literature on the topic. Merger arbitrage is another example of such a quasi-arbitrage.

In a strict sense, merger arbitrage is a misnomer because it, too, involves some risk. The type of risk in merger arbitrage is unlike the market risk that financial risk managers are familiar with and build models around: beta risk. Instead, merger arbitrage is about event risk, the event that the merger is not completed. It is not directly related to the movements in the overall market.

This does not mean that merger arbitrage is completely independent of the market, especially during large dislocations in the market. However, market movements are not the principal determinant for the successful completion of a merger. It is very difficult to capture event risk mathematically. In most statistical risk models, event risk falls into the unexplained component, the error term. As part of the error term, it is uncorrelated to market risk. It is precisely this property that makes investment strategies based on event risk appealing in the construction of portfolios that seek to reduce exposure to market risk. This topic is discussed in more depth in Chapter 12.

More specifically, the risk in merger arbitrage is primarily the nonconsummation of the announced merger. Much can go wrong between the announcement of a merger and its closing. For example:

- Financing for the transaction can dry up.
- Antitrust authorities can block a transaction.
- The economic environment can change, making the merger less appealing.
- Fraud or other misrepresentations can be discovered.
- A spoiler bidder (a.k.a. "white knight") can intervene.

It is the role of the arbitrageur to weigh these risks against the profit opportunity.

Merger arbitrage generally is used to describe a wide range of investment strategies around mergers, many of which have little to do with actual arbitrage. These investment tactics can be organized into a risk spectrum (see Figure 1.1) from the most speculative activity, which is the most removed from an actual arbitrage, to least risky, which is merger arbitrage in a proper sense.

At the most risky end of the spectrum is speculation about potential takeover targets. Some investment magazines occasionally publish lists of takeover targets based on financial characteristics, typically price relative to cash on balance sheet and earnings before interest, taxes, depreciation, and amortization (EBITDA). The idea is that these companies could potentially be bought out based on attractiveness of their accounts for leveraged buyouts. Of course, there is no guarantee that anybody actually will have an interest in acquiring any of the firms on the list. Many more factors must align before a financial buyer might be interested in acquiring a firm.

Of similar riskiness albeit occasionally more founded in reality is the Wall Street rumor mill. There is little doubt that the spreading of such rumors is facilitated by investors who hold the relevant stock. Internet message boards have been a particularly fruitful breeding ground for all sorts of takeover speculation. Sometimes rumors enter analyst reports or

http://www.pbookshop.com

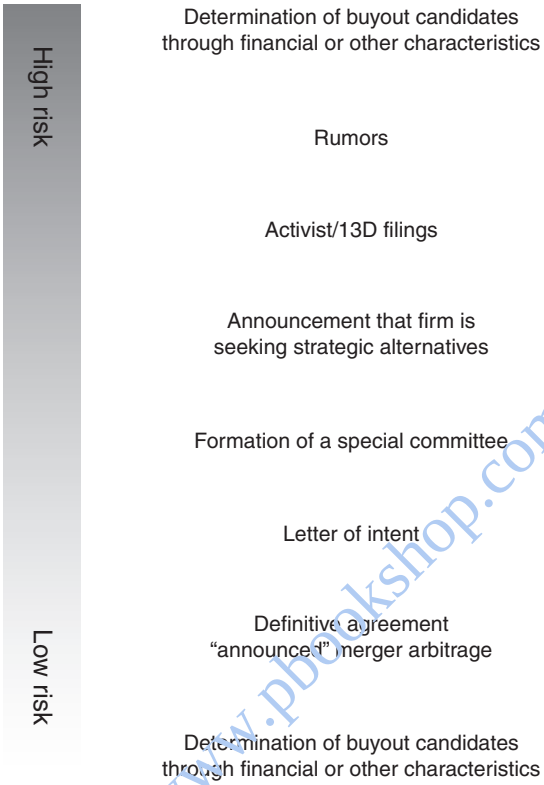

FIGURE 1.1 Risk Spectrum of Merger-Related Investments

http://www.pbookshop.com

newspapers. At that level, rumors are often somewhat more reliable—to the extent that the word "reliable" can be used in describing a rumor. One publication that made itself a name with sometimes-accurate reports of ongoing acquisition discussions in the apparel industry is *Women's Wear Daily*. In August 2005, it reported accurately that J. Jill was to be sold. A few months later, Jill rejected an acquisition proposal from Liz Claiborne and was eventually sold to Talbots.

A more reliable, although still speculative, merger investment strategy is to follow activist investors who try to get a company to sell itself. Activists file their intentions with the Securities and Exchange Commission (SEC) under Schedule 13D. These filings can be a source of potential merger targets; however, companies that are targets of activists are often in

less-than-perfect condition and pose significant investment risk. This is, after all, why activist investors target these firms in the first place. Some commercial services monitor 13D filings and provide additional analysis.

Companies sometimes announce that they are for sale. These announcements are usually phrased as a "search for strategic alternatives, including a sale" or other transaction. Sometimes these announcements come in response to an attack by activist investors; sometimes a company's board decides on its own to explore the possibility of a sale. Compared to the previously discussed scenarios, investing in a firm whose management is actively pursuing a sale is much safer, but it still is no arbitrage because the company may well be sold for less than it can be purchased for at the time of the announcement. In addition, the outcome of such an investment depends highly on the market environment. In a bull market, it is relatively easy for management to sell the firm at a premium. In contrast, in a bear market, no buyers may materialize and the stock may fall along with the market.

Potential acquirers sometimes enter into a letter of intent before signing a formal merger agreement. Investing after a letter of intent can be very speculative. Most merger partners enter into a definitive agreement right away. Letters of intent are a sign of adverse selection: Either the buyer or the company is not yet quite ready to sign a definitive agreement. In the case of the acquisition of CCA Industries by Dubilier & Co., a private equity firm managed by the son of a cofounder of Clayton, Dubilier & Rice, a letter of intent led to a busted buyout because the acquiring private equity fund could not arrange the requisite financing. Had the firm found it easy to arrange the financing, it would have entered into a definitive agreement rather than a letter of intent in the first place.

Hostile bids are of a similar degree of risk as letters of intent. If the target fends off the bidder successfully, its share price may well revert to a lower, prebid level. Even worse, if an arbitrageur has set up a short position in the acquirer (discussed later in the chapter), a short squeeze could ensue, leading to losses on both the long and short side of the arbitrage.

The only real merger arbitrage occurs when the arbitrageur enters the position after a definitive agreement has been signed between the target and the acquirer. Arbitrageurs who specialize only in this type of transactions refer to it as announced merger arbitrage to differentiate it clearly from the other, more risky investment styles shown in the risk spectrum in Figure 1.1.

The remainder of the book addresses transactions in which a definitive agreement has been reached.

Merger arbitrage resembles in many respects the management of credit risk. Both are concerned with the management of a large asymmetry in payoffs between successful transactions and those that incur losses. A

http://www.pbookshop.com

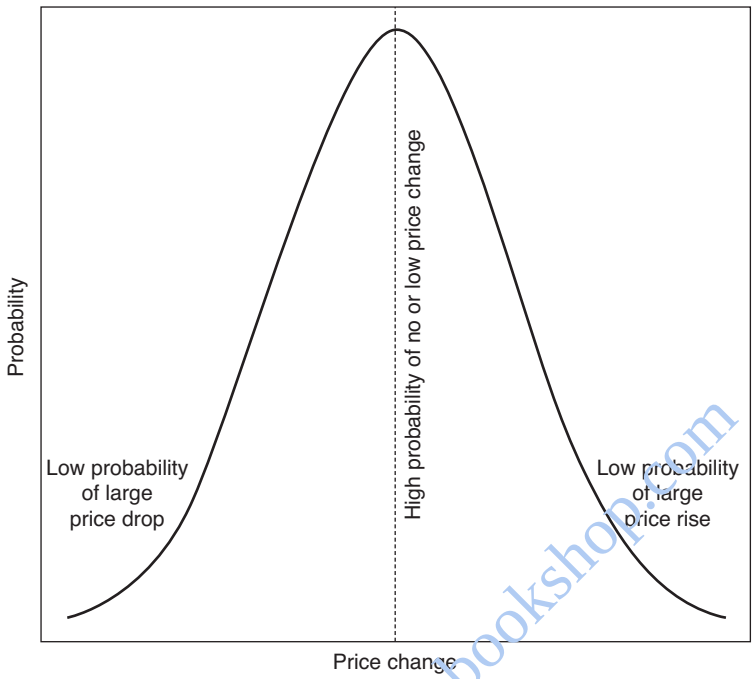

FIGURE 1.2 Payoff Distribution for Stock Investors

http://www.pbookshop.com

typical stock investor is faced with an almost symmetric payoff distribution (see Figure 1.2). The stock price is almost as likely to go up as it is to go down. The likelihood of a small gain is roughly the same as the likelihood of a loss of equal size. Larger changes in value are also almost equally likely. The downside is unlimited, or limited only by a complete loss of the investment. The upside, however, is unlimited. Every now and then, an investor gets lucky and owns the next Microsoft or Berkshire Hathaway. A small upward drift in stock prices means that in the long run, stocks trend up.

The situation is different for merger arbitrage and credit managers (see Figure 1.3). The upside in a merger is limited to the payment received when the merger closes. Likewise, the most credit managers will receive on a loan or bond is the interest (or the credit spread if they manage a hedged or leveraged portfolio). The downside is unlimited: If a merger collapses or a loan goes into default, a complete loss of capital is possible in a worst-case scenario. The only reason why investors are willing to take risks with such an asymmetric payoff distribution is that the probability of a large loss is

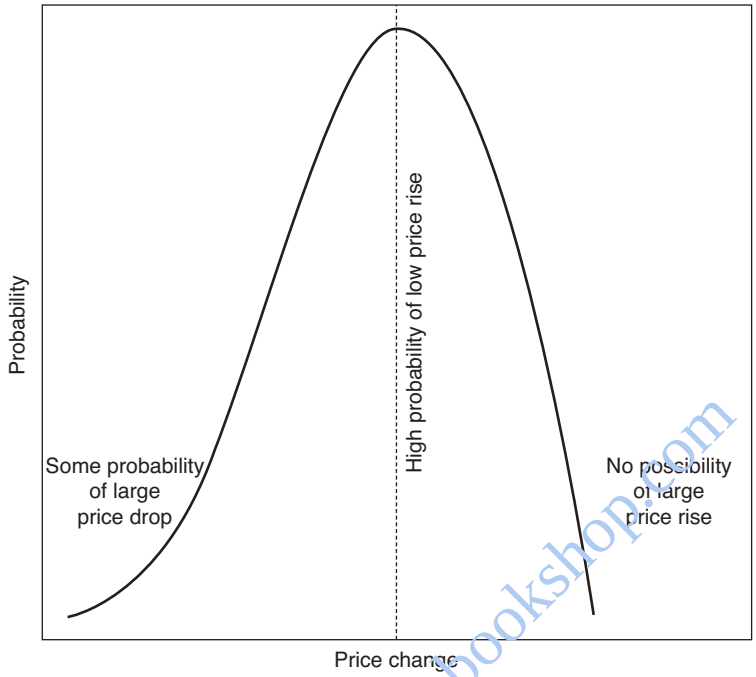

FIGURE 1.3 Asymmetric Payoff Distribution

http://www.pbookshop.com

very small and the probability of a small gain is very large. The skill in merger arbitrage, as in credit management, is to eliminate investments that have a high probability of generating losses.

Another field in finance has payoff distributions very similar to those of merger arbitrage and credit: option selling. An option seller expects to make only a small return in the form of the option premium but can suffer a significant loss when the option is in the money. Option strategies are often depicted in payoff diagrams, such as that of a short (written) put option in Figure 1.4. If at expiration the stock price rises above the strike price, the option seller will earn only the premium. However, if the stock price falls below the strike price, the option seller will suffer a significant loss. Merger arbitrage and credit resemble this payoff pattern. Figure 1.5 shows the payoff diagram for a simple merger arbitrage, where a buyer proposes to acquire a company for cash consideration. If the transaction passes, the arbitrageur will receive only the spread between the price at which she acquired the target's stock and the price at which the firm is merged. However, if the merger collapses, the stock price probably will drop, and the arbitrageur

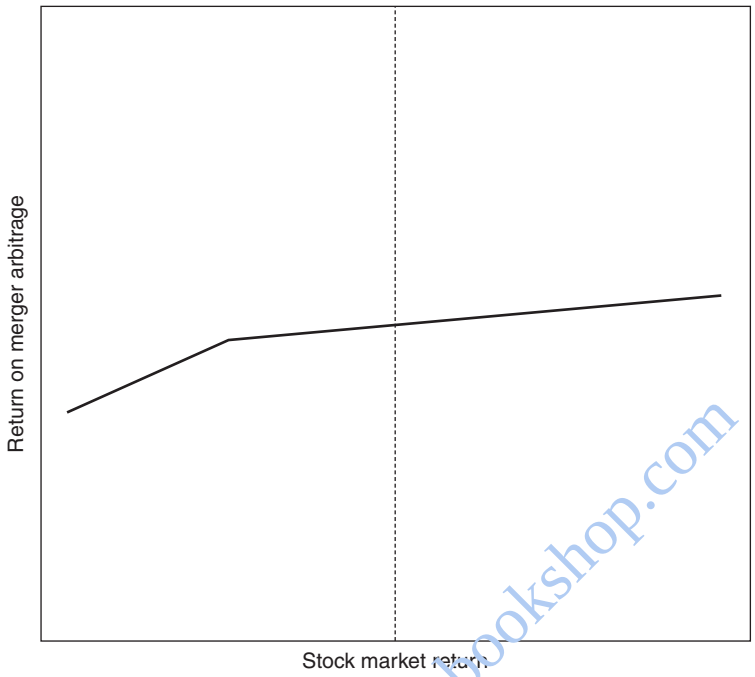

FIGURE 1.4 Put Option Characteristics of Merger Arbitrage

http://www.pbookshop.com

will incur a loss that is much larger than the potential gain if the merger is closed.

From an arbitrageur's point of view, the most important characteristic of a merger is the form of payment received. Therefore, merger typology used by arbitrageurs uses payment method as the principal classifier. Other merger professionals, such as tax advisers or lawyers, may use other criteria to categorize mergers. For example, tax advisers distinguish between taxable and tax-exempt mergers, whereas legal counsel may distinguish mergers by its antitrust effect. There are three principal categories of mergers and one rare category.

1. *Cash mergers*. The shareholders of the target firm receive a cash consideration for their shares.
2. *Stock-for-stock mergers*. The shares of the target firm are exchanged for shares in the acquirer.
3. *Mixed stock and cash mergers*. The target company's shareholders receive a mix of cash and a share exchange.

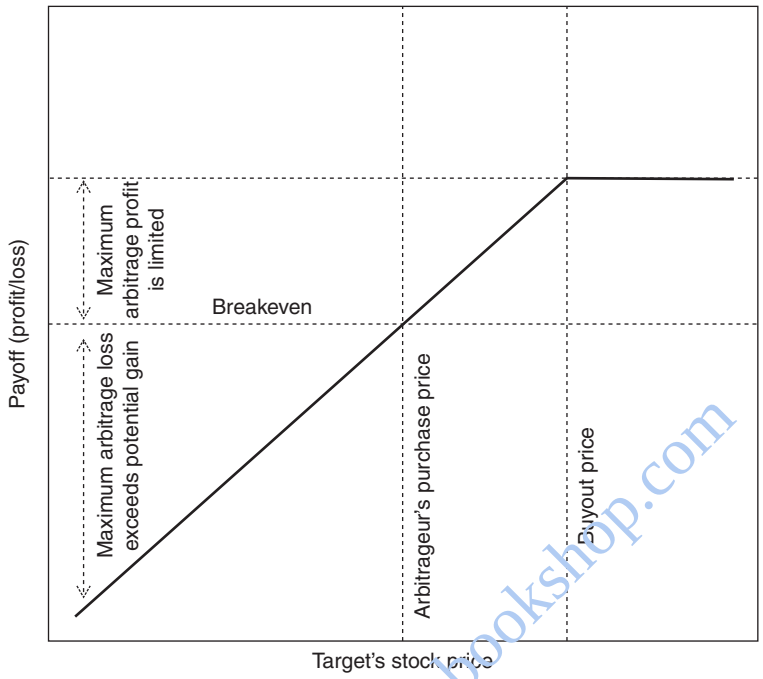

FIGURE 1.5 Payoff Diagram of Cash Mergers

4. *Other consideration.* In rare instances, shareholders of the target firm receive debt securities, spun-off divisions of the target, or contingent value rights.

The remainder of this chapter discusses the first three types of merger consideration and how arbitrageurs will set up an arbitrage trade and profit from it.

CASH MERGERS

The simplest form of merger is a cash merger. It is a transaction in which a buyer proposes to acquire the shares of a target firm for a cash payment.

We will look at a practical example to illustrate the analysis. An announcement for this type of merger is shown in Exhibit 1.1. This is the press release announcing the purchase of Trustreet Properties, a real estate investment trust, by a subsidiary of GE. It is typical of announcement of cash mergers.

http://www.pbookshop.com

EXHIBIT 1.1 PRESS RELEASE ANNOUNCING ACQUISITION OF TRUSTREET PROPERTIES BY GE CAPITAL

Orlando, Fla. (October 30, 2006)—Trustreet Properties, Inc. (NYSE: TSY), a leading restaurant real estate investment trust (REIT), announced today that it has entered into a definitive agreement to be acquired by GE Capital Solutions, Franchise Finance ("GE Capital Solutions"), a leading lender for the franchise finance market in the United States and Canada. The transaction is valued at approximately $3 billion, including the payment of $17.05 per outstanding share of Trustreet's common stock, in the form of cash, and the assumption or refinancing of Trustreet's outstanding debt. GE Capital Solutions will add Trustreet's preeminent restaurant 1031 trading platform to its own Franchise Finance business, and will also establish an East Coast office at Trustreet's headquarters in Orlando, Fla., where all sale-leaseback financing and related asset management will be handled for GE Capital Solutions' Franchise Finance business.

The transaction is expected to close during the first quarter of 2007 and is subject to the approval of Trustreet's common shareholders and other customary closing conditions. . .

GE Capital Solutions will acquire all of the outstanding common stock of Trustreet for $17.05 in cash. Trustreet is permitted to pay its quarterly dividend for the quarter ending December 31, 2006, but is not permitted to pay any additional dividends on its common stock thereafter unless necessary for Trustreet to maintain its status as a REIT. Dividends paid after December 31, 2006, may have the effect of reducing the merger consideration payable to the holders of Trustreet common stock.

http://www.pbookshop.com

The terminology used in mergers is quite straightforward: A Buyer, GE Capital Solutions in this case, proposes to acquire a Target, Trustreet here, for a consideration of $17.05 per share. The difference between the consideration and the current stock price is called the spread. When the stock price is less than the merger consideration, the spread will be positive. Sometimes the stock price will rise above the merger consideration, and the spread can become negative. This happens occasionally when there is speculation that another buyer may enter the scene and pay a higher price.

In a cash merger, the buyer of the company will cash out the existing shareholders through a cash payment, in this case $17.05 per share. An

arbitrageur will profit by acquiring the shares below the merger consideration and holding it until the closing, or alternatively selling earlier.

Arbitrageurs come across press releases as part of their daily routine search for newly announced mergers. This one was released on October 30, 2006, at 9:00 AM. For regulatory reasons, companies announce significant events like mergers after the end of regular market hours or in the morning prior to the opening. This is meant to prevent abuse by investors with slightly better access to news. With the growing importance of after-hours trading and the availability of 24-hour trading of U.S. stocks through foreign exchanges, this restraint has already become somewhat pointless but is still considered best practice.

The first observation an arbitrageur will make is that the stock of Trustreet jumped almost immediately upon the announcement of the merger. As can be seen in Figure 1.6, Trustreet closed at $12.51 on October 27, the last day before the announcement of the merger. It opened at the same level on October 30, quickly moved above $17.00, and closed at $16.97. Some

http://www.pbookshop.com

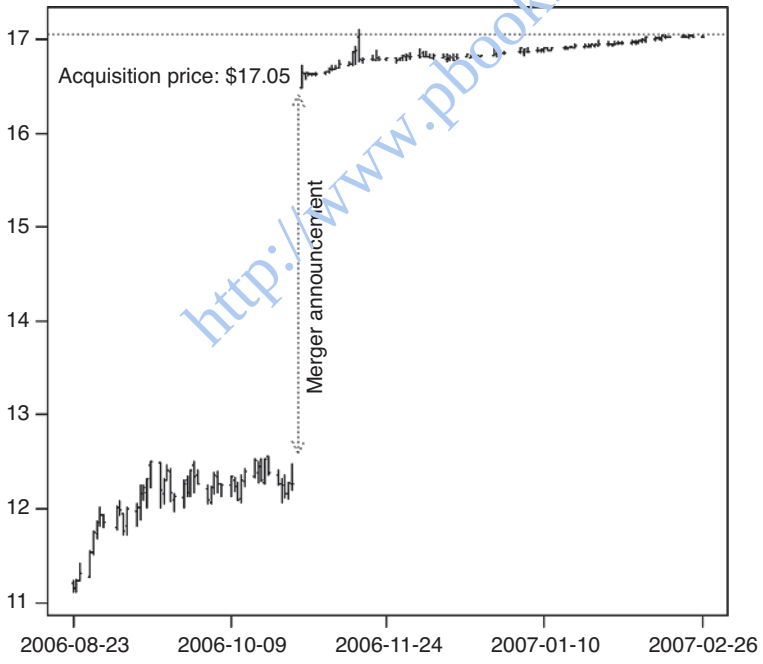

FIGURE 1.6 Stock Price of Trustreet Properties before and after the Merger Announcement

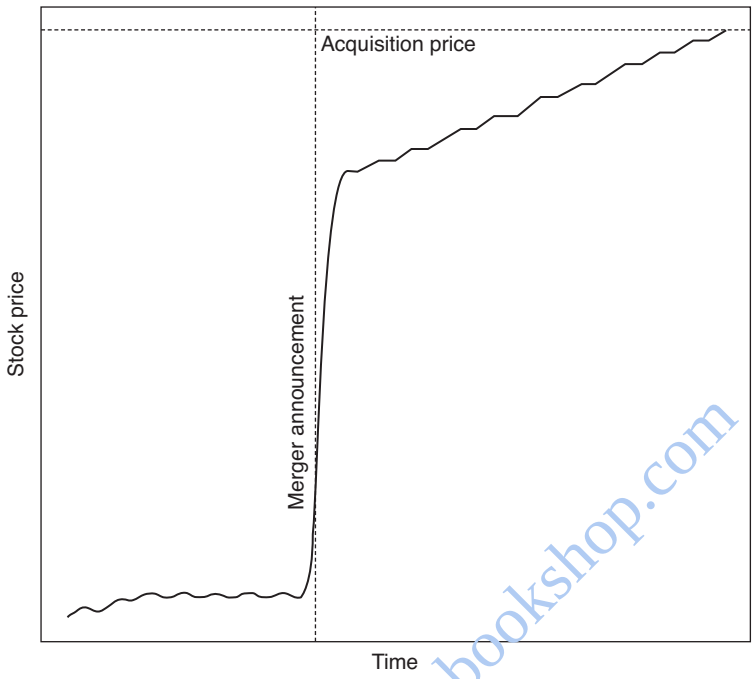

FIGURE 1.7 Idealized Chart of Stock in a Cash Merger

http://www.pbookshop.com

lucky investors bought shares at the opening price, and because there must be a seller for every buyer, some unfortunate sellers parted with their investment at a low price. However, it was not practical for any investor to acquire any significant number of shares at the open. It is most likely that these shares were acquired by specialists on the New York Stock Exchange, where the stock was listed. An investor had a realistic chance to acquire shares around $17.00.

A chart like that shown in Figure 1.6 is typical of stocks undergoing mergers. The buyout proposal is generally made at a premium to the stocks' most recent trading price. This leads to a jump in the target's stock price immediately following the proposal. As time passes and the date of the closing approaches, the spread becomes narrower. This means that the stock price moves closer to the merger price. An idealized chart is shown in Figure 1.7, whereas Trustreet's actual chart is more typical of the behavior of most such stocks.

In some instances, the buyout proposal is made at a discount to the most recent trading price. This rarely happens and is limited to small companies

where the buyer is in a position to force the sale. It often leads to litigation and a subsequent increase in the consideration. A transaction at a discount to the last trading price is called a "takeunder."

INSIDER TRADING

Investors looking at the large jump in Trustreet's stock on October 30 will be tempted to calculate the profits they could have made with a little advance knowledge of the upcoming merger. Insider trading is a crime, not a form of arbitrage.

As readers of the financial press know, every merger cycle is characterized by insiders taking advantage of advance knowledge of mergers. Law enforcement has been successful in prosecuting even the most elaborate insider trading rings. One recent case involved New York bankers who bought options over the Internet through an online brokerage account established in Austria in the name of an elderly woman living in Croatia. Despite the complexity of the scheme, the perpetrators were caught and imprisoned.

Penalties for insider trading are up to 10 in years prison, in addition to monetary penalties, rescission of profits, and potential civil liability in shareholder lawsuits.

http://www.pbookshop.com

An arbitrageur who buys the stock on October 30 for $17.00 will receive $17.05 when the transaction closes. The gross profit for the capital gain on this arbitrage is $0.05 on $17.00, or 0.29 percent:

$$R_G = \frac{P_C}{P_P} - 1 = \frac{17.05}{17.00} - 1 = 0.00294 \tag{1.1}$$

where R_G is the gross return.
P_C is the cash consideration received in the merger.
P_P is the purchase price.

This return will be achieved by the closing of the merger. A key component in investments is not just the return achieved but also the time needed. A more useful measure of return that makes comparisons easier is the annualized return achieved. The relevant time frame starts with the date on which the arbitrageur enters the position and ends with the date of the closing. The press release stated that the "transaction is expected to close during the first

quarter of 2007." Therefore, the last day of the quarter, March 31, is used as a conservative estimate for the closing of the transaction. Pedantic arbitrageurs would choose March 30 instead because March 31 was a Saturday in 2007. There are 152 days in the period until the anticipated closing. Two methods can be used to annualize the return: simple or compound interest.

Simple interest

$$R_{AG} = \left(\frac{P_C}{P_P} - 1\right) \times \left(\frac{365}{t}\right) = \left(\frac{17.05}{17.00} - 1\right) \times \left(\frac{365}{152}\right) = 0.00706 \qquad (1.2)$$

where R_{AG} is the annualized gross return.
t is the number of days until closing.

Compound interest

$$R_{AG} = \left(\frac{P_C}{P_P}\right)^{\left(\frac{365}{t}\right)} - 1 = \left(\frac{17.05}{17.00}\right)^{\left(\frac{365}{152}\right)} - 1 = 0.00708 \qquad (1.3)$$

where R_{AG} is the annualized gross return.
t is the number of days until closing.

http://www.pbookshop.com

Personal preference determines which method is used. Simple interest is useful if the returns are compared to money market yields that are also computed with the simple interest method, such as the London Interbank Offered Rate (LIBOR) or Treasury bills (T bills). Compound interest is preferable if the result is used in further quantitative studies. If the returns are compared to bond yields, they should be adjusted for semiannual compounding used in bonds. It is an error encountered frequently, even in research by otherwise experienced analysts and academics, that yields calculated on different bases are compared with one another.

An annualized return of 0.71 percent is not enough to excite any investor at a time when money market yields are above 4 percent. Fortunately, there is another source of income in this arbitrage: the dividend that Trustreet pays on its common stock. As a real estate investment trust (REIT), Trustreet is required to distribute at least 90 percent of its income in order to maintain its tax-favored status. Trustreet's quarterly dividends have been $0.33 in the past, and it is fair to assume that it will continue to pay at this level.

The press release states that Trustreet will "pay its quarterly dividend for the quarter ending December 31, 2006, but is not permitted to pay any additional dividends on its common stock thereafter." The last dividend before the announcement of the merger was paid on September 15, so the assumed dividend date for the next payment is December 15. For the first quarter of 2007, no dividend payment should be assumed. A back-of-the-envelope calculation for the net return with dividends is to add the dividend to the merger consideration received. This gives an annualized return of 5.37 percent if simple returns are used:

$$R_{AN} = \left(\frac{P_C + d}{P_P}\right)^{\left(\frac{365}{t}\right)} - 1 = \left(\frac{17.05 + 0.33}{17.00}\right)^{\left(\frac{365}{152}\right)} - 1 = 0.05368 \tag{1.4}$$

where d is the amount of the dividend received.

A more accurate method is the calculation of the internal rate of return (IRR). Spreadsheets have built-in functions to calculate IRRs that require the user to enter each payment with the associated date, as shown in Figure 1.8.

http://www.pbookshop.com

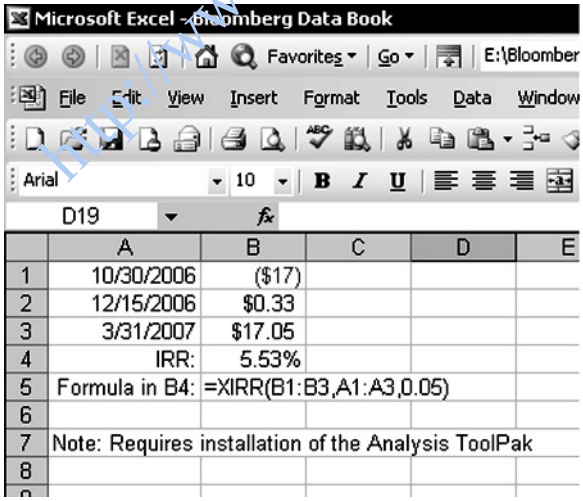

FIGURE 1.8 IRR Calculation of Annualized Return in Excel

The resulting return is an annualized return of 5.53 percent, slightly higher than in the simplified calculation. The reason for the difference lies in the earlier receipt of the dividend cash flow in the IRR calculation.

It is helpful to look at the actual outcome of this merger arbitrage. The Trustreet acquisition closed earlier than an arbitrageur would have assumed: February 26, 2007. The actual date of the dividend payment was December 26, 2006. Entering these values into the IRR calculation, it can be seen that the actual return on this arbitrage would have been 7.09 percent. Of course, this outcome was not foreseeable on October 30. However, whenever new information becomes known, such as the announcement of the dividend date on November 7, 2006, arbs must update their spreadsheets promptly.

The anticipated annualized return of this arbitrage was 5.53 percent, which may not seem very lucrative. Remember that there are several reasons for this anticipated low rate:

- Several months earlier, the largest buyout ever had closed, that of the REIT Equity Office. An initial acquisition proposal for Equity Office was trumped by a higher bid, and the holder of the stock realized significant extra gains. Some arbs may have hoped for a similar outcome in Trustreet, which is also a REIT. They were willing to settle for a relatively low return for the potential of additional upside should another buyer emerge.
- The timing assumption for the closing on March 31 was very conservative. Had an arbitrageur worked with a closing date of February 28, the annualized return would have been closer to 7 percent.

http://www.pbookshop.com

STOCK-FOR-STOCK MERGERS

Stock-for-stock mergers are more complicated than cash mergers. In stock-for-stock mergers, a buyer proposes to acquire a target by paying in shares rather than cash. Sometimes the consideration paid can be a combination of stock and cash. That case is addressed later.

A good example of a stock-for-stock merger announcement is shown in Exhibit 1.2. It is the $4 billion acquisition of Agere Systems by LSI Corporation, announced in December 2006.

In this case, LSI Logic is the buyer, Agere Systems the target, and the per share consideration is no longer a fixed cash amount but a fixed number of LSI Logic shares. Shareholders of Agere Systems will receive 2.16 shares of LSI Logic for each share of Agere that they hold. The number 2.16 is referred to as the conversion factor.

EXHIBIT 1.2 MERGER ANNOUNCEMENT FOR LSI LOGIC AND AGERE SYSTEMS

MILPITAS, Calif., and ALLENTOWN, Pa., December 4, 2006—LSI Logic Corporation (NYSE: LSI) and Agere Systems Inc. (NYSE: AGR) today announced that they have entered into a definitive merger agreement under which the companies will be combined in an all-stock transaction with an equity value of approximately $4.0 billion. Under the terms of the agreement, Agere shareholders will receive 2.16 shares of LSI for each share of Agere they own. Based on the closing stock price of LSI on December 1, 2006, this represents a value to Agere shareholders of $22.81 per share. . . .

The transaction is subject to the approval of shareholders from both companies as well as customary closing conditions and regulatory approvals. The companies expect the transaction to close in the first calendar quarter of 2007.

http://www.pbookshop.com

The dollar amount of $22.81 mentioned in the press release refers to the value of the merger on the day before the announcement. This amount is calculated simply by multiplying the closing price of LSI's stock of $10.56 on December 1, the last trading day before the announcement, by the conversion factor of 2.16. It is not the value that shareholders will receive at the closing of the merger. The value will vary with the stock price of LSI Logic. This distinction is important, because unlike in the case of a cash merger, arbitrageurs cannot just buy the stock of the target Agere and wait for the merger to close.

A naive strategy would be to purchase Agere stock and wait for the merger to consummate. The investor would receive 2.16 shares of LSI that it would then need to sell at the prevailing market price, which could be higher or lower. There is no arbitrage in such a transaction. Recall that one of the elements of the definition of arbitrage was that a purchase and sale occur simultaneously. Holding a stock and waiting to sell it for a higher price is speculation, not arbitrage.

Instead, arbitrageurs must lock in the value of the transaction through a short sale. For readers new to short sales, a brief explanation is given here. Additional aspects of short sales are discussed in Chapter 13.

SHORT SALES

Most investors will only buy stocks and sell stocks that they bought previously and hold in their portfolio at the time of the sale. Selling short differs from a normal sale mainly through the timing of the purchase. A short sale is done before the stock is acquired. If a stock declines in value, a short seller will make a profit; if a stock increases in value, the short seller will suffer a loss.

An important component in short selling is the delivery of the stock to the buyer. The buyer is unaware that the stock has been sold short and rightfully expects delivery. In order to make delivery of the stock, the short seller must borrow it from someone who owns it. Most brokerages and clearing firms offer their customers the ability to borrow stock. Online discount brokerages generally have fully automated systems to locate stocks that can be borrowed for their customers. If the stock cannot be borrowed, it cannot be sold short, and the brokerage will inform the customer.

The process of closing the short sale—that is, buying back the shares that have been shorted—is a buy-to-cover transaction.

Sometimes the lender of a stock requests its return, for example, if the stock is to be sold. In that case, either the customer must buy to cover or the broker will do a buy-in, meaning that the broker places the buy-to-cover order. If an investor is served with a notice of an upcoming buy-in, it is always better to buy the stock oneself and maintain control over the order than to let the broker execute a buy-in.

Selling short is sometimes portrayed as illegal, dishonest, or un-American. However, in financial markets, arbitrage would not be possible without short selling. Arbitrage involves the simultaneous sale of an asset identical to the one acquired; in many instances, this is possible only through short sales. If there were no arbitrage in financial markets, many products would not be priced correctly, and investors might overpay.

The chief executives of some companies have launched a crusade against naked short selling, which is an illegal activity in which the short seller does not borrow the stock that is sold short.

http://www.pbookshop.com

The graph of the stock prices of LSI and Agere are shown in Figure 1.9. It can be seen that Agere jumped on December 4, the day of the announcement,

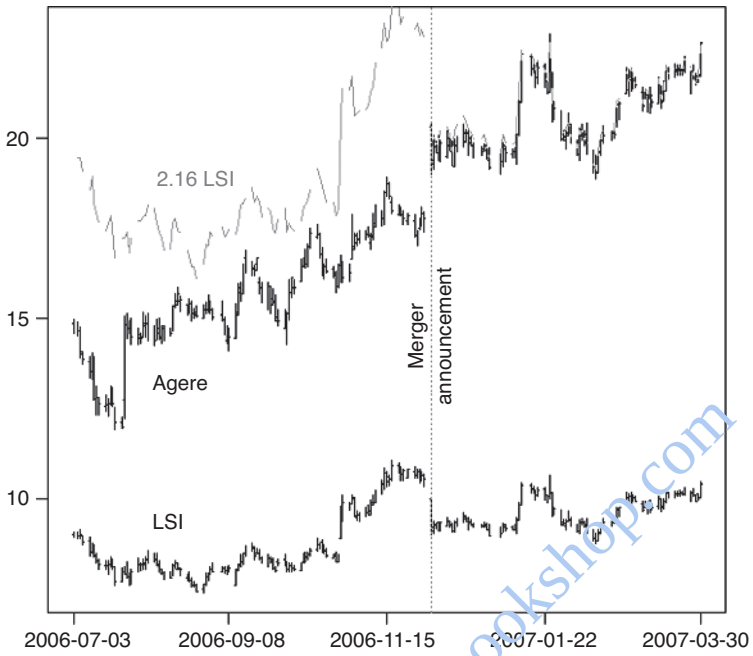

FIGURE 1.9 Stock Prices of LSI and Agere

http://www.pbookshop.com

from under $18.00 to over $20.00 and closed at $19.30. LSI Systems had traded around $10.70 before the announcement and fell to a closing price of $9.12. Articles in the press often attribute such a drop of an acquirer's stock price to skepticism about the merger in the investor community. However, it will be seen that the drop is often the by-product of arbitrage activity.

For simplicity, it will be assumed that an arbitrageur enters the position on December 4 at the closing price. The arbitrageur will execute two transactions:

1. Pay $19.30 per share to buy 100 shares of Agere.
2. Sell short 216 shares of LSI at $9.12 per share.

It helps to examine the cash flows and stock holdings after these two trades. They can be found in Table 1.2. There is an expense of $1,930.00 to acquire the shares of Agere, and proceeds from the short sale amount to $1,970.00.

It can be seen that this transaction leaves the arbitrageur with a net cash inflow of $40.00. At the closing of the merger, the 100 shares of Agere will

TABLE 1.2 Cash Flows in Agere/LSI Merger

	Stock Transaction	Cash Flow
Agere	+100	$(1,930.00)
LSI	−216	$1,970.00
Net	—	$40.00

be converted into 216 shares of LSI. The arbitrageur is then long 216 shares and short 216. The long position can then be used to deliver shares to the counterparty from which the short position was borrowed. As a result, the arbitrageur no longer has a position in stock, long or short, but is left with a profit of $40.00.

The example of 100 shares is useful for illustrative purposes. Rather than looking at the purchase of 100 shares, transactions should be calculated on a per-share basis. Each share of Agere is converted into 2.16 shares of LSI. By multiplying the exchange ratio with the stock price of LSI, it can be seen that per share of Agere an arbitrageur receives $19.70 from the short sale of LSI. The spread is hence $0.40 per share of Agere.

The return calculation is simplified here in that no dividends need to be taken into account. LSI has not paid dividends since 1986, and Agere does not pay dividends either.

$$R_G = \left(\frac{P_S}{P_P}\right) - 1 = \left(\frac{19.70}{19.30}\right) - 1 = 0.0207 \tag{1.5}$$

$$P_S = r \times P_A$$

where P_S is the proceeds received from the short sale, per share of target stock.
P_A is the price at which the acquirer is sold short.
r is the exchange ratio.

The gross return on this arbitrage is 2.1 percent.

Calculation of the annualized return works as in the example of a cash merger. Only the calculation of compound returns are shown here; simple interest can be calculated analogously. To determine the likely closing date, the arbitrageur will again reference the press release: "The companies expect the transaction to close in the first calendar quarter of 2007." A closing date of March 31 is 117 days from December 4, the day the position was entered.

http://www.pbookshop.com

The number 116 days would be used if March 30, the last business day of the quarter, is used.

Compound interest

$$R_{AG} = \left(\frac{P_S}{P_P}\right)^{\left(\frac{365}{t}\right)} - 1 = \left(\frac{19.70}{19.30}\right)^{\left(\frac{365}{117}\right)} - 1 = 0.00661 \qquad (1.6)$$

The actual closing of this merger occurred on April 2, 2007, so the actual return on this arbitrage was an annualized 6.5 percent.

One of the advantages of stock-for-stock mergers is the simultaneous holdings of a long and a short position. Because of the upcoming merger, the two stocks are highly correlated, so that an increase in Agere's stock price is accompanied by an offsetting increase in LSI's. If the two stocks were no longer to move in parallel, the spread would change, and the annualized return available to arbitrageurs would either compress or expand.

The evolution of the spread of the Agere/LSI merger is shown in Figure 1.10. In the case of a cash transaction, the spread depends on only one variable. In a stock-for-stock merger, it depends on two stock prices. The spread does trend toward zero over time, albeit not very smoothly.

http://www.pbookshop.com

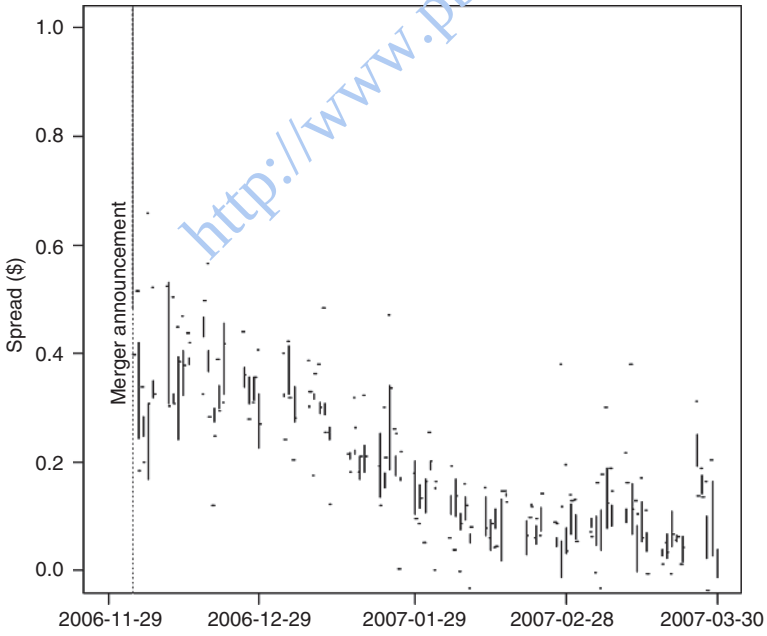

FIGURE 1.10 Evolution of the Agere/LSI Spread

It is clear that short sales from arbitrage activity can lead to significant selling pressure on the stock of a buyer after the announcement of a stock-for-stock merger. Often analysts and journalists attribute the drop of a buyer's stock after a merger announcement to fundamental reasons, such as the prospect for the merged entity. One account of the trading activity following the announcement of the merger of Trane Inc. with Ingersoll-Rand is shown in Exhibit 1.3. The mechanics of this merger are discussed in the next section. Ingersoll-Rand fell over 11 percent following the announcement of the merger. The fundamental reasoning behind this merger appeared solid. Some reports suggested that the combination of the two firms created the number-two air-conditioning company in the United States. The long-term prospects of Ingersoll-Rand clearly were not bad and would not have justified an 11 percent drop. It can be explained only by arbitrage activity. Experienced investment bankers warn company management during merger negotiations of the risk to their stock price and suggest structures with a cash component to a stock-for-stock merger in order to reduce short selling.

http://www.pbookshop.com

EXHIBIT 1.3 ACCOUNT OF INGERSOLL-RAND'S ACQUISITION OF TRANE FOR $10.1 BILLION, CREATING CLIMATE CONTROL BEHEMOTH

TRENTON, N.J. (AP)—In a deal worth a cool $10 billion, Ingersoll-Rand Co. will acquire Trane Inc. and create one of the world's largest makers of commercial and residential home air conditioners, refrigerators for trucks and stores, and other climate control products.

But some Ingersoll-Rand shareholders, who had expected the cash-rich company to pour some money into share repurchases, seemed disappointed with the acquisition announced Monday and sold Ingersoll-Rand stock, driving shares down sharply.

Merger arbitrage is attractive to many investors as a portfolio diversifier because of its long/short components. It is assumed that these positions immunize the portfolio against fluctuations in the overall stock market and leave only uncorrelated event risk to the investor, and therefore, the portfolio is market neutral. This argument is revisited in more detail in Chapter 12. Nevertheless, at this point, a short discussion of one of the pitfalls of long/short positions is necessary. A constant percentage spread can lead to dollar paper losses in an extreme bull market, if both the long and the short position increase, but the percentage spread remains constant. Table 1.3 illustrates this problem with a hypothetical increase of Agere

TABLE 1.3 Losses Suffered at a Constant Percentage Spread in a Rising Market

Agere	LSI	Value of LSI	Spread ($)	Spread (%)	P & L
19.30	9.12	19.70	0.40	2.07	0
20	9.45	20.41	0.41	2.07	−0.01
21	9.92	21.43	0.43	2.07	−0.03
22	10.40	22.46	0.46	2.07	−0.06
23	10.87	23.48	0.48	2.07	−0.08
24	11.34	24.50	0.50	2.07	−0.10
25	11.81	25.52	0.52	2.07	−0.12
26	12.29	26.54	0.54	2.07	−0.14
27	12.76	27.56	0.56	2.07	−0.16
28	13.23	28.58	0.58	2.07	−0.18
29	13.70	29.60	0.60	2.07	−0.20
30	14.18	30.62	0.62	2.07	−0.22
31	14.65	31.64	0.64	2.07	−0.24
32	15.12	32.66	0.66	2.07	−0.26
33	15.59	33.68	0.68	2.07	−0.28
34	16.07	34.70	0.70	2.07	−0.30
35	16.54	35.72	0.72	2.07	−0.32
36	17.01	36.74	0.74	2.07	−0.34
37	17.48	37.77	0.77	2.07	−0.37
38	17.96	38.79	0.79	2.07	−0.39
39	18.43	39.81	0.81	2.07	−0.41
40	18.90	40.83	0.83	2.07	−0.43

http://www.pbookshop.com

and LSI with a constant percentage spread. The losses discussed here are temporary only and will eventually be recovered once the merger closes.

The table starts with the actual spread of 2.07 percent at prices of $19.30 and $9.12 for Agere and LSI, respectively. It shows the profit and loss (P&L) relative to a position entered at $19.30 and $9.12. If both Agere and LSI rise and the percentage spread remains constant, then the spread expressed in dollars must rise (2 percent of $40.00 is more than 2 percent of $19.30). The simulated price rise in Table 1.3 shows that a spread of $0.40 would widen to $0.83 per share if Agere were to double in value to $40.00 per share. Although LSI's stock appreciates by the same percentage as Agere, the difference in dollar terms increases. At $40.00 per share, the arbitrageur's portfolio would record a loss of $0.43 per Agere share.

This scenario does not imply inefficiency in the market. If the hypothetical increase in spreads were to occur on the same day as the position was entered, the annualized return would be unchanged, because the percentage spread is the same whether Agere trades at $40.00 or at $19.30.

It is clear that these losses are only paper losses. As long as the merger eventually closes, the arbitrageur will realize a gain of $0.40. Only those who panic and close their position early will actually suffer a loss. The arbitrageur is short 2.16 shares of LSI for every long position of Agere, and the cash changed hands when the trade was made. Therefore, the eventual profit is certain as long as the merger closes.

Whether an arbitrageur wants to hedge against paper losses is a matter of personal preference. Any hedging transactions will entail costs and will reduce the return of the arbitrage. Because the spread eventually will be recovered, it probably makes little sense to hedge against transitory marked-to-market losses.

It can be extrapolated from this discussion that in the case of a fall in stock prices, the dollar spread will tighten, and the arbitrageur will record a gain even though the percentage spread and the annualized return would remain unchanged.

Sometimes shareholders hold a number of target shares that does not get converted to a round number of buyer shares. For example, a holder of 110 shares of Agere would receive 237.6 shares of LSI. However, the fractional 0.6 shares cannot be traded or issued because corporations have whole shares only. (Note that mutual funds are different even though they are also organized as corporations.) Therefore, companies will liquidate fractional shares and issue only full shares. The investor in our example would receive 237 shares of LSI and a cash payment for the value of the fractional 0.6 shares. The cash payment depends on the share price of LSI at the time of the closing of the merger.

In addition to earning the spread, a stock-for-stock merger has another source of income. When arbitrageurs short a stock, they receive the proceeds of the short sale. In the example from Table 1.2, the arbitrageur received $1,970.00 from the short sale of Agere. These funds are on deposit at the brokerage firm that executed the short sale. Arbitrageurs can negotiate to receive interest on this deposit. This is easier said than done. In the author's experience, most retail brokerage firms do not pay interest on the proceeds of short sales. At the time of writing, one retail brokerage firm advertised that it had paid interest on balances of short proceeds in excess of $100,000.00. Institutions are better off. They are always offered interest on the proceeds. This is referred to as "short rebate" in industry parlance.

The example of the Agere/LSI merger can illustrate the effect of the short rebate on merger arbitrage returns. Assume that the short rebate is 1 percent. This may appear low, but it is quite normal for rates for short rebates to be well below interest rates. In fact, the spread between short rebates and margin rates charged customers who borrow to buy stock is an important source of revenue for brokerage firms. The interest earned on the

http://www.pbookshop.com

$1,970.00 over the 117-day period until the closing of the merger would have been

$$i = \$1{,}970 \times 0.01 \times \frac{117}{365} = \$6.32 \tag{1.7}$$

This would increase the merger profit from $40.00 to $46.32—an increase of almost 16 percent. For simplicity, simple interest is used in this calculation. Most brokers pay interest monthly, so monthly compounding should be used.

The annualized spread increases by the amount earned on the short rebate:

$$R_{AG} = \left(\frac{P_S \times (1 + r_s)^{\cdot\left(\frac{t}{365}\right)}}{P_P}\right)^{\left(\frac{365}{t}\right)} - 1$$

$$= \left(\frac{19.70 \times (1 + 0.01)}{19.30}\right)^{\left(\frac{365}{117}\right)} - 1 = 0.0767 \tag{1.8}$$

where r_s represents the interest paid on the short rebate.

As discussed in Chapter 13, returns on merger arbitrage tend to be correlated with interest rates as a result of the impact that short rebates have on spreads.

The LSI merger was easy to analyze because neither stock pays any dividends. Stocks paying dividends can be tricky to handle when sold short, because the short seller must pay the dividend on the stock. The long position will generate a dividend; the short position will cost a dividend. A crude calculation to determine the net effect of dividends on the annualized spread is to subtract the dividend yield of the short position from the dividend yield of the long position, and add the result to the annualized return of the merger arbitrage. However, this method can give incorrect results, especially for mergers with a short horizon to closing. The method can be used as a first approximation, but arbitrageurs always must consider the actual dividend dates and dividend amounts.

The gross return in the presence of dividends is calculated for a long/short merger arbitrage in this way:

$$R_G = \left(\frac{P_S}{P_P + d_P}\right) - 1 = \left(\frac{19.70}{19.30}\right) - 1 = 0.0207 \tag{1.9}$$

$$P_S = r(P_A - d_S)$$

where d_S are the total dividends to be paid on the short sale.
d_P are the total dividends to be received on the purchased (long) stock.

http://www.pbookshop.com

Mixed Cash/Stock Mergers

Many buyers want to limit dilution in the acquisition of a target company or have access only to an amount of cash insufficient to purchase the target entirely for cash. They are structured as the acquisition of a target for a dollar amount plus a shares, or they offer target shareholders the option to choose between cash and stock, typically with a forced proration.

In the former case, every shareholder of the target company is treated equally. Exhibit 1.4 shows the announcement of the merger of Trane, Inc. with Ingersoll-Rand, announced in December 2007. This merger was mentioned briefly earlier to illustrate the effect that arbitrage-related short selling can have on a company's stock price immediately following the announcement of a merger.

EXHIBIT 1.4 ANNOUNCEMENT OF ACQUISITION OF TRANE INC. BY INGERSOLL-RAND

HAMILTON, Bermuda, and PISCATAWAY, N.J.—(BUSINESS WIRE)—Ingersoll-Rand Company Limited (NYSE: IR) announced today that it has executed a definitive agreement to acquire Trane Inc. (NYSE: TT), formerly American Standard Companies Inc., in a transaction valued at approximately $10.1 billion, including transaction fees and the assumption of approximately $150 million of Trane net debt. Trane is a global leader in indoor climate control systems, services and solutions with expected 2007 revenues of $7.4 billion.

Under the terms of the merger agreement, which has been approved by the Boards of Directors of both companies, Ingersoll Rand will acquire all outstanding common stock of Trane. Holders of Trane's approximately 200 million common shares will receive a combination of $36.50 in cash and 0.23 Ingersoll Rand shares of common stock per each Trane share. The total value for this transaction was $47.81 per Trane share based on the closing price as of December 14, 2007. The transaction which is expected to close late in the first quarter or early in the second quarter of 2008, is subject to approval by Trane shareholders, regulatory approvals and customary closing conditions.

http://www.pbookshop.com

Trane's shareholders will receive $36.50 plus 0.23 share of Ingersoll-Rand. Trane's shares closed on December 17 at $45.24, whereas those of

Ingersoll-Rand closed at $43.60. An arbitrageur entering a position at these prices would make a gross return of 2.85 percent:

$$R_G = \left(\frac{P_S + P_C}{P_P}\right) - 1 = \left(\frac{0.232 \times 43.60 + 36.50}{45.24}\right) - 1 = 0.00285 \tag{1.10}$$

where $P_S = r \times P_A$ as before.
P_C is the cash component received in the merger.

This gross return should be annualized by one of the methods explained earlier.

Another form of mixed cash/stock transactions does not specify a set dollar amount to be received per share but instead sets a fraction of the total consideration to cash. Frequently used ratios are 50/50 cash/stock, 40/60, or 20/80.

The acquisition by Vulcan Materials Company of Florida Rock Industries, Inc. had 70 percent cash and 30 percent stock. The press release is shown in Exhibit 1.5.

Mixed transactions with election rights can be difficult to calculate because they require some guesswork. Shareholders can choose to receive either cash or stock. Arbitrageurs and many shareholders will pick the option that is worth the most. In this case, if Vulcan's shares trade above $67.00 at the time of the merger, profit-maximizing shareholders will want to receive shares. If Vulcan's shares trade below $67.00, shareholders will prefer $67.00 in cash. For this reason, these transactions have a proration provision, so that the buyer of the firm can make the blended cash/stock payment of 30 percent stock and 70 percent cash. However, not all shareholders will seek to be paid in cash when the shares are below $67.00. Some shareholders fail to make a selection and will be allocated the less valuable consideration by default. Many long-term shareholders will select shares even though they could get a higher cash payment because they intend to continue to hold the shares. Strategic investors or managers will hold on to their shares. Some asset allocators may find it easier to roll their shares into the buyer's stock than reinvest themselves. Finally, the most important group selecting stock rather than cash are long-term holders who have significant appreciation in their holdings of target stock. They would be faced with an immediate tax bill if they realized a gain in the merger. By selecting stock, they can defer realization of a taxable gain into the future. Because these investors have a preference for stock even if the cash component is worth more at the time of the merger, slightly more cash will be paid to shareholders who select cash than if proration were applied at the stated ratio.

In the case of Florida Rock, 85.7 percent of shareholders elected to receive cash, 10.7 percent elected stock, and the remaining 3.6 percent did not make a selection. Because the cash election was oversubscribed, the

http://www.pbookshop.com

EXHIBIT 1.5 ACQUISITION OF FLORIDA ROCK BY VULCAN MATERIALS

Birmingham, AL, and Jacksonville, FL—February 19, 2007—Vulcan Materials Company (NYSE: VMC), the nation's largest producer of construction aggregates and a major producer of other construction materials, and Florida Rock Industries Inc. (NYSE: FRK), a leading producer of construction aggregates, cement, concrete, and concrete products in the Southeast and Mid-Atlantic states, today announced that they have signed a definitive agreement for Vulcan Materials to acquire Florida Rock in a cash and stock transaction valued at approximately $4.6 billion.

The acquisition, which has been unanimously approved by both companies' boards of directors, will significantly enhance Vulcan Materials' strategic position and long-term growth opportunities by greatly expanding its presence in attractive Florida markets and in other high-growth Southeast and Mid-Atlantic states. The combined company will have aggregate reserves totaling approximately 13.9 billion tons, an increase of more than 20% over Vulcan Materials' stand-alone aggregate reserves, and 2006 pro forma aggregate shipments of 300 million tons, an increase of approximately 18% compared to Vulcan Materials' stand-alone shipments.

Under the terms of the agreement, Vulcan Materials shareholders will receive one share of common stock in a new holding company (whose subsidiaries will be Vulcan Materials and Florida Rock) for each Vulcan Materials share. Florida Rock shareholders can elect to receive either 0.63 shares of the new holding company or $67.00 in cash for each Florida Rock share, subject to proration, to ensure that in the aggregate 70% of Florida Rock shares will be converted into cash and 30% of Florida Rock shares will be converted into stock. The transaction is intended to be non-taxable for Vulcan Materials shareholders and non-taxable for Florida Rock shareholders to the extent they receive stock. The total blended cash and stock consideration of $68.03 per share, based on the closing price of Vulcan Materials' stock on Friday, February 16, 2007, represents a premium of 45% for Florida Rock shareholders based on Friday's closing price of each company's stock.

http://www.pbookshop.com

shareholders who did not select cash received all stock. Shareholders who elected to receive cash received cash for 81.6 percent of their shares and stock for the other 18.4 percent.

Arbitrageurs must use experience and guesswork to determine the ratio that is most likely to apply. In the next discussion, it is assumed for simplicity that the ratio of cash/stock that the arbitrageur will receive is that of the stated proration factor.

To calculate the gross return,

$$R_G = (R_S \times P_S + R_C \times P_C) \div P_P - 1 \tag{1.11}$$

where R_S is the ratio of stock to be received.
R_C is the ratio of cash to be received (obviously, $R_S + R_C = 1$).
P_S is the proceeds received from the short sale, per share of target stock.

As before, $P_S = r \times P_A$

This gross return can be annualized by analogy with the previous examples.

Mergers with Collars

The Agere/LSI merger had a fixed exchange ratio of 2.16. This exposes both Agere and LSI to a certain market risk. If the value of LSI's stock increases significantly, then the 2.16 shares that Agere shareholders will receive for each share will also increase in value. In this case, the value of the transaction will be much higher than $4 billion. While Agere shareholders will be happy with this outcome, the investors in LSI will wonder whether they could have acquired Agere by issuing fewer shares. Conversely, if LSI's stock falls, then Agere's shareholders will receive less valuable shares for each Agere share. They would have been better off with a higher exchange ratio.

For this reason, many merger agreements include provisions to fix the value of stock received by the target company's shareholders at a set dollar amount or at a fixed exchange ratio. The exchange ratio is adjusted as a function of the share price of the acquirer. Two reference prices are determined.

Two types of collars are common:

1. *Fixed value collars*. Target shareholders will receive a set dollar value's worth of shares of the acquirer as long as the acquirer's share price is within a certain collar. This collar is buyer-friendly. The exchange ratio can change within the collar range. This type of collar is so common that the term "fixed value" is often dropped. References to a generic "collar" relate to fixed value collars.
2. *Fixed share collars*. A set number of shares is given to the target shareholders as long as the acquirer's share price is within a certain range. If

http://www.pbookshop.com

the acquirer's share price rises above the maximum, the exchange ratio declines. This collar is seller-friendly. The exchange ratio is fixed within the collar range.

The September 2006 acquisition of Windrose Medical Properties Trust by Health Care REIT, Inc. contained a fixed value collar, shown in the press release in Exhibit 1.6.

EXHIBIT 1.6 ACQUISITION OF WINDROSE MEDICAL PROPERTIES BY HEALTH CARE REIT

Toledo, Ohio, and Indianapolis, Indiana, September 13, 2006—Health Care REIT, Inc. (NYSE: HCN) and Windrose Medical Properties Trust (NYSE: WRS) announced today that they have entered into a definitive merger agreement pursuant to which Health Care REIT will acquire Windrose for approximately $877 million, including the assumption of Windrose's outstanding debt which totaled approximately $426 million as of June 30, 2006. The merger will create a company with investments throughout the health care delivery system with more than 550 properties in 37 states. The combined entity would have gross real estate assets of approximately $4 billion and an enterprise value of approximately $5 billion based on the closing prices of both Health Care REIT and Windrose's stocks on September 12, 2006. . . .

Under the terms of the agreement, each outstanding share of Windrose will be exchanged for 0.4509 shares of Health Care REIT common stock. At yesterday's closing prices, this represents a price of $18.06 for each Windrose share. The actual exchange ratio at closing will be based upon the volume-weighted average price per share of Health Care REIT common stock on the New York Stock Exchange for the 10 trading days selected by lot from the 15 trading day period, ending on and including the fifth trading day prior to the closing of the transaction. The exchange ratio will be subject to increase up to a maximum of 0.4650 in the event of a decrease in Health Care REIT's common stock price prior to the end of such period. Upon closing, Windrose stockholders will own approximately 15% of Health Care REIT, assuming conversion of all of the outstanding Windrose convertible preferred stock. The transaction is expected to close on or about year-end 2006, subject to the approval of the stockholders of Windrose and other customary conditions and consents. Completion of the transaction does not require approval of Health Care REIT stockholders.

http://www.pbookshop.com

Exhibit 1.6 also illustrates that arbitrageurs sometimes need to reverse-engineer merger announcements to understand the terms. Nowhere in the press release is the expression "fixed value collar" used, and the reference prices are also missing. The merger agreement is sometimes of help. It is shown in Exhibit 1.7.

Unfortunately, the merger agreement has similar wording as the press release. In addition, it was not filed with the SEC until the afternoon of September 15, two days after the press release. A merger arbitrageur would have lost valuable time in which a position could have been established.

EXHIBIT 1.7 ACQUISITION OF WINDROSE MEDICAL PROPERTIES BY HEALTH CARE REIT

Merger agreement, section 2.2

(c) Conversion of Shares. Each Share issued and outstanding immediately prior to the Merger Effective Time (other than Shares to be cancelled in accordance with Section 2.2(b)) shall be converted into a fraction of a duly authorized, validly issued, fully paid and non-assessable share of common stock, par value $1.00 per share, of Parent (a "Parent Share" and collectively, the "Parent Shares") equal to the quotient determined by dividing $18.06 by the Parent Stock Price (as defined below) and rounding the result to the nearest 1/10,000 of a share (the "Exchange Ratio"); provided, however, that if such quotient is less than 0.4509, the Exchange Ratio will be 0.4509 and if such quotient is greater than 0.4650, the Exchange Ratio will be 0.4650. For the purposes of this Section 2.2, the term "Parent Stock Price" means the average of the volume weighted average price per Parent Share on the NYSE, as reported on Bloomberg by typing "HCN.N <EQUITY> AQR <GO>", for ten (10) trading days, selected by lot, from among the fifteen (15) consecutive trading days ending on (and including) the date that is five trading days prior to the Effective Times.

http://www.pbookshop.com

An arbitrageur can calculate the reference values for the collar from the information in the press release. The value is fixed at $18.06 per share in the collar, and the exchange ratio can fluctuate between 0.4509 and 0.4650. The two reference prices are calculated as

$$\$18.06 \div 0.4650 = \$38.84 \quad \text{and} \quad \$18.06 \div 0.4509 = \$40.05$$

This is a very narrow collar. As long as Health Care REIT's stock price remains between $38.84 and $40.05, Windrose's shareholder will receive $18.06 worth of Health Care REIT's stock. The range for this collar is less than 5 percent of the buyer's stock price. Typical are ranges of 10 or 15 percent. It can be seen from the chart in Figure 1.11 that Health Care REIT was fluctuating quite wildly during the merger period and exceeded the upper limit of the collar by the time of the closing on December 20, 2006.

Arbitrageurs must hedge mergers with collars dynamically. If the merger is hedged with a static ratio and the stock price of the acquirer moves, the arbitrageur will incur a loss. For example, if Health Care REIT trades at $40.05 and the arbitrageur hedges with a ratio of 0.4509, there will be an insufficient number of shares sold short if the price falls to $38.84, where the correct number of shares sold short would be 0.4650. This underhedging results in the short position's not generating enough return to offset losses on the long position of the arbitrage. Similarly, if 0.4650 shares of Health Care REIT are sold short when it trades at or below the lower end of the

http://www.pbookshop.com

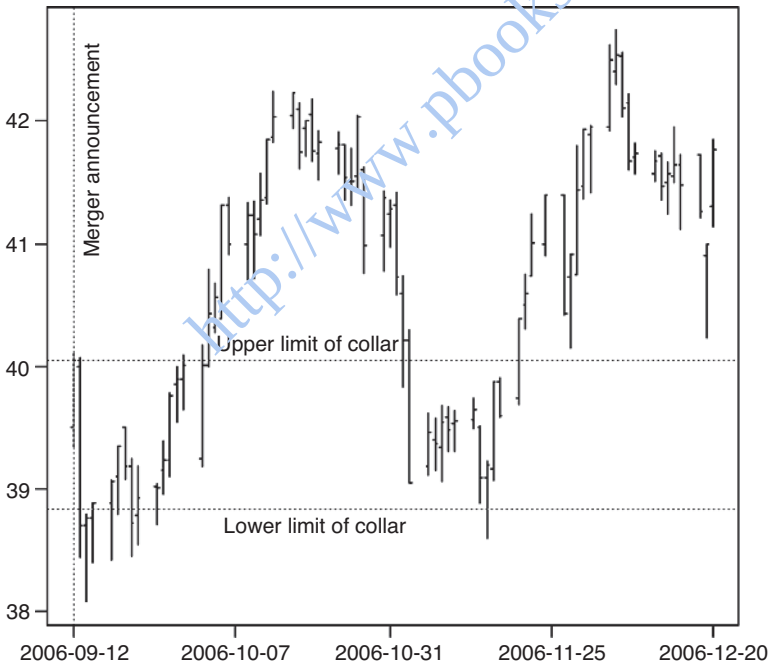

FIGURE 1.11 Fluctuation of Health Care REIT's Stock Price Prior to the Merger

collar, the arbitrageur will be short too many shares if it subsequently rises. The overhedged short position then will generate losses that are too high. The correct way to hedge a collar is dynamically, in the same way that an option collar is hedged by an option market maker.

In the case of the Windrose/Health Care REIT merger, the collar is very tight and the hedge ratio does not change very much. It would be possible to enter an arbitrage position with a static hedge ratio and assume the modest risk that the position needs to be adjusted once the exact conversion ratio is known. An arbitrageur will weigh the potential transaction costs of such a strategy against the spread that can be earned.

A more accurate method for hedging transactions with collars is delta hedging. Both discontinuities in the payoff diagram of collars lead to optionality (see Figure 1.12). The discontinuity to the left of a fixed value collar resembles the payoff diagram of a short put position, whereas the discontinuity to the right resembles a long call position. In a delta-neutral hedge, the arbitrageur calculates the sum of the deltas of these two options and shorts the number of shares given by that net delta. A drawback of delta-neutral hedging is that it requires constant readjustment with fluctuations in the stock price and as time passes. However, for wide collars with

http://www.pbookshop.com

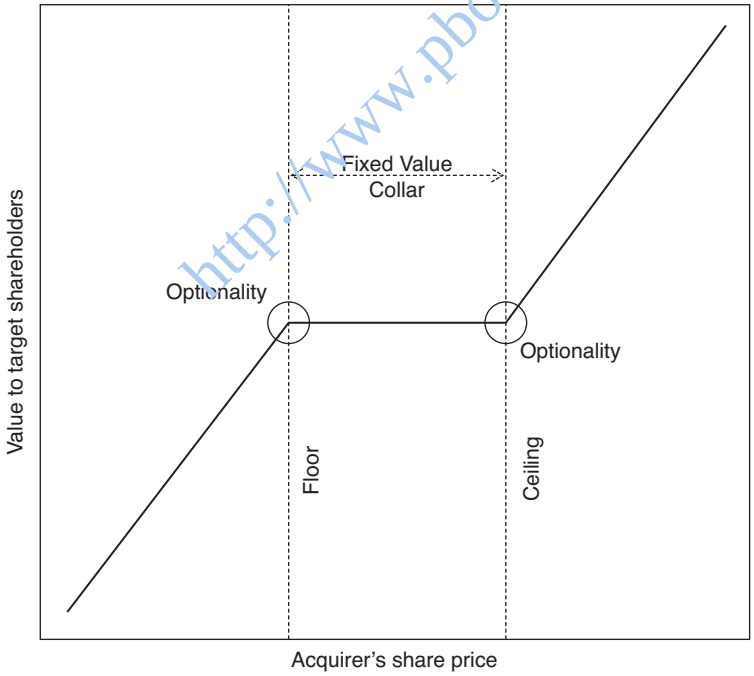

FIGURE 1.12 Optionality in Mergers with a Fixed Value Collar

exchange ratios that change significantly, delta-neutral hedging is the best method to hedge. For further details on the concept of delta hedging, the reader should consult texts dealing with options.

Fixed share collars are less common. One example is shown in Exhibit 1.8. It is the May 2007 acquisition of East Penn Financial Corporation by Harleysville National Corporation. This merger is relatively complex because it combines a collar with a cash/stock proration formula, as discussed earlier. Collars are very common in mergers of small banks.

EXHIBIT 1.8 ACQUISITION OF EAST PENN FINANCIAL CORPORATION BY HARLEYSVILLE NATIONAL CORPORATION

HARLEYSVILLE, Pa., May 16 /PRNewswire-FirstCall/—Harleysville National Corporation (HNC) (NASDAQ: HNBC) and East Penn Financial Corporation (NASDAQ: EPEN) jointly announced today that they have reached a definitive agreement for East Penn Financial Corporation to merge with and into HNC and East Penn Financial's wholly owned subsidiary, East Penn Bank, a $451 million bank offering deposit and lending services throughout the Lehigh Valley, PA, to merge with and into Harleysville National Bank and Trust Company, HNC's banking subsidiary (HNB). . . .

The total value of the transaction if it closed currently under the agreement is estimated at $92.7 million or approximately $14.50 per share of East Penn Financial stock, although actual value will depend on several factors, including the price of Harleysville National Corporation stock, but will not be less than $13.52 per share ($86.3 million) or greater than $15.48 per share ($99.1 million). Under terms of the Merger Agreement, each shareholder of East Penn Financial Corporation may elect to receive either cash only or HNC shares only for each share of East Penn Financial Corporation stock, but may receive a combination of both in the aggregate for all East Penn Financial Corporation shares the shareholder owns. The amount of final per share consideration is based on a formula that is determined by the average per share value of HNC stock during the twenty-day period ending eleven days prior to closing. The consideration is subject to election and allocation procedures designed to provide that the cash portion is $50,284,000 but in any event not greater than 60% of the dollar value of the merger consideration.

http://www.pbookshop.com

EXHIBIT 1.9 MERGER AGREEMENT FOR THE ACQUISITION OF EAST PENN FINANCIAL CORPORATION BY HARLEYSVILLE NATIONAL CORPORATION

Section 2.2 Exchange of and Consideration for East Penn Financial Shares. Upon the Effective Time, all of the East Penn Financial Shares issued and outstanding immediately prior to the Effective Time, shall, at the Effective Time, by reason of the Merger and without any action on the part of the holder thereof, cease to be outstanding and shall be converted into the "Merger Consideration," which shall be comprised of:

(i) the "Cash Consideration," which shall be the sum of $50,284,464.00 (or $14.50 per "Cash Election Share" as defined below assuming 6,305,262 East Penn Financial Shares are outstanding at the Effective Time) plus $7.97 per share for each of the Converted Option Shares (the "Aggregate Converted Share Cash"); plus
(ii) shares of HNC Common Stock as more fully provided below (the "Stock Consideration").

Holders of East Penn Financial Shares shall be entitled to receive, for each East Penn Financial Share, either HNC Common Shares only (a "Stock Election Share") or cash only (a "Cash Election Share"), based on an allocation of the Cash Consideration identified above and the "Stock Consideration" shown below according to the provisions of this Article II, including without limitation Section 2.4:

(a) If the "Indicated HNC Share Price" (as defined in Section 2.4(b)) is equal to or less than $19.84 and equal to or greater than $14.66, the "Stock Consideration" shall be (I) 2,385,172 shares of HNC Common Stock, plus (II) 0.3782 shares of HNC Common Stock for each of the Converted Option Shares.

For example:

Under subsection (a), if the Indicated HNC Share Price is $17.25 and 6,305,262 East Penn Financial Shares are outstanding, an East Penn Financial shareholder will receive 0.8406 shares of HNC Common Stock for each Stock Election Share and $14.50 in cash for each Cash Election Share.

http://www.pbookshop.com

(**b**) If the Indicated HNC Share Price is less than $14.66, the "Stock Consideration" shall be (I) that number of HNC Common Shares equal to the result obtained by dividing $34,970,559.00 by the Indicated HNC Share Price, plus (II) for each of the Converted Option Shares, that number of HNC Common Shares equal to the result obtained by dividing $5.55 by the Indicated HNC Share Price.

For example:

Under subsection (b), if the Indicated HNC Share Price is $14.50 and 6,305,262 East Penn Financial Shares are outstanding, an East Penn Financial shareholder will receive 0.8500 shares of HNC Common Stock for each Stock Election Share and $14.50 in cash for each Cash Election Share.

(**c**) If the Indicated HNC Share Price is greater than $19.84, the "Stock Consideration" shall be (I) that number of HNC Common Shares equal to the result obtained by dividing $47,313,110.00 by the Indicated HNC Share Price, plus (II) for each of the Converted Option Shares, that number of HNC Common Shares equal to the result obtained by dividing $7.51 by the Indicated HNC Share Price.

For example:

Under subsection (c), if the Indicated HNC Share Price is $20.00 and 6,305,262 East Penn Financial Shares are outstanding, an East Penn Financial shareholder will receive 0.8337 shares of HNC Common Stock for each Stock Election Share and $14.50 in cash for each Cash Election Share.

http://www.pbookshop.com

This collar is easier to understand because the reference prices are stated clearly. If Harleysville's share price falls below $13.52, shareholders of East Penn will receive more shares so that the value they receive remains $13.52. This is a very risky transaction to enter for a seller, and probably one of the reasons for its rarity. If Harleyville's share price were to suffer a sudden sharp drop, it would have to issue more shares in the merger. The additional issuance dilutes existing shareholders and leads to a drop in the share price with the issuance of even more shares. It risks triggering a downward death spiral in the share price. As discussed earlier, arbitrage activity always exerts some selling pressure on an acquirer's stock, so that the possibility of this effect should not be ignored. Only buyers who acquire target companies that

are small relative to their own size should use fixed share collars, because the dilution would remain insignificant even for a sharp drop in share prices, and no death spiral would be triggered. If Harleysville accepted a fixed share collar, it must have been very confident that its share price would remain strong.

The ratios can be found in the merger agreement, an extract of which is shown in Exhibit 1.9. The fact that this information is also contained in section 2.2, as in the Windrose merger agreement, is pure coincidence. There is no standardized numbering of the sections of merger agreements.

Subsection (a) fixes the number of shares to be issued as long as Harleyville's share price is in the collar. Subsections (b) and (c) have a set dollar amount for the value of the consideration, so the exchange ratio varies.

This transaction is difficult to hedge. The banks are so small that no options are traded that could help in the hedging—Harleysville has a market capitalization of only $400 million. The only way to hedge this merger is by running a delta-neutral hedge.

http://www.pbookshop.com

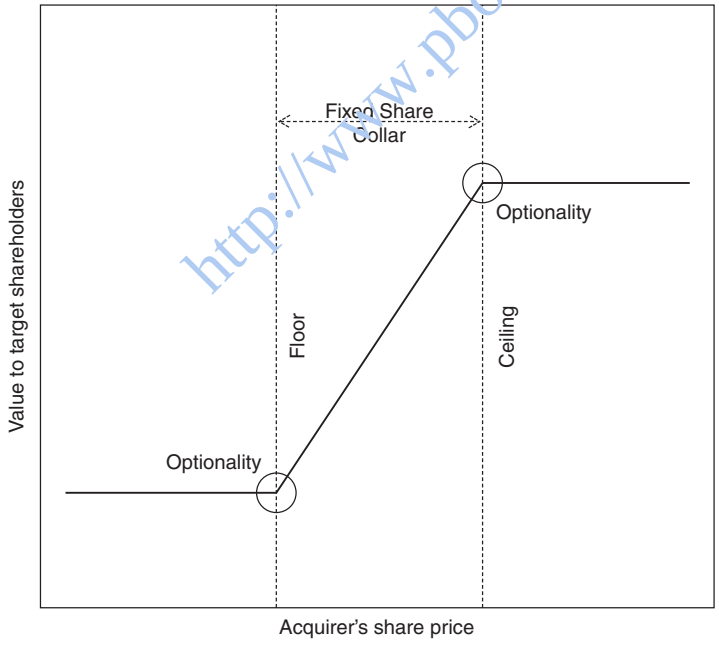

FIGURE 1.13 Optionality in Mergers with a Fixed Share Collar

Figure 1.13 shows the implied options in a fixed share collar. The combination of a long call with a low strike price and a short call with a higher strike price yields such a payoff diagram. This combination is also known as call spread or bull spread. An arbitrageur who wants to hedge a fixed share collar needs to calculate the delta for each option, sum the deltas, and then short the net delta in the form of shares of the target firm.

http://www.pbookshop.com

http://www.pbookshop.com