1.4.5 Trading: Brokers, Dealers, Bid, Ask, Size, and Volume

We first review the units in which securities are bought and sold—see Table 1.2. For example, buying three bonds means that you are purchasing three separate contracts (IOUs), while buying stock means that you are buying a certain number of shares of the stock.

Stocks are typically sold in round lots, where a *round lot* is 100 shares of a security, but you can purchase an *odd lot*, i.e. fewer than 100 shares. The fees for the latter are higher than the former. Institutional investors usually order at least 10,000 shares. Options are sold in round lots.

Table 1.2 Summary of the basic trading units of some important securities. For instance, purchasing forwards means you are buying contracts, while purchasing stocks means you are buying shares.

Security	Trading Unit
Bonds	Contract: issuer obligated to pay face value of bond plus possible coupon payments
Stocks	Share (usually traded in round lots, i.e. 100-share batches)
Mutual Fund Product	Share
Forwards/Futures	Contract: obligation of buyer/seller to buy/sell an asset (no restriction on amount)
Equity Options	Contract: right of holder or potential obligation of issuer to buy/sell 100 shares of underlying equity
Swaps	Contract: obligation to exchange cash flows on a sequence of dates

We now turn to a few basics about trading securities. It is useful to know the following key terminologies:

- *Brokers* conduct a buy or sell orders on behalf of investors for a fee.
- *Dealers* buy and sell securities for their own account or a firm's account. They make money by buying securities low (*bid price*) and selling them high (*ask price*). This is why the ask price is generally higher than the bid price. The *bid size* is the number of units (shares or contracts) of the security that the dealer is interested in purchasing at her stated bid price, while the *ask size* is the number of units the dealer is selling at the ask price. We note that brokers can also become authorized dealers.
- *Trading volume* can be defined in more than one way. Perhaps the most common, which is the one we use, is the total number of units of the security (e.g. number of shares for stocks and contracts for derivative securities) exchanged in each trade in the security during a given time period. For example, if in a certain marketplace you bought 100 shares of IBM and your

Table 1.3 Bid and ask terminologies. Dealers profit from the spread between the bid and ask prices by buying low and selling high. It may remind the reader of the buy-sell spreads at foreign-currency exchange booths in airports.

Buying and Selling Securities			
Bid		**Ask**	
Bid Price	Bid Size	Ask Price	Ask Size
price at which a dealer *buys* a security from investors	number of units of security dealer wants to buy at bid price	price at which a dealer *sells* a security to investors	number of units of security dealer wants to sell at ask price

friend sold 30 shares, then these two trades add 130 shares to the volume in IBM. Note that the volume measure does not double count—e.g. if a buy-sell transaction involves 100 shares of a stock, then the trade contributes 100 shares to the volume in the stock, not 200 shares. Trading volume is also defined by some authors as the number of trades in a certain period.

A variety of order types is available for trading securities. We shall discuss two basic ones. When a broker explores the price offerings for a stock you want to trade, the broker will look up the *order book* for the stock, which is an electronic listing of the bids and asks different dealers are offering for the stock. This listing creates a market in the stock.

Table 1.4 illustrates the basic idea using Goldman Sachs (GS). The table is a momentary snapshot of the bid and ask prices dealers are offering for shares of GS at 2:15 p.m. EST on December 20, 2012. The different rows show the current bids and asks by dealers. Moving down the bid column, you see that the price dealers will pay per share for GS is decreasing, which means that the prices get less and less attractive to investors who want to sell shares of GS. Moving down the ask column, the price at which dealers are selling shares of GS is increasing, so the price becomes less and less attractive to investors who want to buy shares of GS. For investors, the top row then has the most attractive bid and ask prices (called the *inside quotes*). For stocks with heavy trading, the investor will have to move quickly because the order book updates continuously as new dealer bid-asks arrive. An order to buy or sell at the best price available at the current time is called a *market order*.

Some investors may prefer to wait for an optimal price and so will not use market orders. Rather they prefer *limit orders*, which would instruct a broker to buy when the bid price is at or below a certain price or, if investor is selling, to sell when the ask price is at or above a certain amount. Depending on the

Table 1.4 Portion of an order book illustrated using Goldman Sachs. The top of the table gives the best prices for investors, i.e. if you have GS shares to sell, then the highest sale price you get is $128.86 and at most 200 shares are available at that price. If you wish to purchase, the lowest share price is $128.93 with a maximum of 200 shares also available. The order book changes regularly.

Order Book for Goldman Sachs (GS) **Date/Time: 2012/12/20 2:15 p.m. EST**			
Bid		**Ask**	
Price	Size	Price	Size
$128.86	200	$128.93	200
$128.84	200	$128.94	140
$128.83	110	$128.96	210

nature of the investor's optimal price, it may take some time for a limit order to be met. The trade may not even get executed the same day.

Electronic trading

Most trading today is done through Electronic Communication Networks (ECNs), which are electronic trading systems that provide investors with minute-by-minute trading order books in numerous securities and allow them to input anonymously and directly their trade orders without using a broker. The ECN rapidly crosses orders, i.e. the computerized system searches rapidly for bid and ask prices that match buy and sell orders from investors. In other words, an ECN acts as a high-speed broker and generally costs less to transact trades.

1.4.6 Cash Dividends Paid by Common Stock

Common stocks paying a cash dividend are clearly attractive to investors. However, some of the key dates associated with such dividends can be confusing to the newcomer. We give an introduction to these dates (at least as they were structured at the time of writing this book).

What is the declaration date?

This is the date when a company announces it will make a cash-dividend payment to eligible common-stock holders. The announcement does not happen

unbeknown to the market. For example, each business day the NASDAQ posts publicly available dividend tables that contain the next cash dividend to be paid by a company, some pertinent dates associated with the dividend, and the company's past payout of cash dividends.

Table 1.5 shows a portion of the cash-dividend table for AT&T on December 7, 2012. For pedagogical reasons, we modified the format (not the data) of the table shown at the NASDAQ on that date.[2] From left to right, the table shows chronologically the declaration date, ex-dividend date, record date, and payment date, as well as the dividend amount. We shall see that, from a trading perspective, the most important date is the ex-dividend date.

We now explain Table 1.5 using the top row and assuming the current date is December 7, 2012. This row states that the Board of Directors of AT&T declared on November 6, 2012—the declaration date—that the company will pay a cash dividend of $0.45 per share on February 1, 2013, to every investor who is recorded as an AT&T shareholder on January 10, 2013.

Table 1.5 Part of the AT&T (T) cash-dividend history using data complied by the NASDAQ on December 7, 2012. The 2013 dates are then in the future relative to the table date. This is a modified format of the actual NASDAQ table, but the data is the same. Data source: http://www.nasdaq.com/symbol/t/dividend-history

Portion of the AT&T (T) Dividend History				
Declaration Date	**Ex-Dividend Date**	**Record Date**	**Payment Date**	**Dividend Amount**
6-Nov-2012	8-Jan-2013	10-Jan-2013	1-Feb-2013	$0.45 per share
28-Sep-2012	5-Oct-2012	10-Oct-2012	1-Nov-2012	$0.44 per share
29-Jun-2012	6-Jul-2012	10-Jul-2012	1-Aug-2012	$0.44 per share
30-Mar-2012	5-Apr-2012	10-Apr-2012	1-May-2012	$0.44 per share

What is the record date?

It is the date when you must be recorded on the company's official list of shareholder in order to receive the promised dividend.

In our example, the record date is January 10, 2013. The catch, though, is that if you bought shares on the record date or even a day before, you would not make it to the official list of shareholders on the record date and, hence, would not be eligible for the dividend. The reason is that when you buy shares of a stock from a broker, it can take a few days (about three days) for the trade to

[2] Specifically, we reordered the dates chronologically to a left to right format, dropped the dividend-type column, and re-expressed the dates as Day-Month-Year.

be settled with you being recorded as an official shareholder at the company. Consequently, the official AT&T shareholder list on the record date of January 10, 2013, reflects investors who bought and held their shares prior to that date. This brings us to the importance of the ex-dividend date.

What is the ex-dividend date?

It is the cutoff date to be eligible for the cash dividend. In other words, if an investor bought shares (even during after hours trading) and held on to them until at least the close of trading on the business day before the ex-dividend date, then the investor would make it to the company's official list of shareholders on the record date and would be eligible for the declared dividend.

The ex-dividend date is set by the NASDAQ or the stock exchange where the stock is traded and is usually the second business day before the record date.[3] The date allows companies time to update their official list of existing shareholders and add new investors who purchased shares and did not sell them prior to the close of trading on the business day before the ex-dividend date. For this reason, the stock is said to be *traded cum-dividend* ("with dividend") before the ex-dividend date.

In our example, the ex-dividend date is January 8, 2013. If you bought shares of AT&T before the ex-dividend date and held on to them until at least the close of trading on January 7, 2012, then you would receive the dividend. Your name would be included on the AT&T list of shareholders on January 10, 2012. Even if you sold all your shares on or after the ex-dividend date, you would still receive the dividend because you bought the shares prior to and did not sell them before the close of trading on the business day before the ex-dividend date.

Should you buy shares on or after the ex-dividend date, you would not receive the dividend since you would not make it to the official list of shareholders on the record date. In this case, the stock is said to be *traded ex-dividend* ("without dividend") on and after the ex-dividend date, and will continue so until the payment date. When stock trades ex-dividend an "x" is put next to its ticker symbol.

---

[3] The reader may have noticed that for the bottom row of Table 1.5 the difference between the ex-dividend date (April 5, 2012) and the record date (April 10, 2012) is five days, seemingly contradicting the ex-dividend date set by the NASDAQ. However, the ex-dividend date is still the second trading day before the record date. This is because April 6, 2012, was a NASDAQ holiday (Good Friday) and April 7-8, 2012, was a weekend, leaving April 5th and 9th as the two trading days before April 10th. Hence, the ex-dividend date is April 5, 2012.

What is the stock price on and just before the ex-dividend date?

Dividend adjustment does not occur on the dividend payment date

By paying a dividend, a company reduces its value by the total dividend payout, which is reflected in a per share price reduction. One would then expect that the opening price of the company's stock on the payment date to drop by the amount of the dividend relative to the closing price the previous trading day. This is not the case in general. For example, consider the bottom row of Table 1.5, where AT&T has an ex-dividend date of April 5, 2012, and payment date of May 1, 2012. Note that we are not using the first row of the table because the ex-dividend date is in the future relative to the designated current date of December 7, 2012. Table 1.6 shows the opening and closing prices of AT&T and the S&P 500 on the trading days before and on April 5, 2012, and May 1, 2012. The opening price of AT&T on the payment date of May 1, 2012, was basically unchanged (only 0.06% higher) from the closing price on the prior trading day, April 30, 2012. The overall market was essentially unchanged as well, i.e. the S&P 500 opened on the payment date a mere 0.004% lower.

Upon closer reflection, however, *one may expect a downward adjustment of the stock's price earlier than the payment date, namely, it should show up in the stock's opening price on the ex-dividend date*. This is reasonable theoretically because the dividend cutoff is the ex-dividend date, i.e. investors who buy shares of the stock between the ex-dividend date and the payment date will not be eligible for the dividend. Of course, during the period from closing to opening on the ex-dividend day, we are assuming no significant overall market movement, sudden adverse news about the company, etc., which could affect the opening price (see below for more on non-dividend factors that can influence the opening price).

In Table 1.6, the opening price of AT&T on the ex-dividend date was lower by $0.48 per share, which is close to the $0.44 dividend (a 1.5% drop). In addition, the opening price of the S&P 500 on the ex-dividend date was 1,398.79, which is essentially the same as its closing price 1,398.96 (a mere 0.01% drop) the day before. In other words, there was no obvious overall market movement that pushed the price down.

For modeling purposes, adjusted closing prices are introduced in historical stock price data in part to account for the stock price reduction just before the ex-dividend date.[4] In this sense, a cash dividend can be viewed theoretically as the downward adjustment by the declared dividend amount of the closing stock price on the trading date immediately before the ex-dividend date (e.g. Hull [8, Sec. 13.12]).

[4] Adjusted closing prices usually account for cash dividends and stock splits.

Table 1.6 Opening and closing prices of AT&T (T) just before and on the ex-dividend date (April 5, 2012) and the dividend-payment date (December 10, 2012). The declared dividend is $0.44 per share. Data source: http://www.finance.yahoo.com

AT&T (T)		
Date	**Opening Price**	**Closing Price**
4-Apr-2012	$31.38	**$31.57**
5-Apr-2012	**$31.09**	$30.94
30-Apr-2012	$32.53	**$32.91**
1-May-2012	**$32.93**	$33.06

S&P 500 Index (^GSPC)		
Date	**Opening Value**	**Closing Value**
4-Apr-2012	1,413.09	**1,398.96**
5-Apr-2012	**1,398.79**	1,398.08
30-Apr-2012	1,403.26	**1,397.91**
1-May-2012	**1,397.86**	1,405.82

Factors influencing the opening price on the ex-dividend day

A perusal of opening prices on ex-dividend dates shows that they need not show a drop by the dividend amount. After the close of trading on any given day, some other factors that can influence the opening price on the next trading day are:

- Number of buy versus sell orders from closing to just before opening (supply and demand forces)
- Positive or negative news about the company that comes out after the close of trading (earnings report, announced layoffs, etc.)
- Positive or negative news about the sector in which the company operates (e.g. outlook for growth)
- Positive or negative news about the macro-economic environment that creates overall market movement (inflation, interest rates, unemployment, etc.)

If such influences occur between closing on the trading day prior to the ex-dividend date and opening on the ex-dividend date, then the ex-dividend day's opening price need not be reduced by the dividend. These influences can cause the opening price to be less than, approximately the same, or even greater than the theoretical price with reduction by the dividend.