Appendix A: Introduction to the Wave Principle

In the 1930s, R. N. Elliott discovered that market price movements adhere to a certain pattern composed of what he called *waves*. He called the pattern's characteristics the Wave Principle. Every wave has a starting point and ending point in price and time. The pattern is continuous in that the end of one wave marks the beginning of the next wave. The basic pattern consists of five individual waves that are linked together and achieve progress as market prices move up or down (see Figure A.1).

This five-wave sequence, labeled with numbers 1 through 5, is called a *motive wave*, because it propels the market in the direction of the main trend. Subwaves 1, 3, and 5 are also motive waves. Subwaves 2 and 4 are called *corrective waves*, because they interrupt the main trend and travel in the opposite direction.

Two Elliott wave rules govern motive waves: Wave 2 always retraces less than 100 percent of wave 1, and
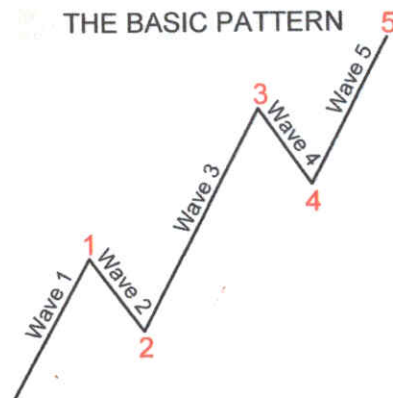
THE BASIC PATTERN

Figure A.1
Source: Adapted from Elliott Wave Principle.

wave 3 can never be the shortest motive subwave (although it does not have to be the longest).

After a five-wave sequence is complete, the corrective wave begins. The corrective wave partially retraces the progress made by the motive wave. It follows a three-wave sequence or a specific combination of three-wave structures. Its waves are labeled using letters, for example A, B, and C (see Figure A.2).

All waves are part of other waves at larger degree. They are also divisible into waves at lower degree, as shown in Figure A.3. Motive and corrective waves can move up or down.

A number of rules and guidelines apply to wave formations. Guidelines differ from hard-and-fast rules in
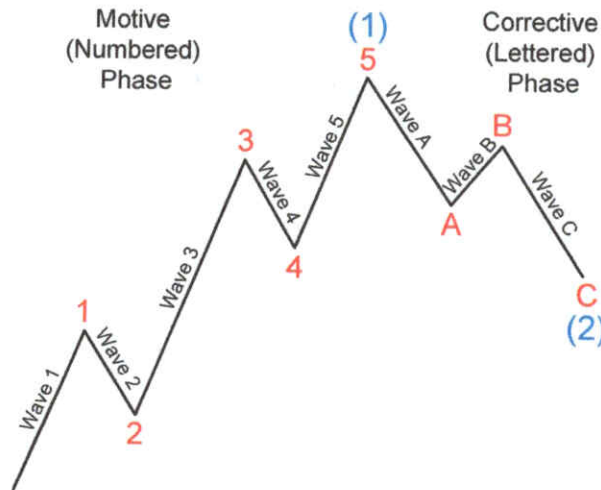

Figure A.3
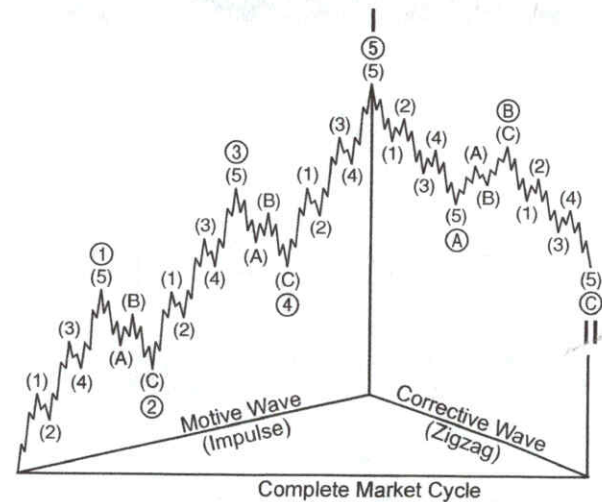*Source: Adapted from Elliott Wave Principle.*

that they describe what is most likely to occur, even though it may not always occur.

Motive Waves

The two types of motive waves are *impulse* and *diagonal*.

Impulse

The impulse wave, which is the strongest form of motive wave, follows these three rules:

1. Wave 2 never moves beyond the start of wave 1. In other words, it always retraces less than 100 percent of wave 1.

Figure A.2
Source: Adapted from Elliott Wave Principle.

2. Wave 3 is never the shortest motive subwave, but it does not have to be the longest.
3. Wave 4 never enters the price territory of wave 1.

Add to these rules one strong guideline: Wave 4 should not enter the price territory of wave 2.

Rules are crucial to real-time application. In Figure A.4, the first wave count is incorrect, because the end of wave 4 enters the price territory of wave 1. The second wave count is incorrect, because wave 3 is the shortest motive wave. The third wave count correctly displays the first three subdivisions of wave 3. The next wave count is correct because, even though wave 3 is not the longest motive wave, it is also not the shortest one. The last wave count is incorrect, because wave 2 here retraces more than 100 percent of wave 1.

In an impulse wave, waves 1 and 5 are always motive waves (that is, either impulse or diagonal), while wave 3 is always an impulse wave. Waves 2 and 4 are always corrective waves. Therefore, we call an impulse wave a 5-3-5-3-5 structure.

Extension

In an impulse wave, often one of the motive waves, usually wave 3 or wave 5, is extended. An *extended wave* is an elongated impulse wave whose motive subwaves at next lower degree are as large as or larger than the non-extended motive wave(s) of the same impulse wave.
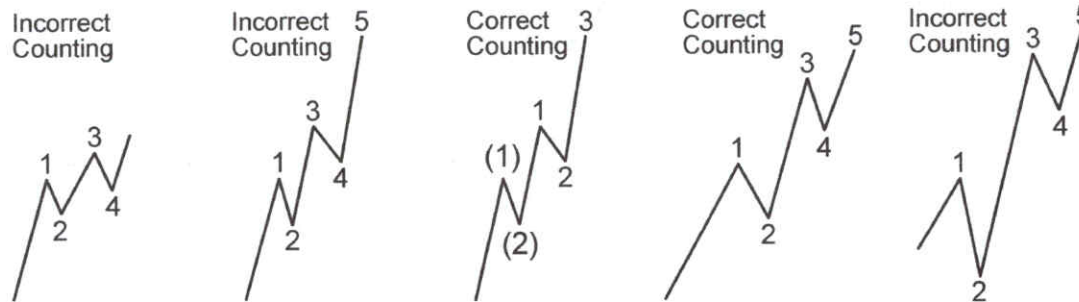

Figure A.4
Source: Adapted from Elliott Wave Principle.

Figure A.5 shows diagrams of extensions for waves 1, 3, and 5. Sometimes the initial subwaves of an impulse wave are all about the same length, and therefore it is difficult to determine which motive wave is extended. This aspect is displayed in the diagram at the bottom, where the extended wave could be 1, 3, or 5. For all practical purposes, it does not matter which one is extended, as long as there is a total of nine waves. Third-wave extensions are often seen in the stock market, while fifth-wave extensions are often seen in commodity markets.

If wave 1 is extended, expect waves 3 and 5 to be about equal in length. If wave 3 is extended, expect wave 5 to be about equal to wave 1. If waves 1 and 3 are about equal, expect wave 5 to be extended. After a fifth-wave extension terminates, expect a swift and sharp reversal back to the second subwave of the extension. Rarely do two motive waves extend, but if that does happen, it is usually waves 3 and 5. We call that structure a *double extension*.

When an extension occurs within an extended wave, it is common for the extension at lower degree to be in the same wave position as the extension of
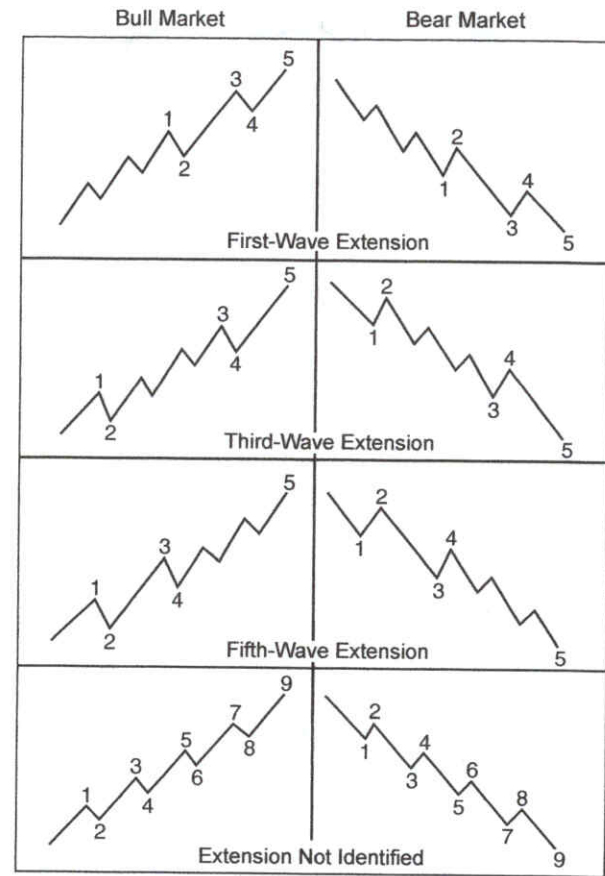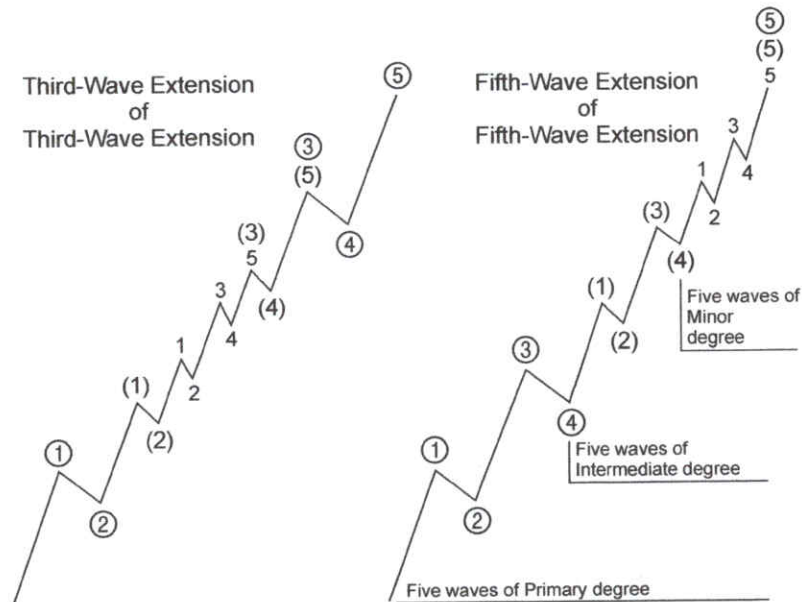

Figure A.5
Source: Elliott Wave Principle.

Figure A.6
Source: *Elliott Wave Principle.*

which it is a part. For example, in a wave 3 extension, subwave 3 is often extended (see Figure A.6).

Truncation

In an impulse wave, a *truncation* occurs when wave 5 fails to terminate beyond the end of wave 3. A truncated fifth wave still unfolds as a five-wave structure (see Figure A.7). A truncated fifth wave, which is a sign of exhaustion in the main trend at next higher degree, is
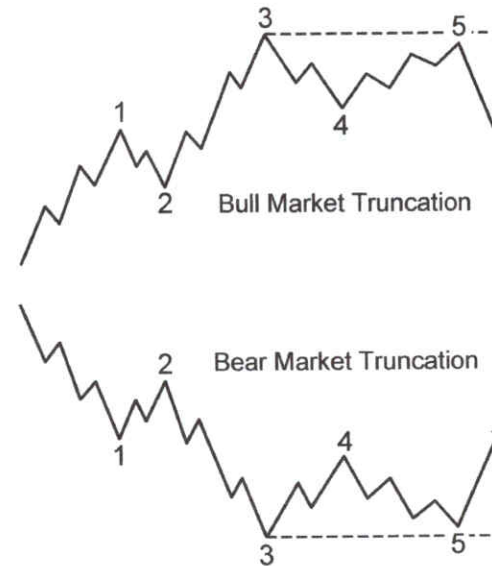

Figure A.7
Source: *Elliott Wave Principle.*

often preceded by an exceptionally strong third wave of the same degree. A truncated fifth wave is often followed by a swift and sharp reversal.

Diagonal

Although diagonal and impulse waves are both motive waves, diagonals differ significantly from impulse waves in that they follow the first two rules but not the third rule about wave 4 never entering in the price territory of wave 1. In a diagonal, in fact, wave 4 almost always enters in the price territory of wave 1.

A diagonal is typically contracting but, in rare occasions, expanding. In the contracting variety, wave 3 is shorter than wave 1, wave 5 is shorter than wave 3, and wave 4 is shorter than wave 2. In the expanding variety, wave 3 is longer than wave 1, wave 5 is longer than wave 3, and wave 4 is longer than wave 2. Since expanding diagonals are so infrequent, we will confine the rest of our discussion to the contracting variety.

The two types of diagonals are leading diagonal and ending diagonal, with the ending diagonal being more common. Within an ending diagonal, subwaves 1, 2, 3, 4, and 5 always take corrective-wave form, specifically either a single or multiple zigzag. Ending diagonals can form only as fifth waves of impulse waves and C waves of zigzags and flats. (We will cover zigzags and flats in the section on corrective waves.)

In Figure A.8, wave (5) is a contracting ending diagonal. It is bounded by two converging trendlines, which gives the diagonal a wedge shape. One
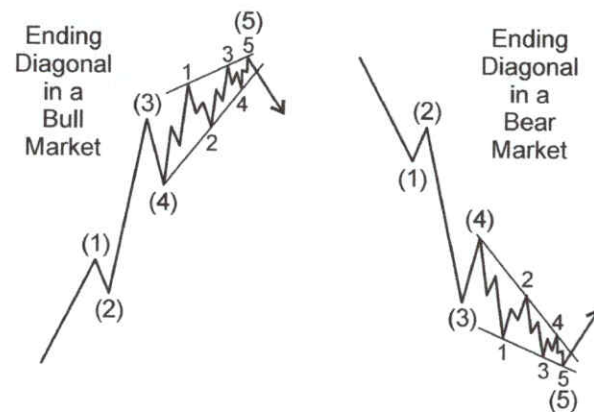

Figure A.8
Source: Adapted from Elliott Wave Principle.

trendline connects the termination points of waves 1 and 3, and the other trendline connects the termination points of waves 2 and 4. Wave 5 can end either on or slightly above or below the 1-3 trendline. If wave 5 moves beyond that trendline, it is called a throwover. A swift and sharp reversal usually brings prices at least back to where the diagonal began and usually far further. The reversal usually takes anywhere from one-third to one-half the time that it took the diagonal to form.

In a leading diagonal, waves 1, 3, and 5 are all impulse waves or all corrective waves in the form of zigzags. Waves 2 and 4 are always zigzag patterns. A leading diagonal can form wave 1 of an impulse wave and the first wave of a zigzag, which we call wave A. This formation is exceptionally rare.
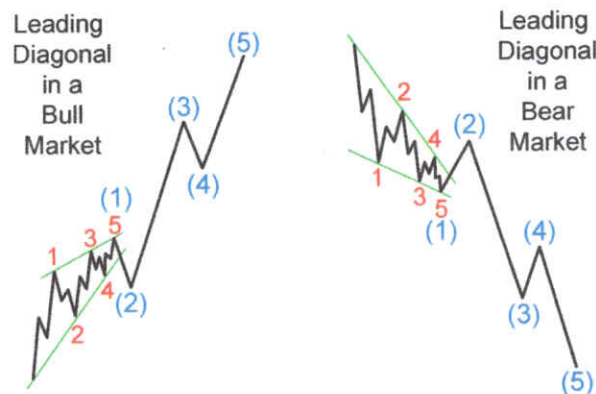
Figure A.9
Source: Adapted from Elliott Wave Principle.

In Figure A.9, wave (1) is a contracting leading diagonal and has the same structural characteristics as the contracting ending diagonal. After a wave 1 leading diagonal terminates, expect wave 2 to retrace a significant portion of wave 1.

Corrective Waves

In markets, we have all heard the old adage, "nothing moves in a straight line." The Elliott wave model incorporates this observation. Market trends invariably encounter interruptions. In Elliott wave terms, we refer to these interruptions as corrective waves.

Corrective waves are either *sharp* or *sideways*. A sharp corrective wave usually has a relatively steep angle, never registering a new price extreme beyond the previous wave that it is retracing. A sideways correction's boundaries are closer to horizontal and, before terminating, it usually records a new price extreme beyond the previous wave that it is retracing. All corrective waves achieve some partial retracement of the preceding wave of the same degree. Because corrective waves come in many variations, it is a challenge to identify them in real time and to know when they are complete.

The three basic types of corrective wave patterns are *zigzag, flat,* and *triangle.* Elliotticians often use the word "three" as a noun, meaning a corrective pattern. When two or more of these patterns link together to form a sideways correction, they are called a *combination.*

Zigzag

A zigzag is a sharp, three-wave corrective pattern, labeled A-B-C. Wave A is always an impulse or leading diagonal, and wave C is always an impulse or ending

Figure A.10
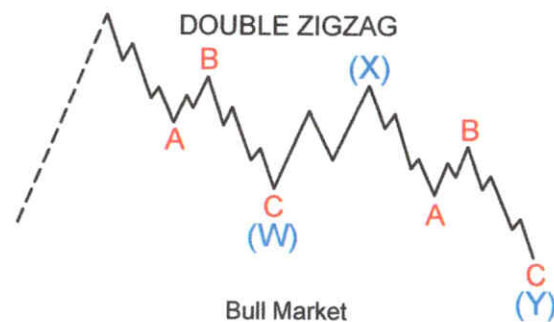Source: Adapted from Elliott Wave Principle.

Figure A.11
Source: Adapted from Elliott Wave Principle.

diagonal. Wave B is always a corrective wave, that is zigzag, flat, triangle or combination. Therefore, we call the zigzag a 5-3-5 structure (see Figure A.10).

In a zigzag, wave B can never go beyond the start of wave A, and wave C almost always goes beyond the end of wave A. If wave C does not go beyond the end of wave A, it is called a truncated wave C.

Zigzag corrections can take the form of one, two, or three zigzags. Three zigzags appear to be the limit. Whenever there is more than one zigzag, another corrective wave forms in order to link one zigzag to the other. In a double zigzag, the first zigzag is labeled W, the second zigzag is labeled Y, and the corrective wave that links the two zigzags together is labeled X. In a triple zigzag, the

third zigzag is labeled Z. Wave X can form any corrective structure but is usually a zigzag. It always moves in the opposite direction of wave W (see Figure A.11).

Flat

A flat is a sideways, three-wave corrective pattern, also labeled A-B-C. Waves A and B are always corrective waves, and wave C is always a motive wave. Therefore, we call the flat a 3-3-5 structure. In flats, waves A and B are never triangles and rarely flats. Wave B usually retraces at least 90 percent of wave A. There are three types of flats: regular, expanded, and running. The most common type of flat is the expanded flat. Running flats are rare.
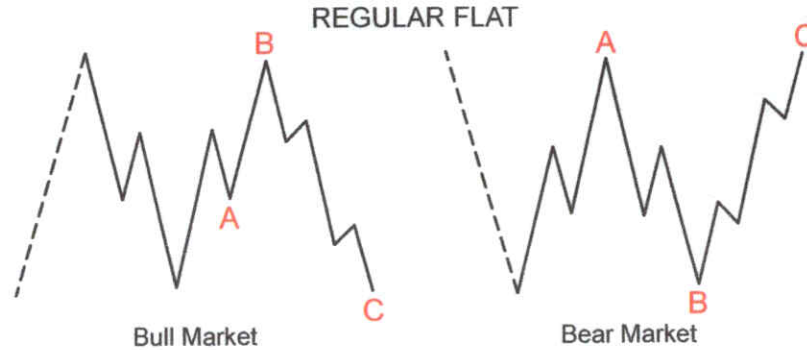
REGULAR FLAT

Bull Market

Bear Market

Figure A.12
Source: Adapted from Elliott Wave Principle.

In a regular flat, wave B ends at about the same level as the beginning of wave A, and wave C ends slightly past the end of wave A (see Figure A.12).

In an expanded flat, wave B ends beyond the start of wave A, and wave C ends substantially beyond the end of wave A (see Figure A.13).
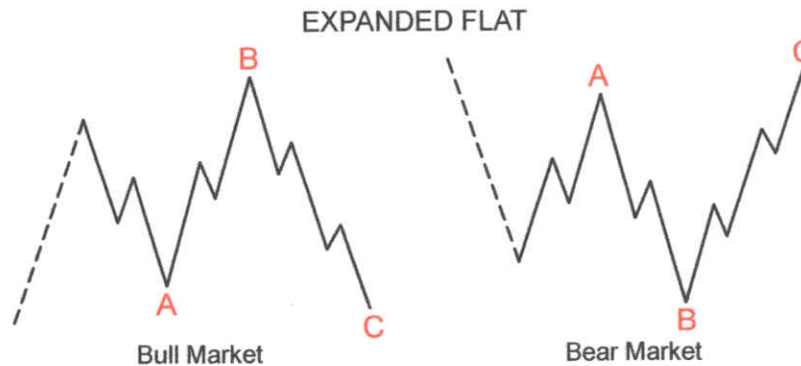
EXPANDED FLAT

Bull Market

Bear Market

Figure A.13
Source: Adapted from Elliott Wave Principle.

RUNNING FLAT

Bull Market

Bear Market

complex, meaning strung out over time, and that subwave is normally wave C, D, or E. Figure A.15 shows the three types of triangles: contracting, barrier, and expanding.
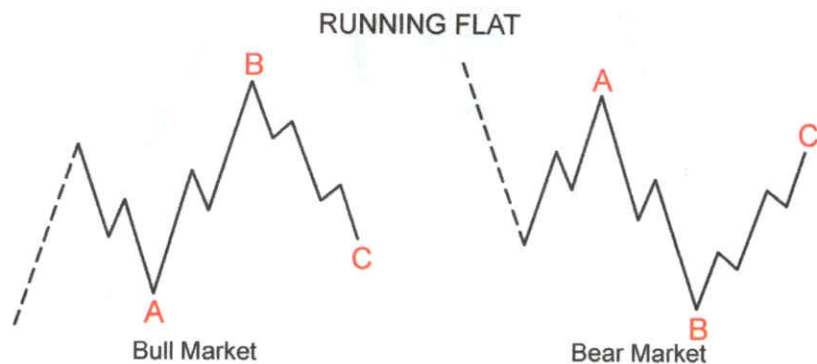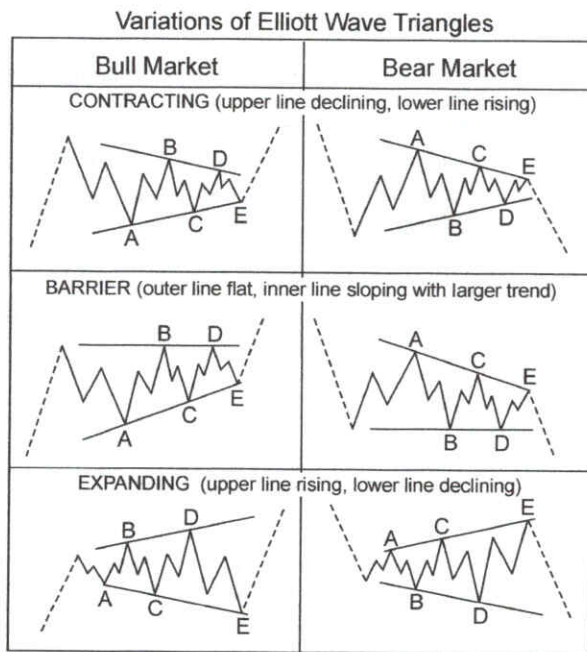
In a running flat, wave B ends beyond the start of wave A, and wave C fails to reach the end of wave A (see Figure A.14).

Triangle

A triangle is a sideways corrective wave with subwaves labeled A-B-C-D-E. In most cases, all the subwaves of a triangle are zigzags or multiple zigzag patterns. Therefore, we call the triangle a 3-3-3-3-3 structure. On occasion, one of these subwaves takes the form of another triangle, and that subwave is usually wave E. Only one of these subwaves can be

Variations of Elliott Wave Triangles

In a triangle, the line that connects the termination points of waves A and C is called the A-C trendline, and the line that connects the termination points of waves B and D is called the B-D trendline. Wave E may terminate at, short of, or beyond the A-C trendline.

In contracting and barrier triangles, the A-C and B-D trendlines converge. In barrier triangles, the B-D trendline is horizontal, and the A-C trendline points in the direction of the main trend at next higher degree. In expanding triangles, the A-C and B-D trendlines diverge.

In a contracting triangle, wave C never moves beyond the end of wave A, wave D never moves beyond the end of wave B, and wave E never moves beyond the end of wave C. Wave B may or may not move beyond the start of wave A. As shown in Figure A.16, if wave B moves beyond the start of wave A, the triangle is called a running contracting triangle. Running triangles are common.

A barrier triangle has the same characteristics as a contracting triangle, with the following exception: In
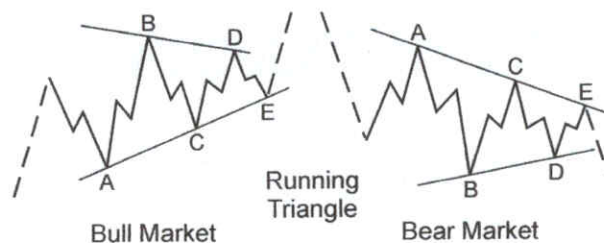

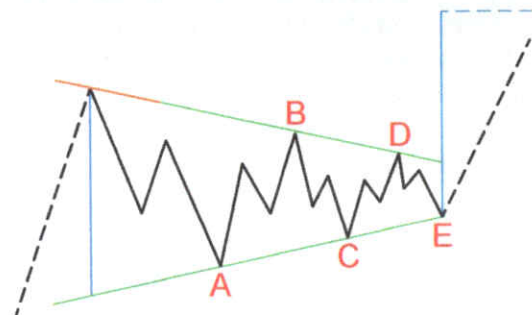## POST-TRIANGLE THRUST MEASUREMENT

Figure A.17
Source: Elliott Wave Principle.

a barrier triangle, wave D ends at about the same level as wave B. In an expanding triangle, after completion of wave A, each new subwave moves beyond the starting point of the previous subwave.

A triangle always precedes the final motive wave in the direction of the main trend at next higher degree. That final motive wave normally makes a swift and sharp move, which is called the *post-triangle thrust* (see Figure A.17).

For a contracting or barrier triangle, we can estimate the minimum termination point of the thrust by extending the A-C and B-D trendlines back to the start of wave A and then drawing a vertical line that connects those two trendlines. That vertical distance defines the "width" of the triangle. We then apply the width of the triangle to the end of wave E to give us an estimate for the next move in the direction of the main trend at next higher degree.

Running Triangle

Bull Market   Bear Market

Figure A.16
Source: Elliott Wave Principle.

Within an impulse wave, a post-triangle thrust measurement estimates the minimum length for wave 5. If wave 5 goes beyond the estimated termination point, expect a prolonged fifth wave.

Combination

A combination is a sideways corrective pattern that includes two or more corrective structures. Three corrective structures appear to be the limit. Each corrective structure is linked by an X wave, which has three characteristics: It can be any corrective pattern; it always moves in the opposite direction of the previous corrective pattern; and it is usually a zigzag. There never appears to be more than one triangle in a combination, and, when one appears, it always seems to be the final corrective structure in the combination. The two types of combinations are double three and triple three.

A double three combination includes two corrective patterns—the first labeled W and the second labeled Y—that are linked by an X wave. Figure A.18 represents one of many variations of a double three correction. A triple three combination includes three corrective patterns, labeled W, Y, and Z, each linked by X waves. Triple threes are rare. Within double and triple threes, X waves are usually zigzags and never triangles.

Fibonacci Relationships

Price and time aspects of wave patterns often reflect *Fibonacci ratios*. In wave formations, the key Fibonacci ratio is .618, which is known as the Golden Ratio
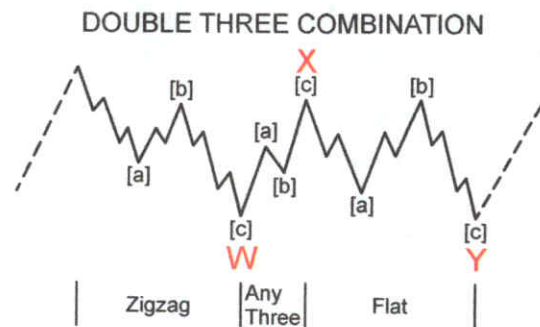
DOUBLE THREE COMBINATION

Figure A.18
Source: Elliott Wave Principle.

or Golden Mean. It is represented by the Greek letter *phi* (ϕ), pronounced "fie." Its inverse is 1.618. *Phi* is the only number which, when added to one, is also equal to its inverse. If we square *phi* or subtract *phi* from 1, the result is .382, which is another Fibonacci ratio.

Figure A.19 displays a number of Fibonacci ratios.

Each ratio can be expressed as *phi*—either .618 or its inverse 1.618—raised to a power. Other important

Fibonacci Ratios and Multiples		
Ratio	Inverse	Φ^N
.618	1.618	$(1.618)^1$
.382	2.618	$(1.618)^2$
.236	4.236	$(1.618)^3$
.146	6.854	$(1.618)^4$
.090	11.089	$(1.618)^5$

Figure A.19

Fibonacci numbers related to wave formation are 0.5 (1/2), .786 (square root of .618), 1.0 (1/1), and 2.0 (2/1).

In Elliott wave patterns, the key types of Fibonacci relationships are *retracements*, *multiples*, and *dividers*. Although these relationships are more commonly used to estimate the length of certain waves with respect to price, they can also be used to estimate the length of waves with respect to time.

Retracements

In impulse waves, second waves usually make deep retracements near .618 times the length of wave one. Fourth waves usually make shallow retracements that are often close to .382 times the length of wave three (see Figure A.20).

In a zigzag, the retracement of wave A by wave B will depend on the structure of wave B. For example, in Figure A.21, if wave B is a zigzag, it should retrace 0.5 to .786 of wave A. If wave B is a triangle, it should retrace .382 to 0.50 of wave A.
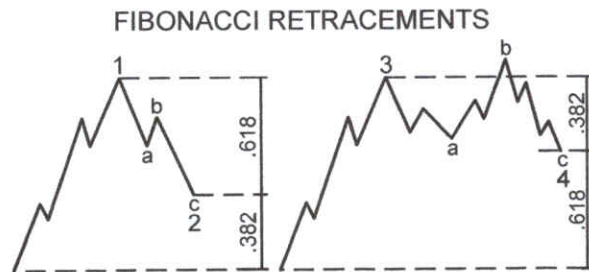
Guidelines for Typical Retracements of Wave A by Wave B in Zigzags	
Wave B	Net Retracement (%)
Zigzag	50–79
Triangle	38–50
Running Triangle	10–40
Flat	38–79
Combination	38–50

Figure A.21

Multiples

In an impulse wave, wave 5 will often equal .618 or .382 times the net distance traveled of waves 1 through 3 (see Figure A.22).

When wave 3 is extended, expect wave 5 to be related to wave 1 by equality or .618. When wave 5 is extended, expect wave 5, in price terms, to travel 1.618 times the net distance traveled of waves 1

FIBONACCI RETRACEMENTS

Figure A.20
Source: Elliott Wave Principle.
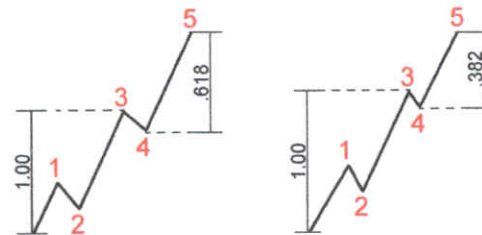
FIBONACCI MULTIPLES IN IMPULSE WAVES

Figure A.22
Source: Elliott Wave Principle.

FIBONACCI MULTIPLES IN IMPULSE WAVES

Figure A.23
Source: Adapted from Elliott Wave Principle.

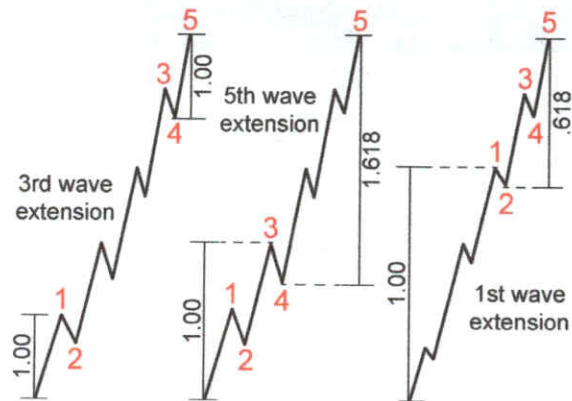## FIBONACCI MULTIPLES WITHIN CORRECTIVE WAVES — ZIGZAGS
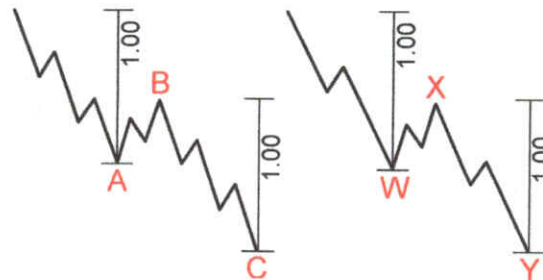
Figure A.24
Source: Adapted from Elliott Wave Principle.

through 3. If that length is exceeded, look for larger multiples as shown in Figure A.22. When wave 1 is extended, expect the net distance traveled of waves 3 through 5 to equal .618 times the length of wave 1 (see Figure A.23).

The most common Fibonacci relationship in single zigzags and multiple zigzag structures is *equality*—for example, C = A in the single zigzag, and Y = W in the double zigzag (see Figure A.24).

When equality is not present, look for the other Fibonacci relationships, as shown in Figure A.25.

The relationships for multiple zigzags are analogous to those for a single zigzag.

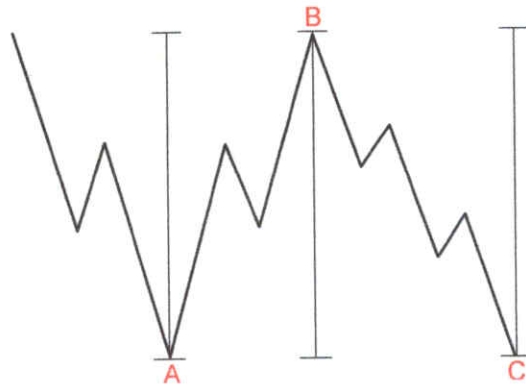| Fibonacci Relationships |
| --- |
| **Single Zigzag** |
| Wave C = Wave A |
| Wave C = .618 Wave A |
| Wave C = 1.618 Wave A |
| Wave C = .618 Wave A past Wave A |
| **Double Zigzag** |
| Wave Y = Wave W |
| Wave Y = .618 Wave W |
| Wave Y = 1.618 Wave W |
| Wave Y = .618 Wave W past Wave W |
| **Triple Zigzag** |
| Equality for W, Y, and Z |
| Ratio of .618, i.e., Wave Z = .618 Wave Y |

Figure A.25

FIBONACCI MULTIPLES FOR FLATS

Figure A.26
Source: *Adapted from Elliott Wave Principle.*
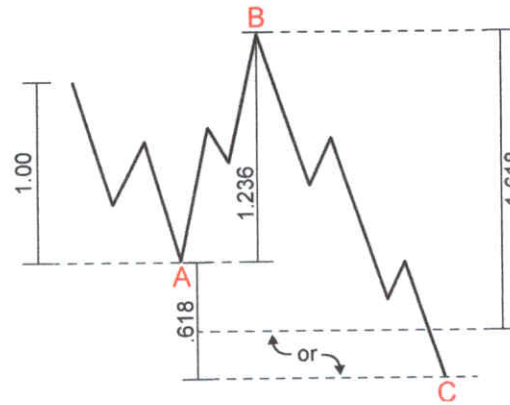
FIBONACCI MULTIPLES FOR EXPANDED FLATS

Figure A.27
Source: *Adapted from Elliott Wave Principle.*

In a regular flat, waves A, B, and C are generally equal to each other (see Figure A.26).

In an expanded flat, expect wave C either to equal 1.618 times the length of wave A or to terminate at a price equal to .618 times the length of wave A past wave A. Expect wave B to equal 1.236 or 1.382 times the length of wave A (see Figure A.27).
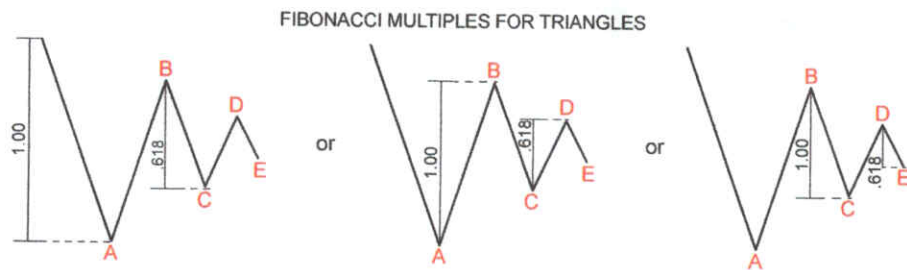
FIBONACCI MULTIPLES FOR TRIANGLES

Figure A.28
Source: Adapted from Elliott Wave Principle.

The alternate waves of a contracting triangle are often related to each other by the Fibonacci ratio of .618 (see Figure A.28).

For expanding triangles, that ratio is 1.618.

Dividers

If we divide any length in such a way that the ratio of the smaller part to the larger part is equal to the ratio of the larger part to the whole, that ratio will always be .618 (see Figure A.29).
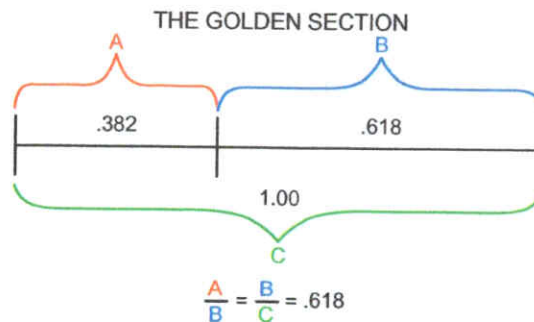
THE GOLDEN SECTION

$$\frac{A}{B} = \frac{B}{C} = .618$$

Figure A.29
Source: Adapted from Elliott Wave Principle.

This is called the *Golden Section*, which results in a .382/.618 split. Certain wave termination points will often divide wave patterns into the Golden Section or sometimes a .50/.50 split.

In an impulse wave, wave 4 (usually its origin or termination point) will often divide the entire wave into the Golden Section or into two equal parts (see Figure A.30).

Clusters

Whenever possible, we prefer not to rely on just one Fibonacci relationship in forecasting market movements. The most powerful application of Fibonacci analysis is the identification of *Fibonacci clusters*. A Fibonacci price cluster occurs when two or more Fibonacci price relationships project to approximately the same price level. (A Fibonacci time cluster occurs when two or more Fibonacci time relationships project to approximately the same time.) Since wave patterns unfold at all time frames simultaneously, there is often an opportunity to spot a Fibonacci cluster. The diagram in Figure A.31 illustrates a Fibonacci price cluster.
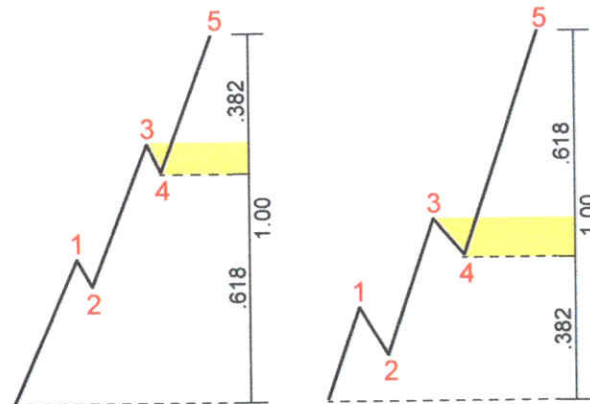
FIBONACCI DIVIDERS IN IMPULSE WAVES

Figure A.30
Source: Adapted from Elliott Wave Principle.

FIBONACCI PRICE CLUSTER

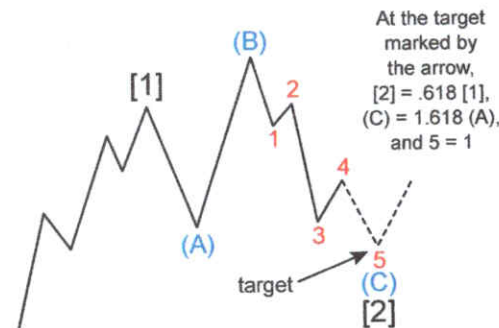At the target marked by the arrow, [2] = .618 [1], (C) = 1.618 (A), and 5 = 1

Figure A.31
Source: Adapted from Elliott Wave Principle.