CHAPTER 1

# The Language of Options

In the Chicago area, where I live, many people know what options are. That is because several of the world's largest options exchanges are here, and many people either work at one of the exchanges or know someone who does.

Still, more people are probably unfamiliar with options. And so it happens that when someone asks about my line of work, the discussion invariably leads to the subject of options, and I find myself having to tell them, in the briefest terms, what options are.

After a short description, I pause, and the words that often come back to me are "Well, that sounds too complicated for me." At that point, I usually hesitate to go much further, because I don't want to make them listen to what might be, to them, an arcane subject. But what I want to say, and sometimes do come right out and say, is that options are not really that complicated. Sure, there is a terminology to learn. But I like comparing options to the game of chess. Like chess, you can learn all the rules about options in just about 20 minutes. Then you're off and running.

Admittedly, some practice is needed to become successful. Options have a number of strategies to become familiar with, but hardly as many as chess! Anyone with average intelligence can learn all about options in a short time.

Also, it's easy to set up an account and begin trading options. Almost every brokerage that allows you to trade stocks also allows you to trade stock or index options. And almost every brokerage that allows you to trade futures also allows you to trade futures-based options. Establishing an options trading account just requires a little extra paperwork, including

signing a statement that you have read and understood the options prospectus and are prepared to assume the risks involved.

Options are fascinating to trade, and they have some unique qualities as a trading vehicle. There are many strategies, some involving the use of two or more options in combination, or the use of options along with a position in the underlying security or futures contract, that have extraordinary risk/reward characteristics.

However, options trading is not for everyone. While there are some conservative options trading strategies, there are some risky strategies as well, where your capital can be lost very quickly. It is up to the individual, after learning about options, to decide whether he or she has the temperament for it.

## THE BASICS

Suppose you agree to sell something. And suppose you and the other party have agreed on a price and a time to complete the sale. In such a case, you have what is called, in the realm of finance, a forward contract.

However, if you agree to let someone have the privilege of buying something from you at a stated price and for a limited time, *if and when the other party decides to do so*, you have sold an *option*.

The holder of the option possesses the right, but not an obligation, to buy something at a stated price for a limited time. The party who sold the option is obligated to deliver the goods if the options holder decides to exercise his option.

The asset that would be delivered is called the *underlying asset*, or just the *underlying*. The price agreed to is called the *strike price* or *exercise price* of the option.

For example, let's say I have a piece of real estate worth $100,000. I could agree to let someone have an option to buy the property from me for, say, exactly $100,000 at any time during the next two years. The option's strike price is therefore $100,000, the underlying is the property itself, and the expiration date is two years from today.

Now, why would I enter into such an agreement? After all, if the property increases in value over the next two years, that appreciation would be lost to me because I have agreed to sell the property for $100,000. Furthermore, I am locked into owning the property, and may not sell it to anyone for the next two years—because if the option holder decides to exercise, I am obligated to deliver the property. So why should I put myself in such a constrained position?

First, for the money I receive. An option has value and won't be

granted without compensation. I may need to receive, for example, $15,000 for this particular option. The $15,000 (should the option buyer agree to that amount) would be mine to keep, regardless of the outcome (whether or not the buyer decides to exercise his option). The price paid for an option is usually referred to as the *premium*.

The second reason for me to do this is that I may be unwilling, or unable, to sell the property at this time. Under those circumstances, I might be happy to at least receive $15,000 immediately, especially if I do not believe that the house is likely to appreciate more than $15,000 over the next two years.

What happens at the end of the two-year period, as we approach the expiration date of the option? If it turns out that the property appreciates less than $15,000, then I'm better off for having sold the option. If the property appreciates exactly $15,000 during the next two years, I end up with the same outcome as if I had not sold the option. And if the property appreciates more than $15,000, then I may regret having sold the option.

Why might someone want to *buy* an option? For one thing, leverage. In this example, for just $15,000, an option buyer can have control over a $100,000 asset. Without incurring the hassle of ownership, he has the *right* to own the property anytime simply by submitting an exercise notice and paying the agreed $100,000. Suppose, during the next two years, he pursues his plans for the property, and those plans don't come together the way he hoped. He now has greater flexibility in getting out because, in fact, he never got in; he never bought the property. He can simply let his option expire.

Also, the option buyer may believe that the property will appreciate more than $15,000 during the next two years. If it does, he could exercise his option and then sell the property for more than $115,000.

Another reason to buy an option, rather than the asset itself, is the limited risk. Although real estate doesn't often drop in price, if the value of this property, for whatever reason, were to fall below $100,000, the option holder is not likely to exercise. Why should he pay $100,000 for something that could be bought, on the open market, for less than $100,000? And if the value of the property were to fall to less than $85,000, the option buyer would be happy that his loss is limited to the $15,000 he paid for the option, rather than having bought the property and now seeing a loss of more than $15,000.

Does the strike price of an option have to be precisely equal to the property's current fair value? Of course not. I could have written (sold) my option at a strike price of, say $110,000, $10,000 above the current fair value. Such an option wouldn't be worth as much, however, and I probably would not get $15,000 for it. When an option's strike price is above the underlying's current market value, the option is said to be "out of the money."

(More on this later. As we will see, I might prefer selling an out-of-the-money option because it gives my asset room to appreciate.)

Does this option have to end either in exercise or by letting it expire? No, there is a third possible outcome. If the two parties are willing and can agree on a price, the option seller may buy back his option, effectively canceling it out.

Again, to open an option position the buyer (holder) pays the seller (writer) an agreed amount (premium) for the option. This premium is the writer's to keep, regardless of the outcome.

Table 1.1 summarizes the possible closing option transactions.

Note the use of a new term—*assigned*. When an option holder exercises, an option writer is assigned, meaning he is being called upon to fulfill his obligation.

## LISTED OPTIONS

In the example above, an option was transacted between two individuals. Its strike price and duration were created by agreement between the two parties to meet their specific needs. Its price was also reached by negotiation. The underlying asset was a specific and unique piece of property. Options that are tailored to a specific situation, with the terms negotiated, are often called over-the-counter (OTC) options. As you can imagine, this process is cumbersome, and finding a willing counter-party usually involves a third party. That's why these types of options are done primarily by large institutions.

In contrast, individuals are more likely to trade *listed* options. These are standardized contracts traded on exchanges and available on many

**TABLE 1.1** Summary of Possible Closing Option Transactions

| If the Option Holder . . . | The Option Writer . . . |
|---|---|
| Exercises | Is *assigned* |
| Pays for the asset | Receives payment for the asset |
| Receives the asset | Must deliver the asset |
| With the option writer's agreement, sells his option back | Buys the option back, effectively canceling the position and eliminating any further obligation |
| Does nothing, allowing his option to expire | Gets to keep his asset, and no additional cash changes hands |

stocks, indexes, bond futures, commodity futures, and currency futures. There are even options on interest rates, inflation rates, and the weather.

With listed options, you do not need to worry about the trustworthiness of the other party to the transaction. A single clearing agency, such as the Options Clearing Corporation, stands in the middle of every trade, guaranteeing the transaction to both the buyer and the seller.

If an option holder exercises his option, the clearing corporation assigns any party holding a short position on a random, arbitrary basis. An option buyer never finds out, nor does he care, who sold the option to him. An option seller never finds out, nor does he care, who bought the option from him.

Listed options have many attractive features. For one thing, several strike prices are usually available at regular price intervals. Also, several different durations (expiration dates) are usually available, following a set pattern. In stocks, for example, one set of options expires in 30 days or less, another set of options expires in approximately 31 to 60 days, another set expires in approximately 3 to 6 months, and so on, going out as far as 2 years or more.

Each listed option is standardized for the same quantity of the underlying asset. In the United States, for example, one stock option is based on 100 shares of an underlying stock, and one futures option is based on one futures contract. By standardizing options contracts, the exchanges make them appealing to large groups of investors, which results in heavy trading and a liquid market.

As the markets are constantly moving, options prices are continuously quoted and changing. Market makers at the options exchanges are always publicly posting prices at which they are willing to buy and sell each option. They stand ready to take the other side of your trade, and thus *make a market* in the options they are responsible for. This allows an option holder to sell his option(s) at any time, and an option writer may buy to close his position at any time.

In the real estate example discussed previously, it is very possible, even likely, that the option holder will exercise his option prior to expiration. In contrast, the vast majority of listed option buyers never exercise them; they simply sell them back on the open market. Many of these people are speculators who only expect to hold their option for a short time. Once the underlying makes a move in the expected direction (or perhaps a move in the wrong direction) they sell. In a sense, options are like hot potatoes being tossed around among speculators. This accounts for quite a bit of the options trading volume.

Another big source of trading volume is institutional trading. Institutions may use options to hedge large positions, or simply trade large positions for speculation.

So far we have only talked about options to *buy*. Options to buy something at a stated price for a limited time are *call* options. There is another type of option: an option to *sell* something. While these options can be a bit more difficult to conceptualize, options to sell something at a stated price for a limited time are *put* options.

## NOMENCLATURE

An option is identified by stating its underlying asset, the expiration month, the strike price, and the type (call or put), usually in that order. For example,

Motorola April 20 calls

would define an option expiring in April of this year. If the option expires more than a year from now, one might need to include a year indication of some kind, as in the following example.

Motorola April04 20 calls

In this example, "04" means the year 2004.

Also important is the way options prices translate into dollar amounts. Most stock options have a multiplier of 100, based on the fact that one option is for 100 shares of stock. So if you were to buy one option at a price of 2.20, for example, you would pay $220. Most index options also have a multiplier of 100. Multipliers for futures-based options vary from 50 to 500 or so.

## LONGS AND SHORTS

Most investors are familiar with being *long*, whether they realize it or not. When you own something, you are said to have a long position in it. When you are long in the market, it means you hope to make a profit from a rising market.

Going *short* means to sell something, without first owning it, to profit from a falling market. The concept of going short can be confusing at first. How can you sell something you don't own? In securities, going short involves borrowing the securities (usually from your broker) to sell. Later, to close the position, you buy, giving the shares back to your broker. With instruments such as futures and options, it's much easier. You're entering

into an agreement to buy or sell—that's all. It is a contract with rights and obligations like any other contract. The only difference is that with futures and options, you may get out of the contract at any time by placing an order that cancels your position before the obligations come due.

However, the concepts of long and short are a bit more involved when working with options. When you buy an option, you are long the option. With a call option, you stand to benefit from the underlying going up, so you can be considered to be, in a general sense, long the underlying as well. However, when you buy a put option, you stand to benefit from the underlying going down, so you can be considered to be, in a general sense, short the underlying. Table 1.2 summarizes the four possible scenarios.

## A BIT MORE TERMINOLOGY

Now just a bit more terminology, and then we can look at why options are such an interesting trading vehicle.

It is very important that the options trader be familiar with the terms and concepts. In this section, the examples refer to stock options. However, the same terms and concepts apply to all asset types.

The value of an option is comprised of two components: intrinsic value and time value. You'll never see these two components quoted separately. You'll just see the total price of the option. Nevertheless, it is important to realize that the value of an option comes from these two elements.

To draw an analogy, the value of a company can be said to consist of (a) book value plus (b) all the rest. Book value, meaning what the company is worth if one were to break it up and sell all its assets, is like an option's intrinsic value. All the rest, including good will and the potential for future earnings, is like an option's time value.

An option's intrinsic value is what you could gain by exercising the option and immediately closing your new position in the underlying. For example, say the price of IBM is 100 and you have a 95 call. If you were to exercise your option, you'd pay 95 for the stock. Then you could immediately sell the

**TABLE 1.2** Four Possible Scenarios

| Position | Exposure |
|---|---|
| Long calls | Long the underlying |
| Short calls | Short the underlying |
| Long puts | Short the underlying |
| Short puts | Long the underlying |

stock on the market for 100, realizing a profit of 5. Thus, the intrinsic value of the option is 5.

An option is said to be *in the money* when it possesses some intrinsic value. Call options are in the money when their strike price is below the current price of the underlying (as in the preceding example). It's the reverse for put options. Puts are in the money when their strike price is above the current price of the underlying.

When an option's strike price is *equal to* (in practice, very close to) the price of the underlying, it is said to be *at the money*.

Call options are said to be *out of the money* when their strike is above the current price of the underlying. Puts are out of the money when their strike is below the current price of the underlying. (See Figure 1.1.)

Time value, the other component of an option's value, represents the possibility of the underlying moving in the option's favor (up for calls, down for puts) during the remaining life of the option. "Isn't it just as possible for the stock to move the wrong way?" one might ask. Yes it is. However, if the stock moves the wrong way, an option's value can drop, at most, to zero. On the other hand, if the stock moves the right way, the option's value can, theoretically, go up without limit. That is why options almost always have some time value. Time value represents the summation of all the possible intrinsic values the option might have, at all the different underlying prices possible on or before expiration, factoring in the probabilities of the stock reaching each of those prices.

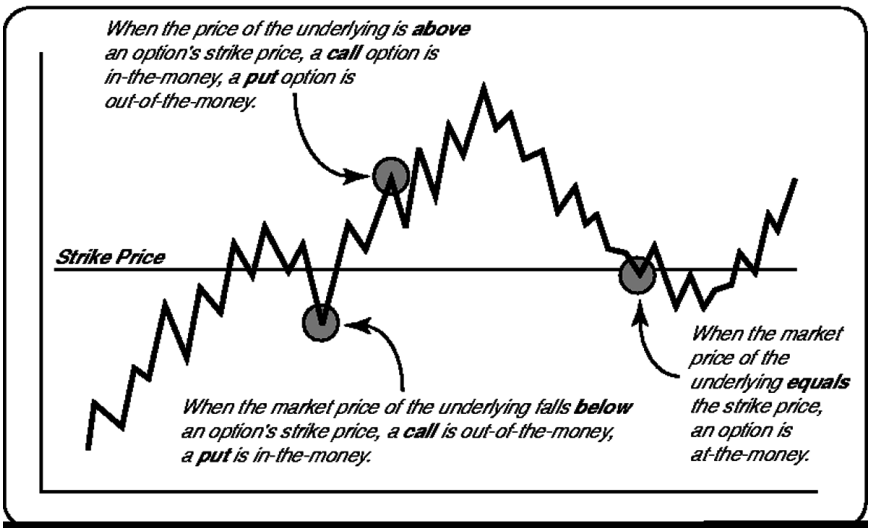



**FIGURE 1.1** Strike Price

Time value can be a challenge to estimate. For that reason, options traders refer to mathematical models, implemented in computer programs, to compute the fair value of an option.

In the previous IBM example, we showed how an in-the-money option could be exercised to get into a stock position at below market price. Would it ever make sense to exercise an out-of-the-money option?

The answer is no. To exercise an out-of-the-money call would be to pay more than the current market price for a stock. To exercise an out-of-the-money put would be to sell a stock for less than the current market price of the stock. It never makes sense to exercise an out-of-the-money option.

In fact, it seldom makes sense to exercise an in-the-money option either. Why? Because you'd be throwing away its time value. Let's illustrate this by extending the IBM example. You have a 95 call and the stock is currently at 100. Your call, if it has more than a few days of life left, is probably worth something more than 5; let's say 6.5. (This would be an intrinsic value of 5 plus a time value of 1.5.)

If you exercise the option and then sell the stock, as before, you gain $500 on the stock transaction. However, you no longer have an option worth $650. Thus, you lost $150—the option's time value. It would be better to sell your option on one of the options exchanges. Not only do you recover the full value of your option this way, but it is also simpler to do just one option transaction, versus two transactions the other way.

Here is a little pop quiz to see if you have grasped the concepts we have been discussing.

1. A stock is at 60. A 65 call on this stock has a price of 1.75. Is this option in-the-money, at-the-money, or out-of-the-money? What is this option's intrinsic value? What is this option's time value?

   *Answers:* The option is out-of-the-money and has an intrinsic value of zero and a time value of 1.75.

2. A stock is at 70. A 60 call on this stock has a price of 11.40. Is this option in-the-money, at-the-money, or out-of-the-money? What is this option's intrinsic value? What is this option's time value?

   *Answers:* The option is in-the-money, has an intrinsic value of 10 and a time value of 1.40.

3. A stock is at 50. A 55 put on this stock has a price of 6.60. Is this option in-the-money, at-the-money, or out-of-the-money? What is this option's intrinsic value? What is this option's time value?

   *Answers:* The option is in-the-money, has an intrinsic value of 5 and a time value of 1.60.

4. A stock is at 50. A 50 call on this stock has a price of 3.20. Is this option in-the-money, at-the-money, or out-of-the-money? What is this option's intrinsic value? What is this option's time value?

   *Answers:* The option is at-the-money, has an intrinsic value of zero and a time value of 3.20.

*One final question:* In question 2 above, do you think this option could trade below 10 (its intrinsic value)?

*Answer:* Yes it could. Anything could happen in an open market. However, practically speaking, it would not trade for much less than 10. That is because traders are constantly watching the options markets for bargains, and snap them up in an instant. So if you were to offer this option for sale at, say, 9.8, someone would quickly buy it from you, because they know they can immediately exercise it and sell the stock, realizing a 0.20 point profit.

Even if an option's time value has dropped to zero, it is always worth its intrinsic value, and you should be able to sell it for intrinsic value, or perhaps just a bit less. Thus intrinsic value serves practically as a "floor level" for the price of an option. When an option is trading at intrinsic value, it is said to be trading *at parity*.

Previously, I pointed out that a great many options are never exercised. It does not make sense to exercise an option that has any appreciable time value; you'd be throwing away money. However, it is when an option's time value is zero or nearly zero that option holders *are* likely to exercise. Conversely, if you sell (short) an option with zero or nearly zero time value, you are apt to be assigned—and it can happen that very day.

Early assignment may or may not be a significant danger to you. It depends on the nature of the position you would be left holding. (More will be said on this in Chapter 4.)

## OFFSETTING OPTION TRADES

The only way to close an option position before expiration is to do the opposite transaction in the marketplace. This applies to both puts and calls, whether long or short. When you have bought a call, the only way to rid yourself of the position is to sell the same call. Buying a put will not do it. Selling some other call on the same underlying does not do it. Such trades might reduce your risk, but they would only build (and complicate) your original position.

## EXPIRATION, EXERCISE, AND ASSIGNMENT

The alternatives to closing a position with an opposite transaction are to let the option expire or to exercise it. If the option is out-of-the-money at expiration, it has no value and therefore should be allowed to expire worthless. However, if the option is in-the-money at expiration, it has value and should be exercised.

When you exercise a stock option, you pay for and receive shares of stock. This is an important point to remember. Let's say you have a long call position that gives you the right to buy 100 shares of a stock at $50. If you intend to exercise it, make sure you have enough in your account to cover the $5,000 payment you need to make! Futures and index options work differently. When you exercise futures options, you are immediately in a futures position and no cash changes hands. When you exercise index options, you simply receive the intrinsic value as a cash settlement. For example, if you have an index option that is 4.00 in-the-money at expiration, you receive $400 posted to your account. There is no delivery of anything (besides cash), and it does not create a new position in another security.

It is not always required that the option holder submit an exercise notice. Exercise is automatic for some instruments if the option is a certain amount in-the-money. It is important to understand what will happen if you do nothing with an in-the-money option at expiration. Speak with your broker if you are unsure. It never hurts to submit an exercise notice, as you would not want to let a valuable option just disappear!

## AMERICAN VERSUS EUROPEAN

Options can also be classified in terms of *style*, which relates to the two ways in which they can be exercised. If an option can be exercised anytime up until expiration, it is said to be *American style*. However, many options can be exercised only on expiration day. These are said to be *European style*. Note: This is not a reference to which continent the options trade on. Both American and European style options trade in America, Europe, and on other continents.

In the United States, all stock options and more than half of the index options are American style; the remaining index options are European style. Some futures-based options are American style and others are European style.

An option buyer intending to exercise needs to know which style options he is getting. An option seller might prefer European style options,

because he'd rather not be concerned about being assigned before expiration. For the options buyer who has no intention of exercising, the only difference is that American style options are a bit more valuable—and a quality options pricing model will bear this out.

## QUOTATIONS

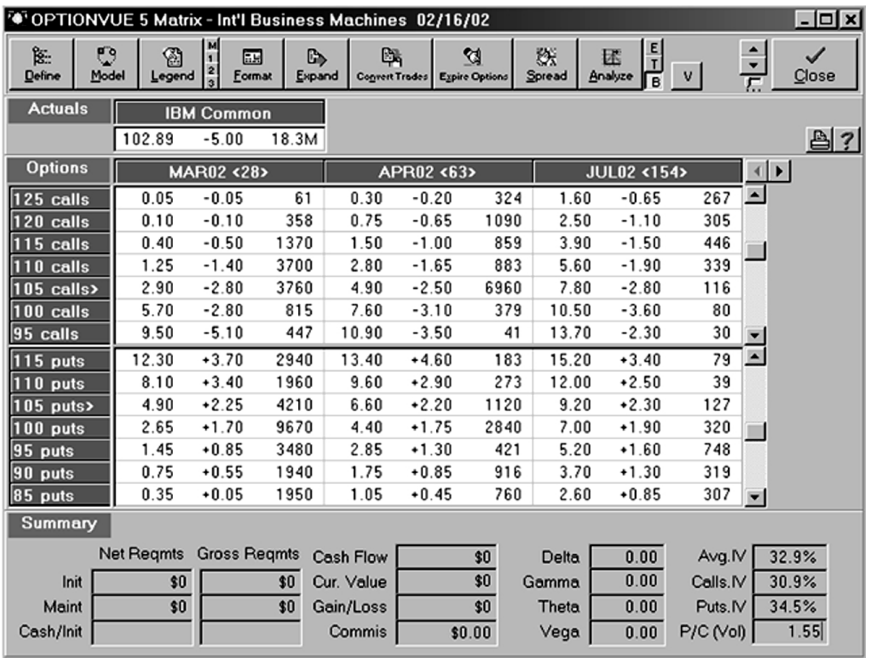
Figure 1.2 illustrates how options are quoted in two popular business newspapers. Both identify the underlying stock in boldface type and list several options per stock. For each option, they print the option's expiration month, strike, last trade price, and day's volume. Note that many more options exist than what is shown. One newspaper lists only actively traded options and the other apparently lists only the nearby options (the ones expiring the soonest).

More complete listings can be seen in trading software, as in the example in Figure 1.3. This matrix of IBM options shows the stock price, today's price change, and volume (number of shares traded), as well as the price, change, and volume for 42 of IBM's options. Even more options are available at strikes above and below those shown (and could be seen by

| OPTION/STRIKE | | EXP. | VOL. | LAST | VOL. | LAST |
|---|---|---|---|---|---|---|
| AmOnline | 25 | Feb | 1587 | 2.40 | ... | ... |
| 27.35 | 25 | Mar | 2014 | 2.70 | 1082 | 0.50 |
| 27.35 | 27.50 | Feb | 1229 | 0.10 | 1568 | 0.35 |
| 27.35 | 27.50 | Mar | 1180 | 1.15 | 866 | 1.45 |
| 27.35 | 32.50 | Apr | 1577 | 0.50 | 20 | 5.40 |
| AT&T | 15 | Mar | 698 | 1.15 | 1494 | 0.55 |
| 15.65 | 17.50 | Jul | 5661 | 0.95 | 120 | 2.65 |
| Abb L | 55 | May | 141 | 3 | 1707 | 1.95 |
| 56.27 | 60 | May | 1901 | 0.80 | 4 | 4.60 |
| Activisn | 25 | Mar | 2060 | 3.40 | 5 | 1.35 |
| AdvncPCS | 30 | Feb | 805 | 0.45 | 1293 | 0.40 |
| A M D | 12.50 | Feb | 1194 | 2.50 | ... | ... |
| Aetna | 35 | Apr | 18 | 1.45 | 2593 | 3.50 |
| Amazon | 15 | Feb | 1622 | 0.10 | 335 | 1.20 |
| A Hess | 65 | Mar | 1365 | 2.40 | ... | ... |
| AmIntGp | 75 | Mar | 109 | 3.50 | 2413 | 1.35 |
| 77.17 | 80 | Feb | 645 | 0.05 | 6775 | 3.20 |
| AmerisBrgn | 65 | Aug | 1250 | 4.90 | ... | ... |
| Amgen | 55 | Feb | 2059 | 3 | 877 | 0.05 |
| 58.00 | 55 | Mar | 1673 | 4.40 | 1319 | 1.10 |
| 58.00 | 60 | Feb | 1699 | 0.05 | 489 | 2 |
| 58.00 | 60 | Mar | 1609 | 1.25 | 236 | 3.20 |
| 58.00 | 60 | Apr | 1254 | 2.50 | 44 | 4.30 |

| P | Strike | Last | | Last | | Last |
|---|---|---|---|---|---|---|
| C | Price | Vol. | Price | Vol. | Price | Vol. Price |
| | | Feb | | Mar | | |
| eBay | | | | Close 60.00 | | Apr |
| c55 | 616 | 5.20 | 69 | 6.40 | 20 | 8.10 |
| c60 | 1125 | 0.65 | 822 | 3.20 | 24 | 5.20 |
| c65 | no tr | | 967 | 1.15 | 135 | 2.60 |
| c70 | 6 | 0.05 | 68 | 0.35 | 229 | 1.25 |
| c75 | no tr | | no tr | | 197 | 0.55 |
| c80 | no tr | | no tr | | 465 | 0.30 |
| c90 | no tr | | 299 | 0.05 | 198 | 0.10 |
| p45 | no tr | | 183 | 0.30 | 14 | 0.80 |
| p50 | no tr | | 304 | 0.60 | 155 | 1.50 |
| p55 | 303 | 0.05 | 327 | 1.50 | 77 | 2.85 |
| p60 | 1228 | 0.50 | 566 | 3.20 | 76 | 4.80 |
| i2 Tech | | | | Close 6.20 | | Apr |
| c7.50 | 101 | 0.05 | 240 | 0.35 | 381 | 0.65 |
| AbbotLabs | | | | Close 56.27 | | Apr |
| c50 | 2 | 6.10 | 266 | 6.40 | no tr | |
| c55 | 382 | 1.35 | 179 | 2 | 141 | 3 |
| c60 | no tr | | 116 | 0.15 | 1901 | 0.80 |
| p55 | 55 | 0.10 | 269 | 0.85 | 1707 | 1.95 |

**FIGURE 1.2** Option Quotes



OPTIONVUE 5 Matrix - Int'l Business Machines 02/16/02

Define | Model | Legend | Format | Expand | Convert Trades | Expire Options | Spread | Analyze | Close

Actuals | IBM Common

102.89 -5.00 18.3M

| Options | MAR02 <28> | | | APR02 <63> | | | JUL02 <154> | | |
|---|---|---|---|---|---|---|---|---|---|
| 125 calls | 0.05 | -0.05 | 61 | 0.30 | -0.20 | 324 | 1.60 | -0.65 | 267 |
| 120 calls | 0.10 | -0.10 | 358 | 0.75 | -0.65 | 1090 | 2.50 | -1.10 | 305 |
| 115 calls | 0.40 | -0.50 | 1370 | 1.50 | -1.00 | 859 | 3.90 | -1.50 | 446 |
| 110 calls | 1.25 | -1.40 | 3700 | 2.80 | -1.65 | 883 | 5.60 | -1.90 | 339 |
| 105 calls> | 2.90 | -2.80 | 3760 | 4.90 | -2.50 | 6960 | 7.80 | -2.80 | 116 |
| 100 calls | 5.70 | -2.80 | 815 | 7.60 | -3.10 | 379 | 10.50 | -3.60 | 80 |
| 95 calls | 9.50 | -5.10 | 447 | 10.90 | -3.50 | 41 | 13.70 | -2.30 | 30 |
| 115 puts | 12.30 | +3.70 | 2940 | 13.40 | +4.60 | 183 | 15.20 | +3.40 | 79 |
| 110 puts | 8.10 | +3.40 | 1960 | 9.60 | +2.90 | 273 | 12.00 | +2.50 | 39 |
| 105 puts> | 4.90 | +2.25 | 4210 | 6.60 | +2.20 | 1120 | 9.20 | +2.30 | 127 |
| 100 puts | 2.65 | +1.70 | 9670 | 4.40 | +1.75 | 2840 | 7.00 | +1.90 | 320 |
| 95 puts | 1.45 | +0.85 | 3480 | 2.85 | +1.30 | 421 | 5.20 | +1.60 | 748 |
| 90 puts | 0.75 | +0.55 | 1940 | 1.75 | +0.85 | 916 | 3.70 | +1.30 | 319 |
| 85 puts | 0.35 | +0.05 | 1950 | 1.05 | +0.45 | 760 | 2.60 | +0.85 | 307 |

Summary

| | Net Reqmts | Gross Reqmts | | | | | |
|---|---|---|---|---|---|---|---|
| Init | $0 | $0 | Cash Flow | $0 | Delta | 0.00 | Avg.IV 32.9% |
| Maint | $0 | $0 | Cur. Value | $0 | Gamma | 0.00 | Calls.IV 30.9% |
| Cash/Init | | | Gain/Loss | $0 | Theta | 0.00 | Puts.IV 34.5% |
| | | | Commis | $0.00 | Vega | 0.00 | P/C (Vol) 1.55 |

**FIGURE 1.3** IBM as Seen on Trading Software

scrolling vertically), as well as farther out expiration dates (which could be seen by scrolling to the right).

This illustrates the rather large array of options available on many stocks and other types of financial instruments. The strike prices are shown vertically at five-dollar ("nickel") intervals. The options are separated into two sections: calls in the upper section and puts in the lower section. In each section, the row where the strike is marked with a ">" represents the closest-to-the-money strike. In the top section (calls), rows above that mark represent progressively farther out-of-the-money strikes, while rows beneath it represent progressively farther in-the-money strikes. In the bottom section (puts), the reverse is true, since strikes are listed in the same numerical order.

You might want to take a few moments to study how option prices vary by strike and by expiration. Can you see the smooth progression from expensive to cheaper options as you go from in-the-money toward out-of-the-money? Also, options expiring the soonest (called the *nearbys*) are in the left column, while farther out options flow to the right. Do you see that the farther out options (with more time remaining) are more valuable than the nearby options?

As this was a significant down day for IBM, with the stock dropping 5 points, you can see the relative amounts by which the call options dropped and the put options gained in value. Higher-priced options changed the most. However, lower-priced options probably changed by greater percentage amounts. Also note that trading volume is especially concentrated in the nearby expiration months and in those options closest to the money. Many of these options traded thousands of contracts on this day.

## THE SPECIAL PROPERTIES OF OPTIONS

Options have some unique properties that make them very special as a trading vehicle. For starters, unlike stocks and futures, their performance is nonlinear. Every point a stock or futures contract moves results in the same amount gained or lost. Their performance graph is a straight line (see Figure 1.4).

In contrast, an option's performance graph curves upward, meaning that as the underlying moves in favor of the option, the option makes money faster. Yet, as the underlying moves against the option, the option loses money slower. (In Figure 1.5, focus on the dotted line, which represents *today's* performance of the option.)

The fact that the performance line curves upward like this, and that ultimately an option's value can go up without limit but can drop only to zero, is a very attractive feature for option buyers.


**FIGURE 1.4** Straight Line

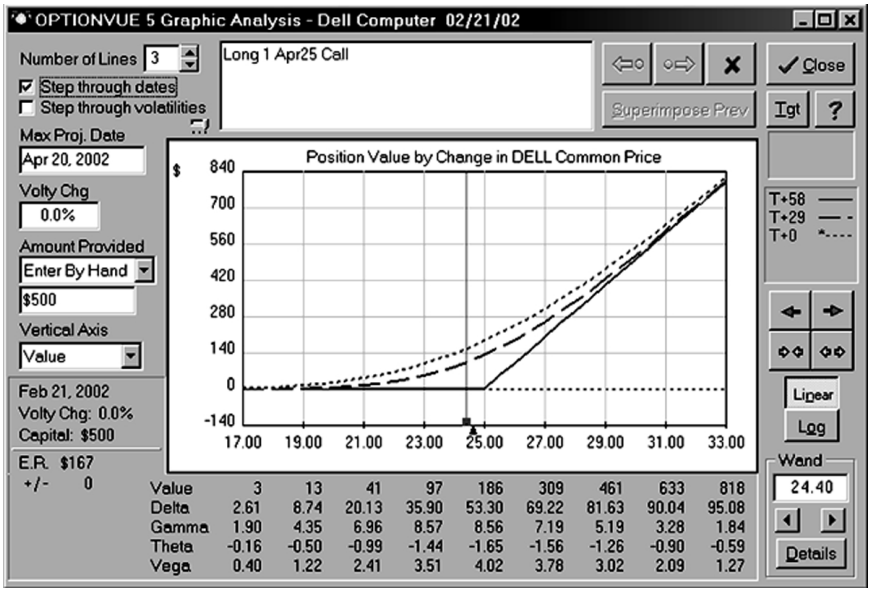



**FIGURE 1.5** Curved Line

## TIME

Another property of options is a pesky little thing called "time decay." With the passing of time, all other things being equal (i.e., the underlying price has not changed), an option's value falls. In Figure 1.5, the dashed line represents the theoretical value of this call option 64 days from now (halfway to expiration), while the solid line represents the theoretical value of the option at expiration. As you can see, if the stock does not move above 25 (the strike price of this option), the value of this option will fall gradually and inexorably to zero.

Many options traders are attracted to selling options (rather than buying them) in order to put this time decay property in their favor. While it is wonderful to have time working in your favor, this can convey a false sense of security. Time is precisely what gives the underlying a chance to move—potentially against the option seller's position.

So there is a trade-off. The option buyer has the nonlinear performance line of an option in his favor, but time works against him. The option seller has time in his favor, but the nonlinear performance line of the option works against him.

To limit the damage of time decay, the option buyer may determine to hold his position for only a short time. To limit the damage from an adverse price movement, the option seller may decide to use a stop order.

## Time Decay

The traditional time decay curve that is frequently given in options books and literature is depicted in Figure 1.6.

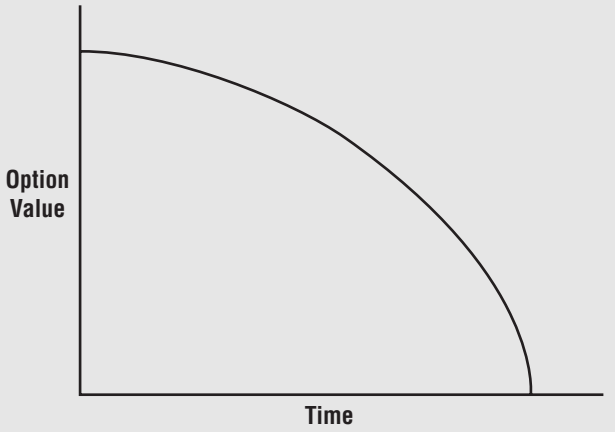



**FIGURE 1.6** Traditional Time Decay Curve

It is important for the option trader to understand that this is only correct for at-the-money options. In-the-money and out-of-the-money options have different time decay curves (see Figures 1.7 and 1.8).

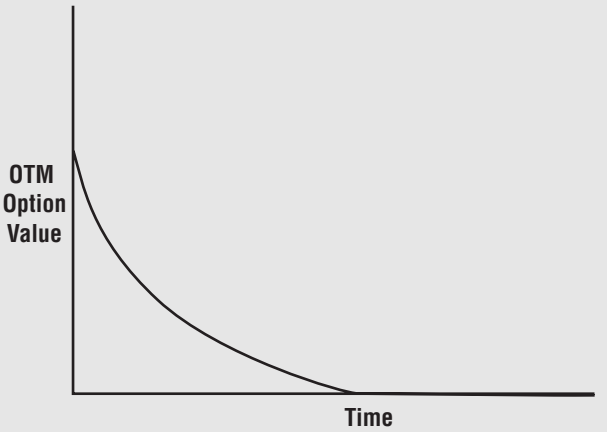



**FIGURE 1.7** In-the-Money

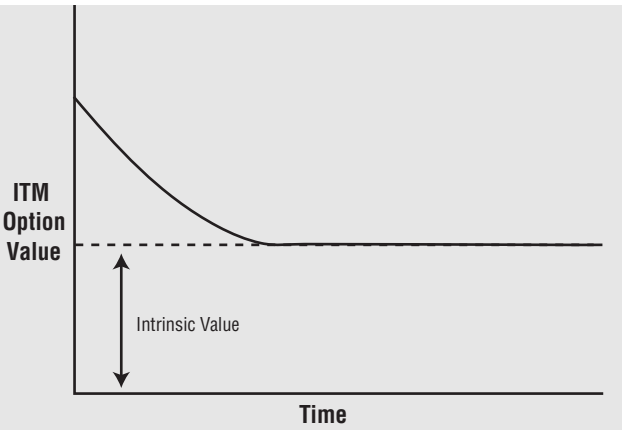



**FIGURE 1.8** Out-of-the-Money

To visualize how time decay works for options at different "money" levels, consider this analogy. You have a funnel full of liquid that is slowly draining out. The center of the funnel represents at-the-money options. To the left of center are the progressively in-the-money options and to the right are the progressively out-of-the-money options (see Figure 1.9).

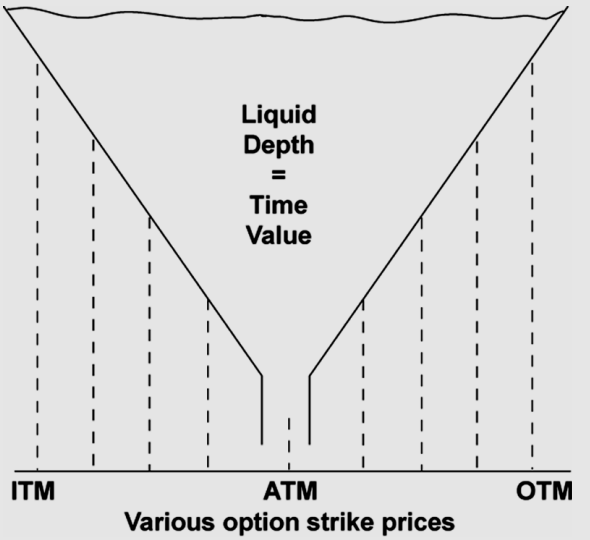



**FIGURE 1.9** Funnel Analogy

*(Continued)*

The depth of the liquid at various places represents how much time value remains in these options. For instance, the depth of the liquid in the middle shows that the at-the-money options have the greatest time value. The deep in-the-money and far out-of-the-money options, where the liquid is shallowest, have the least time value.

Now visualize the liquid slowing draining out. As the surface level gradually drops, the deep in-the-money and far out-of-the-money options will be the first to lose all of their time value. Over time, the liquid's surface level will drop faster, because the drainage rate is constant and there is less surface area. Eventually, the at-the-money options will be the only ones with any time value, and that will be slipping away faster than ever as very little liquid remains in the funnel. At the expiration date, all of the liquid has drained, and none of the options have any time value.

In truth, at-the-money options have faster time decay (a higher *theta*) than in-the-money and out-of-the-money options, so this analogy is not entirely correct. To be more accurate, we would need to begin the analogy with the surface of the liquid somehow "heaped up" near the center, and picture the surface of the liquid gradually flattening out over time as the at-the-monies lose time value faster.

## VOLATILITY

The other unique property of options is their sensitivity to volatility. Options on more volatile assets, all else being equal, are more expensive. Options on less volatile assets are cheaper. This can make a big difference. Even options on the same underlying can be twice as expensive during a period when the asset's price is perceived to be volatile than during quieter periods.

This gives options an extra dimension. Not only can options be traded based on expected price moves in the underlying (called directional trading), but they may also be traded based on expected swings in volatility levels. You would buy options when volatility is low and the options are cheap, and sell options when volatility is high and the options are expensive. This kind of trading is called volatility-based trading, and is discussed in detail in Chapter 3.

## HOW OPTIONS RESPOND TO CHANGING CONDITIONS

As we have learned, options can be said to have (and move in) three dimensions: (1) price, because options respond to changes in the price of

their underlying; (2) volatility, because options respond to changes in the perceived volatility of their underlying; and (3) time, because an option's value decays over time, all else being constant.

The first two dimensions are tradable, as these elements fluctuate, giving traders the opportunity to speculate on their future direction. Time is different. While a trader may put time on his side by selling options, time is not quite the same as the dimensions of price and volatility. Time only marches forward, and the effect of time decay is very gradual, accelerating somewhat for an at-the-money option approaching expiration.

One other factor that affects option prices is a change in interest rates. However, this effect is very small, and it will not be discussed in much detail in this book.

It is important to understand how changes in all these factors affect the value of options. Changes in the underlying price or interest rates cause the values of calls and puts to move in opposite directions. For instance, when the price of the underlying goes up, calls go up and puts go down. Volatility and time affect calls and puts in the same way. When the underlying becomes more volatile, both the calls and the puts go up in value. With the passing of time, both calls and puts decline in value.

How changing conditions affect option values is summarized in Table 1.3.

## THE GREEKS

Options traders use several parameters, named after Greek letters, that tell them how sensitive an option is to changing conditions.

The first of these is *delta*. Delta measures how much the price of an option moves in response to a one-point increase in the price of the underlying. For example, if an option moves up 0.5 when its underlying moves

**TABLE 1.3** How Changing Conditions Affect Option Values

| | **Call Options** | **Put Options** |
|---|---|---|
| Underlying price goes up | Go up | Go down |
| Underlying price goes down | Go down | Go up |
| Volatility goes up | Go up | Go up |
| Volatility goes down | Go down | Go down |
| Time passes | Go down | Go down |
| Interest rates increase | Go up | Go down |
| Interest rates decrease | Go down | Go up |

up 1.0, the option's delta is said to be 50, because you would theoretically gain $50 per option contract.

Since the values of call and put options move in opposite directions with a change in the underlying price, calls have positive deltas and puts have negative deltas. Call options have deltas ranging from 0 to 100, while put options have deltas ranging from –100 to 0.

Note that at-the-money calls typically have a delta close to 50, while at-the-money puts typically have a delta close to –50. To illustrate this, let's contrast buying 100 shares of stock versus buying one at-the-money call. If the stock goes up one point, the stockholder gains $100. However, the option holder will theoretically gain $50. So why not just buy the stock then, since it makes more money? Because the option costs much less than the stock, and gains a greater percentage. Note that buying two of these options would obtain the same delta as buying 100 shares of the stock. And typically, two (or even 10 or more) of these options cost less than 100 shares of stock.

Another greek, *vega*, measures how much the price of an option moves in response to a one-point increase in volatility. For example, if an option has a vega of 23, and volatility increases from 18% to 19%, the option's price will increase by 0.23 and its value by $23. All options have positive vega.

*Theta* measures how much the price of an option should drop today, due to the passage of time. For example, if an option has a theta of –5, its price should fall 0.05, and its value by $5, by the end of the day. All options have negative theta.

*Rho* measures how much the price of an option should change (positive for calls and negative for puts) in response to a one-point increase in interest rates. For example, if a call option should increase 0.02 when interest rates go up one point, the option's rho is said to be 2.

All the greeks are theoretical. That is, they measure how an option *should* respond to changing conditions. The same mathematical models used to calculate an option's fair value also produce the greeks as by-products. That's important to understand. Just as an option's fair value constantly changes in response to changing inputs, the greeks also change. In fact, there is another greek—*gamma*—that's just for measuring how fast delta changes!

Sophisticated options traders use the greeks to gauge their risk, as the greeks reveal the exposures of their current position. In a way, the greeks are more valuable the more complicated the position gets. For example, market makers often hold positions (long and short) in many different options on a particular asset. By viewing the net greeks of their position (computed by adding up the greeks of each option in which they

have a position, times the number of contracts they have in each option), they can determine their net risk, and make adjustments if necessary. For example, if they see that their net delta is –617, they may buy 600 shares of stock to change their net delta to –17, bringing it reasonably close to zero, or *delta-neutral*. Holding a delta-neutral position means the total position value should remain unchanged when the price of the underlying changes.

## THE ROLE OF THE MARKET MAKER

Individual investors seldom trade with each other. More often, though never knowing it, they trade with market makers. Market makers must post two prices for every option: the price they are willing to buy it for (the *bid* price) and the price they are willing to sell it for (the *asked* price). Market makers are bound by agreement with the exchanges to post bid and asked prices and trade with interested buyers and sellers at these prices. By doing so, they are *making a market*.

An individual market maker is usually assigned to one or more underlying assets, and each underlying asset has one or more (typically more) market makers assigned to it. When multiple market makers are assigned to an underlying, they are in competition with each other.

While market makers must trade with interested parties at the stated bid and asked prices, they are not required to trade an unlimited number of contracts. The exchanges only require them to honor their prices for a certain number of contracts at a time. For example, most stock options would have at least 10 contracts "up" at a time. If an investor wants to trade more than 10 contracts, he will get the stated price for the first 10 contracts but may have to pay a bit more (if buying) or accept a bit less (if selling) for any additional contracts.

While 10 is a minimum requirement, many of the most heavily traded options markets have hundreds, even thousands, of contracts available at the posted bid and asked prices. Many online pricing services show how many contracts are available at the bid and the asked. For example, you may see a bid of 2.20, an asked of 2.40, and a number like 200 × 500. This indicates 200 contracts are available at the bid and 500 contracts are available at the asked.

Market makers are kind of like bookies, taking a small piece of the action from all participants. Consulting a computer model that computes options' fair values, they typically post a bid price just below fair value and an asked price just above fair value. If a seller comes along, offering options at a reasonable price, the market maker buys from them. If a buyer

comes along, the market maker sells to them. Since the market maker's selling price is higher than his buying price, he typically makes a profit.

The problem for the market maker is that the market is seldom so convenient that a seller comes along immediately after a buyer, and vice versa. Often, a string of orders come at him on the same side. For this reason the market maker usually works to hedge his position. For example, after taking on a new long position in a call option, the market maker immediately looks for any other call options on the same underlying that he can sell at reasonable prices. He will sell an appropriate quantity of these to bring his delta back to near zero. Or he may look for any puts that he can buy on the same underlying. If no such opportunities are available, he will probably sell (short) an appropriate quantity of the underlying itself.

As you can see, the market maker is always working to manage his risk. The new long call position places the market maker in a net long (positive delta) position, exposing him to losses if the stock were to drop. Not being interested in betting on the stock's direction, he looks for a way to neutralize, or hedge, his position. Any of the trades mentioned above will accomplish that. A computer model helps the market maker figure out what the appropriate quantity would be.

## VOLUME AND OPEN INTEREST

Volume is simply the number of contracts traded on a given day. Both volume and open interest are indications of the depth of a market. Neither is more important than the other. However, volume could be considered a more immediate indication of liquidity.

Open interest is the total number of contracts outstanding. To illustrate, say a new standard option contract becomes available. At first, its open interest is zero. Suppose you put in a buy order and I put in a sell order (both of us to open new positions). We make the trade. Now, open interest is one, because there is one contract open—you have the option to buy (presuming it's a call) and I have the obligation to supply, if called upon, the underlying.

Now suppose more buyers and sellers come in, each side opening new positions, just as we did. This will make open interest go higher as new contracts are opened.

However, if someone with a long position comes in with an order to sell, and gets matched up with someone with a short position who is buying to close, open interest will go down after they trade because contracts are being canceled out.

If someone who is closing his or her position gets matched up with

someone who is opening a position, open interest remains unchanged. To help picture this, suppose you and I are the only parties who have a position in an option. You're long one contract and I'm short one. Therefore open interest is one. What if you sold your contract to an interested third party? Now, you're out of the position, the third party is long one contract, and I'm short one contract. Open interest is still one.

A high open interest simply says that a large number of contracts have traded during the life of the option, and that there is a potential for these open contracts to translate into more volume as traders unwind their positions. (Note the word *potential*, because traders do not *have* to unwind their positions if they don't want to; they may hold until expiration and then exercise.)

If there is a large open interest in the nearby, at-the-money options, and it is the final day of trading for the nearby options, I have often seen the underlying stock price be driven toward the at-the-money option during the course of the day. This is one of the few instances when you can observe the tail (the options) wagging the dog (the stock).

For example, say GM stock is trading at 26 and there is a large open interest in the 25 calls, as well as the 25 puts. Today is the final day of trading for these options. Here is what happens. With the stock at 26, the calls have one point of intrinsic value. Holders of the calls, knowing that they must make a decision today, put in sell orders because they are interested in redeeming any value before it is too late. When the market maker absorbs the sell orders, he also sells stock to balance his position, thus transferring downward pressure onto the stock. If enough call option holders sell, the stock may be driven all the way down to 25, at which point it is no longer worthwhile for remaining call holders to sell.

Meanwhile, put option holders have been watching the stock, hoping it will drop below 25 sometime during the day so they can sell for some worthwhile amount. If it does, the put holders will begin selling. In fact, the farther the stock goes below 25, the more put selling is probably going to be triggered. As put holders sell, it has the opposite effect to that of calls. As the market maker absorbs the sell orders, he also buys stock to balance his position, thus transferring upward pressure onto the stock. If enough put holders sell, the stock may be driven back up to 25, at which point it is no longer worthwhile for remaining put holders to sell. Thus the stock is pushed up toward 25 by put selling every time the stock dips below 25, and downward toward 25 by call selling every time it tries to go above 25.

It is not unusual to observe many stocks "locking in" on the price of the nearest strike price on an option's final trading day. Is there any way to take advantage of this? I don't believe there is. The idea of selling a straddle (selling both calls and puts) on or just prior to the final day

comes to mind, but this is likely to backfire on you (by the stock making a significant move instead of staying quiet) just often enough to cancel out your profits in the long run. The one way I *have* used this knowledge to my benefit is when I'm one of those call or put holders who is hoping to recover even just a small amount before it is too late. As I look for the right time to sell, I keep in mind that there are many other traders in competition with me, and that I'd better take a decent price when I see it, without delay.