McGRAW-HILL FINANCE & INVESTING

FOREX SHOCKWAVE ANALYSIS

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Contents

Acknowledgment

I wish to thank Paul J. Szeligowski, friend and economic analyst, for his editorial assistance in the preparation of this book. His insightful recommendations and novel ideas proved invaluable in researching the nature and occasionally cryptic relationships that arise when scrutinizing financial wave theories.

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Introduction

Economically, a shockwave occurs in an otherwise well-behaved time series when a violent breakout in price manifests itself in either direction. Shockwaves can be either anticipated or unanticipated. Fortunately for spot currency traders, most of these breakouts are expected owing to scheduled news announcements released by government agencies and some independent institutions.

Knowing when shockwaves will occur gives Forex traders a tremendous analytical advantage in measuring, identifying, and categorizing each shockwave's unique properties. By scrutinizing a plethora of historical shockwaves, analysts can isolate and determine recurring shockwave personality traits, which, in turn, may directly influence market entry timing and the size and position of the trade.

ABOUT THIS BOOK

This book not only examines the shockwave itself (which occasionally lasts less than a minute or two after the news release) but also investigates the reactive phase that immediately follows the shockwave. This is in a very broad sense the economic equivalent to Newton's third law of motion: "For every action, there is an equal and opposite reaction."

Numerous analytical tools required to unveil the mysteries of Forex shockwaves are also explained in this book. Some are old techniques with new variations (such as adjustable-range studies), and others are relative newcomers to the arena of technical analysis (such as activity, inertia, composite charting, and Forex wave theory).

Lastly, I should note that trading in the global foreign exchange markets recently has exceeded $2 trillion a day and is expected to double over the next five years. Spot currency traders with a solid knowledge in a wide variety of analytical tools and shockwave behavior will have an appreciable advantage over the novices entering the world's largest financial market for the first time. The highly visual approach presented in this book allows investors to use it as a computer-side reference guide while working online in their currency trading platforms.

HOW THIS BOOK IS ORGANIZED

There are seven major divisions within this book.

PART 1: FUNDAMENTAL STUDIES

The subject of this book is shockwave analysis, which is a branch of technical analysis. Why, then, include a section on fundamental analysis? Simple. Fundamental economic factors do influence currency prices, and even though they may not affect price fluctuations directly at the tick level, it is always expedient for technical analysts to be aware of the forces that can adversely influence technical forecasts. Regression studies for interest rates, balance of trade, and consumer price indexes are included as reference material.

PART 2: EXCHANGE RATE DETERMINANTS

This section examines price fluctuations at the very lowest possible level, the electronic transaction level. Order flow not only affects price movements but also liquidity, volatility, range of trading, and transaction costs. Economic calendars for the most significant news releases are also presented in this section to assist speculators in scheduling their daily and hourly trading sessions.

PART 3: ACTIVITY AND RANGE

Composite charts and diagnoses based on activity, range, and their interaction are explored in this section. The study of both activity and range is crucial to uncovering the semicryptic forces behind spot currency shockwaves.

PART 4: FOREX WAVE THEORY

Wave analysis of economic cycles began in earnest during the 1930s and continues to evolve even today. An innovative addition to technical analysis called *Forex wave theory* is reviewed in this section. Wave relationships, cycle nomenclature, and channel lines are examined in detail.

PART 5: SHOCKWAVE RAW DATA

Traditionally, the most significant news releases have occurred at 8:30 a.m. ET on Fridays. Fifteen practical studies from January 6, 2006 through April 14, 2006 are presented as OHLC vertical bar charts and continuous tick charts. These are accompanied by corresponding statistical analysis for each chart.

PART 6: SHOCKWAVE SWING DATA

In this section, the swing reversal algorithm essential to reversal charting is applied to the raw data presented in Part 5. This assists traders in identifying recurring shockwave patterns and provides insight into determining market entry and exit timing.

APPENDICES

The 11 appendices are an integral part of shockwave analysis and are intended to act as detailed reference tools while readers are trading online.

DISCLAIMER

I want to emphasize that spot and futures currency trading may not be suited to everyone's disposition. All traders must be keenly aware of the risks involved and of the consequences of poor trading habits and/or mismanaged resources. Neither the publisher nor the author is liable for any losses incurred while trading currencies.

PART 1
Fundamental Studies

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Chapter 1
Fundamental versus Technical

OVERVIEW

It is commonly accepted that there are two major schools of thought when formulating a trading strategy for any market, be it securities, futures, or currencies. They are called *fundamental analysis* and *technical analysis*. The former is based on economic factors, whereas the latter is concerned with price actions. Of course, most traders may opt to include elements of both disciplines while honing their personal trading strategy.

This book was written specifically for spot currency scalpers and day traders who favor technical analysis and are particularly interested in wave theory forecasting and shockwave studies that are investigated in the bulk of this book. In Part 2 (Exchange Rate Determinants), I examine price fluctuations at the lowest conceivable arena, the order-transaction level.

However, I feel that any work on spot currency forecasting is not complete if the influence of fundamental factors is totally ignored. Hence this chapter has been included.

TECHNICAL ANALYSIS

The motivating belief among all technical analysts is that past and current technical data (open, high, low, and closing prices) provides sufficient information to forecast price fluctuations for the immediate future. This genre of trader also believes that identifiable price formations and patterns recur with such a high degree of frequency as to warrant market entry orders. This microcosmic viewpoint, however, is based on a rather restricted set of input data: the open, high, low, and closing prices. Futures speculators also have the luxury of volume and open interest, two fields not available to Forex traders owing to the decentralized nature of the foreign exchange markets.

The small-cap short-term Forex trader who remains glued to the computer monitor for hours on end is essentially granted only one piece of incoming information—the prevailing market price. However, there exists a myriad of techniques by which the collection and storage of the streaming data can be massaged and coerced into revealing critical properties and characteristics about the underlying currency pair. It is this process that makes the employment of technical analysis a potentially profitable occupation.

Forex shockwave analysis is an emerging branch within technical analysis that relies heavily on the principles of financial wave theory. Traders will find many groundbreaking innovations in the chapters that follow, several of which they may mold and modify to meet their trading goals and ambitions.

FUNDAMENTAL ANALYSIS

Fundamental analysis is a study of the economy and is based on the assumption that the supply and demand for currencies is a result of economic processes that can be observed in practice and that can be predicted. Fundamental analysis studies the relationship between the evolution of exchange rates and economic indicators, a relationship that it verifies and uses to make predictions.

For currencies, a fundamental trading strategy consists of strategic assessments in which a certain currency is traded based on virtually any criteria excluding the price action. These criteria include, but are not limited to, the economic condition of the country that the currency represents, monetary policy, and other elements that are fundamental to economies.

The focus of fundamental analysis is on the economic, social, and political forces that drive supply and demand. There is no single set of beliefs that guides fundamental analysis, yet most fundamental analysts look at various macroeconomic indicators such as economic growth rates, interest rates, inflation, and unemployment. Several theories prevail as to how currencies should be valued (see Part 2 for details).

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Chapter 2
Interest Rates

OVERVIEW

It is common knowledge that domestic interest rates have a direct influence on price fluctuations of the corresponding underlying currency pairs. The first statistical relationship to scrutinize is based on the well-known maxim, “Smart money follows higher interest rates.” Large corporations and institutions tend to convert liquid assets to the currency of the country with the higher interest rate.

For example, assume that the prevailing U.S. prime rate is 5.0 percent and that the equivalent British official rate is 4.75 percent. Both countries announce a new rate on the same day: The U.S. prime rate declines to 4.25 percent, whereas the British official rate advances to 5.75 percent, a relative rally of 1.5 percent for the British rate.

Assume that the U.S. XYZ Corporation is a major importer/exporter for both American and British durable goods. After the advance of the British rate, it now becomes more profitable for XYZ Corporation to deposit its USD cash on hand reserves in British banks, earning the higher interest rate. Therefore, XYZ Corporation buys 10 million units of the GBPUSD currency pair, longing the pound and shorting the dollar.

FORECASTING MODEL

In my forecasting model, I will assume that the currency pair is the dependent variable and that some function of the two interest rates is the independent variable. Specifically, I will assume that the interest-rate relationship is additive rather than multiplicative:

$$\text{GBPUSD} = A(\text{U.K. rate} - \text{U.S. rate}) + B$$

where A and B are the ordinary least squares (OLS) linear regression coefficients, slope and intercept, respectively. Note that in this model the independent variable is the *difference* between the two interest rates. Also note that an advance in the U.K. rate will cause an advance in the GBPUSD currency pair. Conversely, an advance in the U.S. rate will cause a decline in the same currency pair.

FUNDAMENTAL DATA

The U.S. interest-rate data were obtained from an independent financial portal called Money Café (www.moneycafe.com/library/prime.htm). The British interest-rate data were obtained from the Bank of England (www.bankofengland.co.uk/statistics/index.htm). Monthly data for the time frame January 2000 through December 2005 for the GBPUSD currency pair was obtained from Disk Trading, Ltd. (www.disktrading.com) on three compact disks.

VISUAL REPRESENTATION

In the upper portion of Figure 2-1, the U.S. prime rate is higher than the Bank of England (BOE) official rate in all cases. At the bottom of the chart is the difference between the two rates. The vertical scaling on the right represents interest rates expressed as percentages.

The solid continuous line in Figure 2-2 represents the monthly exchange rate for the GBPUSD currency pair from January 2000 to December 2005. The dotted line is the regression estimate for the forecasting model described earlier.

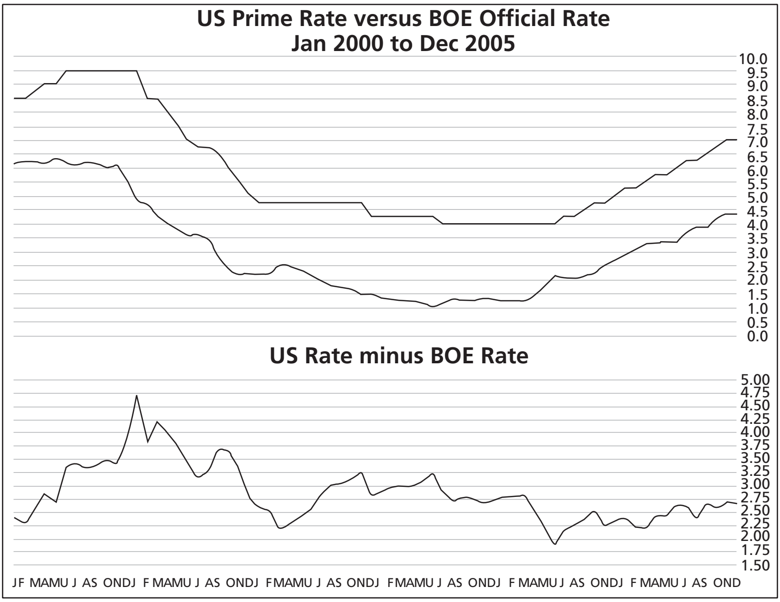

Figure 2-1 U.S. versus Bank of England interest rates and difference.

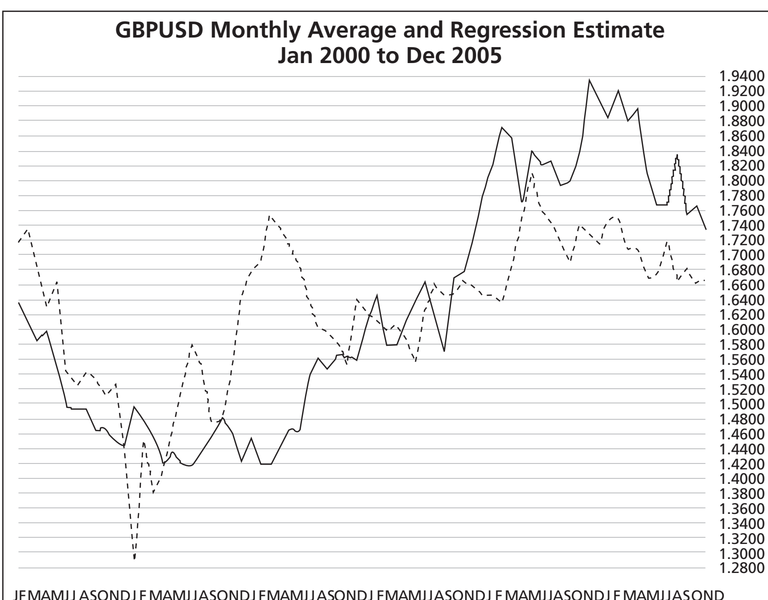

Figure 2-2 GBPUSD and regression line.

Table 2-1 Interest-Rate Regression Coefficients

Regression Coefficient	Value
Slope	0.1861
Intercept	2.1597
Coefficient of correlation	62.39

REGRESSION RESULTS

A linear regression for the preceding model generated the results shown in Table 2-1.

OBSERVATIONS

First, I note that a coefficient of correlation of 62.39 is relatively encouraging, considering all the other economic factors that influence the GBPUSD exchange rate. Essentially, this means that 62 percent of the directional movement in the underlying currency pair can be attributed directly to the fluctuations between the interest rates of the two countries.

Sadly, though, this information does not directly benefit day traders and scalpers who operate at the tick level. The U.S. prime interest rate is published by the Federal Reserve Bank of St. Louis and is only modified every one and a half to two and a half months (on average). Thus critical analysis of interest rates is usually left to long-term traders.

Chapter 3
Balance of Trade

OVERVIEW

The purpose of this chapter is to quantify the influence of the balance of trade between two countries on their corresponding currency pair. *Balance of trade* (BOT) is defined as

$$\text{BOT} = \text{exports} - \text{imports}$$

The balance of trade hypothesis is as follows: An increase in one country's trade deficit will cause a proportional decrease in that country's currency. Conversely, as a country's exports increase in relation to its imports, the value of its currency also increases. Just as a point of curiosity, the United States has a deficit trade balance with over 90 percent of the world's nations.

FORECASTING MODEL

The following linear model will be employed using the USDCAD currency pair:

$$\text{USDCAD} = A \times (\text{U.S. exports} - \text{CA imports}) + B$$

An ordinary least squares (OLS) linear regression will be used to extract the following:

A = first regression coefficient in the preceding model (slope)

B = second regression coefficient in the preceding model (intercept)

s = standard deviation

r = coefficient of correlation

see = standard error of the estimate

The critical value here is *r,* the coefficient of correlation, which explains how closely the currency pair (the dependent variable) follows the BOT data (the independent variable).

FUNDAMENTAL DATA

The U.S.–Canada BOT data were obtained from the U.S. Census Bureau, Department of Foreign Trade Statistics (www.census.gov/foreign-trade/balance/index.html). Initially, monthly data for the time frame January 2000 through December 2005 were used. The USDCAD currency pair data were obtained from Disk Trading, Ltd. (www.disktrading.com) on three compact disks.

VISUAL REPRESENTATION

The first step is to chart the raw data to determine if there are any statistical anomalies that may bias the regression coefficients and the coefficient of correlation (Figures 3-1 and 3-2).

OBSERVATIONS

In Figure 3-1, on first sight we note that the BOT values exhibit a rather "choppy" behavior. On closer inspection, we see that this supposed erratic property is actually the sum of multiple sinusoidals overlaid on top of a basic downward trend. This becomes an excellent candidate for trigonometric dissection at a later date.

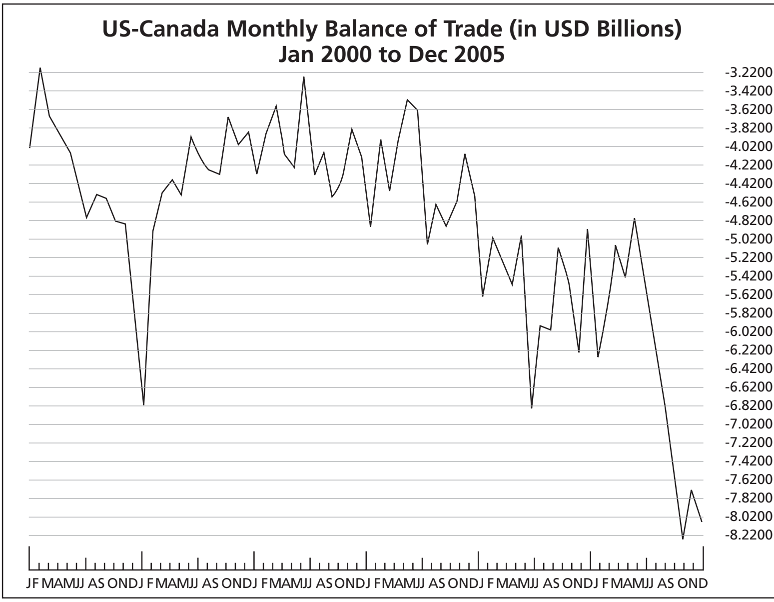

Figure 3-1 U.S.–Canada balance of trade.

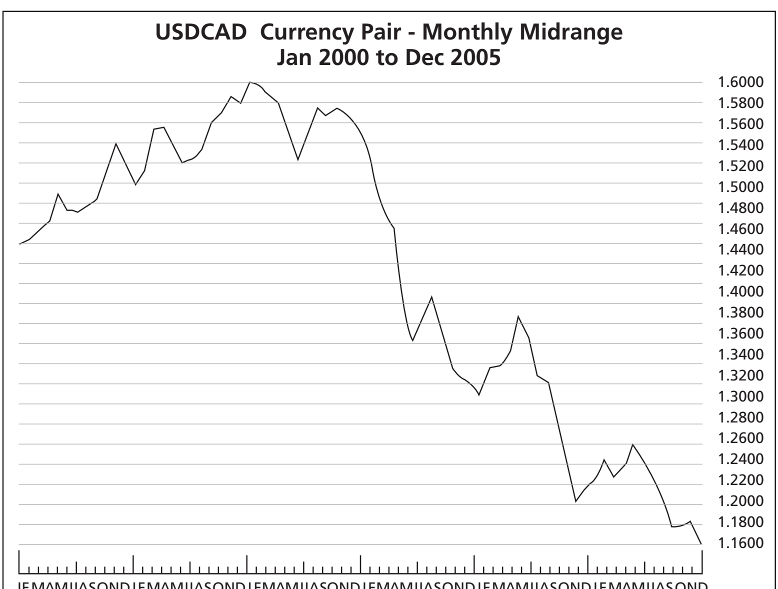

Figure 3-2 USDCAD monthly midrange.

In Figure 3-2, I explain the arbitrary use of the monthly midrange instead of the monthly close for one important reason: Through experimentation, it improved the coefficient of correlation by 2 percent on average. Midrange is a central value, whereas the closing price can fluctuate anywhere inside the monthly range.

I also must note that a clear linear trend is not required in either set of data because the two sets are regressed against each other and not against a straight line.

DESCRIPTIVE STATISTICS

The descriptive statistics for the independent variable (BOT) are listed in Table 3-1.

The descriptive statistics for the dependent variables (USDCAD) are listed in Table 3-2.

Descriptive statistics are used by analysts to parameterize various properties of the underlying data.

REGRESSION RESULTS

The OLS linear model generated the results shown in Table 3-3.

Table 3-1 Statistics for Balance of Trade

Statistic	Value
High	−3.1234
Low	−8.2129
Range	5.0895
Midrange	−5.6682
Mean	−4.8273
Standard deviation	1.1114

Table 3-2 Statistics for USDCAD Currency Pair

Statistic	Value
High	1.6008
Low	1.1591
Range	0.4417
Midrange	1.3799
Mean	1.4202
Standard deviation	0.1379

Table 3-3 Model Coefficients

Regression Coefficient	Value
Slope	0.0872
Intercept	1.8411
Standard error of the estimate	0.0082
Coefficient of correlation	70.29

Therefore, the forecasting model has the arithmetic form

$$USDCAD = 0.0872 \times BOT + 1.8411$$

INTERPRETATION

The surprisingly high coefficient of correlation implies that the BOT between the two countries does have a direct and positive correlation with the corresponding currency pair on a long-term basis (or at least in the U.S.–Canada example).

However, I must note that BOT is only one of many influences on currency prices. The ultimate equation will have several dependent variables on the right side and require a multiple (nonlinear) regression for its solution.

ENHANCEMENTS

This study is far from being conclusive because it represents a single fundamental influence and a single currency pair. The same approach must be applied to all the major currency pairs and their cross rates, as well as numerous other fundamental categories.

Additional analysis on USDCAD balance of trade can include the following.

DIFFERENTIAL ANALYSIS

This involves performing a linear regression on the monthly *change* in the two data sets using the linear differential model:

$$USDCAD_{current} - USDCAD_{previous} = A \times (BOT_{current} - BOT_{previous}) + B$$

SERIAL CORRELATION

Serial correlation techniques are employed to determine if a leader/lagger relationship exists between the two data sets. This is also called a *dominance/dependence relationship*.

The dependent variable (the currency pair) is shifted one time unit (one month, in this case) into the future. This is to determine if the current BOT has a robust forecasting influence on the following month's currency pair. For example,

$$\text{USDCAD}_{\text{July}} = A \times (\text{BOT}_{\text{June}}) + B$$

In the serial model, the coefficient of correlation must be significantly higher than the coefficient of correlation using the standard nonserial model.

SMOOTHING TECHNIQUES

It is also expedient to determine the effect on the coefficient of correlation when either the currency data or the BOT data or both are massaged with mild moving-average filters.

TRIANGULAR CORRELATIONS

This involves the USD and two other currencies plus BOT data among all three corresponding countries. The mathematics is more complex but may yield a significant increase in the aggregate coefficients of correlation.

CONCLUSION

A coefficient of correlation of 70 percent is very significant. However, spot currency traders must keep in mind that this information is used primarily by medium- and long-term speculators.

Chapter 4
Consumer Price Index

OVERVIEW

The purpose of this study is to quantify the influence of the consumer price index (CPI) between two countries on their corresponding currency pair.

Fundamentally, the CPI (also called the *retail price index*) is a statistical measure of a weighted average of prices of a specified set of goods and services purchased by wage earners in urban areas. It is a price index that provides a measure of inflation and a cost-of-living index. The CPI can be used to track changes in prices of all goods and services purchased for consumption by urban households. User fees (such as water and sewer service) and sales and excise taxes paid by the consumer are also included. Income taxes and investment items (such as stocks, bonds, life insurance, and homes) are not included. There are numerous methods to quantify one country's inflation rate. In fact, a robust inflation indicator should incorporate over half a dozen or so such indicators. However, for the sake of clarity and simplicity, I have decided to focus on the single-most important inflation indicator—the CPI.

The testing premise is simple: As one nation's CPI rises, its currency decreases proportionately against foreign currencies.

FORECASTING MODEL

In this study I compare monthly CPI data between the United States and the United Kingdom; thus the currency pair GBPUSD is required. The method will be an OLS linear regression (cross-correlation) of the following model:

$$\text{GBPUSD} = A \times (\text{U.S. CPI}/\text{U.K. CPI}) + B$$

Note that because of the inverse relationship defined in the preceding hypothesis, the U.K. CPI must be in the denominator of the independent variable.

CPI DATA

The U.S. CPI data were downloaded from the Bureau of Labor Statistics (U.S. Department of Labor) at www.bls.gov/cpi and span the time period January 1971 through December 2005. The corresponding U.K. CPI data were downloaded from the National Statistics Web site at www.statistics.gov.uk/statbase/TSDdownload2.asp and cover the period January 1988 through December 2005.

The U.S. CPI data use a basis month of July 1983, whereas the U.K. CPI data use May 2005 as the basis month. The *basis month* is when the agency who compiled the data sets the CPI to 100.0 as a reference point. This is an arbitrary decision on the part of the compiling agencies, who, for very valid reasons, readjust the index periodically. Mathematically, the use of two different basis months in two sets of data has no effect on their mutual coefficient of correlation because scaling is linear.

INDIVIDUAL LINEAR REGRESSIONS

Before performing a cross-correlation between the two CPI data sets (the independent variables) and the corresponding currency pair (the dependent variable), it is expedient to test the CPI data individually using a simple time-based linear model (see Figures 4-1 and 4-2):

$$\text{CPI} = A \times \text{MonthNo} + B$$

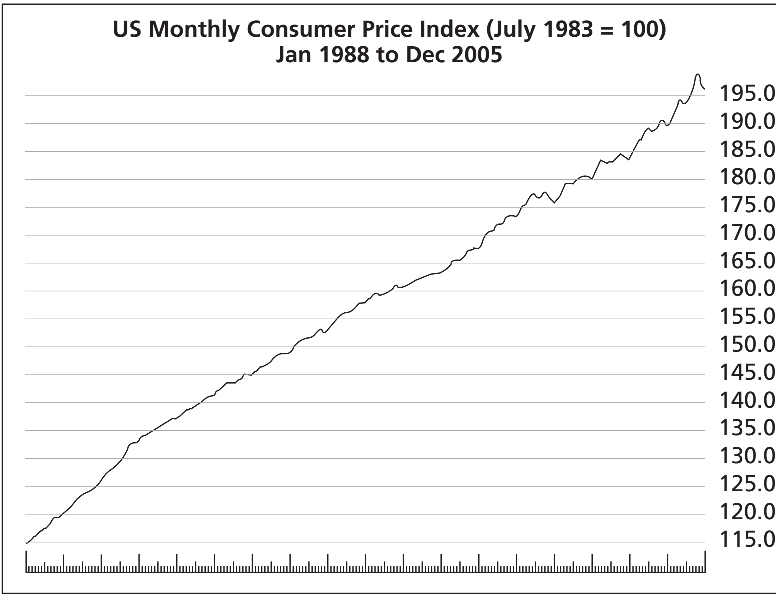

Figure 4-1 U.S. consumer price index.

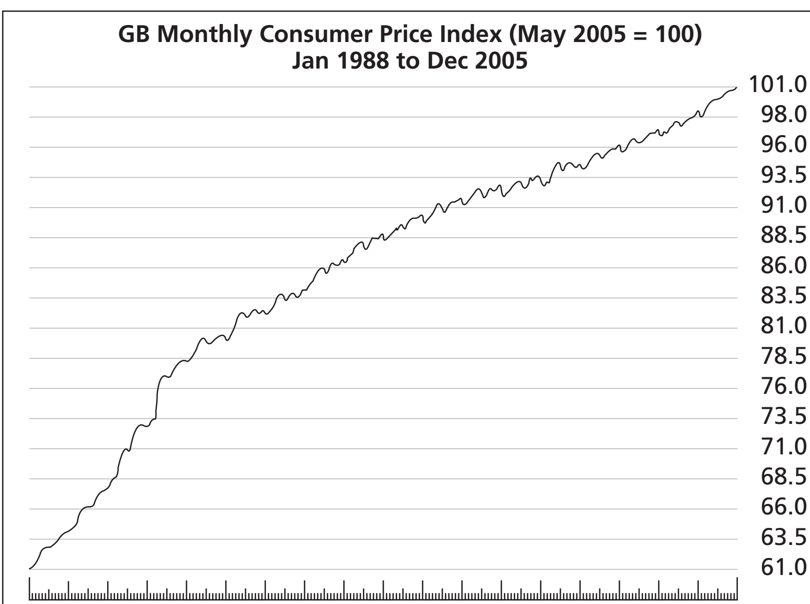

Figure 4-2 U.K. consumer price index.

REGRESSION RESULTS AND INTERPRETATION

Tables 4-1 and 4-2 present the regression results.

The regression results of the two CPIs taken individually are hardly surprising.

First, the rates of increase (slope) over the 216-month time frame are 2.81 and 5.73 percent, respectively (although the U.S. rate seems slightly low compared with other U.S. inflation indicators).

Second, both CPIs exhibit a very high coefficient of correlation (99.7 and 96.3 percent, respectively), which seems very consistent with the linear model expectations.

Third, ignore the negative values for the intercept. Those are simply hypothetical values if the regression line were drawn all the way back to the year 1 A.D. (actually the year 0, if it existed).

Table 4-1 U.S. Consumer Price Index: Linear Regression Results

Regression Statistic	Value
High	199.2000
Low	115.7000
Range	83.5000
Midrange	157.4500
Mean	157.7046
Standard deviation	22.1465
Slope	2.8146
Intercept	–335.3753
Coefficient of correlation	99.7368

Table 4-2 U.K. Consumer Price Index: Linear Regression Results

Regression Statistic	Value
High	101.0000
Low	61.9000
Range	39.1000
Midrange	81.4500
Mean	86.0630
Standard deviation	10.5155
Slope	5.7250
Intercept	–384.2116
Coefficient of correlation	96.3252

INDEPENDENT VARIABLE

Figure 4-3 and Table 4-3 show the independent variable and descriptive statistics, respectively.

CURRENCY DATA

Raw GBPUSD currency data were obtained from Disk Trading, Ltd., on compact disks (see Figure 4-4 and Table 4-4).

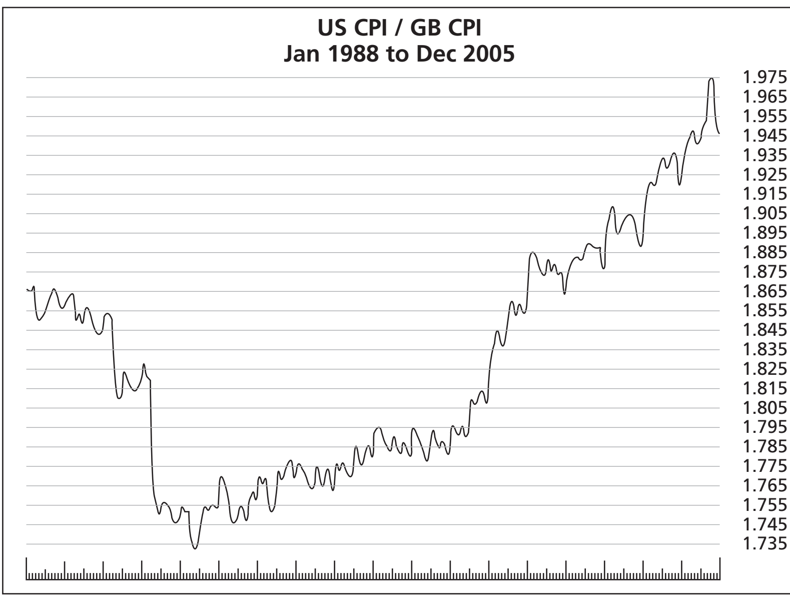

Figure 4-3 Independent variable U.S. CPI/U.K. CPI.

Table 4-3 Descriptive Statistics for the Independent Variable

Statistic	Value
High	1.9782
Low	1.7354
Range	0.2427
Midrange	1.8568
Mean	1.8297
Standard deviation	0.0615

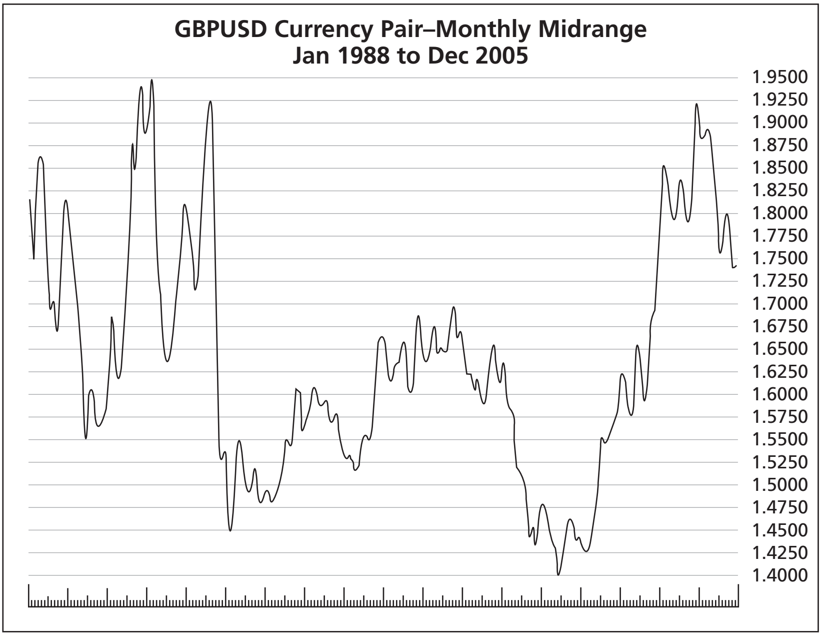

Figure 4-4 GBPUSD currency pair.

Table 4-4 Descriptive Statistics for the GBPUSD Currency Pair

Statistic	Value
High	1.9528
Low	1.3956
Range	0.5572
Midrange	1.6742
Mean	1.6395
Standard deviation	0.1336

CROSS-CORRELATION

I will now return to my original model for the relationship between a currency pair and the two CPIs of the corresponding countries:

$$\text{GBPUSD} = A \times (\text{U.S. CPI})/(\text{U.K. CPI}) + B$$

The regression yielded the results shown in Table 4-5.

Table 4-5 Cross-Correlation Coefficients

Regression Statistic	Value
High	1.9782
Low	1.7354
Range	0.2427
Midrange	1.8568
Mean	1.8297
Standard deviation	0.0615
Slope	0.4955
Intercept	0.7329
Coefficient of correlation	22.81

A purely visual examination of the preceding four charts indicates that a direct linear correlation would not be high. The 23 percent coefficient of correlation might appear low, but it is noteworthy to keep in mind that CPI data are only one of a half dozen or so indicators in the composite inflation index.

ENHANCEMENTS

There are experimental techniques to test the model further, such as

1. Convert the model from a multiplicative to an additive paradigm:

$$\text{GBPUSD} = A \times (\text{U.S. CPI} - \text{U.K. CPI}) + B$$

2. Test a variety of logarithmic relationships:

$$\log(\text{GBPUSD}) = A \times (\text{U.S. CPI})/(\text{U.K. CPI}) + B$$

$$\text{GBPUSD} = A \times \log[(\text{U.S. CPI})/(\text{U.K. CPI})] + B$$

$$\log(\text{GBPUSD}) = A \times \log[(\text{U.S. CPI})/(\text{U.K. CPI})] + B$$

3. Segment both currency and CPI time series into annual samples, and apply the original model on each year.
4. Test for any serial correlations in the currency data and filter them out.
5. Combine the CPI data with another inflation indicator before performing the cross-correlation.

Inferential statistics is a wide-open field of investigation. “If you torture the data long enough, it is bound to say something.”

In other words, it is not the magnitude of the coefficient of correlation that is tantamount. It is whether the same results can be reproduced consistently with different time frames and other minor modifications.

Chapter 5
Summary of Fundamental Studies

OVERVIEW

The preceding chapters examined the coefficients of correlation for the linear forecasting models shown in Table 5-1.

In all three studies, it should be noted that only one fundamental economic influence was regressed per forecasting model.

COMPOSITE MODELING

Forecasting long-term currency prices using fundamental data is a complex and sometimes ineffective endeavor. A more realistic forecasting model requires more independent variables on the right side of the modeling equation. For example,

Table 5-1 Model Correlation Summary

Study	Forecasting Model	Correlation
Interest rates	GBPUSD = A(U.K. rate − U.S. rate) + B	63 percent
Trade balance	USDCAD = A(U.S. exports − CA imports) + B	70 percent
Inflation rates	GBPUSD = A(U.S. CPI)/(U.K. CPI) + B	23 percent

$$\begin{aligned}\text{GBPUSD} = A(\text{INT}) + B(\text{INF}) + C(\text{BOT}) + D(\text{PPP})\\ + E(\text{GDP}) + F(\text{PPI}) + \ldots + Z\end{aligned}$$

where

INT = interest rates

INF = inflation rates

BOT = balance of trade

PPP = purchasing power parity

GDP = gross domestic product

PPI = producer price index

... = other fundamental influences such as housing starts, unemployment rate, etc.

The letters A through F are called the *partial regression coefficients for a multiple regression.* The letter Z represents a single intercept constant that applies to all the individual economic factors in the model.

The composite model can be solved using a technique called the *solution to simultaneous equations.* This may require specialized software that most standard statistical packages include. Specifically, the program for the Gauss-Jordan elimination technique is recommended.

Again, it should be noted that historical technical data are available for the smallest possible time unit—streaming tick data and interval data as small as 1 minute. Historical fundamental data, on the other hand, usually are packaged as weekly or monthly data and, in some cases, quarterly data. Thus, as mentioned earlier, knowledge of fundamental influences can be its own reward, but it does not directly assist day traders and scalpers who operate at the tick level in their online currency platforms.

EURO CURRENCY AND FUNDAMENTALS

When devising fundamental forecasting models that involve the euro currency, the analyst should be aware that as of January 1, 2001, there are 12 nations (13 if the Vatican is included) that gave up their legacy currencies and switched to the euro.

Essentially, analysts will need fundamental data from all 13 nations to forecast a currency pair estimate accurately. For example, assume that the analyst is investigating how BOT affects the EURUSD currency pair. Export and import data must be gathered for all 13 euro countries as they relate to commercial trade with the United States. This is somewhat of a Herculean task for an independent small-cap investor.

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PART 2
Exchange Rate Determinants

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Chapter 6
Electronic Broking

OVERVIEW

Before delving into Forex wave theory and shockwave analysis, I want to present a brief review of how exchange rates are handled at the lowest possible transaction level—*the automated electronic order-matching system.*

EBS

Electronic Broking Services (EBS) is the world's leading provider of Forex and precious metals transactional trading and data solutions to thousands of trading professionals and organizations. EBS was created in September 1993 by a partnership of the world's largest foreign exchange market-making banks. Approximately $145 billion in spot foreign exchange transactions, 700,000 ounces of gold, and 7 million ounces of silver are traded every day over the EBS Spot Dealing System.

In June 2006, EBS was acquired by Intercapital Public Limited Company (ICAP), the world's largest interdealer broker. This acquisition combined EBS' strengths in electronic spot foreign exchange with ICAP's electronic broking business to create a single global multiproduct business. ICAP has a daily average transaction volume in excess of $1 trillion, 50 percent of which is electronic. ICAP provides specialist intermediary broking services to commercial banks and investment banks in the wholesale financial markets.

An interdealer broker works in these markets to draw together liquidity and to match buyers and sellers so that deals can be executed by its banking customers. Banks pay a commission when they use a broker to complete a deal.

REUTERS

The Reuters Group is best known as a news service that provides reports from around the world to newspapers and broadcasters. However, news reporting accounts for less than 10 percent of the company's income. Its main focus is on supplying the financial markets with information and trading products. These include market data, such as share prices and currency rates, research and analytics, as well as trading systems that allow dealers to buy and sell currencies and shares on a computer screen instead of by telephone or on a trading floor such as that of the New York Stock Exchange. Reuters has offered a traditional electronic platform since 1989.

Reuters and EBS compete head-on for the liquidity offered by major foreign exchange banks. Reuters is fighting back with the launch of its upgraded Dealing 3000 screen-based system. But both EBS and Reuters give access to a relatively limited number of players, focusing on the interbank market.

The Reuters Dealing 3000 system is changing over from the old proprietary front end used on Dealing 2000 to a Windows NT environment with an improved look and flexible screen layout. Its other new features include a broadcast facility, the ability to carry out more conversations, and access to Reuters' core financial information packages, the Reuters Integrated Data Network (IDN). The new Reuters system still requires a separate terminal to trade rather than allowing access through a trader's PC and is not Web-capable.

MARKET MAKERS

A *market maker* is a person or a firm that quotes a buy and sell price in a financial instrument or commodity hoping to make a profit on the turn or the spread between the bid price and the ask price.

Forex market makers ensure that the market is always functional and that the currencies in it will always return the market rate. They do so by updating their prices at very small time intervals and undertaking to trade if requested. Forex market makers must fulfill their obligations irrespective of whether the economic situation is favorable or unfavorable or whether they lose or profit from the transaction.

Typical Forex market makers include Gain Capital, CMS Forex, Forex Capital Markets (FXCM), and Global Forex Trading, all of which are regulated by the Commodity Futures Trading Commission (CFTC) of the United States. Another prominent Forex market maker is Saxo Bank, which is regulated by the Financial Services Authority (FSA) of Denmark.

Until recently, central banks, commercial banks, and investment banks dominated the Forex market. Owing to the entry of Forex market makers, other market players such as international money brokers, large multinational companies, registered dealers, global money managers, and private speculators have entered the market in large numbers.

Figure 6-1 illustrates the order-execution mechanism from the vantage point of an independent Forex client.

ORDER FLOW

Order flow is a concept from microstructure finance that refers to *signed* volume of trading. Trades can be signed arithmetically as positive or negative depending on whether the "aggressor" is buy-

Client → Market Maker → Interdealer Bank → Electronic Broker

Figure 6-1 Order-execution mechanism.

ing or selling. The *aggressor* is the client who initiates the trade, whereas the dealer who posted the bid/ask quotes is considered to be on the passive side of the trade. For example, a sale of 1,000 units by the trader creates an order flow of -1,000 with the dealer in the underlying currency pair.

In the commodity markets, each futures contract has a standardized unit size and must be executed with one buyer and one seller simultaneously, thus ensuring a state of equilibrium in the market. Forex market makers are not bound by the constraint that each sale in one currency pair must have an equal and opposite counterpart, a purchase of the same quantity of units. If order flow becomes too lopsided and deviates significantly from the desired goal of order flow equaling zero, market makers can initiate a non-client order with the interbank dealer or the electronic broker if they deal direct. It is this transactional process that can influence price fluctuations at the lowest level, the electronic broker.

LIVE BOOK

Unfortunately, owing to the lack of centralization of spot currency markets, there is no one single order-flow book whereby traders have ready access to order flow, volume, and open interest information. Figures 6-2 and 6-3 provide two examples of how order flow works within the commodity futures framework of the Chicago Board of Trade.

The abbreviation ZGZ6 is the electronic trading symbol for a gold contract (ZG) with a delivery month of December 2006 (Z6). The contract specification is for 100 troy ounces of fine gold (at least 0.995 pure). The minimum tick size is 10 cents equivalent to $10 per contract.

Note that buy orders are represented in the upper box as the two columns on the left, and sell orders are on the right. Buy prices are listed in descending order, whereas sell prices are listed in ascending order. The difference between the top prices in the two columns defines the bid/offer spread, which varies only 1 or 2 ticks

BUY	ORDERS	SELL	ORDERS
QTY	PRICE	QTY	PRICE
4	587.9	13	588.0
2	587.8	10	588.1
6	587.7	39	588.2
57	587.6	10	588.3
41	587.5	7	588.4
22	587.4	8	588.5
13	587.3	2	588.6
39	587.2	25	588.7

Sep 21, 2006	11:01:43 AM
Symbol	ZGZ6
Last 3	587.9
Last 2	587.8
Last 1	587.8
Change	+1.1
Previous Settle	586.7
Bid	4 x 587.9
Ask	13 x 588.0
Open	582.7
High	589.4
Low	580.2
Today's Volume	29555

Figure 6-2 Live book and summary, September 21, 2006, 11:01:43 a.m.

in these examples. The contract live book summary is displayed in the bottom box.

The time lapse between these two live-book examples is only 44 seconds yet this is a sufficient duration to increment the trading volume by 111 contracts. Access to the analogous live book for spot-currency prices would be a tremendous advantage to spot-currency speculators, but sadly, this resource is not presently available to spot-currency traders.

BUY	ORDERS	SELL	ORDERS
QTY	PRICE	QTY	PRICE
1	588.3	1	588.5
6	588.2	14	588.6
30	588.1	28	588.7
3	588.0	16	588.8
4	587.9	29	588.9
51	587.8	15	589.0
4	587.7	2	589.1
66	587.6	24	589.2

Sep 21, 2006	11:02:27 AM
Symbol	ZGZ6
Last 3	588.4
Last 2	588.3
Last 1	588.3
Change	+1.6
Previous Settle	586.7
Bid	1 x 588.3
Ask	14 x 588.6
Open	582.7
High	589.4
Low	580.2
Today's Volume	29666

Figure 6-3 Live book and summary, September 21, 2006, 11:02:27 a.m.

To view the CBOT live book in action, traders are directed to the following Web page: www.cbot.com/cbot/pub/page/0,3181,1069,00.html.

Chapter 7
Scheduled News Releases

NEWS SOURCES

Table 7-1 represents the major agencies that supply economic and fundamental data on a periodic schedule.

TABLE 7-1 Major News Sources

Agency	Department	Web Site
Federal Reserve System	U.S. central bank	www.federalreserve.gov
Bureau of Labor Statistics	Department of Labor	www.bls.gov
Bureau of Economic Analysis	Department of Commerce	www.bea.gov
Bureau of the Census	Department of Commerce	www.census.gov
Economic Research Service	Department of Agriculture	www.ers.usda.gov
FedStats	Over 100 U.S. federal agencies	www.fedstats.gov
Statistics	Bank of England	www.bankofengland.co.uk
National Statistics	Official U.K. statistics	www.statistics.gov.uk
Statistics Canada	National Statistical Agency	www.statcan.ca

DOMESTIC ECONOMIC CALENDAR (SEE TABLE 7-2)

TABLE 7-2 Domestic Economic Calendar

Economic Release	Release Time (ET)
Gross domestic product	8:30 a.m.
Consumer price index	8:30 a.m.
Employment cost index	8:30 a.m.
Producer price index	8:30 a.m.
Productivity and costs	8:30 a.m.
Employment	8:30 a.m.
Personal income	8:30 a.m.
Business inventories	8:30 a.m.
Durable goods	8:30 a.m.
Retail sales	8:30 a.m.
Trade balance	8:30 a.m.
Housing starts	8:30 a.m.
Production and capacity utilization	9:15 a.m.
Leading indicators	10:00 a.m.
Consumer confidence	10:00 a.m.
Wholesale inventories	10:00 a.m.
Philadelphia Fed survey	10:00 a.m.
Existing home sales	10:00 a.m.
Construction spending	10:00 a.m.
Report on business	10:00 a.m.
Nonmanufacturing report on business	10:00 a.m.
New home sales	10:00 a.m.
Chicago Fed national activity index	10:00 a.m.
Factory orders	10:00 a.m.
Federal budget	2:00 p.m.
Consumer credit	3:00 p.m.

FOREIGN ECONOMIC CALENDAR (SEE TABLE 7-3)

TABLE 7-3 Foreign Economic Calendar

Market	Open	Releases	Close
Frankfurt	0200	0245	1100
London	0300	0430	1200
New York	0800	0830	1600
Wellington	1500	1530	2300
Sidney	1700	1730	0100
Tokyo	1800	1850	0200
Hong Kong	1900	1930	0300

USAGE

Since economic indicators gauge a country's economic state, changes in the conditions reported therefore will directly affect the price and volume of a country's currency. It is important to keep in mind, however, that the indicators just listed are not the only things that affect a currency's price. There are third-party reports, technical factors, and many other things that also can affect a currency's valuation significantly.

It is always prudent to check the economic calendars, both domestic and foreign, before beginning a new trading session. Two critical factors concerning news announcements are the *magnitude* of impact that the release exerts on exchange rates and the *response time*. Response time can be immediate, usually creating highly visible price surges within the first minute. Other response times may be delayed or drawn out over the next half hour or so and exhibit less dramatic vertical surging.

PART 3
Activity and Range

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Chapter 8
Activity

OVERVIEW

Before delving into the complexities of wave theory and shockwave analysis, it is expedient to review some of the technical tools available to spot currency traders.

Traders who specialize in currency futures have an advantage over those who trade in spot currencies. This informational edge consists of two additional data fields—volume and open interest. The decentralized nature of the foreign exchange markets precludes ready access to these fields except at the very lowest-order transaction and accounting levels.

Streaming spot currency data consist of only three fields—date, time, and price. These data can be massaged easily into equispaced interval data such as 1-minute, 30-minute, hourly, daily, and so on. Historical interval data frequently are available to clients through the trader's online currency platform.

The independent data vendor with the largest and most comprehensive selection of historical spot currency data is Disk Trading, Ltd. (www.disktrading.com). DTL packages historical quotes going back to 1972 as date, time, open, high, low, close, upticks, and downticks. An uptick is recorded when a spot price is greater than its immediate predecessor, and a downtick is recorded when a spot price is lower than the previous quote.

DEFINITION

Given the two fields *upticks* and *downticks*, I define *activity* as follows:

$$\text{Activity}_x = \text{upticks}_x + \text{downticks}_x$$

where x is the array index in the time series.

Activity is displayed in the lower portions of Figures 8-1 and 8-2 as vertical bars. The light rectangles are upticks, whereas the shaded rectangles are downticks.

Note that activity in the EURUSD currency pair has nearly tripled since January 1, 2000.

EQUIACTIVITY CHART

The equiactivity chart is my brainchild, and I wanted to incorporate the activity property directly into the OHLC bar chart rather than displaying activity at the bottom of the chart as an afterthought. This concept is similar to that of analyst and author Richard W. Arms,

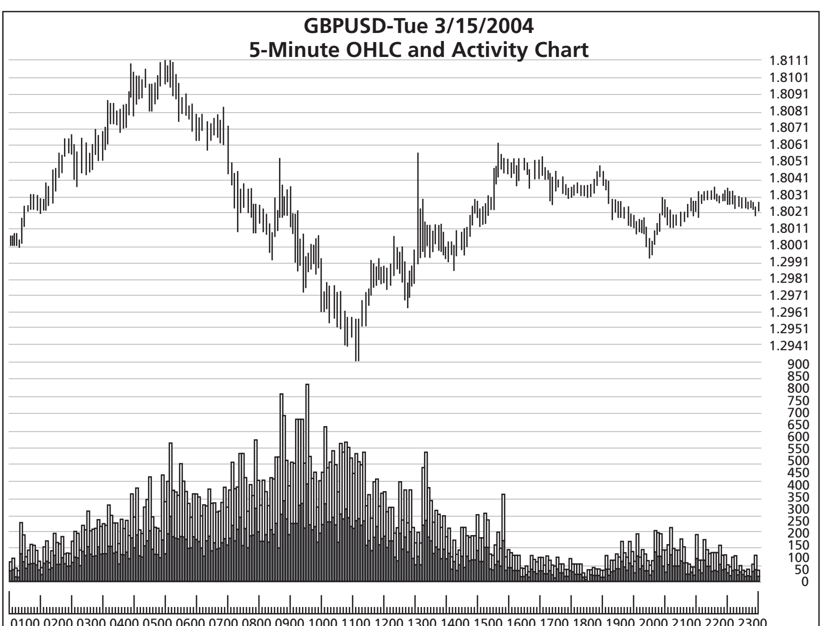

Figure 8-1 Activity expressed as vertical bars.

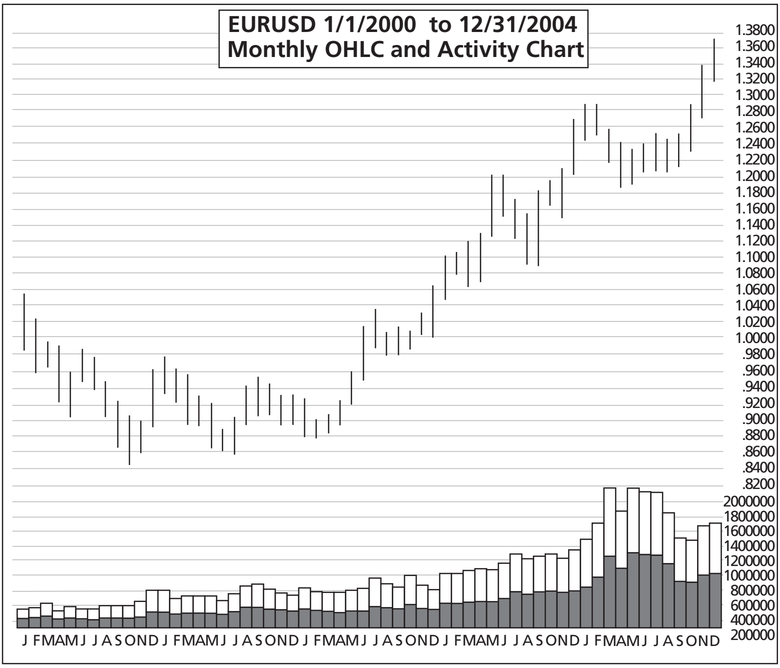

Figure 8-2 Long-term activity.

Jr., who in the early 1970s introduced the equivolume chart in his book *Volume Cycles in the Stock Market.*

The basic principle is that since the height and range of each vertical bar define the high and low prices for that interval, the *width* of the vertical bar can be used to represent the activity for the same interval. The chart in Figure 8-3 displays the raw data as a conventional OHLC vertical bar chart with equal spacing along the *x* axis.

The chart in Figure 8-4 displays the accordionlike property of the equiactivity chart. Column widths increase proportionately with an increase in activity during that interval.

COMPARATIVE ACTIVITY

The concept of activity was employed as a means to evaluate the intrinsic characteristics of a specific currency pair. Activity also can be used to rank multiple currency pairs.

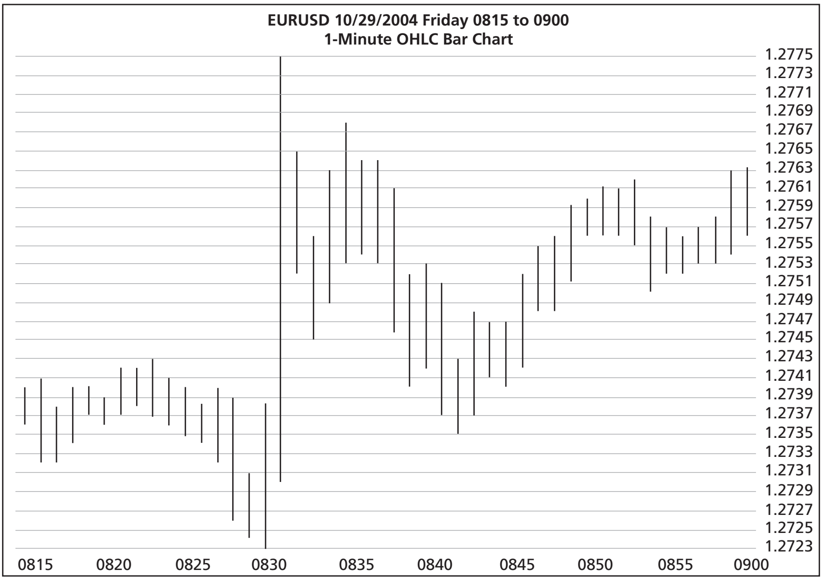

Figure 8-3 Conventional OHLC bar chart.

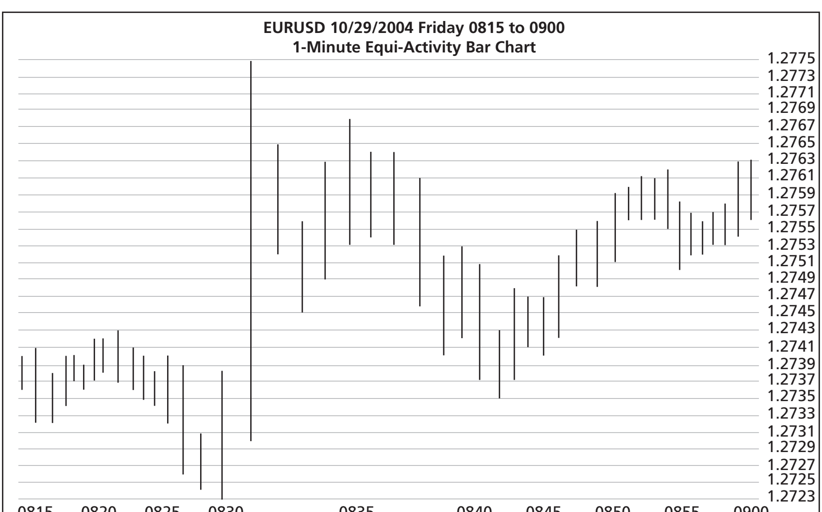

Figure 8-4 Corresponding equiactivity chart.

The totals shown in Table 8-1 were compiled from hourly data supplied by Disk Trading, Ltd. The uptick and downtick data for all currency pairs are based on the date range from January 1, 2000 through December 31, 2003.

This table reveals some interesting insights into the currency markets and dispels many common misconceptions. Although, as mentioned earlier, trading activity is not an exact match for trading volume, the table does illustrate how actively traded a currency pair is. We know which markets have the most ticks, but we do not know the size of each trade (a necessary component used to calculate trading volume in the commodity futures markets).

First, the top position held by the EURUSD is no surprise. However, the order of the next three pairs is somewhat surprising. One would expect the reverse order: GBP, JPY, and then CHF.

TABLE 8-1 Majors, Minors, and Cross-Rates Sorted by Activity

Rank	Pair	Upticks	Downticks	Activity	Percent
1	EURUSD	11,054,097	11,030,492	22,084,589	11.07
2	USDCHF	9,721,359	10,212,108	19,933,467	9.97
3	USDJPY	9,561,763	9,560,629	19,122,392	9.57
4	GBPUSD	8,008,837	8,187,172	16,196,009	8.12
5	EURJPY	7,797,366	7,813,951	15,611,317	7.82
6	EURCHF	6,607,172	6,652,047	13,259,219	6.66
7	EURGBP	6,196,830	6,155,652	12,352,482	6.21
8	GBPJPY	6,137,329	6,040,829	12,178,158	6.11
9	GBPCHF	5,499,563	5,566,750	11,066,313	5.56
10	USDSEK	5,389,366	5,345,511	10,734,877	5.36
11	USDNOK	5,176,038	5,132,495	10,308,533	5.16
12	USDDKK	3,834,671	3,768,339	7,603,010	3.81
13	USDCAD	3,037,610	3,095,395	6,133,005	3.06
14	AUDUSD	2,772,073	2,739,711	5,511,784	2.76
15	USDHUF	2,240,576	2,220,757	4,461,333	2.25
16	NZDUSD	1,602,812	1,617,497	3,220,309	1.60
17	AUDJPY	1,353,009	1,346,705	2,699,714	1.35
18	USDCZK	1,186,874	1,176,489	2,363,363	1.20
19	CHFJPY	1,104,089	1,137,548	2,241,637	1.10
20	USDZAR	652,792	681,038	1,333,830	0.65
21	USDSGD	616,208	589,833	1,206,041	0.60

The position of the Scandinavian pairs (SEK, NOK, and DKK) above both the CAD and AUD is also unexpected.

Two former Soviet-satellite currencies (HUF and CZK) have inched their way up the ladder since the early 1990s and the dissolution of Soviet Communism.

The low position of the South African rand (ZAR) is difficult to explain based on its wealth of gold and diamonds in international trade.

Lastly, the positions of the cross-rates are slightly higher than anticipated. Of course, all these observations are based on the unfounded bias that the USD is the universal currency around the world.

SINGLE-CURRENCY ACTIVITY

The preceding analysis is based on *currency pairs.* It is possible to estimate the activity of each individual major currency by summing only the cross-rate pairs in which it occurs (see Table 8-2).

These are only rough approximations because minor currency pairs were not included in the sampling, nor do these approximations reflect the volume of each trade. Nonetheless, these examples should give traders a better understanding of Forex activity in general.

DIRECTION

The appellation *direction* appears throughout the history of technical analysis, and my use of this moniker differs slightly from previous connotations for lack of a better term. Within the context of the analysis of intrainterval tick data, I will define *direction* as the difference between the sum of the upticks and the sum of the downticks:

TABLE 8-2 Single Major Currencies Sorted by Activity

Currency	Components	Activity	Percent
USD	EURUSD + USDJPY + USDCHF + GBPUSD	77,336,457	27.9
EUR	EURUSD + EURCHF + EURJPY + EURGBP	63,307,607	22.9
GBP	USDGBP + EURGBP + GBPJPY + GBPCHF	51,792,962	18.7
JPY	USDJPY + EURJPY + GBPJPY + CHFJPY	49,153,504	18.7
CHF	USDCHF + EURCHF + CHFJPY + GBPCHF	35,434,323	12.8

$$\text{Direction}_x = \text{upticks}_x - \text{downticks}_x$$

where x is the array index in the time series.

There is no direct correlation between my arbitrary definition of direction and that of J. Welles Wilder, the noted trader/author of the 1970s who developed the *average directional index* (ADX). ADX uses a positive directional indicator and a negative directional indicator to evaluate the strength of a trend. Further information on Wilder's method can be found in his highly acclaimed work, *New Concepts in Technical Trading Systems* (Trend Research, 1978).

Direction can be plotted as a scaled oscillator that ranges from +100 to −100 by dividing the raw direction difference by the activity of the corresponding interval and then multiplying by 100:

$$\text{Direction oscillator}_x = 100(\text{upticks}_x - \text{downticks}_x)/(\text{upticks}_x + \text{downticks}_x)$$

where x is the array index in the time series (see Figure 8-5).

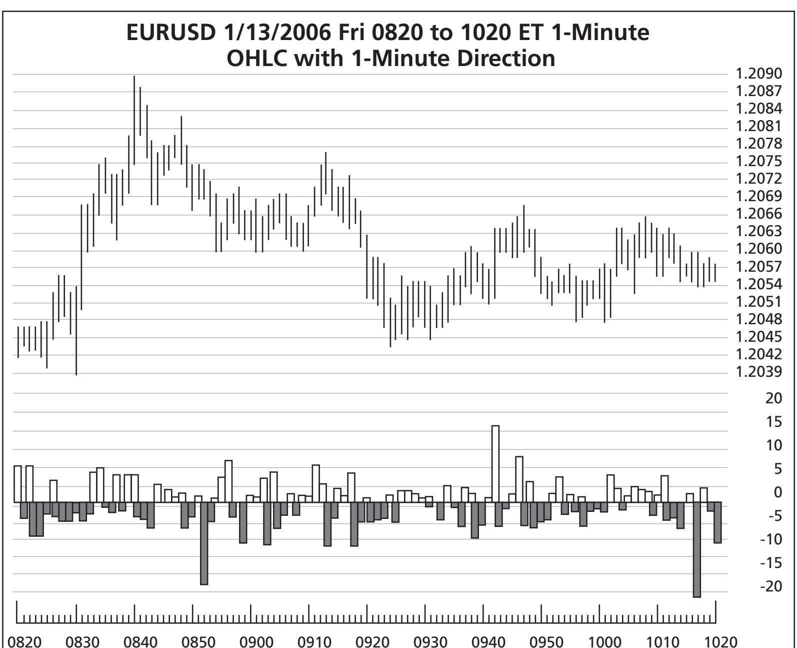

Figure 8-5 Direction oscillator chart.

The lower-right vertical scale in this chart is expressed as a percentage of the total possible number of upticks and downticks for that one interval.

OBSERVATION

Any minute piece of technical information may prove to be valuable to the spot currency trader regardless of how insignificant or cryptic it may appear. Although activity is not an exact match of trading volume, it does provide traders with a viable substitute.

Chapter 9 Composite Activity Charts

TIME OF DAY

The Forex is a 24/7 global market (with reduced liquidity on Saturdays and Sundays, of course). The importance of studying activity is extremely useful for traders in determining *when* to schedule their trading sessions. For this purpose, I developed two composite charting techniques to show traders when trading activity is at its highest and lowest for each currency pair: the *time-of-day chart* and the *day-of-the-week chart.* Composite charts are simply the average activity for each time interval sampled over a long time frame.

In the composite chart in Figure 9-1, multiple time intervals have been plotted in which each average value has been centered. That is, the 3-minute average for 10:00 a.m. is the mean of the activity for 9:59 a.m., 10:00 a.m., and 10:01 a.m. rather than front-based averaging (9:58 a.m., 9:59 a.m., and 10:00 a.m.).

As expected, the highest peak during the 24-hour period is the 8:30 a.m. ET spike coinciding with scheduled news announcements. The gradual rise in activity between 2:00 and 3:00 a.m. marks the opening of the European markets.

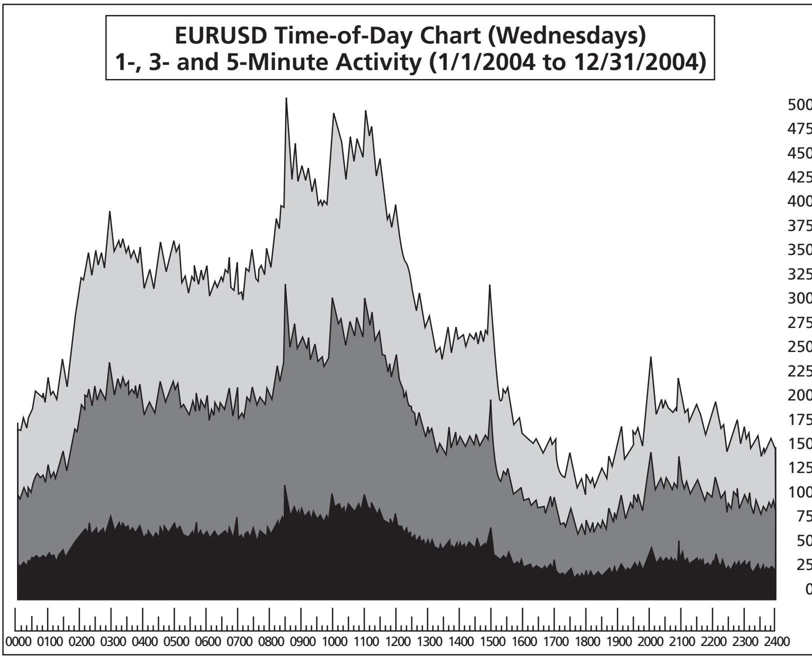

Figure 9-1 Time-of-day activity chart.

DAY OF WEEK

The preceding chart is excellent for examining activity over a single 24-hour period. For the purpose of scrutinizing activity over an entire week, I created the day-of-week chart, which is simply the concatenation of six time-of-day charts (see Figure 9-2).

Because of the increased time frame, I also increased the time interval (i.e., from 1 minute to 1 hour). Because New York City is conventionally deemed the global center for currency trading, the bottom time scale of all time-of-day and day-of-week charts is expressed in terms of Eastern U.S. Time (ET) or Greenwich Mean Time (GMT) minus 5 hours.

Several time-of-day and day-of-week charts for the most frequently traded currency pairs appear in the appendices. These charts have been updated to mirror the prevailing market characteristics and are intended as a computer-side reference guide while traders are working in their online currency platforms.

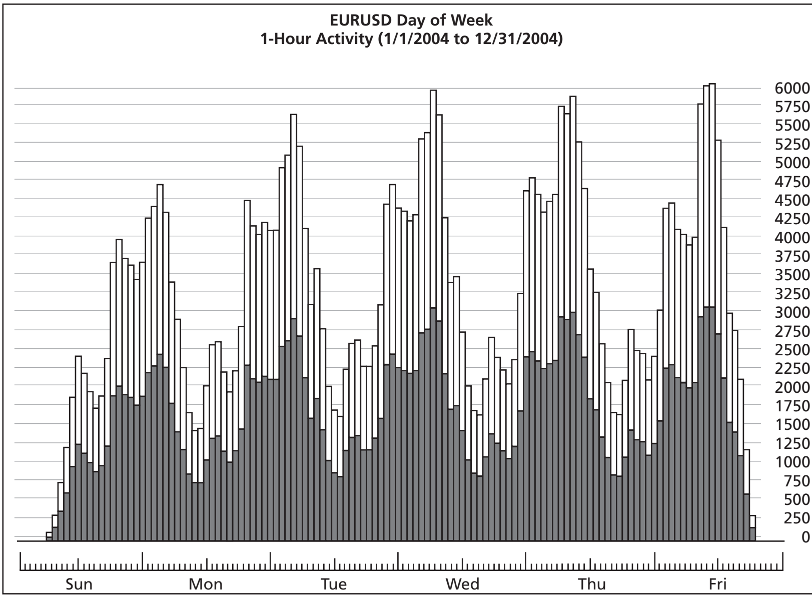

Figure 9-2 Day-of-Week activity chart.

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Chapter 10
Range

ABSOLUTE RANGE

Traditionally, *range* has been defined as the difference between the highest high and the lowest low in a time series over a selected period of time:

$$\text{Range}_x = \text{highest high}_x - \text{lowest low}_x$$

where x defines an interval in the time series array.

The study of range always has provided technical analysts with vital information on the volatility and trending properties of a time series. In fact, without adequate range, speculation in any market becomes rather futile.

Graphically, there is nothing very exotic about a range bar chart. It is simply a vertical bar chart of the OHLC quotes at the top of the chart, whereas range is also represented as vertical columns at the bottom of the chart (see Figure 10-1).

Three different range intervals are displayed on this chart: 5-minute, 30-minute, and 60-minute. The vertical scale in the lower-right portion is expressed in terms of pips in the quote (rightmost) currency of the underlying currency pair. Close examination of the vertical bars will reveal the timing of trending cycles and lateral congestion in the corresponding OHLC chart.

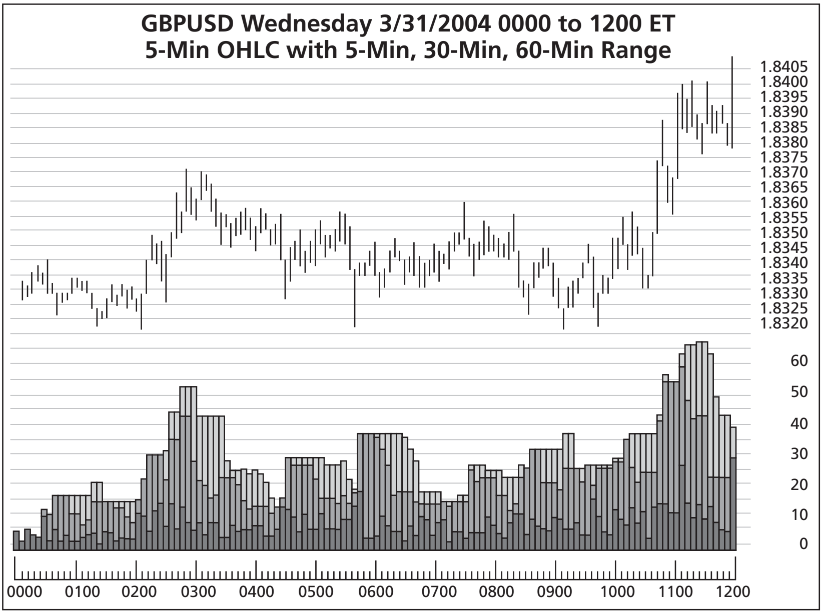

Figure 10-1 OHLC with range bar chart.

RELATIVE RANGE

Relative range is defined as 100 times the quotient of the absolute range divided by the midrange (the mean of the high and low):

$$\text{Relative range}_x = 100(\text{high}_x - \text{low}_x)/[(\text{high}_x + \text{low}_x)/2]$$

When examining the properties of a single currency pair, the trader should use absolute range. When comparing two or more currency pairs at the same time, the trader should use relative range. Absolute range is measured in pips of the quote (second) currency in the currency pair, which may vary radically according to the underlying parity rate (e.g., 210 HUF = 1 USD). On the other hand, relative range is a ratio in which the effects of exaggerated parity rates are automatically filtered out.

Tables 10-1 and 10-2 illustrate how relative range is a better yardstick for comparing currency pairs than absolute range.

TABLE 10-1 Relative Range, January 1, 2004 to March 31, 2004

Rank	Pair	High	Low	Absolute Range	Relative Range
1	USDZAR	7.3603	6.2800	1.0803	15.8398
2	NZDUSD	0.7067	0.6337	0.0730	10.8923
3	AUDUSD	0.7976	0.7253	0.0723	9.4950
4	GBPJPY	207.1300	190.3600	16.7700	8.4379
5	EURJPY	138.7400	127.5400	11.2000	8.4122
6	AUDJPY	85.1900	78.4800	6.7100	8.1994
7	USDSEK	7.6599	7.0833	0.5766	7.8219
8	GBPCHF	2.3865	2.2102	0.1763	7.6707
9	USDNOK	7.1433	6.6306	0.5127	7.4445
10	USDJPY	112.1400	104.3700	7.7700	7.1775
11	USDCZK	27.2030	25.3310	1.8720	7.1268
12	CHFJPY	87.9200	81.9300	5.9900	7.0533
13	GBPUSD	1.9085	1.7803	0.1282	6.9508
14	USDCHF	1.2998	1.2200	0.0798	6.3338
15	EURGBP	0.7060	0.6631	0.0429	6.2669
16	USDDKK	6.1622	5.7893	0.3729	6.2402
17	EURUSD	1.2858	1.2081	0.0777	6.2312
18	USDCAD	1.3477	1.2699	0.0778	5.9444
19	USDHUF	214.5400	202.3100	12.2300	5.8678
20	USDSGD	1.7163	1.6704	0.0459	2.7106
21	EURCHF	1.5833	1.5478	0.0355	2.2676

TABLE 10-2 Relative Range, April 1, 2004 to June 30, 2004

Rank	Pair	High	Low	Absolute Range	Relative Range
1	USDZAR	7.0599	6.1388	0.9211	13.9574
2	AUDUSD	0.7671	0.6809	0.0862	11.9061
3	NZDUSD	0.6671	0.5952	0.0719	11.3919
4	CHFJPY	89.7300	80.7300	9.0000	10.5597
5	USDJPY	114.7300	104.0700	10.6600	9.7441
6	AUDJPY	81.2800	74.5100	6.7700	8.6912
7	USDCZK	27.6590	25.3800	2.2790	8.5937
8	EURJPY	137.0400	126.2700	10.7700	8.1805
9	USDHUF	217.0000	201.6400	15.3600	7.3380
10	GBPJPY	204.7500	190.6400	14.1100	7.1373
11	USDCAD	1.3979	1.3070	0.0909	6.7211
12	USDCHF	1.3206	1.2351	0.0855	6.6909
13	GBPCHF	2.3791	2.2529	0.1262	5.4491
14	GBPUSD	1.8549	1.7566	0.0983	5.4437
15	USDNOK	7.0045	6.6380	0.3665	5.3729
16	EURUSD	1.2366	1.1773	0.0593	4.9132
17	USDDKK	6.3174	6.0207	0.2967	4.8095
18	USDSEK	7.7650	7.4036	0.3614	4.7651
19	EURCHF	1.5663	1.5052	0.0611	3.9785
20	USDSGD	1.7293	1.6623	0.0670	3.9509
21	EURGBP	0.6801	0.6547	0.0254	3.8058

OBSERVATIONS

When comparing the order of the currency pairs in two quarters, traders will observe some statistical peculiarities—most notably, the descent of the Swedish krona from seventh place in the first quarter to eighteenth place in the second quarter. Also unexpected is the rise of the CHFJPY cross-rate from twelfth place to fourth place.

Additionally, it is rather strange that the USDZAR currency pair, which has the second least activity of all 21 currency pairs (see Table 8-1), has the highest relative range. This warrants a specialized future study.

Chapter 11
Composite Range Charts

TIME OF DAY

In a manner analogous to the one described in Chapter 8, range sampled over a long time frame can be used to create Time of Day and Day of Week charts. Simple arithmetic averaging is employed to create representative interval range values.

The Time of Day charts in Figures 11-1 and 11-2 were designed by averaging 2-, 7-, and 15-minute range statistics for the time frame January 1, 2004 through December 31, 2004 for each weekday except Saturday. The vertical scale on the right is expressed in terms of USD pips.

The exaggerated spike at 8:30 a.m. ET indicates the time of week when the most influential U.S. news announcements are released. This means that spot currency traders on the West Coast must have already consumed the appropriate quantity of coffee and powered up the trading platform by 5:15 a.m.

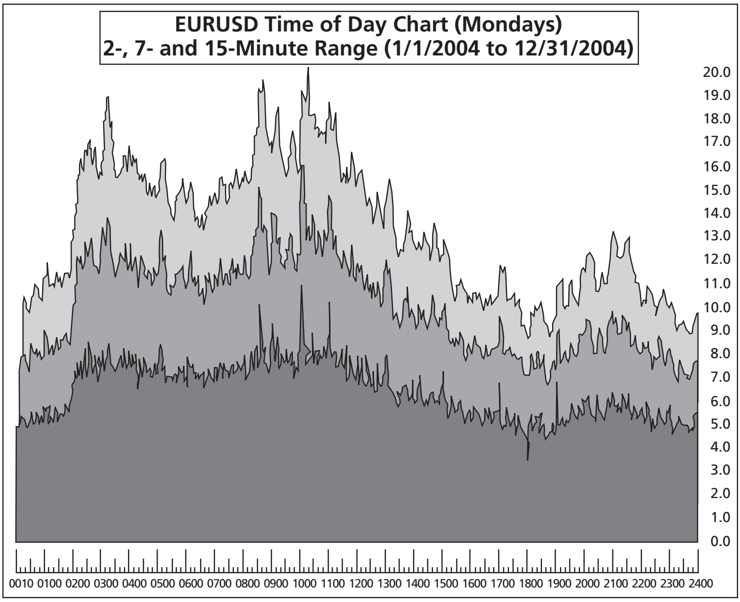

Figure 11-1 Time of Day range chart (Mondays).

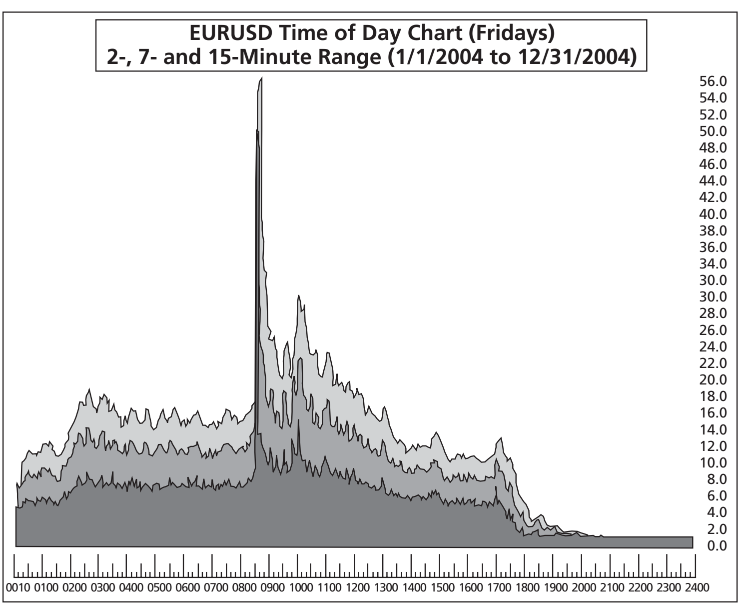

Figure 11-2 Time of Day range chart (Fridays)

DAY OF WEEK

In a similar fashion, the Time of Day range charts can be concatenated to create a Day of Week range chart. The distinguishing time interval must be increased accordingly (see Figure 11-3).

AVERAGE INTERVAL RANGE

The study in Figure 11-4 uses 1-minute high/low data from January 1, 2000 through December 31, 2003 in the EURUSD currency pair. I calculated the average range (high minus low) for each integer time interval from 1 to 60 minutes.

The average range interval chart provides traders with some interesting theoretical information. Note on the far left that the height of the first vertical bar is only 5.14 pips. This means that for *every 1-minute interval* in the horizontal scaling of the dealer's

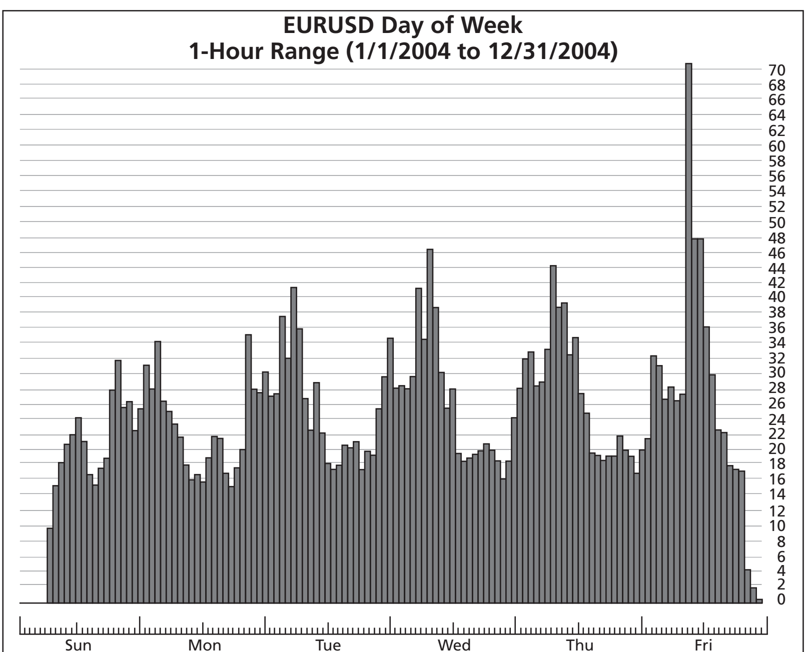

Figure 11-3 Day of Week range chart.

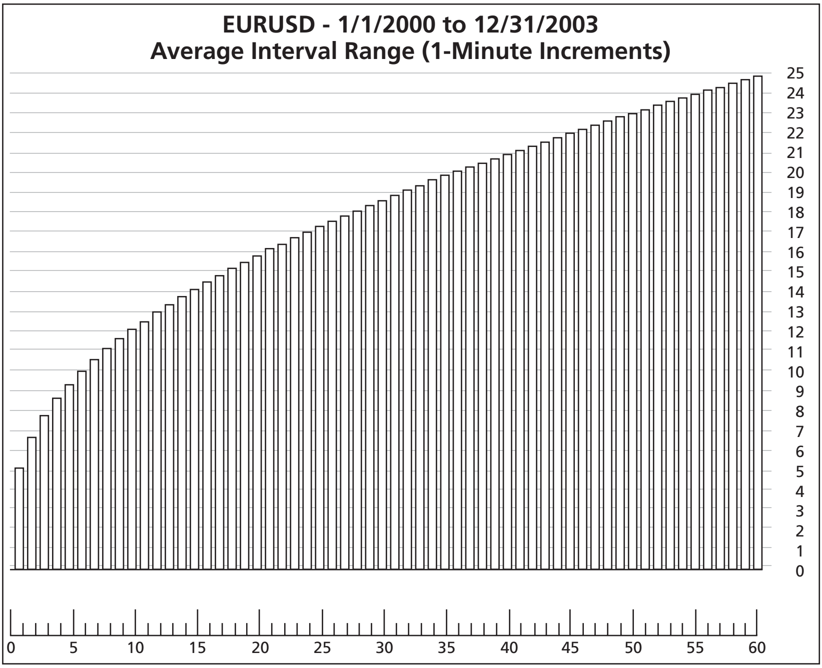

Figure 11-4 Average range interval chart.

trading platform, there is a high statistical expectancy that the price movement will span 5.14 pips.

Within every half-hour representation in the trading platform, the price movement should cover a range of 18.5 pips. Every hour in the trading window, prices should span 21.2 pips (the rightmost vertical bar). Of course, traders must compare this information with the corresponding Time of Day range chart before entering the market based solely of range indicators.

Chapter 12
Activity versus Range

FORECASTING MODEL

This chapter will examine the dominant influence that activity has on range. This is to say, I will assign activity as the independent variable and range as the resulting dependent variable in a simple linear model:

$$\text{Range} = A(\text{activity}) + B$$

where A equals the slope and B equals the intercept of the regression line.

SCATTER DIAGRAMS

Figures 12-1 through 12-4 are scatter diagrams for four different time periods, all expressed in Eastern Time. The vertical scale on the left is range expressed in pips, and the horizontal scale at the bottom is activity expressed in ticks. All diagrams cover the same date range of January 1, 2006 through March 31, 2006.

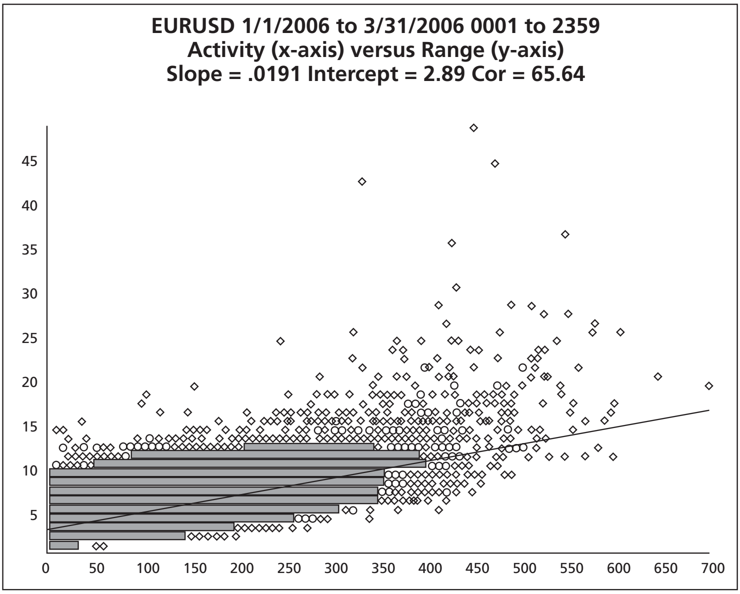

Figure 12-1 Time frame 0001 to 2359 ET.

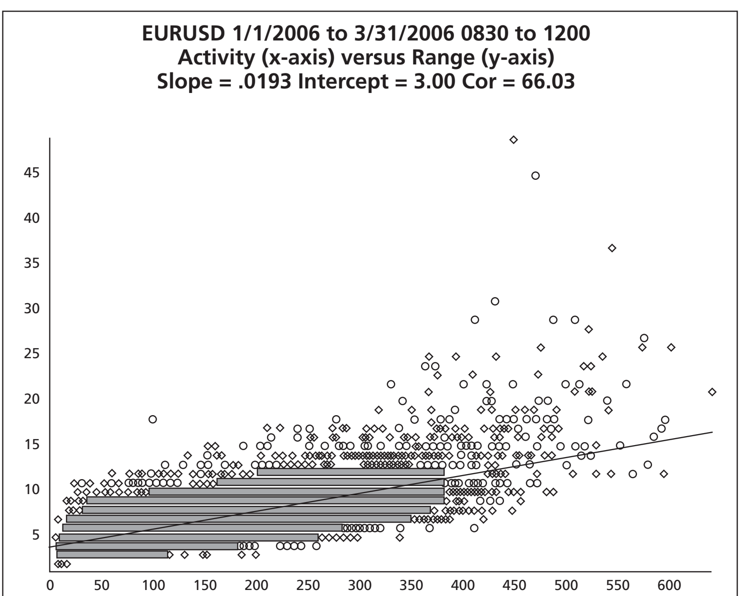

Figure 12-2 Time frame 0830 to 1200 ET.

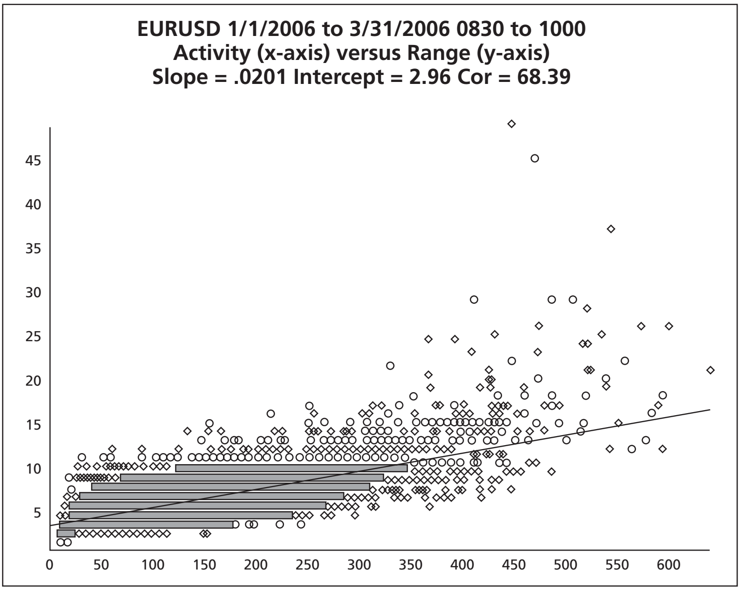

Figure 12-3 Time frame 0830 to 1000 ET.

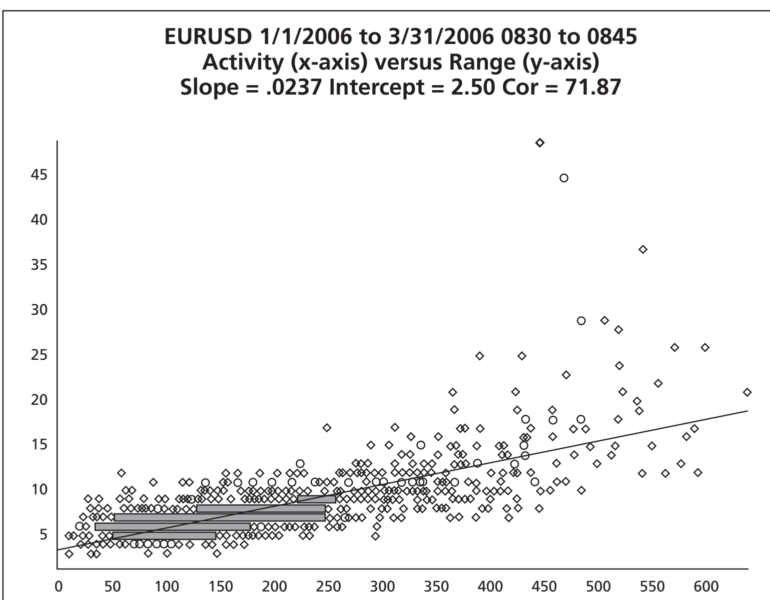

Figure 12-4 Time frame 0830 to 0845 ET.

REGRESSION RESULTS

The preceding four charts generated the data shown in Table 12-1.

As expected logically, activity shows itself to be an adequate independent variable to estimate range over the same time frame. In fact, activity may very well be the only valid estimator for range except for some possible serial correlations.

An interesting statistical point is that as the time span decreases, both the slope and the coefficient of correlation increase, albeit very gradually. This is so because the diminishing time frames eliminate more and more periods of low volatility, where range tends to approach zero.

USAGE

When traders have access to the number of ticks in the streaming data for the time frame 8:30 a.m. to 10:00 a.m., 1-minute range can be forecast with the linear model:

$$\text{Range} = 0.0201(\text{number of ticks}) + 2.96$$

Even though a range estimate does not directly assist in forecasting price direction, it still can be instrumental in determining the placement of stop-loss and take-profit limit orders. Of course, all this will occur in real time, and scalpers must be aware of the risks involved.

TABLE 12-1 Activity versus Range Correlation

Time Span	Slope	Intercept	Correlation
0001 to 2359	0.0191	2.89	65.64
0830 to 1200	0.0193	3.00	66.03
0830 to 1000	0.0201	2.96	68.39
0830 to 0845	0.0237	2.50	71.87

Chapter 13 Inertia

OVERVIEW

Before introducing the concept of economic inertia, I first must review a common technical tool called *momentum*. Traditionally, *momentum* has been defined as the difference between the current closing price and a previous closing price:

$$\text{Momentum}_x = \text{close}_x - \text{close}_{x - \text{lag}}$$

where x is the day number and lag is the number of elapsed days. I mention this because Forex inertia has a very direct relationship with momentum that is explained below.

RAW CURRENCY DATA

Historical data for spot currency pairs can be obtained from a variety of data suppliers. One such purveyor is Disk Trading, Ltd. (www.disktrading.com), which currently offers data for 23 majors, minors, and cross-rates. The data can be obtained as comma-separated files (CSV) in either of two formats—streaming tick data or interval data.

Packaged tick data use the format *Date, Time, Price.* Adjacent prices in the streaming tick data necessarily will have the same time field unless trading volume has dropped sharply or a full minute has elapsed. Up to 700 ticks have been observed in a single minute. This occurred at 8:31 a.m. ET in the EURUSD currency pair on a Friday.

Interval data are simply streaming tick data that have been massaged into standard equispaced time intervals such as 1-minute, 10-minute, 30-minute, hourly, and daily. During the "intervalization" process of streaming data, the number of upticks and downticks per interval are each calculated. Thus historical interval data come packaged using the following format: *Date, Time, Open, High, Low, Close, Upticks, and Downticks* for each time interval. The uptick tally is incremented if the streaming tick price is greater than its immediate predecessor, and a new downtick is recorded if the streaming tick price is less than its predecessor.

In both tick and interval data, dates are expressed as mm/dd/yyyy, and time is represented as hhmm using the 24-hour convention with no intervening punctuation

FOREX INERTIA

When traders have access to historical streaming tick data, another statistic is available with the aid of a little arithmetic. Activity simply "counts" the number of upticks and downticks during a single time unit. Inertia, on the other hand, measures the *magnitude* of upticks and downticks. Thus I define (albeit somewhat arbitrarily) *inertia* as follows:

$$\text{Inertia}_x = \text{sum(positive differentials}_x) + \text{sum (negative differentials}_x)$$

Note that the absolute values of the sum of the negative differentials are used. Assume that we have the sample streaming tick data shown in Table 13-1.

These raw tick data can be coerced to reveal additional intrainterval information as shown in Table 13-2.

TABLE 13-1 Raw Currency Tick Data

Date	Time	Price
10/11/2005	1009	12344
10/11/2005	1010	12346
10/11/2005	1010	12348
10/11/2005	1010	12343
10/11/2005	1011	12349
10/11/2005	1011	12352
10/11/2005	1011	12350
10/11/2005	1011	12355
10/11/2005	1011	12356
10/11/2005	1012	12360
10/11/2005	1012	12359
10/11/2005	1012	12365
10/11/2005	1012	12358
10/11/2005	1012	12354

TABLE 13-2 Intrainterval Data

Time	Price	Up-ticks	Down-ticks	Activity	Direction	Up Inertia	Down Inertia	Inertia	Momentum
1009	12344	0	0	0	0	0	0	0	0
1010	12346								
1010	12348								
1010	12343	2	1	3	1	4	5	9	−1
1011	12349								
1011	12352								
1011	12350								
1011	12355								
1011	12356	4	1	5	3	15	2	17	+13
1012	12360								
1012	12359								
1012	12365								
1012	12358								
1012	12354	2	3	5	−1	10	12	22	−2

The sum of the up inertia and the down inertia provides the trader with another volatility indicator that, for all intents and purposes, is even more informative than the activity indicator because the magnitude of each price fluctuation is included.

It also should be noted that the difference between up inertia and down inertia is equivalent to the momentum of that time interval.

INERTIA CHARTS

The difference between an activity chart and an inertia chart of the same data is displayed in Figures 13-1 and 13-2.

A second example of the difference between activity and inertia is shown in Figures 13-3 and 13-4.

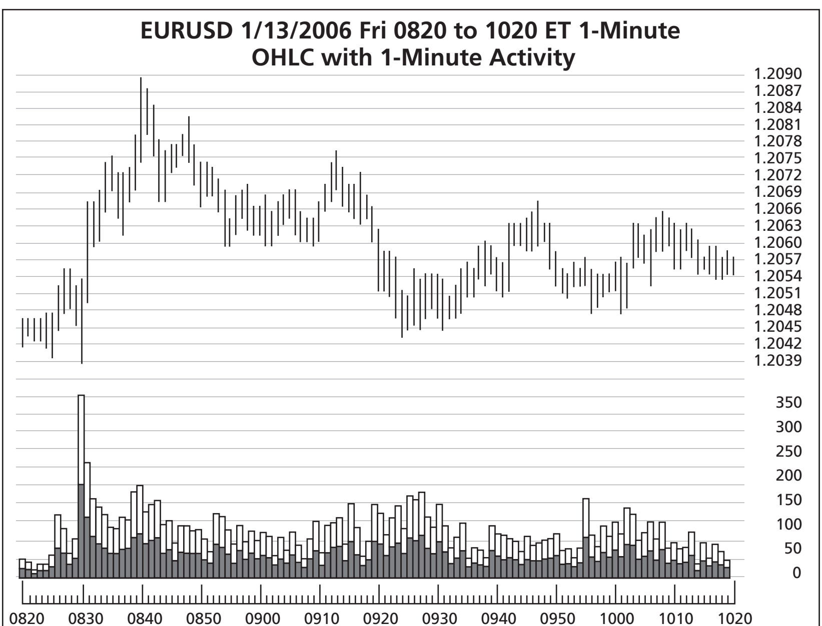

Figure 13-1 OHLC bar chart with activity oscillator.

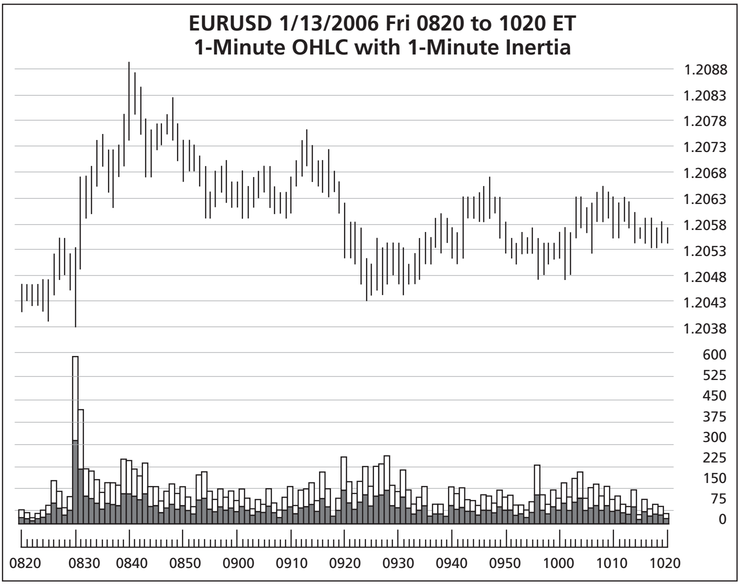

Figure 13-2 OHLC bar chart with inertia oscillator.

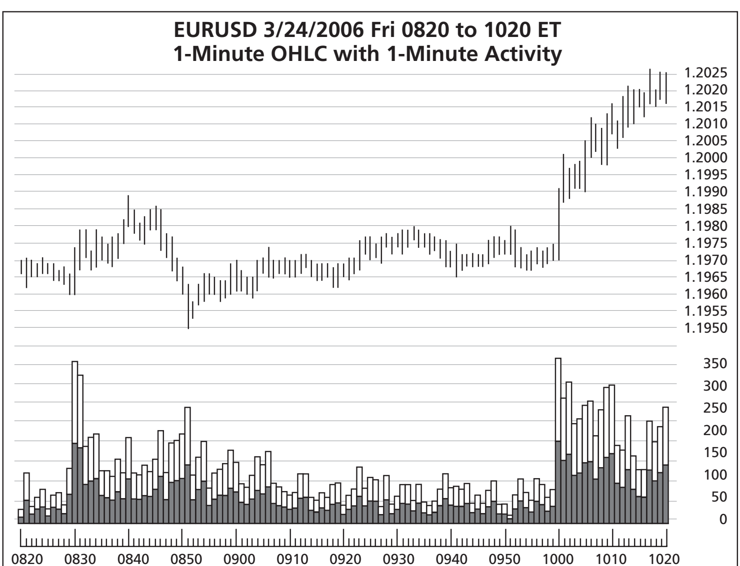

Figure 13-3 Second example (activity).

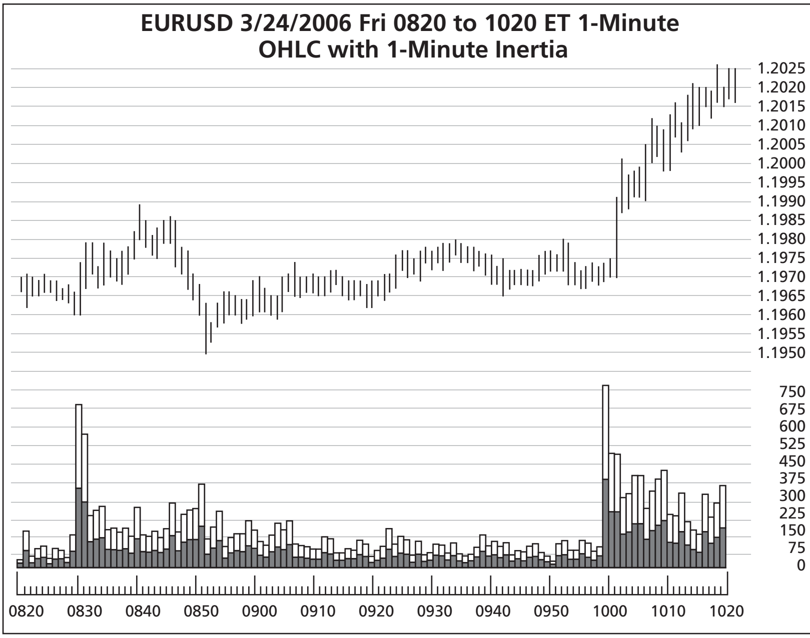

Figure 13-4 Second example (inertia).

OBSERVATIONS

The visible property that we can observe in the preceding examples is that the inertia oscillator produces higher highs and lower lows than the corresponding activity oscillator.

To illustrate the greater "accuracy" of inertia over activity, we should examine the following anomaly: Assume that during the span of 1 minute there are six upticks each with a magnitude of 1 pip. There is also one downtick during the same interval, and it has a magnitude of –12 pips. Therefore, activity is recorded as 7 ticks total, whereas combined inertia has a value of +18.

MOMENTUM VERSUS INERTIA

Combined inertia (the sum of up inertia and down inertia) can be defined more accurately as the sum of the absolute values of the intrainterval tick differentials. In this instance, a *differential* is the difference between the current tick price and the immediately preceding tick price.

As mentioned earlier, the difference between the up inertia sum and the down inertia sum renders the momentum for that interval in question. This gives rise to another very plausible oscillator—momentum divided by inertia. This statistic may be indicative of certain properties that occur at the order-flow level and is currently in the testing phase.

Lastly, I am aware that within the realm of the physical sciences the formal definition of *inertia* is the property of matter by which it remains at rest or in uniform motion in the same straight line unless acted on by some external force. I arbitrarily selected this inertia moniker to distinguish it from momentum as it refers to time-series analysis and yet show its close affiliation to time-series momentum.

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PART 4
Forex Wave Theory

Chapter 14 Review of Wave Principles

OVERVIEW

In the preceding chapters I have reviewed numerous fundamental and technical influences that cause spot currency prices to fluctuate. I also have devised several innovative technical tools that can be employed expeditiously in the endeavor of deciphering the inner workings of the exchange-rate phenomenon.

In the book *Forex Wave Theory* (New York: McGraw-Hill, 2006), I introduced several innovative ideas for forecasting time-series prices that differ dramatically from the prevailing classical theory, Elliott's wave principle. These new concepts are essentially based on an alternative method for identifying, categorizing, and labeling the various wave patterns generated from standard and modified swing reversal algorithms. Statistical and mathematical methods then are applied to uncover the identity and calculate the magnitude of subsequent wave patterns.

One central theme of Ralph N. Elliott's cycle is the wave composition of an impulse cycle and the wave composition of the subsequent corrective cycle. Both are examined below. Elements of Forex wave theory that are applicable to the study of economic shockwaves are reviewed immediately after the section on Elliott's ideas.

REVERSAL CHARTS

The primary purpose of reversal charts is to filter out minor fluctuations in the raw data commonly referred to as *white noise.* In turn, this process accentuates the local extremes, maxima and minima. Probably the most commonly employed reversal chart is the point and figure chart, which dates back to the late nineteenth century. Price movements are represented as columns of X's (uptrends) and O's (downtrends) as shown in Figure 14-1.

The point and figure (P&F) chart is somewhat unique within the realm of occidental charting systems in that it distorts the time element along the *x* axis. That is, a new column is not appended to the right of the current column until a minimum reversal amount in the opposite price direction has been satisfied.

On the other hand, a swing reversal chart represents the same reversal data as a series of interconnected diagonal straight lines

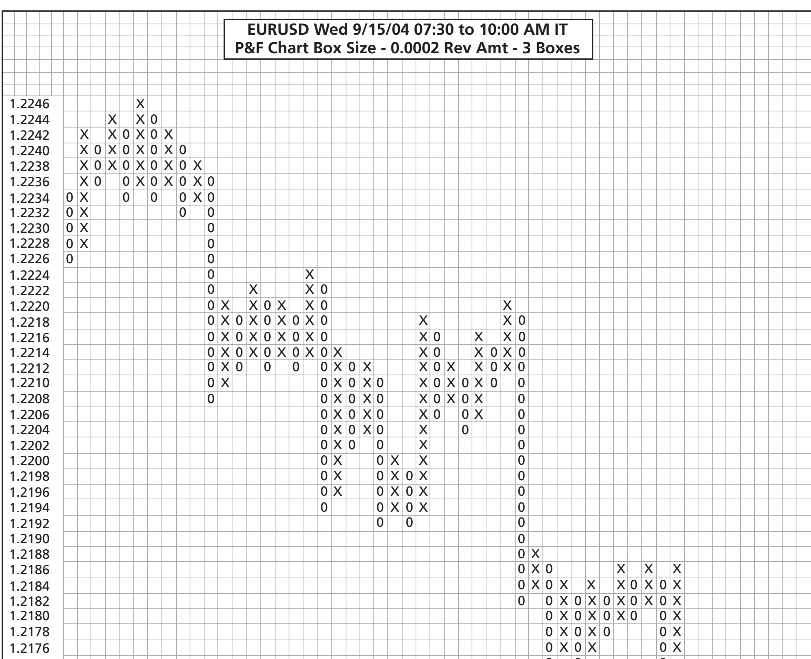

Figure 14-1 Point and figure chart.

that can be fitted to overlay the original OHLC data precisely, as in Figure 14-2.

Both camps (the X's and O's enthusiasts and the straight-line aficionados) have their die-hard proponents. For the purpose of Forex wave theory and shockwave analysis, I side heartily with the straight-liners. Retaining a proper perspective on the *x* axis will prove beneficial later and will provide additional information pertinent to calculating precise shockwave durations along the *x* axis.

ELLIOTT WAVES

The most widely accepted of all wave forecasting methods is undoubtedly R. N. Elliott's wave principle, which he developed during the late 1930s. A Google Internet search on "Elliott waves" produces over 2 million matches.

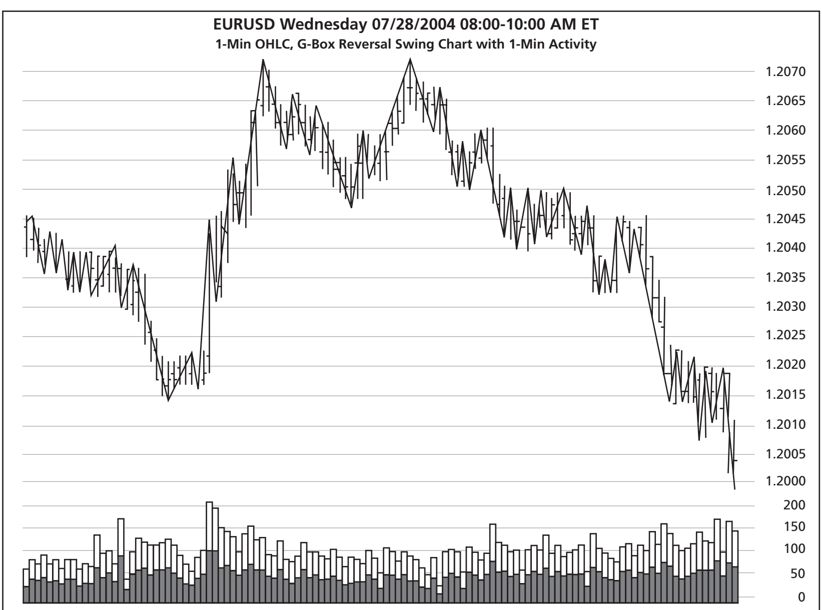

Figure 14-2 Swing reversal chart.

RECURRING WAVE PATTERNS

Elliott believed that one business cycle consisted of a five-wave impulse component (Figure 14-3) and a three-wave corrective component (Figure 14-4).

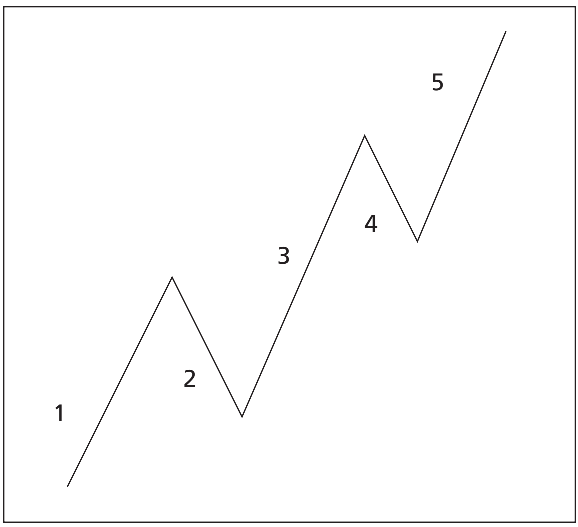

Figure 14-3 Elliott impulse pattern.

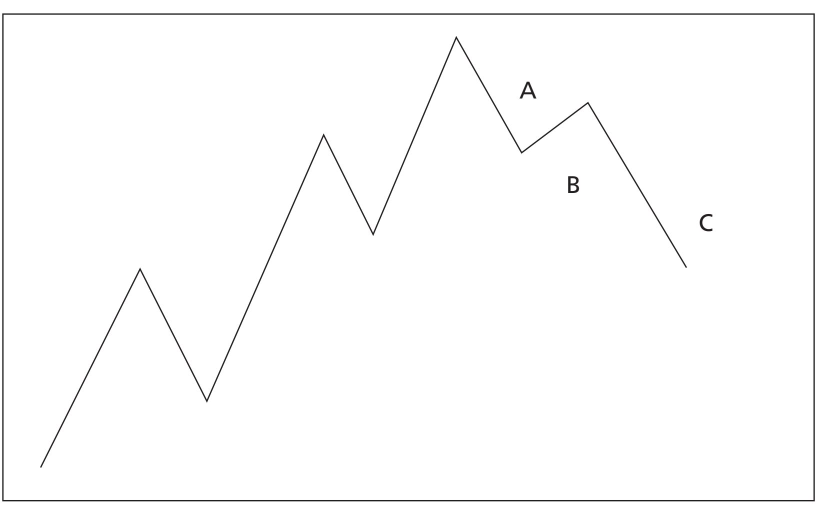

Figure 14-4 Elliott corrective pattern.

This pattern always satisfies the logical condition

$$\text{Wave } 1 > \text{wave } 2 < \text{wave } 3 > \text{wave } 4 < \text{wave } 5$$

A corrective pattern consists of three waves that represents a countertrend in the opposite direction to its preceding impulse pattern. The corrective pattern must obey the following constraint:

$$\text{Wave A} > \text{wave B} < \text{wave C}$$

Elliott identified several other wave patterns (such as zigzags, triangles, flats, and so on), but the impulse and corrective patterns are the most important when analyzing trends.

WAVES WITHIN WAVES

Elliott proposed that economic waves exist at many levels, meaning that there could be waves within waves. Figure 14-5 shows how primary waves could be broken down into smaller component waves.

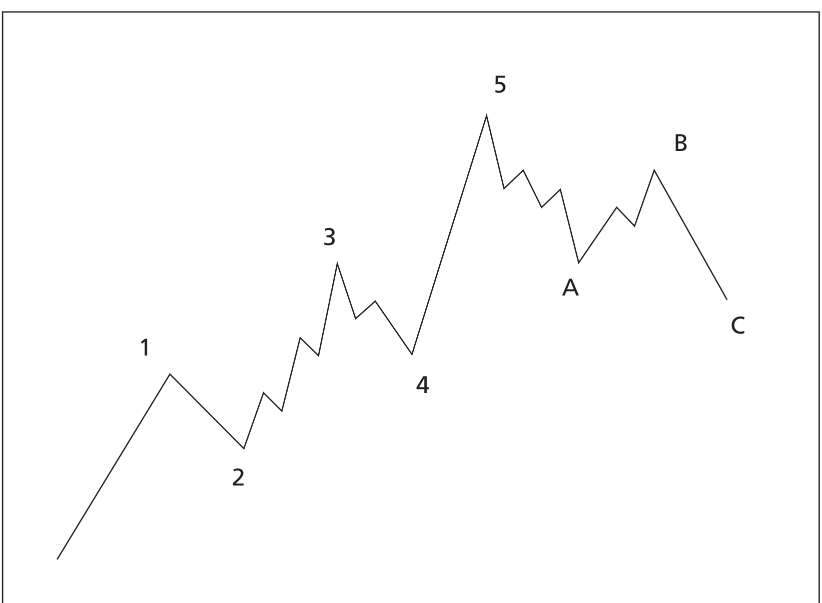

Figure 14-5 Waves within waves.

This figure displays four of the eight waves as their component waves:

Wave 3 consists of a five-wave bull impulse cycle.

Wave 4 consists of a three-wave corrective cycle.

Wave A consists of a five-wave bear impulse cycle.

Wave B consists of a three-wave corrective cycle.

Elliott assigned the nomenclature shown in Table 14-1 to cycles in order of descending size.

The concept of waves within other waves dates back to Charles Dow and probably earlier. However, Dow believed that there were only three levels of wave composition. The scientific name for this phenomenon is *fractal geometry*. The points of interest are the intersections between cycles of different fractal levels.

RULES AND GUIDELINES

There are over 273 major rules and guidelines in the Elliott wave principle. Elliott rules must be obeyed in detail for a pattern to qualify as an Elliott wave or cycle. The guidelines do not have to be obeyed precisely. The more guidelines obeyed by an Elliott pattern, the higher is its probability of being correct.

TABLE 14-1 Elliott Cycle Names

Rank	Cycle Name
1	Grand supercycle
2	Supercycle
3	Cycle
4	Primary
5	Intermediate
6	Minor
7	Minute
8	Minuette
9	Subminuette

A very brief summary of the rules governing a bull impulse cycle is as follows:

- No part of wave 2 can be more than retrace wave 1.
- Wave 2 must retrace wave 1 by a minimum of 20 percent.
- The maximum time for wave 2 is nine times wave 1.
- Wave 3 must be longer than wave 2 in gross distance by price.
- Wave 3 and wave 1 cannot both have wave 5 failures.
- Wave 3 cannot be less than a third of wave 1 by price.
- Wave 3 cannot be more than seven times wave 1 by price.
- The absolute maximum time limit for wave 3 is seven times wave 1.

A comprehensive list of the major rules and guidelines for the Elliott wave principle can be found at www.geocities.com/WallStreet/Exchange/9807/Charts/SP500-Articles/EWRules.htm#imprule.

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Chapter 15 Cycle Preliminaries

DEFINITIONS

In this study, I prefer to use the original terms of author/theoretician R. N. Elliott to avoid any unnecessary confusion with terms used by other swing analysts.

A *wave* is a single straight line in the swing chart. Waves are always diagonal lines with positive or negative slope, never perfectly horizontal or vertical.

A *peak* is the point of intersection between an upward wave on the left and a downward wave on the right. This represents a local maximum in the raw data (see Figure 15-1).

A *valley* (or *trough*) is the point of intersection between a downward wave on the left and an upward wave on the right. This represents a local minimum in the raw data.

A *cycle* is a series of adjacent interconnected waves depicting specific price formations.

To convert a sequence of raw tick data or OHLC interval data to its corresponding swing data, a swing reversal algorithm is employed in which two user-supplied variables must be initialized—the *minimum fluctuation unit* and the *minimum reversal amount*.

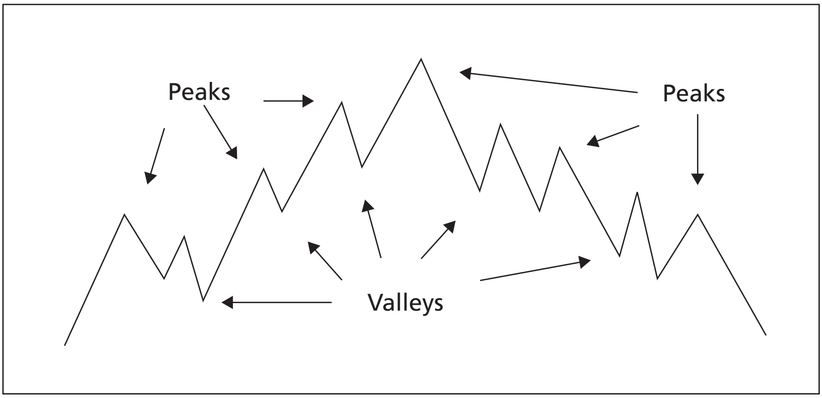

Figure 15-1 Peaks and valleys.

MINIMUM FLUCTUATION UNIT

Traditionally, the minimum price unit is the smallest fractional price increment that the quote currency (or underlying security) can change. This is equivalent to the box size used in P&F charting. In the currency markets, this increment is a single pip. For example, if the EURUSD currency pair is currently trading at 1.2451, a single pip is 0.0001 USD.

There are three cases where a minimum fluctuation unit greater than 1 pip might be used. The first is when the parity rate between two currencies is very wide and causes a very large bid/ask spread. For example, if the bid/ask spread (transaction cost) for the EURCZK currency pair is 350 koruny, then a 1-pip box size will have very negligible filtering power.

A second reason for using a box size greater than 1 pip occurs when performing historical analysis and a longer time frame is being analyzed. In this case, the analyst probably will be scrutinizing major reversals and may have little interest in minor reversals. This pertains more to long-term position traders rather than to session or day traders.

Lastly, a larger box size may be used to align peaks and valleys with the grid lines of a chart. This is purely a display preference, though.

MINIMUM REVERSAL AMOUNT

The reversal amount is the number of minimum fluctuation units necessary to plot a reversal in price direction. For instance, if the current trend is upward and the reversal amount is set at three units, then a decline of three fluctuation units must be reached before the downward movement is plotted. If, instead, a new price continues in the same direction as the existing trend, then single boxes are added automatically to the last extreme (either a peak or a valley).

It is this mutual interaction between the minimum fluctuation unit and the reversal amount that triggers the reversal mechanism in the swing algorithm necessary to plot peaks and valleys while ignoring lateral price movements.

There is one final case for increasing the minimum fluctuation unit not mentioned earlier. If an analyst, for whatever reasons, has become very partial to one specific reversal amount, it is possible to increase the minimum fluctuation unit instead of the reversal amount when market conditions change.

For example, a three-unit reversal amount is favored by most traders. If traders wish to filter out some of the minor swings, they can increase either the reversal amount or the minimum fluctuation unit. However, keep in mind that though a 2-pip unit size with a three-unit reversal amount algorithm will generate results very similar to a 1-pip unit size with a six-unit reversal amount algorithm, they will not be identical. This requires some reflection. The reason is that when you plot a continuation of an existing trend, you can plot smaller distances.

SWING REVERSAL ALGORITHM

The primary purpose of the swing reversal algorithm is to filter out white noise. Given the preceding information and user-supplied variables, I now will define the swing reversal algorithm as follows (this algorithm assumes that we are using daily OHLC quotes as the input data rather than simply the closing prices):

Step 1: Initialize BoxSize and ReversalAmount variables.

Step 2: Create a new variable called Direction.

Step 3: Create two array variables called Price and Time to hold the swing data.

Step 4: Set Price(1) 5 Close(1) and Time(1) 5 1.

Step 5: If High(2) – Price(1) . BoxSize * ReversalAmount, then

  Set Price(2) 5 High(2).

  Set Time(2) 5 2.

  Set Direction 5 UP.

ElseIf Price(1) – Low(2) . BoxSize * ReversalAmount, then

  Set Price(2) 5 Low(2).

  Set Time(2) 5 2.

  Set Direction 5 DOWN

Else

  Increment day number and repeat step 5.

End If

Step 6: Increment DayNo.

If DayNo 5 Number of OHLC quotes, then

  Go to step 9.

If Direction 5 DOWN, then

  Go to step 8

End If

Step 7: If High(DayNo) – Price(Idx) . BoxSize, then

  Set Price(Idx) 5 High(DayNo).

  Set Time(Idx) 5 DayNo.

ElseIf Price(Idx) – Low(DayNo) . BoxSize * ReversalAmount, then

  Increment Swing Idx.

  Set Price(Idx) 5 Low(DayNo).

  Set Time(Idx) 5 DayNo.

  Set Direction 5 DOWN.

```
End If
Go to step 6
Step 8: If High(DayNo) – Price(Idx) . BoxSize * ReversalAmount,
then
  Increment Swing Idx.
  Set Price(Idx) 5 High(DayNo).
  Set Time(Idx) 5 DayNo.
Set Direction 5 UP.
  ElseIf Price(Idx) – Low(DayNo) . BoxSize, then
  Set Price(Idx) 5 Low(DayNo).
  Set Time(Idx) 5 DayNo.
End If
Go to step 6
Step 9: Set Number of Swings 5 Swing Idx.
Exit
```

At this point, the two swing arrays *Price()* and *Time()* have been populated with corresponding pairs of swing data.

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Chapter 16
Basic Three-Wave Cycles

OVERVIEW

The criterion for identifying a basic three-wave cycle formation is the relationship between the heights of the individual waves using the three comparison operators

$>$	greater than
$=$	equal to
$<$	less than

These operators define nine unique bull cycles and nine unique bear cycles. If the first wave in any cycle is upward, then the entire cycle is referred to as a *bull cycle*. If the first wave in any cycle is downward, then the entire cycle is called a *bear cycle*. Each three-wave cycle is identified by a one-letter label (ID). Bull cycles use the uppercase letters *A* through *I,* whereas bear cycles are designated by the lowercase letters *a* through *i*.

IMPULSE CYCLE (ID = A)

The single-most important three-wave cycle is called an *impulse cycle,* a term borrowed from the Elliott principle. This pattern defines a clear and consistent trend in either price direction, thus indicating an opportunity for profit. The cycle begins with a price surge followed by a retracement wave whose height is less than the height of the initial surge wave. The height of the final wave must exceed the height of the retracement wave (see Figure 16-1).

RECTANGLE (ID = B)

The second three-wave cycle occurs less frequently than the impulse cycle because the heights of all three waves must be the same. The *rectangle* formation represents a horizontal price movement, also called *lateral congestion* (see Figure 16-2).

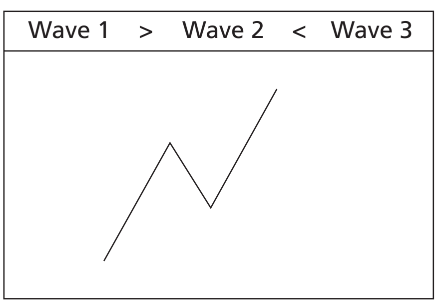

Figure 16-1 Impulse cycle.

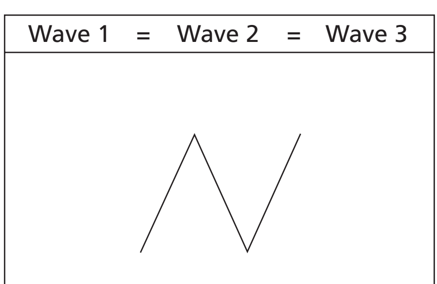

Figure 16-2 Rectangle.

CONTRACTING DESCENDING TRIANGLE (ID = C)

This cycle is identified as two waves of the same height followed by one wave whose height is less than either of its two predecessor waves (see Figure 16-3).

CONTRACTING ASCENDING TRIANGLE (ID = D)

This cycle is identified as a price surge wave followed by two waves whose heights are equal to and less than the height of the initial wave (see Figure 16-4).

CONTRACTING SYMMETRICAL TRIANGLE (ID = E)

This cycle is identified as an initial price surge wave followed by two waves whose heights are less than the immediate predecessor wave. This cycle is very important because a reversal in trend has

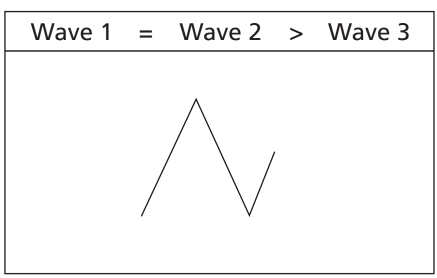

Figure 16-3 Contracting descending triangle.

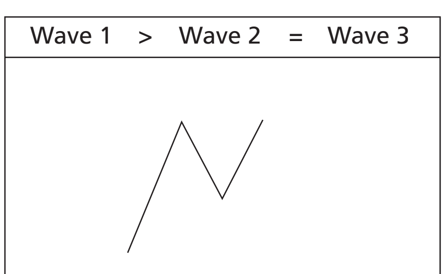

Figure 16-4 Contracting ascending triangle.

not occurred at the end point of wave 1 (also the starting point of wave 2) triggering a downward trend (see Figure 16-5).

EXPANDING ASCENDING TRIANGLE (ID = F)

This cycle is identified as two waves whose heights are equal followed by a final wave whose height is greater than either of its predecessor waves (see Figure 16-6).

EXPANDING DESCENDING TRIANGLE (ID = G)

This cycle is identified as an initial wave whose successor waves are both greater than the initial wave but equal to each other (see Figure 16-7).

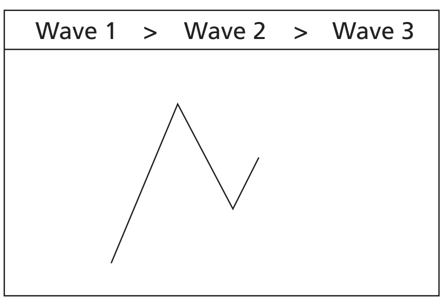

Figure 16-5 Contracting symmetrical triangle.

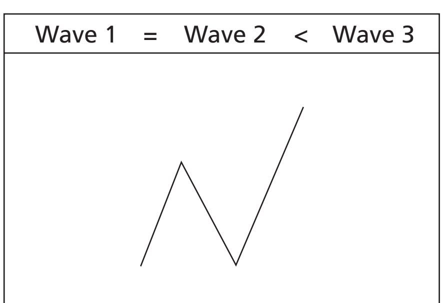

Figure 16-6 Expanding ascending triangle.

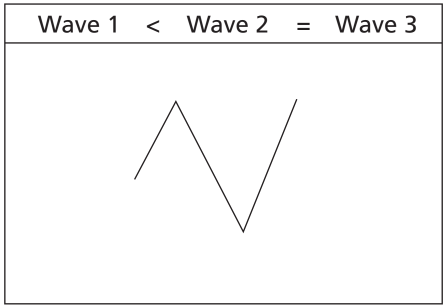

Figure 16-7 Expanding descending triangle.

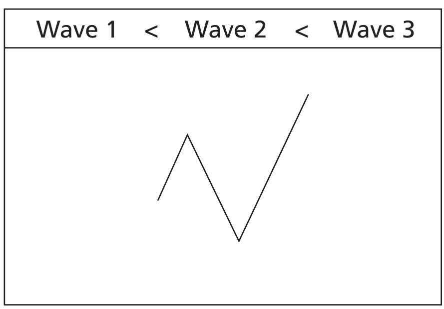

Figure 16-8 Expanding symmetrical triangle.

EXPANDING SYMMETRICAL TRIANGLE (ID = H)

This cycle is identified as an initial price surge wave followed by two waves whose heights are greater than the immediate predecessor wave. This cycle is important because it may signal that a bear trend is ending and a bull trend is beginning at the end point of the second wave (see Figure 16-8).

CONNECTOR (ID = I)

This cycle is so named because it links two impulse cycles together to create an even longer trend cycle. The height of the middle wave is always greater than the heights of either two adjacent waves (see Figure 16-9).

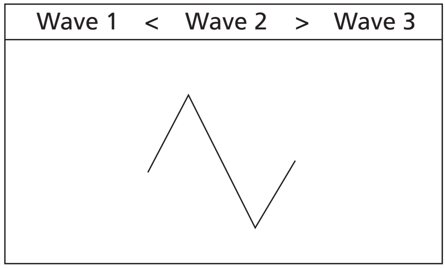

Figure 16-9 Connector.

BEAR CYCLE CONVERSION

Each three-wave bull cycle can be converted to an equivalent bear cycle simply by rotating the cycle 180 degrees along its *x* axis (or in nontechnical parlance, *flipping* the cycle vertically). The height comparison constraints remain the same, but the first wave now points downward. Four of the triangle designations become reversed (see Table 16-1).

FREQUENCIES

In the Table 16-2 the frequencies of the three-wave cycles are expressed as percentages for several minimum reversal amounts. Bull cycles and their complementary bear cycles have been added together to enhance statistical stability.

Several interesting cycle properties are exhibited in this table. As the minimum reversal amount for the swing algorithm increases, two seemingly paradoxical phenomena occur:

1. The frequencies of the impulse cycles, both symmetrical triangles, and the connector cycles also increase.
2. The frequencies for the rectangles, both ascending triangles, and both descending triangles decrease.

The reason for this is quite simple: The cycles that decrease in frequency all have equality relationships between the heights of

TABLE 16-1 Bear Cycle Conversions

No.	Bull Name	ID	Bear Name	ID
1	Impulse	A	Impulse	a
2	Rectangle	B	Rectangle	b
3	Contracting Descending Triangle	C	*Contracting Ascending Triangle*	c
4	Contracting Ascending Triangle	D	*Contracting Descending Triangle*	d
5	Contracting Symmetrical Triangle	E	Contracting Symmetrical Triangle	e
6	Expanding Ascending Triangle	F	*Expanding Descending Triangle*	f
7	Expanding Descending Triangle	G	*Expanding Ascending Triangle*	g
8	Expanding Symmetrical Triangle	H	Expanding Symmetrical Triangle	h
9	Connector	I	Connector	i

TABLE 16-2 Three-Wave Cycle Frequencies

ID	Cycle Name	5-Pip	10-Pip	15-Pip	20-Pip	25-Pip	30-Pip	35-Pip
A	Impulse	13.3	22.9	29.5	30.9	31.8	32.5	33.7
B	Rectangle	12.8	3.7	0.6	0.2	0.0	0.1	0.0
C	Con Desc Triangle	7.6	4.2	1.7	0.8	0.5	0.4	0.3
D	Con Asc Triangle	13.1	8.6	3.5	2.2	1.0	0.7	0.7
E	Con Sym Triangle	6.9	11.3	14.5	15.4	15.7	16.1	13.5
F	Exp Asc Triangle	13.0	8.3	3.6	2.4	1.2	0.7	0.8
G	Exp Desc Triangle	7.5	3.9	1.8	1.1	0.6	0.4	0.4
H	Exp Sym Triangle	6.9	9.7	13.6	14.7	16.9	16.2	16.6
I	Connector	18.9	27.3	31.6	32.2	32.3	32.9	34.0

two or more waves in those cycles. Naturally, as the heights of two adjacent waves increase, there is less likelihood that they will be the same magnitude because the *y*-axis resolution is growing more and more gradated. Mathematically, this is analogous to the outcome of throwing different numbers of dice. Tossing two dice at one time renders 36 possibilities. Throwing four dice at the same time generates 1,296 possibilities (thus greater gradation).

One more curiosity can be observed in this table. In all the different minimum reversal amounts, the connector cycle always ranked at the top of the list in frequency count, even surpassing the impulse cycle, which I originally expected to head the list. This fact will be useful in later studies.

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Chapter 17
Forecasting the Third Wave

OVERVIEW

Financial market forecasts come in many different packages. When dealing with econometric models (such as Box-Jenkins plots, Fourier transforms, trigonometric regressions, and so on), the estimate invariably will be a discrete numeric value or a series of such values. When employing crossover trading systems, the forecast is almost always given as a market action such as initiate a new long trade, enter market short, or liquidate any open position. Within the confines of Forex wave theory, the forecast is represented as a *likelihood relationship*.

FORECASTING WAVE RELATIONSHIPS

Table 16-1 not only exhibits the frequency data for three-wave cycles but also provides sufficient information to forecast the logical length of the third wave when only the first two waves are known. By *logical length,* I mean the result of the comparative ratio length using the logical operators >, =, and <.

PRACTICAL EXAMPLE

For example, assume that the final two waves in the swing data form the pattern shown in Figure 17-1.

We automatically know that there are three possible continuations once the next wave is known: an impulse cycle, a contracting ascending triangle, and a contracting symmetrical triangle (see Figure 17-2).

From Table 16-1, we obtain and list in Table 17-1 the percentages for a 35-pip reversal amount for the possible continuations.

The next step is to sum the percentages in Table 17-1 and divide that sum into each value (see Table 17-2):

$$33.7 + 0.7 + 13.5 = 48.9$$

Given the two-wave pattern in Figure 17-1, this means that when we use a 35-pip swing reversal amount, there is a 69 percent likelihood that the next wave in the swing data will surpass the top of wave 1 and become a "full" three-wave impulse cycle.

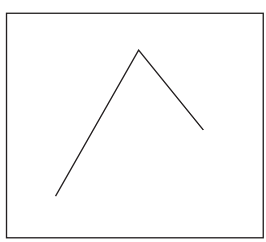

Figure 17-1 Two-wave pattern (wave 1 > wave 2).

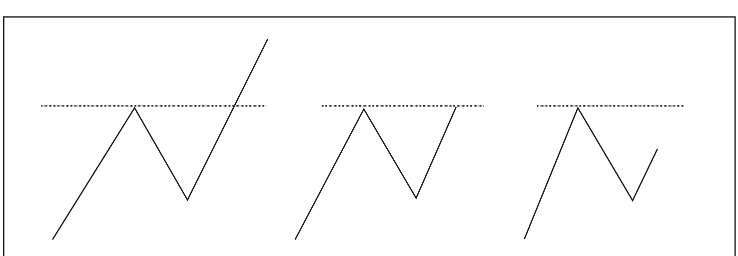

Figure 17-2 Possible third-wave continuations.

TABLE 17-1 Raw Forecast Percentages

Cycle Name	Percent
Impulse	33.7
Contracting ascending triangle	0.7
Contracting symmetrical triangle	13.5

TABLE 17-2 Adjusted Forecast Percentages

Cycle Name	Percent
Impulse	69.0
Contracting ascending triangle	1.4
Contracting symmetrical triangle	27.6

CAVEAT

Although a 69 percent probability is a rather respectable trigger value when considering a possible market entry order, the disadvantage is that the standard deviation is very high when basing the forecast solely on the two preceding wavelengths. However, there are methods to lower the standard deviation and improve the level of confidence in later chapters. (This involves basing the forecast on more than just two preceding waves.)

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Chapter 18
Multiple-Wave Cycles

OVERVIEW

In earlier chapters I indicated that the basic cycle consists of three consecutive waves and is identifiable by a single unique letter between *A* and *I* or *a* and *i* using the three logical operators >, =, and <. In this chapter I will introduce a method for naming cycles with four or more waves.

OVERLAPPING WAVES

When analyzing cycles consisting of more than three waves, I have devised a naming convention that uses an overlapping wave technique.

For example, the four-wave cycle in Figure 18-1 can be decomposed into the two overlapping three-wave cycles in Figure 18-2.

Wave 2–3 on the left aligns perfectly with wave 2–3 on the right. The same is true for the waves 3–4 on the left and the right. The three-wave cycle on the left is a bull impulse cycle (designated A), whereas the three-wave cycle on the right is a bear connector cycle (designated i). Thus, in my naming scheme, the four-wave cycle in Figure 18-1 is labeled Ai.

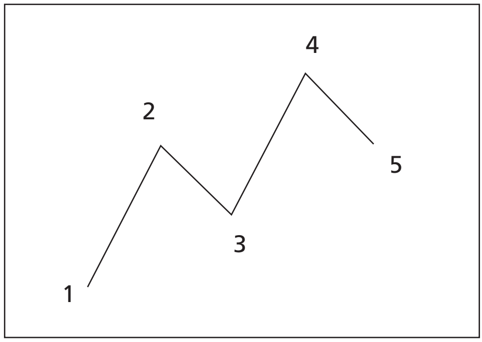

Figure 18-1 Basic four-wave cycle.

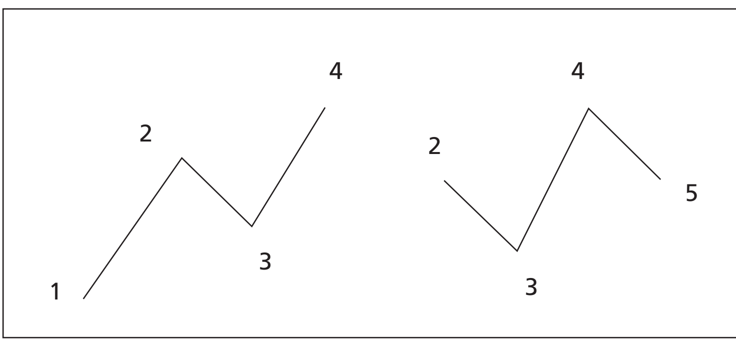

Figure 18-2 Four-wave cycle components.

This naming convention can be extended indefinitely by adding a new letter to the current cycle name each time a new wave is appended. In the next example, a six-wave cycle is "decomposed" and labeled (see Figure 18-3).

The individual three-wave components are listed in Table 18-1.

Thus the six-wave cycle in Figure 18-3 is identified as an AiFa cycle pattern.

Note that the first and second waves of the rightmost cycle are overlaid exactly on the second and third waves in the leftmost cycle. Both the heights (*y* axis) and the widths (*x* axis) of the two shared waves must align perfectly to form a new elongated cycle.

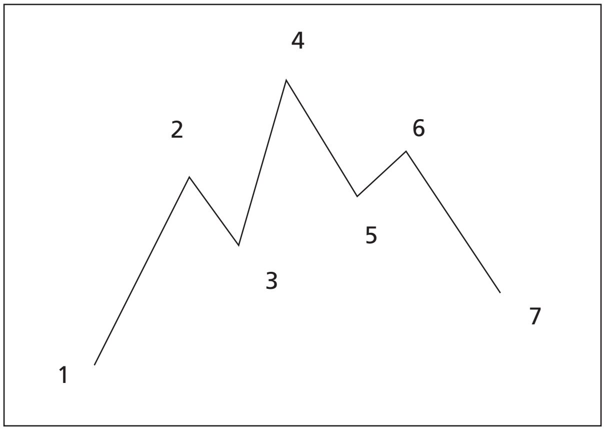

Figure 18-3 Six-wave cycle.

TABLE 18-1 Component Waves

Components	Cycle Name	Cycle ID
1–2–3–4	Bull impulse	A
2–3–4–5	Bear connector	i
3–4–5–6	Bull contracting symmetrical triangle	F
4–5–6–7	Bear impulse	a

NAMING CONVENTION

It is obvious that the four-wave cycle in Figure 18-1 is actually the concatenation (or partial merging) of a three-wave bull impulse cycle and a three-wave bear connector cycle. My labeling convention to identify the new four-wave cycle is Ai.

Because of the constraints imposed by the three logical operators ($>$, $=$, and $<$) between adjacent waves, each three-wave cycle may be merged only with three of the nine possible three-wave cycles. For example, the bull impulse cycle can be overlapped only with a bear connector, a bear expanding ascending triangle, or a bear expanding symmetrical triangle. These are the three cycles in which the height of the second wave is always greater than the height of the first wave.

To further clarify the naming convention for four-wave cycles, I present one more example (see Figure 18-4).

The three waves on the left in this figure form a bear contracting symmetrical triangle, whereas the three waves on the right form a bull impulse cycle. Thus the four-wave cycle in this figure is designated as eA.

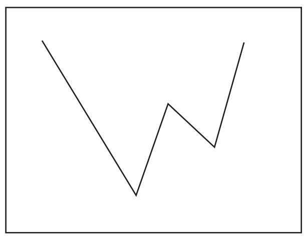

Figure 18-4 Four-wave bear cycle.

Chapter 19
Forecasting the Fourth Wave

OVERVIEW

Using the same logical height relationship that was applied to three-wave cycles, there are 27 possible four-wave bull patterns ($3 \times 3 \times 3 = 27$).

FREQUENCIES

Table 19-1 is a frequency table that is sorted in descending order by 25-pip reversal amount.

Interesting to note in this table is the sharp decline in frequency beginning with the cycle FI. All cycles above FI use only the $>$ or $<$ relationship.

FOURTH-WAVE FORECAST

Given any three-wave cycle, we can estimate the relationship between the third and fourth waves using Table 19-2 sorted by cycle name.

TABLE 19-1 Four-Wave Cycles Sorted by 25-Pip Reversal

Cycle	5-Pip	15-Pip	25-Pip
IA	6.84	18.16	19.73
AI	6.76	18.69	18.93
HI	5.07	10.39	12.59
AH	3.47	9.46	12.28
IE	5.00	10.89	11.87
EA	3.45	10.08	11.64
HH	0.82	2.87	4.27
EE	0.85	3.23	3.78
FI	7.03	2.20	0.79
DF	6.54	2.41	0.72
ID	7.01	2.22	0.72
AG	3.11	1.33	0.57
GF	1.52	0.81	0.42
CA	3.05	1.24	0.42
FH	2.60	1.24	0.38
ED	2.62	1.16	0.26
GC	4.05	0.85	0.23
DC	1.53	0.74	0.23
HG	1.01	0.32	0.08
CE	1.07	0.34	0.04
DB	5.02	0.37	0.04
BF	4.97	0.35	0.04
GB	1.94	0.11	0.00
BB	5.84	0.14	0.00
BC	1.99	0.13	0.00
CD	3.46	0.14	0.00
FG	3.39	0.13	0.00

In the next example I will assume that a 15-pip swing reversal amount was used to create the swing data being scrutinized and that the last three-wave cycle was a bull connector cycle (see Figure 19-1).

The three possible continuations for the overlapping cycle are a contracting symmetrical bear cycle (ID = e), a contracting descending bear cycle (ID = d), and a bear connector cycle (ID = i) (see Figure 19-2).

TABLE 19-2 Four-Wave Cycle Percentages Sorted by Cycle ID

Cycle	5-Pip	15-Pip	25-Pip
AG	3.11	1.33	0.57
AH	3.47	9.46	12.28
AI	6.76	18.69	18.93
BB	5.84	0.14	0.00
BC	1.99	0.13	0.00
BF	4.97	0.35	0.04
CA	3.05	1.24	0.42
CD	3.46	0.14	0.00
CE	1.07	0.34	0.04
DB	5.02	0.37	0.04
DC	1.53	0.74	0.23
DF	6.54	2.41	0.72
EA	3.45	10.08	11.64
ED	2.62	1.16	0.26
EE	0.85	3.23	3.78
FG	3.39	0.13	0.00
FH	2.60	1.24	0.38
FI	7.03	2.20	0.79
GB	1.94	0.11	0.00
GC	4.05	0.85	0.23
GF	1.52	0.81	0.42
HG	1.01	0.32	0.08
HH	0.82	2.87	4.27
HI	5.0780	10.39	12.59
IA	6.84	18.16	19.73
ID	7.01	2.22	0.72
IE	5.00	10.89	11.87

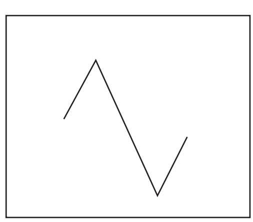

Figure 19-1 Three-wave bull connector cycle.

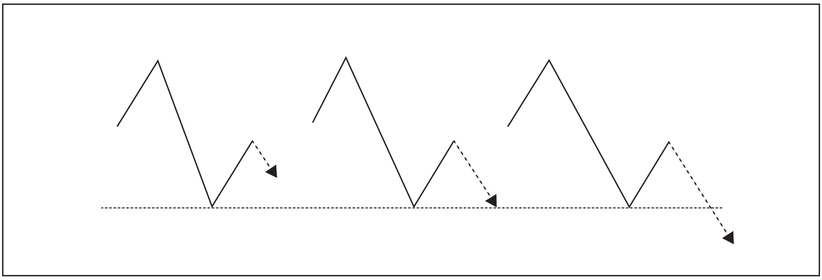

Figure 19-2 Possible fourth-wave continuations

TABLE 19-3 Connector Cycle Percentages

Cycle ID	Raw Percent	Adjusted Percent
IA	18.16	58.08
ID	2.22	7.10
IE	10.89	34.82

From Table 19-2. we find the frequencies listed in Table 19-3 for the connector cycle.

Thus there is an over 65 percent likelihood (58.08 + 7.10) that the fourth wave will touch or descend below the lowest point in the third wave when using a 15-pip reversal amount.

Chapter 20
Forecasting the Fifth Wave

PRUNING

As the minimum reversal amount is increased, five of the nine basic three-wave cycles decrease in frequency of occurrence owing to the equality relationship. I will arbitrarily refer to these cycles as *secondary* cycles, indicating that their low frequency equates to less importance. Specifically, these cycles are listed in Table 20-1

The four remaining cycle types will be referred to as *primary cycles* because their greater frequency of occurrence implies greater importance. They are listed in Table 20-2.

The purpose for making this distinction is to lessen the number of cycle permutations that will occur when examining cycles composed of more than four waves. Using the overlapping methodology to name all five-wave cycles, there are 81 possibilities ($9 \times 3 \times 3$).

TABLE 20-1 Secondary Cycle Types

Cycle ID	Cycle Name
B	Rectangle
C	Contracting descending triangle
D	Contracting ascending triangle
F	Expanding ascending triangle
G	Expanding descending triangle

TABLE 20-2 Primary Cycle Types

Cycle ID	Cycle Name
A	Impulse
E	Contracting Symmetrical triangle
H	Expanding symmetrical triangle
I	Connector

However, by removing all the secondary cycles, this number is reduced significantly to only 16 permutations ($4 \times 2 \times 2$). In other words, I am dropping the *equal to* condition from the height-ratio criteria. I am now concerned only with *greater than* or *less than* height ratios. This form of pruning is justified mathematically because it keeps the data and the results more manageable.

FREQUENCIES

In the Table 20-3, cycles are sorted in descending order of the fourth column.

There is no surprise that the trending cycles IAI and AIA lead the list. It is interesting to note, though, that the 5- and 15-pip reversal amounts do not exactly match the order of the 25-pip reversal amount.

TABLE 20-3 Five-Wave Cycles Sorted by 25-Pip Reversal Amount

Cycle-ID	5-Pips	15-Pips	25-Pips
IAI	15.92	14.91	13.14
AIA	11.78	14.40	12.70
AHI	10.92	8.97	9.46
IEA	10.77	9.43	9.10
HIA	6.84	7.01	7.84
IAH	7.52	7.11	7.64
AIE	6.53	7.59	7.12
EAI	7.25	7.86	6.79
EAH	4.12	4.17	5.38
HIE	8.05	5.26	5.30
HHI	2.91	3.01	3.72
AHH	1.93	2.70	3.60
IEE	2.86	3.22	3.40
EEA	1.91	3.06	3.32
HHH	0.30	0.55	0.85
EEE	0.39	0.73	0.65

FIFTH-WAVE FORECAST

Table 20-4, sorted by cycle ID, provides the information necessary to calculate probabilities for the binary relationships *greater than* and *less than* for height ratios.

EXTENDED IMPULSE CYCLE

In my naming convention, I define a four-wave extended impulse cycle as Ai because it has the potential to become a five-wave Elliot impulse cycle (see Figure 20-1).

Using a 15-pip reversal amount and referring to Table 20-1, we can calculate the likelihood that a full five-wave bull Elliott impulse cycle (AiA) will come to fruition:

$$\begin{aligned} \text{AiA} &= 14.40 \\ \text{AiE} &= 7.59 \\ \text{Probability of AiA} &= 100 \times 14.40/(14.40 + 7.59) \\ &= 65.5 \text{ percent} \end{aligned}$$

TABLE 20-4 Five-Wave Cycle Frequencies Sorted by Cycle ID

Cycle-ID	5-Pips	15-Pips	25-Pips
AHH	1.93	2.70	3.60
AHI	10.92	8.97	9.46
AIA	11.78	14.40	12.70
AIE	6.53	7.59	7.12
EAH	4.12	4.17	5.38
EAI	7.25	7.86	6.79
EEA	1.91	3.06	3.32
EEE	0.39	0.73	0.65
HHH	0.30	0.55	0.85
HHI	2.91	3.01	3.72
HIA	6.84	7.01	7.84
HIE	8.05	5.26	5.30
IAH	7.52	7.11	7.64
IAI	15.92	14.91	13.14
IEA	10.77	9.43	9.10
IEE	2.86	3.22	3.40

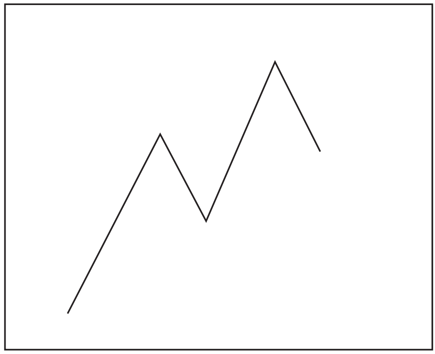

Figure 20-1 Potential five-wave Elliott impulse cycle,

This 66 percent likelihood gives some credibility to the ancient maxim, "A trend continues until it ends."

POTENTIAL HEAD AND SHOULDERS

Head-and-shoulders patterns represent trend reversals and, as such, should be examined closely. The head-and-shoulders pattern that I will analyze has the critical descending neckline (ID = Ah) (see Figure 20-2).

The first indication that the highest point in the third wave is in fact a major reversal point is that the fifth wave does not exceed this point. Thus we need to calculate the probability that the cycle

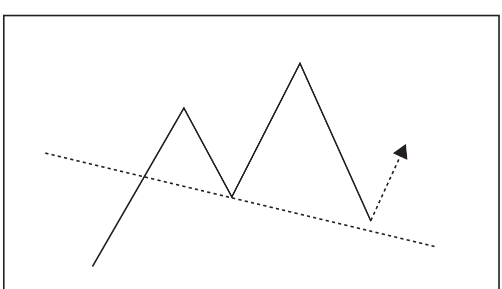

Figure 20-2 Head and shoulders with descending neckline.

AhI will occur. Again, refer to Table 20-1, this time using a 5-pip reversal amount:

$$\begin{aligned} \text{AhI} &= 10.92 \\ \text{AhH} &= 1.93 \\ \text{Probability of AhI} &= 100 \times 10.92/(10.92 + 1.93) \\ &= 85.0 \text{ percent} \end{aligned}$$

This is a very promising result. There is an 85 percent likelihood that the fifth wave will be the beginning of a downward trend. Note the relation between this pattern and the preceding one, the extended impulse cycle, where the height of the fourth wave is the only difference. The extended impulse cycle has the potential to be a head and shoulders pattern with an ascending neckline, but the probability is far less.

EXTENDED CONTRACTING TRIANGLE

From classic pattern-recognition theory, recall that triangles normally are considered to be continuation harbingers. This may be an optimistic appraisal that you feel requires testing. Let's examine the bull contracting symmetrical triangle (ID = Ee) using a 25-pip reversal amount (see Figure 20-3).

My premise is that the trend of the first wave is the current overall trend. Therefore, I want to calculate the likelihood that the height of the fifth wave will be greater than the height of the fourth wave:

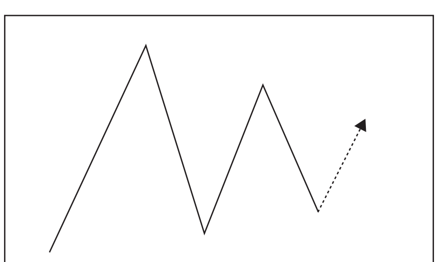

Figure 20-3 Extended contracting symmetrical triangle.

EeA = 3.32
EeE = 0.65
Probability of EeA = 100 × 3.32/ (3.32 + 0.65)
= 83.6 percent

This implies that there is an 84 percent likelihood that the existing trend prior to a double contracting symmetrical triangle will continue. Contracting triangles possess a unique fascination, not unlike increasing the torque on a metal spring to a critical point. Sharp breakouts frequently follow these triangles.

EXTENDED EXPANDING TRIANGLE

Extended expanding triangles are a sign that the market is both highly volatile and very confused. Perhaps indecisive is a better word (see Figure 20-4).

Expanding triangles are the only pattern that cannot be maintained indefinitely. In fact, in the 29 million+ EURUSD database covering the tick data for calendar year 2005, there was only one occurrence of an HhHhH cycle, a seven-wave expanding triangle. Therefore, I will calculate the probability that the height of the fifth wave in this cycle will be less than the height of the fourth wave, thus terminating the expanding phenomenon. I will employ a 5-pip reversal amount in this example:

HhI = 2.91
HhH = 0.30

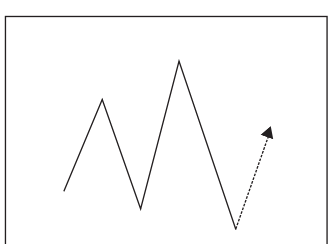

Figure 20-4 Extended expanding symmetrical triangle.

$$\text{Probability of HhI} = 100 \times 2.91/(2.91 + 0.30)$$
$$= 90.7 \text{ percent}$$

This result is not surprising, merely good to know, particularly when dealing with higher swing reversal amounts. I also should note that contracting triangles theoretically can be maintained over time simply by entering a phase of zero activity, where the last price lingers indefinitely (such as during weekends).

This 91 percent probability represents about as close to a "sure thing" as is possible when forecasting with wave theory.

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Chapter 21
Forecasting the Sixth Wave

OVERVIEW

Using the three logical operators >, <, and = for height-ratio comparisons of six-wave cycles generates 243 permutations ($9 \times 3 \times 3 \times 3$). By excluding the equality relationship, the number of permutations is reduced to 32 possibilities ($4 \times 2 \times 2 \times 2$).

FREQUENCIES

Table 21-1 is a six-wave cycle frequency table that is sorted in descending order on the fourth column.

Note the visible decrease in frequency between the second and third rows. Also again we find the extended contracting and expanding triangles at the bottom of the frequency list.

When analyzing cycles composed of six waves, we must note that these are not just randomly connected cycles. My overlapping wave scheme ensures that the four central three-wave cycles are tightly linked to the adjacent cycles using the logical height-ratio comparisons.

TABLE 21-1 Six-Wave Cycles Sorted by 25-Pip Reversal Amount

Cycle	5-Pips	15-Pips	25-Pips
AIAI	8.83	9.70	9.26
IAIA	9.17	9.33	9.07
IEAI	7.50	6.33	6.02
IAHI	7.67	5.73	5.71
AIEA	4.85	5.66	5.55
IAIE	4.91	5.36	5.27
EAIA	3.90	5.40	5.20
AHIA	4.82	4.94	5.11
HIAI	5.24	5.03	5.07
AIAH	4.15	4.94	4.95
AHIE	5.47	3.92	3.85
HIEA	5.29	3.66	3.71
IEAH	3.93	3.18	3.40
EAHI	4.06	3.22	3.36
IEEA	2.06	2.48	2.54
AHHI	2.19	2.34	2.47
EAIE	2.34	2.38	2.35
HIAH	2.42	2.08	2.21
EEAI	1.18	1.87	1.90
HHIA	1.16	1.75	1.85
AIEE	1.00	1.74	1.79
IAHH	1.35	1.61	1.71
HIEE	1.80	1.44	1.43
HHIE	1.69	1.21	1.30
EAHH	0.76	1.11	1.22
EEAH	0.83	1.13	1.16
IEEE	0.43	0.69	0.68
EEEA	0.30	0.65	0.64
HHHI	0.36	0.53	0.59
AHHH	0.24	0.47	0.53
HHHH	0.03	0.06	0.06
EEEE	0.05	0.06	0.05

Table 21-2 is a table of six-wave cycles that has been sorted by cycle ID to facilitate forecasting the sixth wave.

EXTENDED IMPULSE CYCLE

Given the five-wave impulse cycle shown in Figure 21-1, I want to determine the likelihood that the sixth wave will be shorter than the fifth wave, thereby facilitating still another bull wave continuing the upward trend.

TABLE 21-2 Six-Wave Cycles Sorted by Cycle ID

Cycle	5-Pips	15-Pips	25-Pips
AHHH	0.24	0.47	0.53
AHHI	2.19	2.34	2.47
AHIA	4.82	4.94	5.11
AHIE	5.47	3.92	3.85
AIAH	4.15	4.94	4.95
AIAI	8.83	9.70	9.26
AIEA	4.85	5.66	5.55
AIEE	1.00	1.74	1.79
EAHH	0.76	1.11	1.22
EAHI	4.06	3.22	3.36
EAIA	3.90	5.40	5.20
EAIE	2.34	2.38	2.35
EEAH	0.83	1.13	1.16
EEAI	1.18	1.87	1.90
EEEA	0.30	0.65	0.64
EEEE	0.05	0.06	0.05
HHHH	0.03	0.06	0.06
HHHI	0.36	0.53	0.59
HHIA	1.16	1.75	1.85
HHIE	1.69	1.21	1.30
HIAH	2.42	2.08	2.21
HIAI	5.24	5.03	5.07
HIEA	5.29	3.66	3.71
HIEE	1.80	1.44	1.43
IAHH	1.35	1.61	1.71
IAHI	7.67	5.73	5.71
IAIA	9.17	9.33	9.07
IAIE	4.91	5.36	5.27
IEAH	3.93	3.18	3.40
IEAI	7.50	6.33	6.02
IEEA	2.06	2.48	2.54
IEEE	0.43	0.69	0.68

The frequencies from Table 21-1 using a 15-pip reversal amount are

AiAi = 9.70
AiAh = 4.94
Probability of AiAi = 100 × 9.70/(9.70 + 4.94)
= 66.3 percent

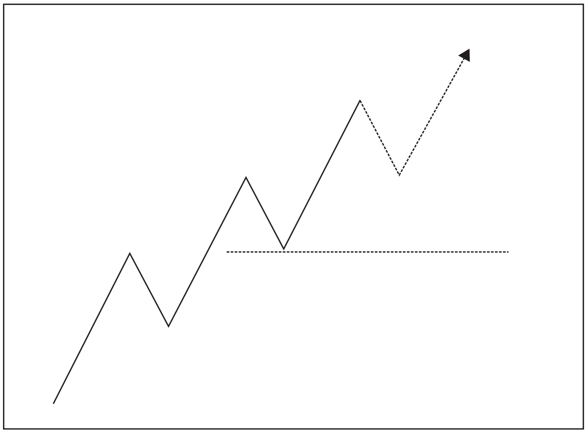

Figure 21-1 Extended impulse cycle.

Thus there is a two out of three chance that a five-wave impulse cycle will continue trending in the same direction. This formation should be confirmed by using different swing reversal amounts.

HEAD AND SHOULDERS

A five-wave head and shoulders formation with a descending neckline is designated AhI. I want to calculate the probability that the sixth wave will fall below the vertex of the fourth and fifth waves, thus confirming that a reversal is actually in progress (see Figure 21-2).

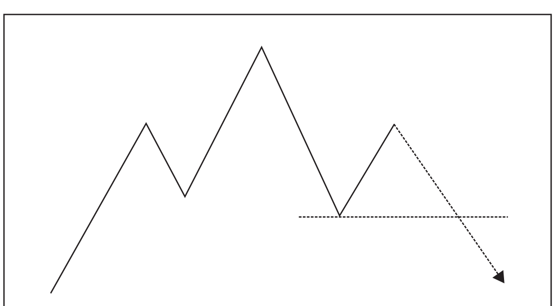

Figure 21-2 Head and shoulders forecast.

Using a 25-pip reversal amount, I obtain the following from Table 21-1:

$$\begin{aligned} \text{AhIa} &= 5.11 \\ \text{AhIe} &= 3.85 \\ \text{Probability of AhIa} &= 100 \times 5.11/(5.11 + 3.85) \\ &= 57.0 \text{ percent} \end{aligned}$$

I also will calculate the probability using a 5-pip reversal amount:

$$\begin{aligned} \text{AhIa} &= 4.82 \\ \text{AhJe} &= 5.47 \\ \text{Probability of AhIa} &= 100 \times 4.82/(4.82 + 5.47) \\ &= 46.8 \text{ percent} \end{aligned}$$

Fortunately, this inconsistency, where probabilities lie on both sides of the 50 percent median when using different reversal amounts, is very rare. When in doubt, stay out of the market.

CHIMERA CYCLE

In this example I will analyze a five-wave chimera cycle so named because of its changeling properties. It starts as a contracting symmetrical triangle and ends as an expanding symmetrical triangle (ID = EaH). This cycle occurs frequently during lateral congestion (see Figure 21-3).

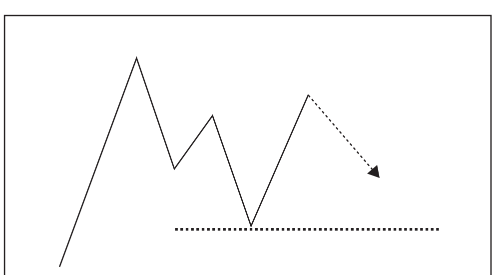

Figure 21-3 Chimera cycle forecast.

I want to test to determine if the sixth wave will drop below the vertex of the fourth and fifth waves. This time I will use a 15-pip reversal amount in Table 21-1:

$$\begin{aligned} \text{EaHi} &= 3.22 \\ \text{EaHh} &= 1.11 \\ \text{Probability of EaHi} &= 100 \times 3.22/(3.22 + 1.11) \\ &= 74.4 \text{ percent} \end{aligned}$$

There is a 74 percent likelihood that the sixth wave will not descend below the vertex of the fourth and fifth waves.

Chapter 22 Advanced Features

FRACTAL LEVELS

In earlier chapters I mentioned using swing analysis at different fractal levels to determine the possible strength of a subsequent wave and its component waves. One method to perform this operation is to calculate swing data using two different minimum reversal amounts, say, a 5-pip reversal amount for the child fractal data and a 10-pip reversal amount for the parent swing data.

To perform this operation successfully, both sets of swing data must end on the same point, preferably the last known price in the raw data. Then, by using height-ratio wave comparisons at two levels, the trader can determine if the predicted waves will extend in the same price direction.

The disadvantage of this method is that prolonged experimentation may be required to find a "perfect" child-parent fractal relationship. As markets become more volatile, higher reversal amounts may be required to filter out undesired white noise. As markets lose volatility, lower reversal amounts may be preferable. Also, there is the possibility that the difference in the two reversal amounts may be set too high. This will cause the fractal relationship to jump from a child-parent relationship to a child-grandparent relationship. An alternative method that progresses through each fractal level one at a time is given below.

PIVOT CHARTS

The *pivot chart* is a subset of the swing reversal chart that uses the bare minimum criteria as the parameters of the reversal algorithm. That is, the reversal increment is set to the minimum legal price fluctuation in the time series, and the number of reversal units is set to one. Paradoxically, this chart does not filter any reversals in price. The reason for this will become apparent shortly.

The pivot chart does, however, have the advantage of merging a multipoint trend into a single diagonal line. It also filters out horizontal price movements. Another advantage is that a pivot chart can be constructed easily by hand without the use of a software utility. All continuous upward movements resolve to a diagonal line, as do all continuous downward movements. There is no need to calculate a minimum reversal amount with each new price. The pivot chart is the only swing chart that can never have a child fractal chart. In other words, it is the lowest common denominator of all swing charts (see Figure 22-1).

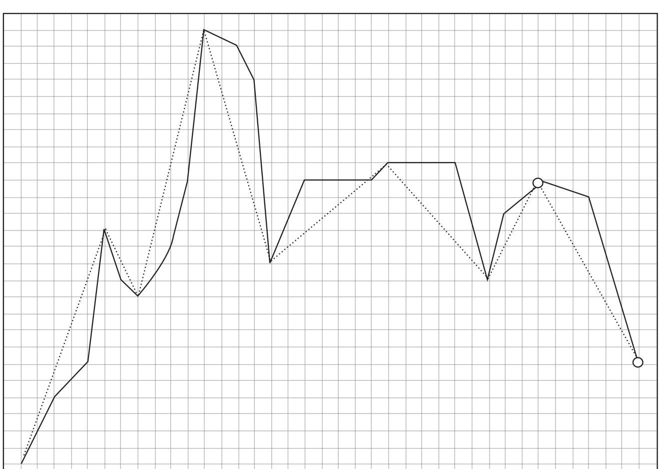

Figure 22-1 Pivot chart.

I note in the figure that no reversal is filtered out. A standard swing reversal chart of the same raw data (the solid curve) using a 15-pip reversal amount would generate only two diagonals, one bull wave followed by one bear wave.

CHANNEL LINES

The classification of the basic three-wave cycles discussed earlier will employ a rigid methodology that prevents any ambiguity—*channeling*. This is a purely mathematical process that has nothing to do with excursions into the supernatural.

All three-wave cycles always can be inscribed inside a channel quadrangle or triangle using the coordinate system in Table 22-1 (see Figure 22-2).

TABLE 22-1 Cycle Coordinate System

Wave No.	Starting Point	Ending Point
1	$x1,y1$	$x2,y2$
2	$x2,y2$	$x3,y3$
3	$x3,y3$	$x4,y4$

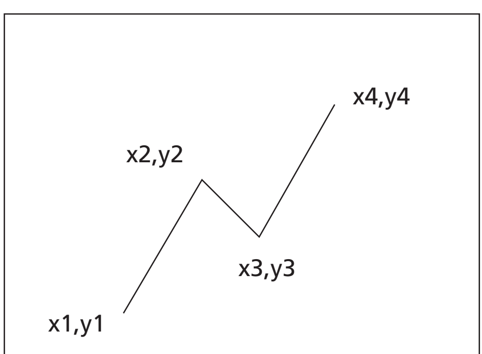

Figure 22-2 Impulse cycle with coordinates.

The upper boundary of the channel polygon (either a triangle or a parallelogram) passes through the two points $x2$, $y2$ and $x4$, $y4$, whereas the lower boundary of the channel shape passes through the two points $x1$, $y1$ and $x3$, $y3$, as depicted in Figure 22-3.

The criteria for classifying any three-wave cycle are derived from the *slopes* of its two identifying channel lines. In Figure 22-2, both slopes are positive, or travel from the lower left to the upper right of the diagram (the standard bull impulse cycle described earlier). The slope property of either channel line may have one of three mathematical attributes: *positive, negative,* or *zero*. This equates to upward, downward, and horizontal price movements.

The nine basic bull cycles with channel lines are shown in Figure 22-4.

Concerning the naming convention for triangles, the modifier *contracting* signifies that the channel lines converge on the right side of the cycle. Conversely, *expanding* indicates that the channel lines converge on the left of the cycle.

CYCLE COLLAPSING

The pivot chart described earlier facilitates a very simple and direct approach to determining the parent fractal level of any swing data, which I refer to as *cycle collapsing*. To collapse any three-wave bull cycle shown in Figure 22-4 into a single wave, the following two rules must be observed:

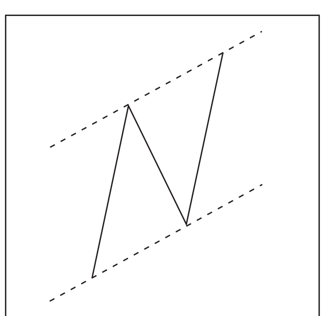

Figure 22-3 Three-wave impulse cycle with channel lines.

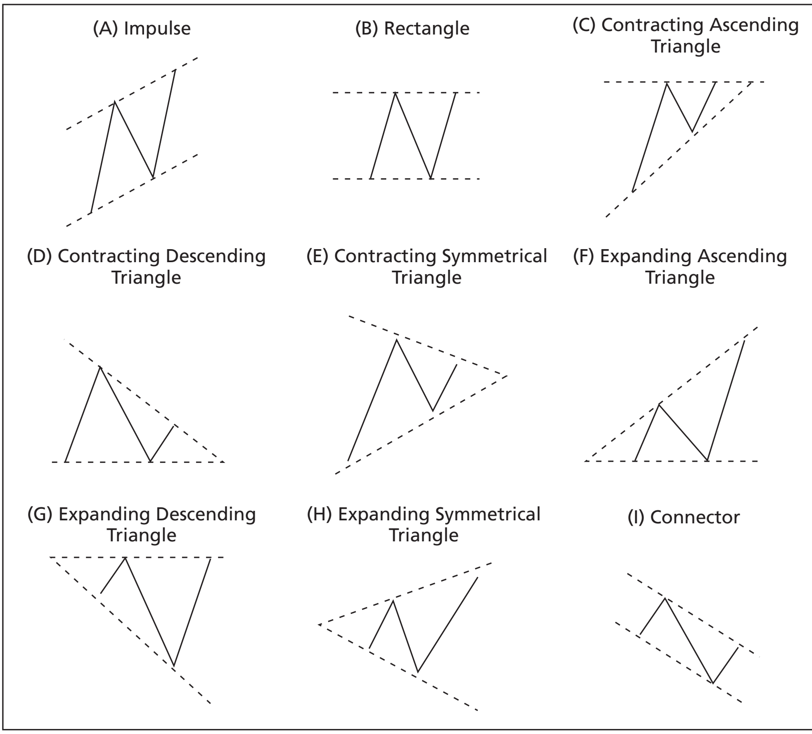

Figure 22-4 The nine basic bull cycles with channel lines.

1. Using the coordinate system in Table 22-1, the starting point $y1$ must be lower than or equal to point $y3$.
2. The ending point $y4$ must be greater than or equal to point $y2$.

If both conditions are satisfied, then the collapsing method is purely mechanical: Extend a straight line from the cycle starting coordinates $x1$, $y1$ to the cycle end point $x4$, $y4$. Examples are shown in Figure 22-5.

The four examples in this figure are, in fact, the only bull cycles that can be collapsed into a single wave in one operation. The remaining five bull cycles (contracting descending triangle, contracting symmetrical triangle, expanding descending triangle, expanding symmetrical triangle, and the connector cycle) all

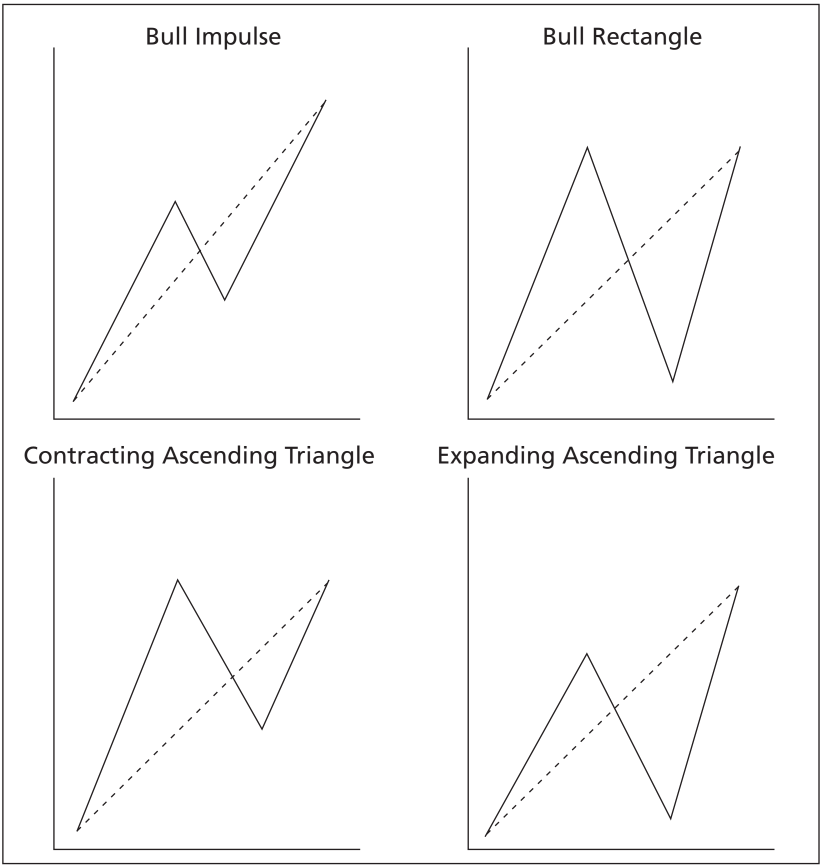

Figure 22-5 Collapsing bull cycles.

violate one of the preceding rules (the bull connector cycle violates both rules).

Surprisingly, though, a second pass through the collapsed data again will collapse several three-wave cycles into a single wave. No more than two passes through the data are required to convert a set of swing data to their parent fractal data.

PART 5
Shockwave Raw Data

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Chapter 23
OHLC Bar Charts

OVERVIEW

In this chapter I will begin my analysis of shockwaves, with the visual representation of the data displayed as 1-minute OHLC quotes. To avoid any bias in the selection of the date ranges involved, I will use the first 15 Fridays in 2006 as my database. I will focus on 8:30 a.m. ET because this is when most of the scheduled news announcements are released.

In the charts that follow, the time frame is maintained uniform for all dates: 8:00 to 10:00 a.m. There are three distinct phases during this time frame:

1. The *preshockwave calm* from 8:00 to 8:29 a.m.
2. The *shockwave surge* from 8:30 a.m. until a significant extreme is reached.
3. The *reactive response* immediately following the significant extreme.

At the top of each chart are the 1-minute OHLC quotes represented as vertical bars. The horizontal background grid is scaled in increments of a single pip. Each OHLC region has two dotted lines. The vertical dotted line indicates the 8:30 longitude, whereas the horizontal dotted line is aligned with the opening price in the 8:30 quote. The vertical numeric scale on the right also represents pips.

In the middle of each chart is the activity oscillator with upticks represented as light rectangles and downticks as shaded rectangles. Their sum is displayed in the right vertical scale as total ticks per minute.

At the bottom of each chart is the 1-minute range oscillator. The light rectangle at the top represents the distance between the open and high prices. The shaded rectangle below it represents the distance from the open to the closing price. Range is measured in pips on the right vertical scale.

Beneath each chart are the descriptive statistic values covering the 2-hour period for that chart.

STUDY NO. 1: JANUARY 6, 2006

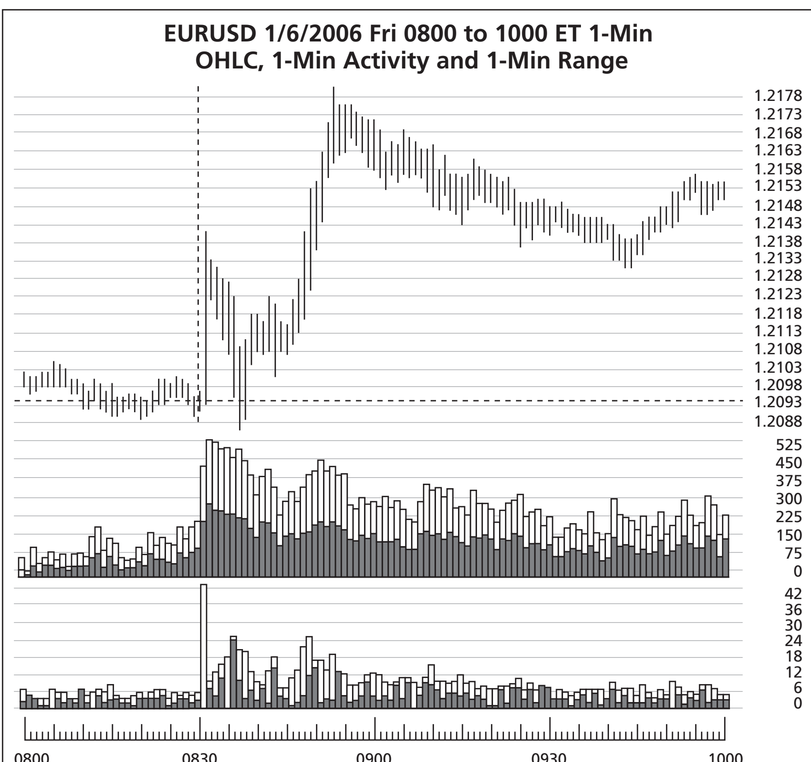

Figure 23-1 OHLC, activity and range, January 6, 2006.

Open	1.2101
High	1.2182
Low	1.2087
Close	1.2154
Midrange	1.2135
Range	0.0095
Mean	1.2133
Standard Deviation	0.0026

STUDY NO. 2: JANUARY 13, 2006

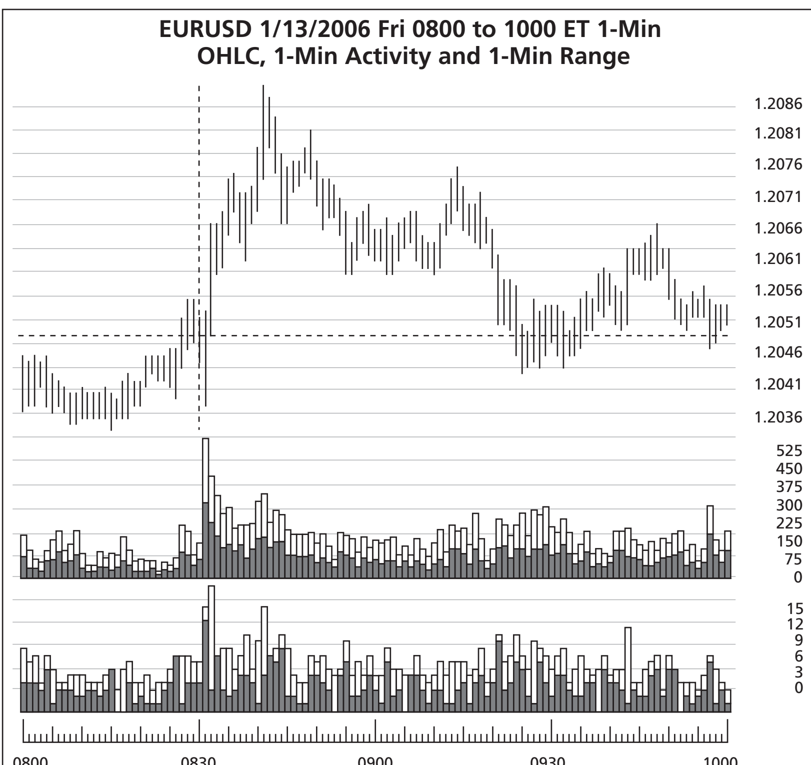

Figure 23-2 OHLC, activity and range, January 13, 2006.

Open	1.2042
High	1.2090
Low	1.2035
Close	1.2052
Midrange	1.2063
Range	0.0055
Mean	1.2058
Standard deviation	0.0012

STUDY NO. 3: JANUARY 20, 2006

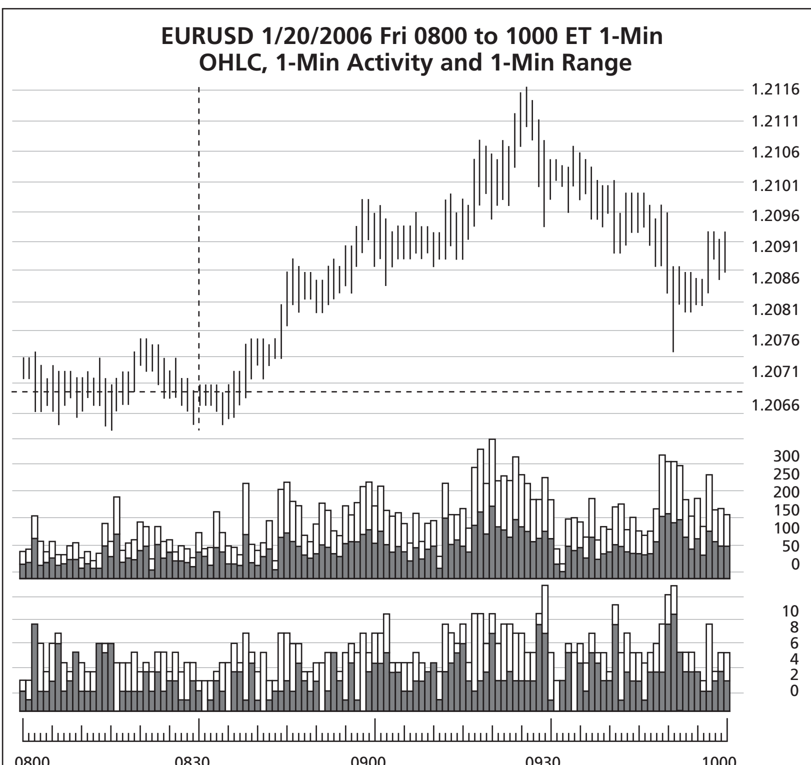

Figure 23-3 OHLC, activity and range, January 20, 2006.

Open	1.2075
High	1.2117
Low	1.2065
Close	1.2094
Midrange	1.2091
Range	0.0052
Mean	1.2087
Standard deviation	0.0013

STUDY NO. 4: JANUARY 27, 2006

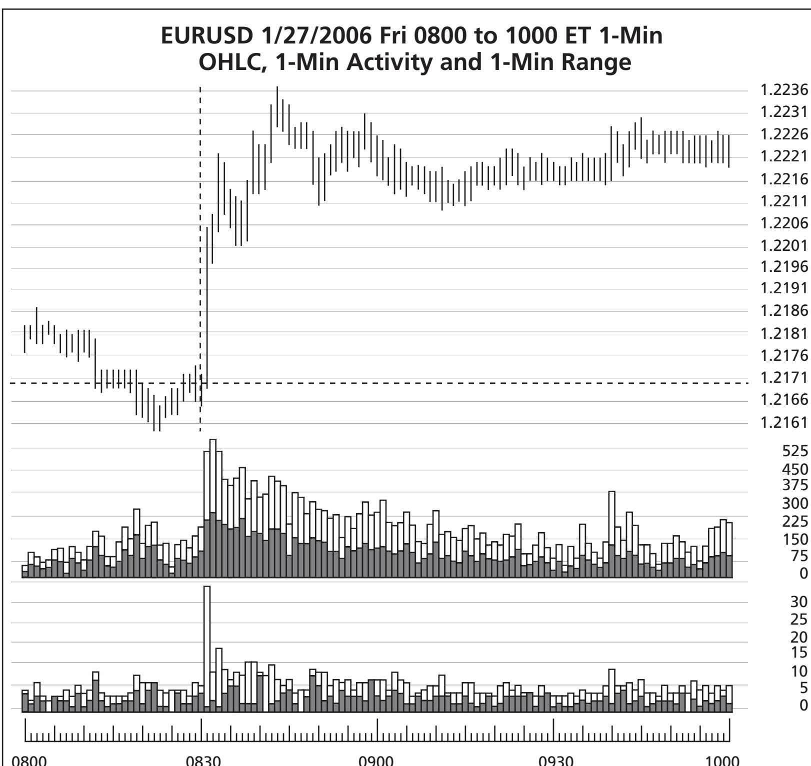

Figure 23-4 OHLC, activity and range, January 27, 2006.

Open	1.2183
High	1.2238
Low	1.2160
Close	1.2222
Midrange	1.2199
Range	0.0078
Mean	1.2208
Standard deviation	0.0021

STUDY NO. 5: FEBRUARY 3, 2006

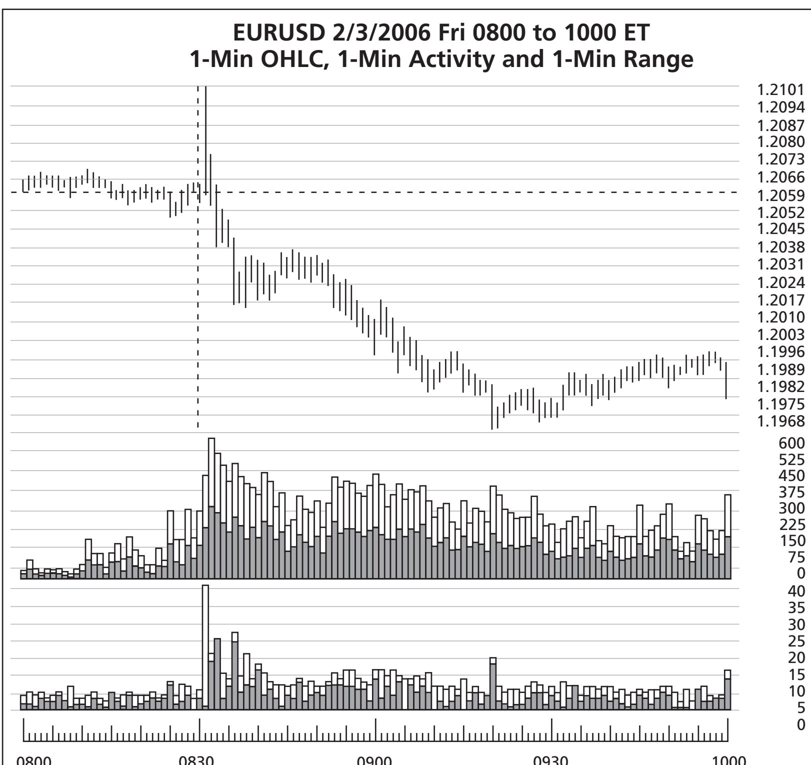

Figure 23-5 OHLC, activity and range, February 3, 2006.

Open	1.2064
High	1.2105
Low	1.1967
Close	1.1982
Midrange	1.2036
Range	0.0138
Mean	1.2018
Standard deviation	0.0034

STUDY NO. 6: FEBRUARY 10, 2006

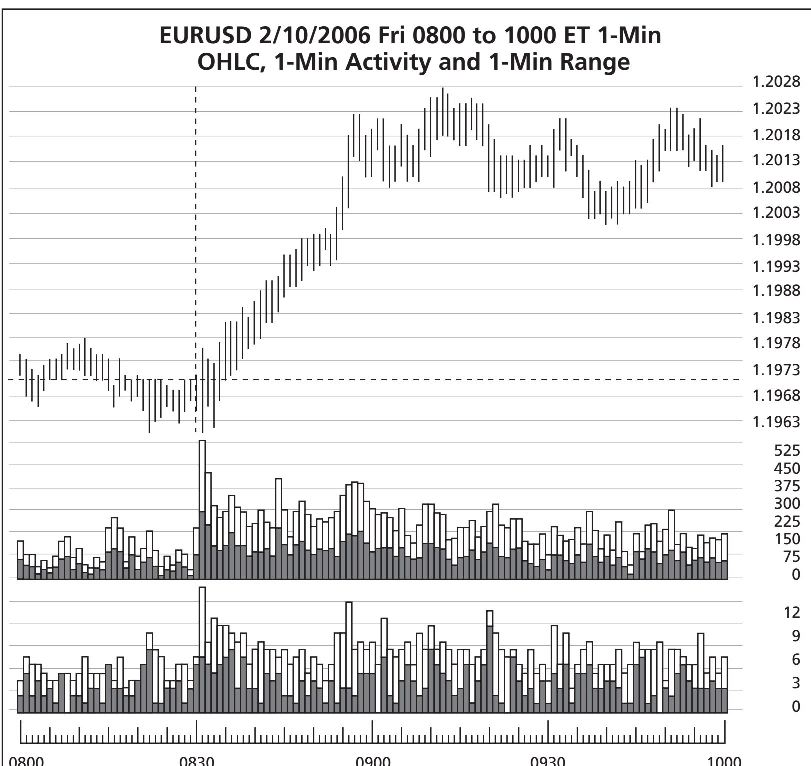

Figure 23-6 OHLC, activity and range, February 10, 2006.

Open	1.1974
High	1.2028
Low	1.1962
Close	1.2015
Midrange	1.1995
Range	0.0066
Mean	1.1998
Standard deviation	0.0020

STUDY NO. 7: FEBRUARY 17, 2006

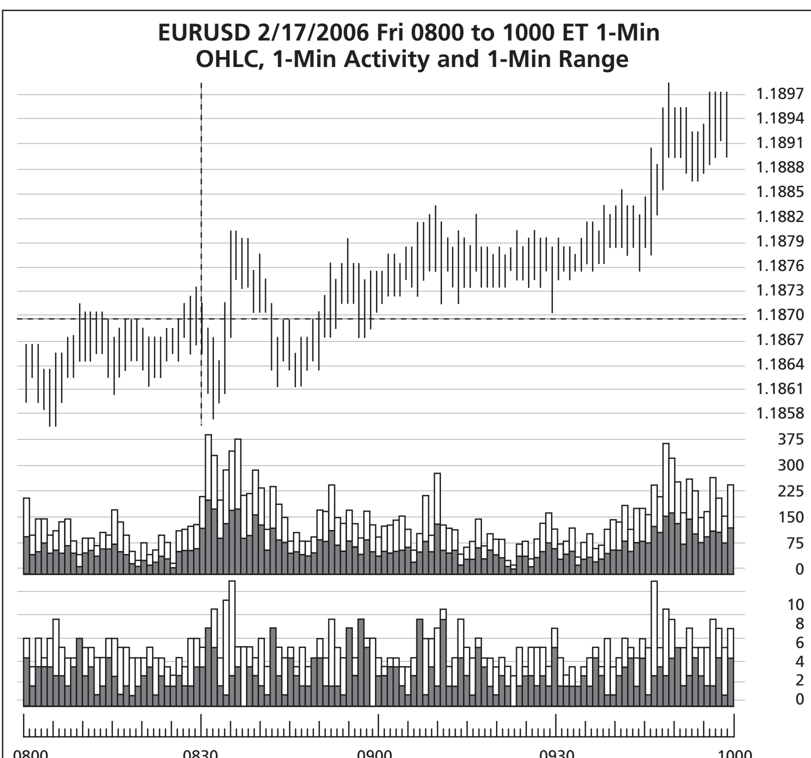

Figure 23-7 OHLC, activity and range, February 17, 2006.

Open	1.1866
High	1.1899
Low	1.1857
Close	1.1897
Midrange	1.1878
Range	0.0042
Mean	1.1875
Standard deviation	0.0009

STUDY NO. 8: FEBRUARY 24, 2006

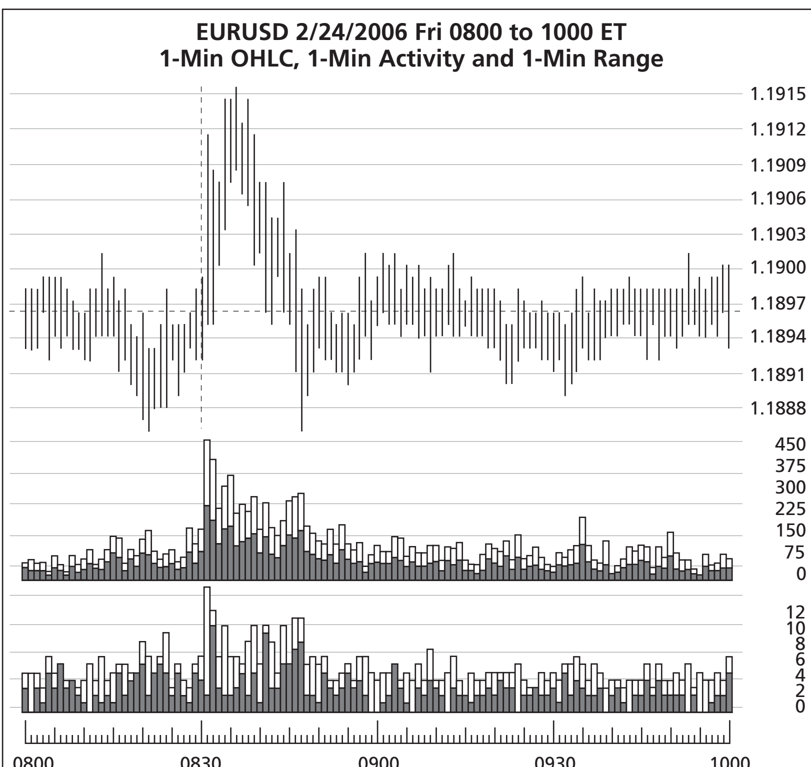

Figure 23-8 OHLC, activity and range, February 24, 2006.

Open	1.1895
High	1.1916
Low	1.1887
Close	1.1899
Midrange	1.1902
Range	0.0029
Mean	1.1897
Standard deviation	0.0004

STUDY NO. 9: MARCH 3, 2006

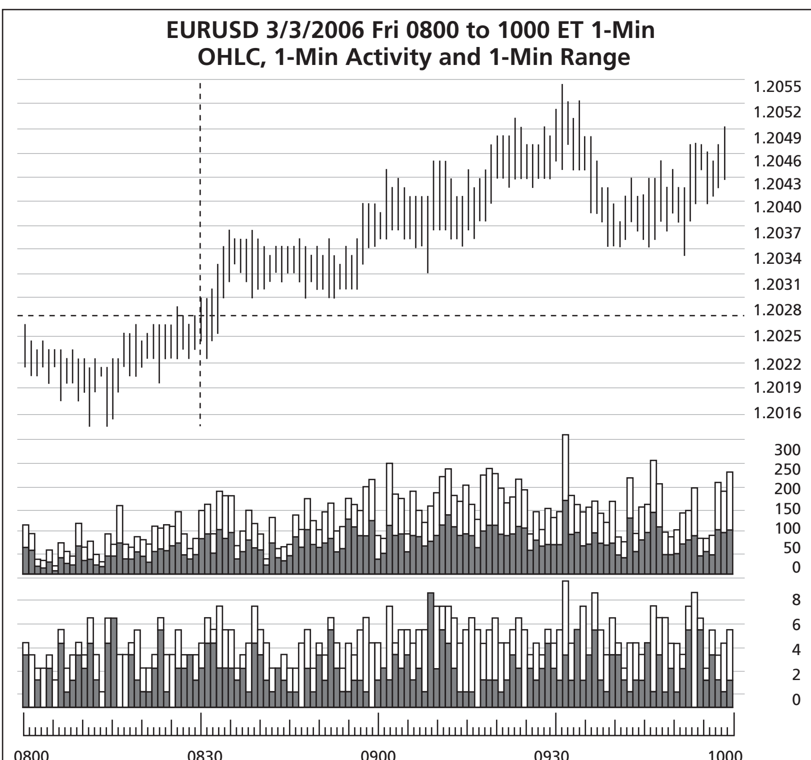

Figure 23-9 OHLC, activity and range, March 3, 2006.

Open	1.2023
High	1.2055
Low	1.2015
Close	1.2050
Midrange	1.2035
Range	0.0040
Mean	1.2036
Standard deviation	0.0009

STUDY NO. 10: MARCH 10, 2006

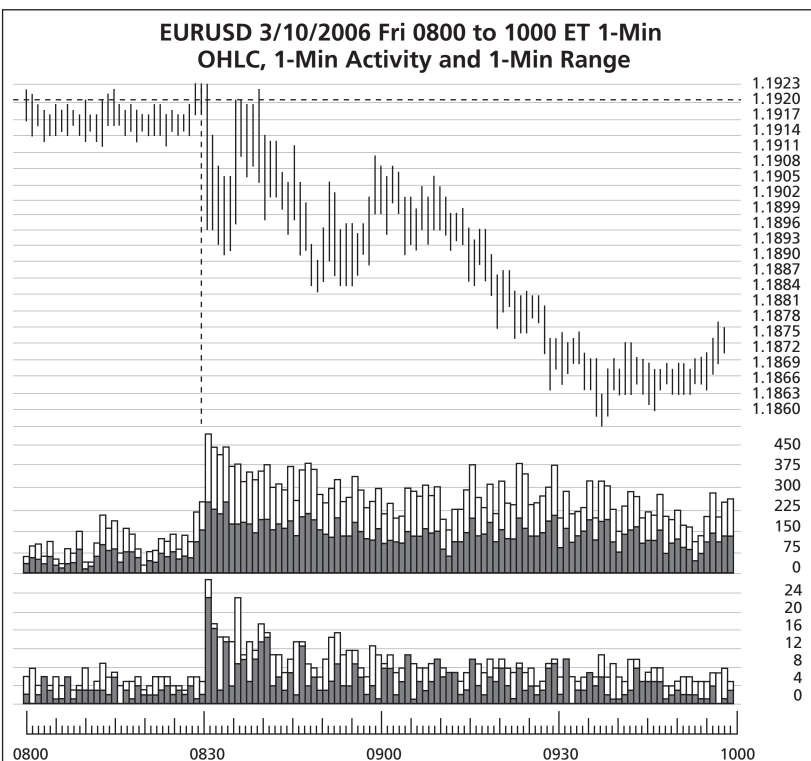

Figure 23-10 OHLC, activity and range, March 10, 2006.

Open	1.1921
High	1.1925
Low	1.1859
Close	1.1873
Midrange	1.1892
Range	0.0066
Mean	1.1895
Standard deviation	0.0019

STUDY NO. 11: MARCH 17, 2006

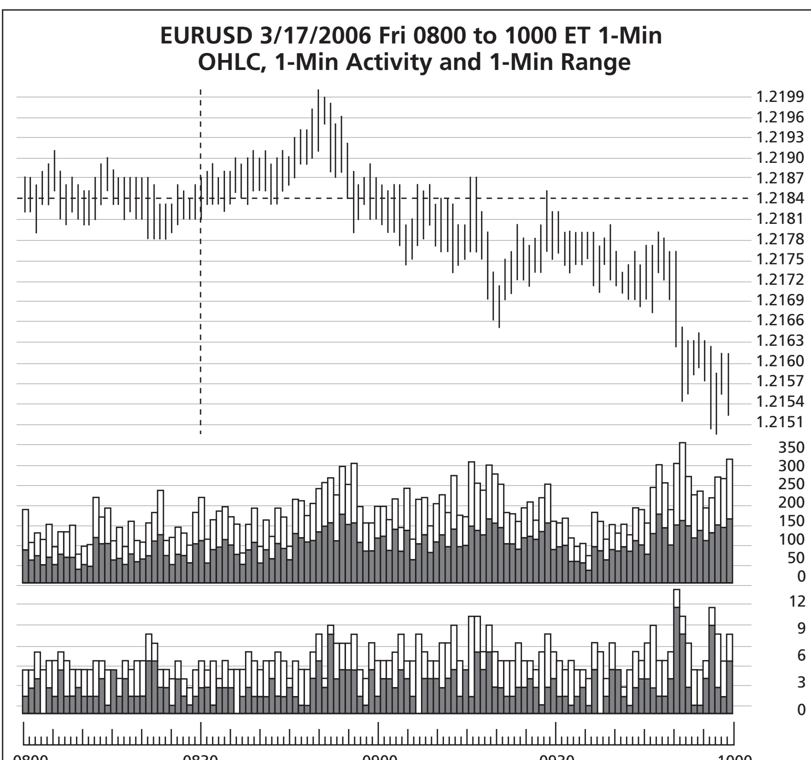

Figure 23-11 OHLC, activity and range, March 17, 2006.

Open	1.2186
High	1.2201
Low	1.2150
Close	1.2155
Midrange	1.2176
Range	0.0051
Mean	1.2181
Standard deviation	0.0009

STUDY NO. 12: MARCH 24, 2006

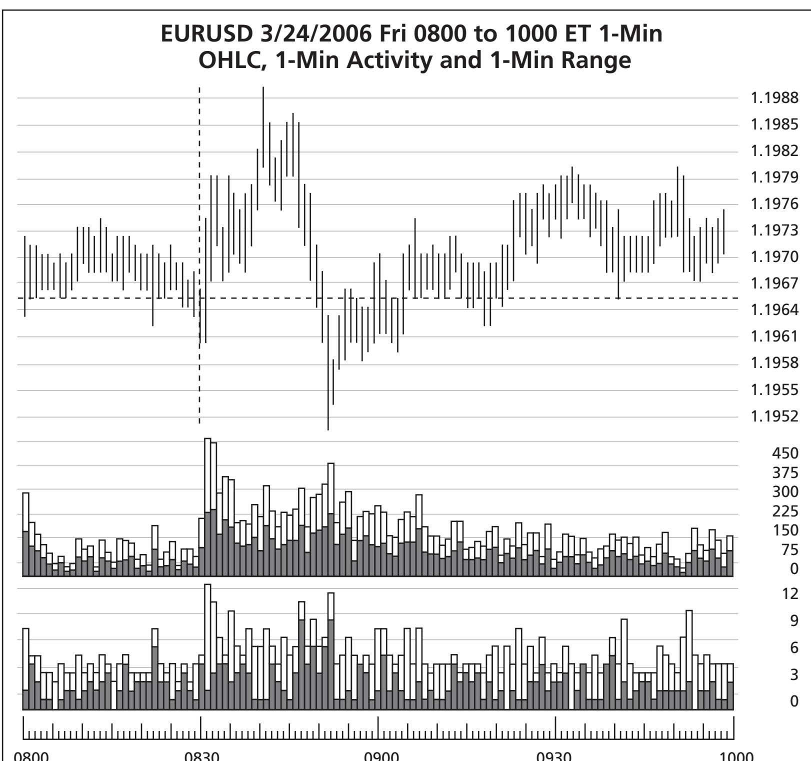

Figure 23-12 OHLC, activity and range, March 24, 2006.

Open	1.1969
High	1.1990
Low	1.1951
Close	1.1972
Midrange	1.1971
Range	0.0039
Mean	1.1971
Standard deviation	0.0005

STUDY NO. 13: MARCH 31, 2006

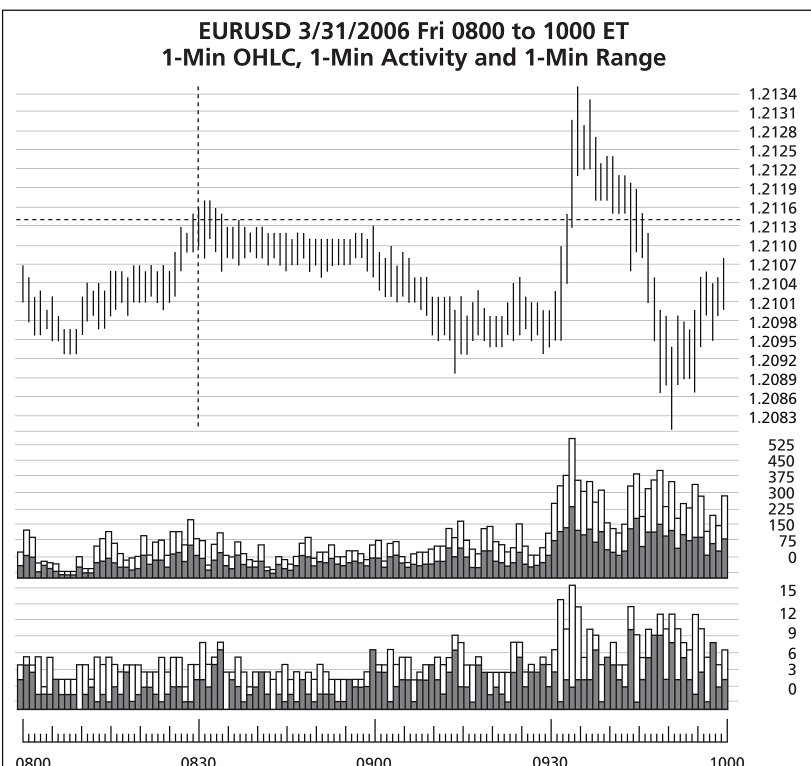

Figure 23-13 OHLC, activity and range, March 31, 2006.

Open	1.2103
High	1.2136
Low	1.2082
Close	1.2103
Midrange	1.2109
Range	0.0054
Mean	1.2106
Standard deviation	0.0008

STUDY NO. 14: APRIL 7, 2006

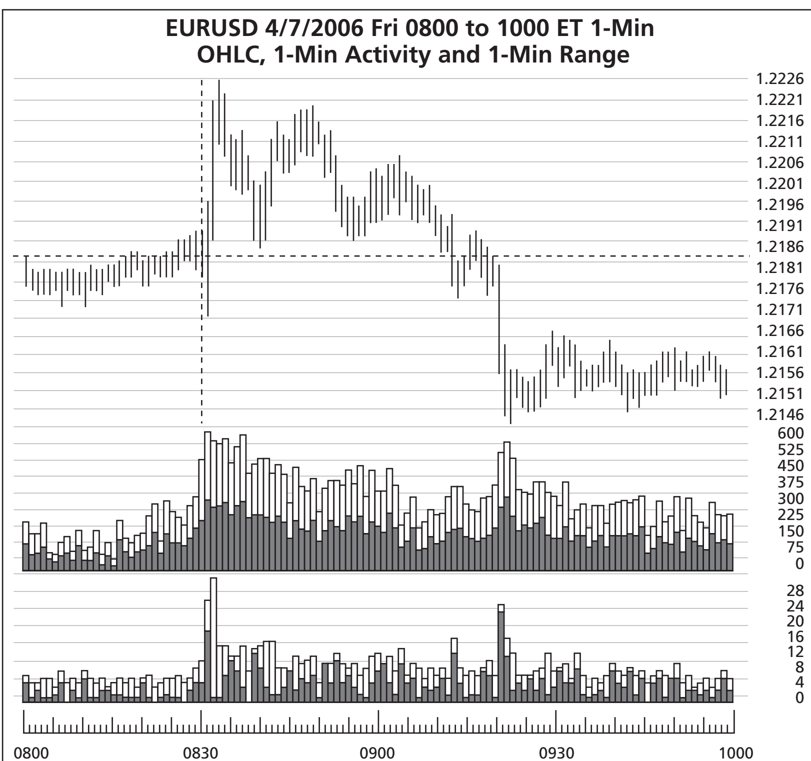

Figure 23-14 OHLC, activity and range, April 7, 2006.

Open	1.2179
High	1.2227
Low	1.2145
Close	1.2157
Midrange	1.2186
Range	0.0082
Mean	1.2181
Standard deviation	0.0020

STUDY NO. 15: APRIL 14, 2006

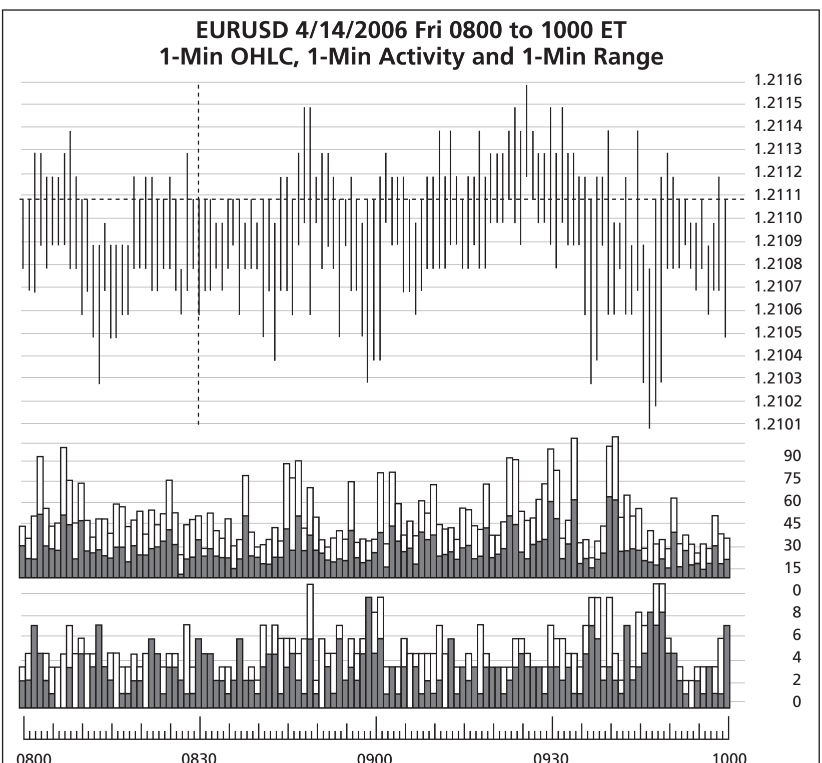

Figure 23-15 OHLC, activity and range, April 14, 2006.

Good Friday	
Open	1.2109
High	1.2116
Low	1.2101
Close	1.2105
Midrange	1.2109
Range	0.0015
Mean	1.2110
Standard deviation	0.0002

TABLE 23-1 Summary of Statistics

Study	Date	Open	High	Low	Close	Range	Std Dev
1	1/6/2006	1.2101	1.2182	1.2087	1.2154	95	26
2	1/13/2006	1.2042	1.2090	1.2035	1.2052	55	12
3	1/20/2006	1.2075	1.2117	1.2065	1.2094	52	13
4	1/27/2006	1.2183	1.2238	1.2160	1.2222	78	21
5	2/3/2006	1.2064	1.2105	1.1967	1.1982	138	34
6	2/10/2006	1.1974	1.2028	1.1962	1.2015	66	20
7	2/17/2006	1.1866	1.1899	1.1857	1.1897	42	9
8	2/24/2006	1.1895	1.1916	1.1887	1.1899	29	4
9	3/3/2006	1.2023	1.2055	1.2015	1.2050	40	9
10	3/10/2006	1.1921	1.1925	1.1859	1.1873	66	19
11	3/17/2006	1.2186	1.2201	1.2150	1.2155	51	9
12	3/24/2006	1.1969	1.1990	1.1951	1.1972	39	5
13	3/31/2006	1.2103	1.2136	1.2082	1.2103	54	8
14	4/7/2006	1.2179	1.2227	1.2145	1.2157	82	20
15	4/14/2006	1.2109	1.2116	1.2101	1.2105	15	2

SUMMARY OF STATISTICS

See Table 23-1. The open, high, low, and close are displayed in terms of the quote currency USD. Range and standard deviation are expressed as pips (0.0001 USD).

RANGE RATIO

When analyzing interval data as opposed to streaming tick data, an interesting phenomenon occurs. Recall that I define *time frame* as the overall duration of the chart data from start date to end date. The *time interval* is defined as the equal-sized gradations within the time frame. Thus, in the preceding studies, the time frame is from 8:00 to 10:00 a.m., and the time interval is 1 minute, which amounts to 121 same-sized gradations or number of intervals per frame.

The range statistic for each study covers the entire time frame for that one study. This gives rise to a new volatility gauge based on the average interval range compared with the range of the total time frame (see Table 23-2).

The calculated columns are defined as follows:

Average range is calculated as the sum of individual interval ranges divided by the number of intervals *N* (121).
Total range is the range of the entire time frame.
Total range/N is the total range divided by the number of intervals.

TABLE 23-2 Range Ratio Index

Study	Date	Average Range	Total Range	Total Range/*N*	Range Ratio
1	1/6/2006	9.66	95	0.7851	8.13
2	1/13/2006	6.60	55	0.4545	6.89
3	1/20/2006	6.14	52	0.4298	7.00
4	1/27/2006	7.17	78	0.6446	9.99
5	2/3/2006	8.76	138	1.1405	13.02
6	2/10/2006	7.18	66	0.5455	7.59
7	2/17/2006	6.05	42	0.3471	5.74
8	2/24/2006	5.60	29	0.2397	4.28
9	3/3/2006	5.31	40	0.3306	6.23
10	3/10/2006	8.21	66	0.5455	6.64
11	3/17/2006	6.44	51	0.4215	6.55
12	3/24/2006	5.99	39	0.3223	5.38
13	3/31/2006	6.76	54	0.4463	6.60
14	4/7/2006	8.83	82	0.6777	7.68
15	4/14/2006	4.31	15	0.1240	2.87

Range ratio is 100 times total range divided by the average range.

The range ratio index (a single value for the entire sample) can be converted easily to a moving indicator with a lookback period called the *range ratio oscillator.*

$$\text{Range ratio oscillator}_x = \frac{100 \times \text{total range}_x}{(\Sigma \text{ average range}_x - \text{lag to } x/N)}$$

where x = the time index in the interval array
lag = the number of time units in the lookback period

The purpose of the range ratio oscillator is to determine if a market is volatile enough to warrant a market entry order. If the range of the individual intervals is too high in proportion to the range of the lookback period, then this is an indicator that lateral whipsawing may be in progress. For scalpers who traditionally set narrow protective orders, this means that stop-loss limit orders may be triggered very unexpectedly. When the range of the individual intervals is sufficiently low in relation to the range of the lookback period, then stop-loss orders will be triggered only when a well-defined reversal trend has begun.

OBSERVATIONS

Economic news announcements are almost never scheduled for banking holidays, which greatly reduces the volatility and liquidity of the currency markets, even though the markets remain open. Under normal conditions, low-volatility trading periods should be avoided unless there is a perceived advantage to long-term trading (say, over 24 hours).

In the preceding studies, only no. 15 coincided with a holiday (Good Friday). I included study no. 15 simply to illustrate the point that diminished range rarely offers sufficient profits for the risk involved (particularly the automatic loss of the transaction cost).

By excluding the results of study no. 15, I find that in the remaining 14 studies the shockwave breakouts were in an upward direction. In study no. 7 and study no. 10, the shockwave was downward. Since the USD is the second currency in the EURUSD currency pair, this means that public opinion interpreted the news releases as pessimistic 85.7 percent of the time.

Chapter 24
Tick Charts

OVERVIEW

In Chapter 23, the 1-minute OHLC bar charts provide traders with a high-altitude aerial perspective of the shockwave landscape. In this chapter I have intentionally zoomed in to focus on the first 3 minutes of the shockwave phenomenon.

Prices are plotted as a univariate continuous line because there are no OHLC quotes in tick data. The horizontal lines in each chart grid are graduated at 1-pip increments, with the first price in the shockwave identified as a dotted horizontal line. The vertical gradations above the time labels at the bottom of each chart are every 25 ticks.

Descriptive statistics of the 3-minute data follow each chart. Size represents the sum of upticks and downticks during the 3-minute period.

STUDY NO. 1: JANUARY 6, 2006

Figure 24-1 Tick chart, January 6, 2006.

Size	1,000
Open	1.2094
High	1.2142
Low	1.2094
Close	1.2125
Midrange	1.2118
Range	0.0048
Mean	1.2128
Standard deviation	0.0006

STUDY NO. 2: JANUARY 13, 2006

Figure 24-2 Tick chart, January 13, 2006.

Size	781
Open	1.2052
High	1.2068
Low	1.2039
Close	1.2065
Range	0.0029
Mean	1.2053
Standard deviation	0.0009

STUDY NO. 3: JANUARY 20, 2006

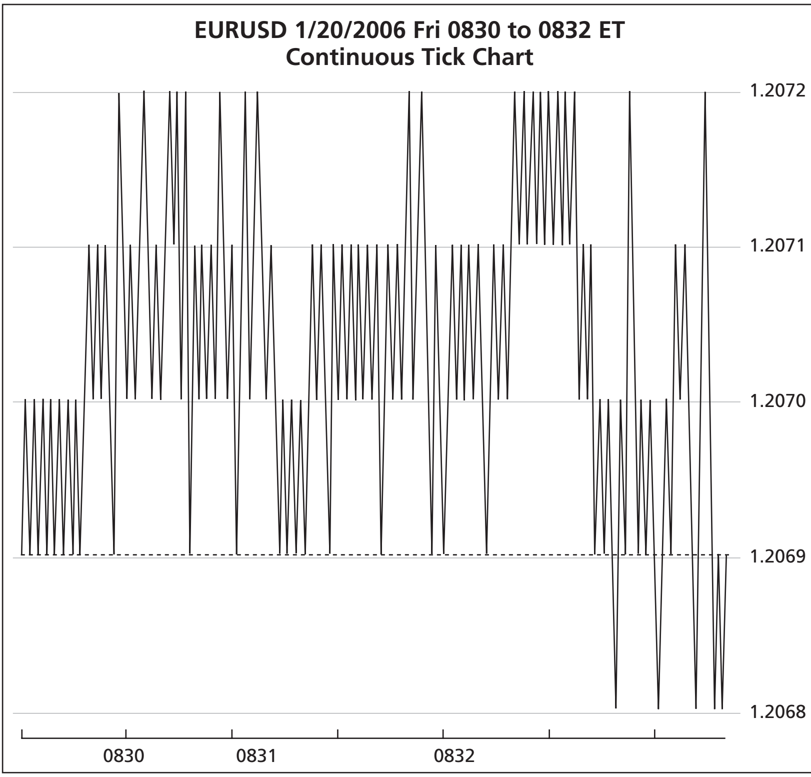

Figure 24-3 Tick chart, January 20, 2006.

Size	168
Open	1.2069
High	1.2072
Low	1.2068
Close	1.2069
Midrange	1.2070
Range	0.0004
Mean	1.2070
Standard deviation	0.0001

STUDY NO. 4: JANUARY 27, 2006

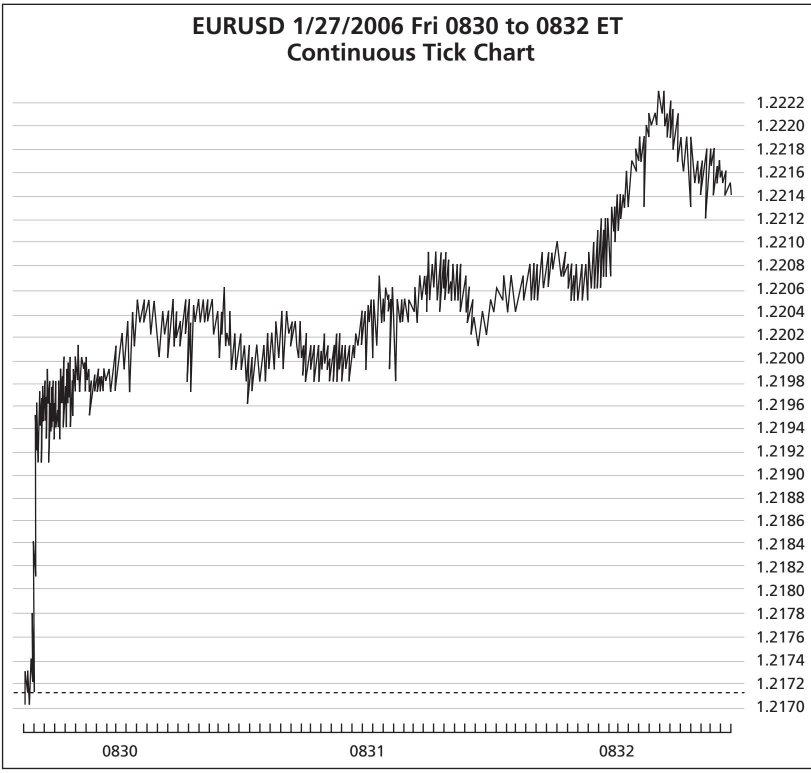

Figure 24-4 Tick chart, January 27, 2006.

Size	1,112
Open	1.2171
High	1.2223
Low	1.2170
Close	1.2214
Midrange	1.2197
Range	0.0053
Mean	1.2205
Standard deviation	0.0008

STUDY NO. 5: FEBRUARY 3, 2006

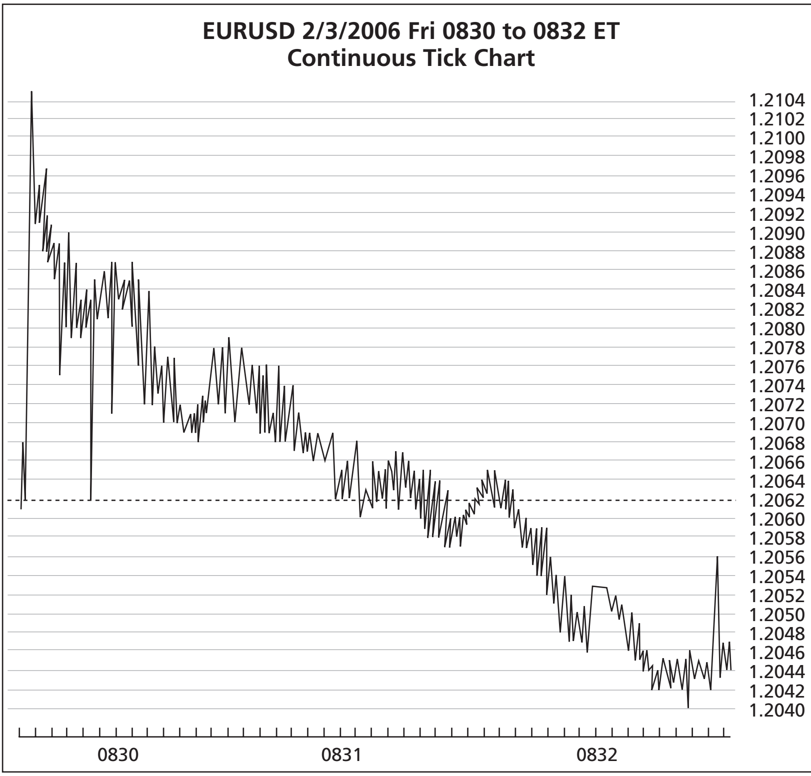

Figure 24-5 Tick chart, February 3, 2006.

Size	1,111
Open	1.2062
High	1.2105
Low	1.2040
Close	1.2046
Midrange	1.2073
Range	0.0065
Mean	1.2064
Standard deviation	0.0013

STUDY NO. 6: FEBRUARY 10, 2006

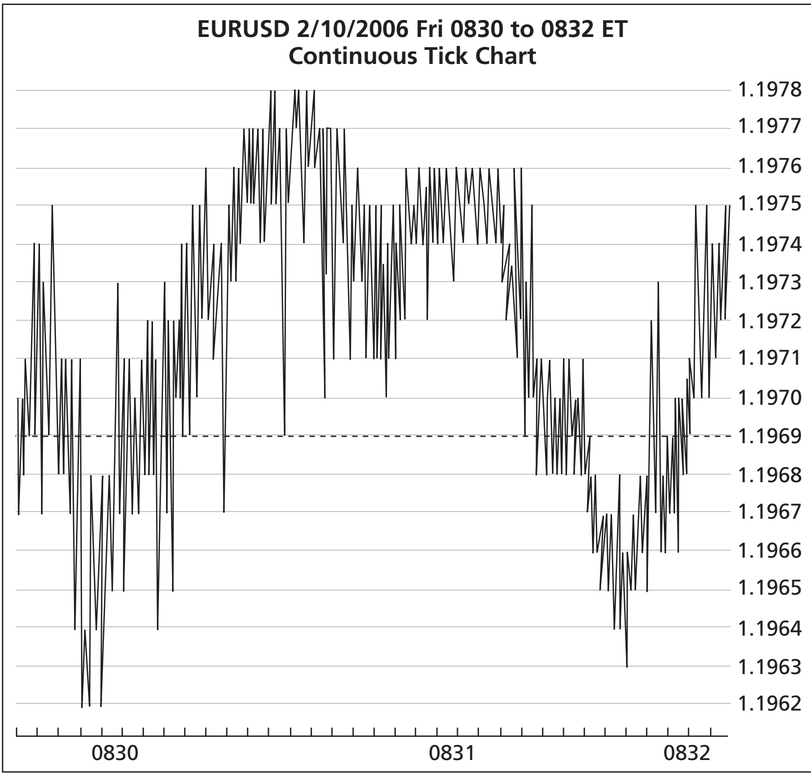

Figure 24-6 Tick chart, February 10, 2006.

Size	849
Open	1.1969
High	1.1978
Low	1.1962
Close	1.1975
Midrange	1.1970
Range	0.0016
Mean	1.1972
Standard deviation	0.0004

STUDY NO. 7: FEBRUARY 17, 2006

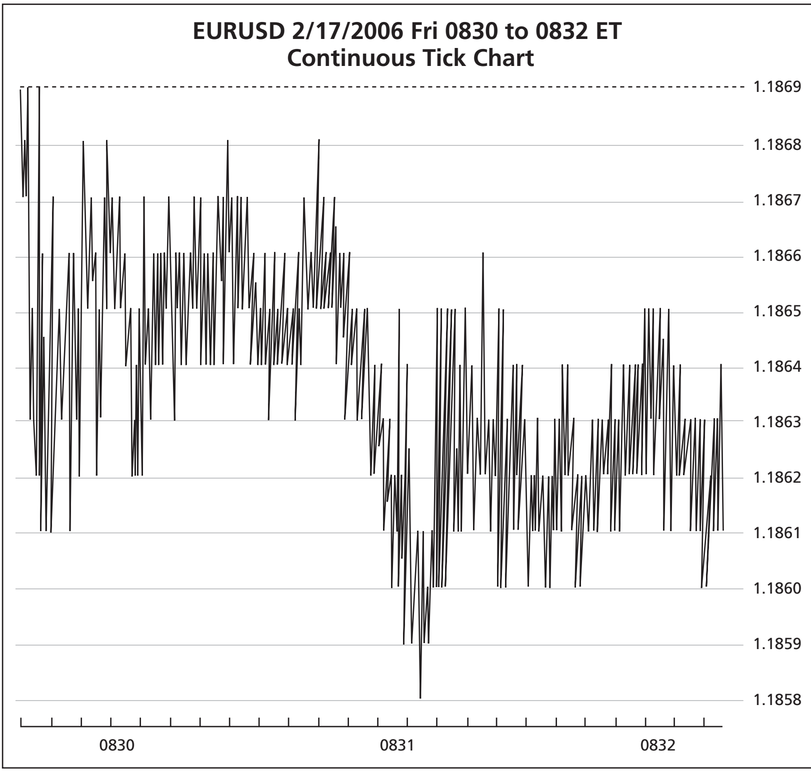

Figure 24-7 Tick chart, February 17, 2006.

Size	592
Open	1.1869
High	1.1869
Low	1.1858
Close	1.1861
Midrange	1.1864
Range	0.0011
Mean	1.1864
Standard deviation	0.0002

STUDY NO. 8: FEBRUARY 24, 2006

Figure 24-8 Tick chart, February 24, 2006.

Size	741
Open	1.1898
High	1.1912
Low	1.1896
Close	1.1905
Midrange	1.1904
Range	0.0016
Mean	1.1904
Standard deviation	0.0003

STUDY NO. 9: MARCH 3, 2006

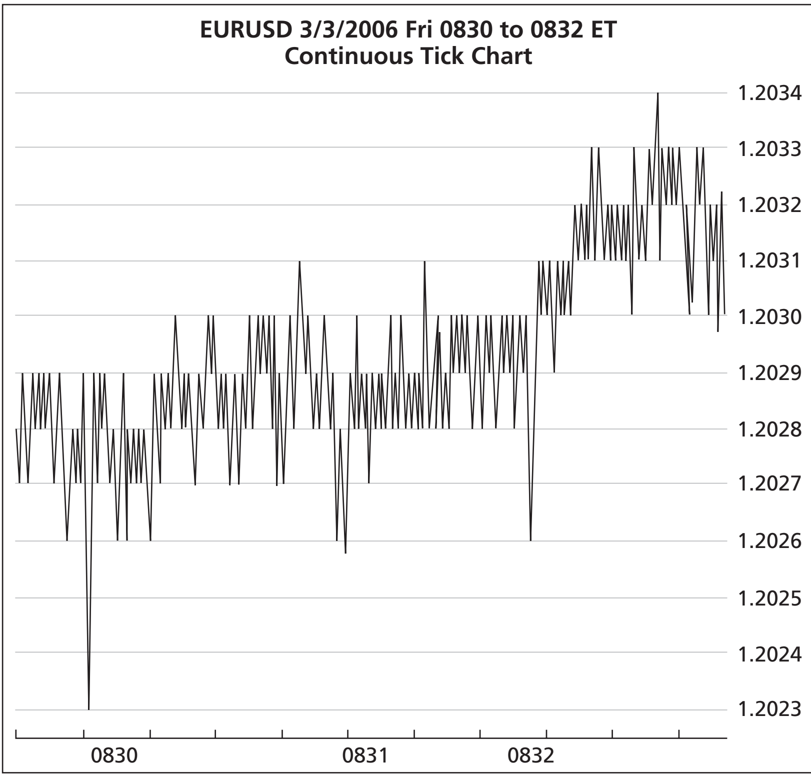

Figure 24-9 Tick chart, March 3, 2006.

Size	268
Open	1.2028
High	1.2034
Low	1.2023
Close	1.2030
Midrange	1.2029
Range	0.0011
Mean	1.2029
Standard deviation	0.0002

STUDY NO. 10: MARCH 10, 2006

Figure 24-10 Tick chart, March 10, 2006.

Size	999
Open	1.1921
High	1.1925
Low	1.1894
Close	1.1905
Midrange	1.1910
Range	0.0031
Mean	1.1907
Standard deviation	0.0006

STUDY NO. 11: MARCH 17, 2006

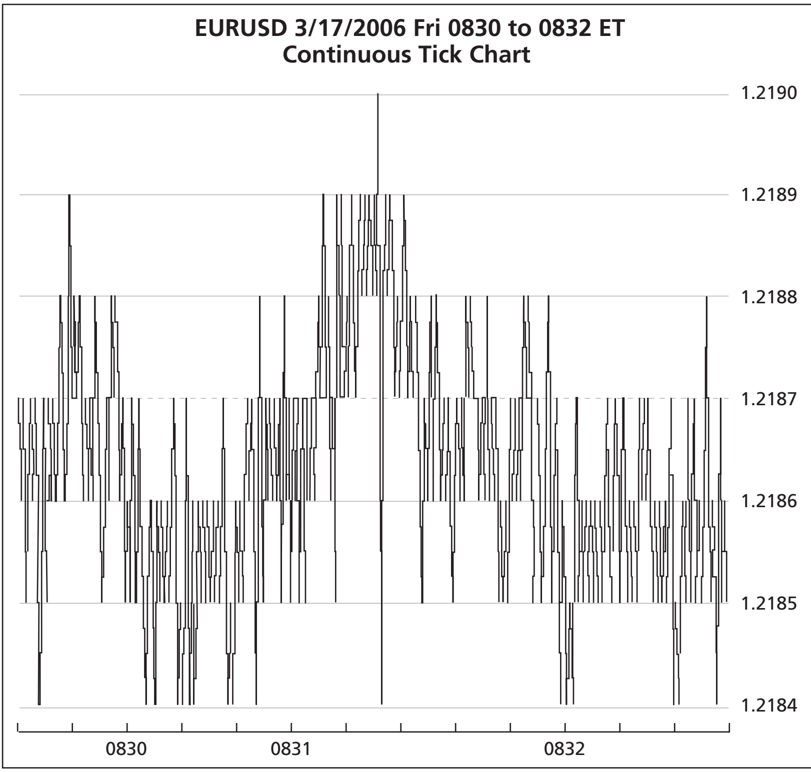

Figure 24-11 Tick chart, March 17, 2006.

Size	308
Open	1.2187
High	1.2190
Low	1.2184
Close	1.2185
Midrange	1.2187
Range	0.0006
Mean	1.2186
Standard deviation	0.0001

STUDY NO. 12: MARCH 24, 2006

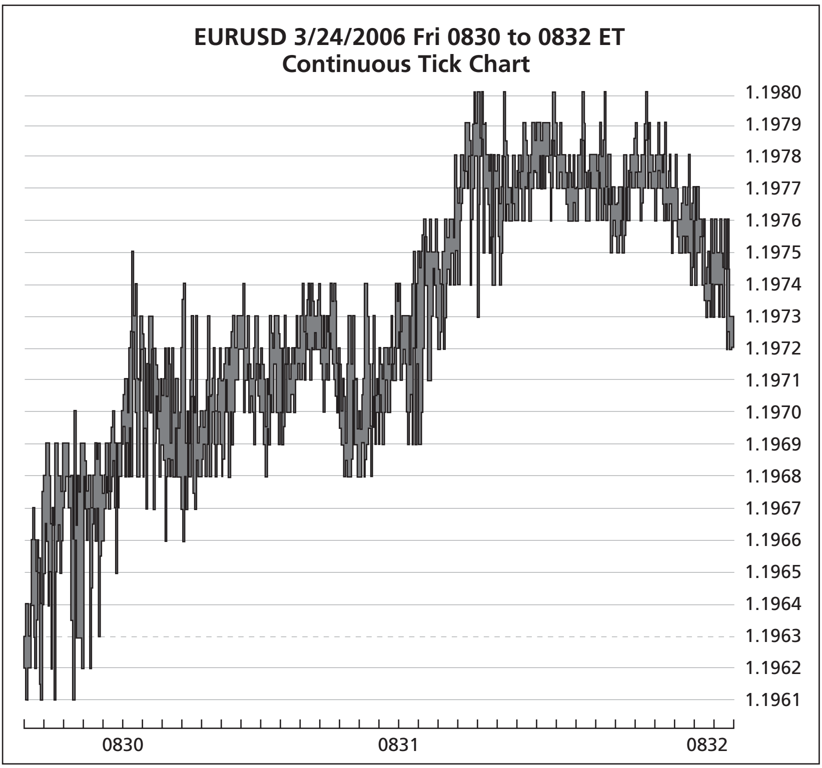

Figure 24-12 Tick chart, March 24, 2006.

Size	868
Open	1.1963
High	1.1980
Low	1.1961
Close	1.1972
Midrange	1.1971
Range	0.0019
Mean	1.1973
Standard deviation	0.0004

STUDY NO. 13: MARCH 31, 2006

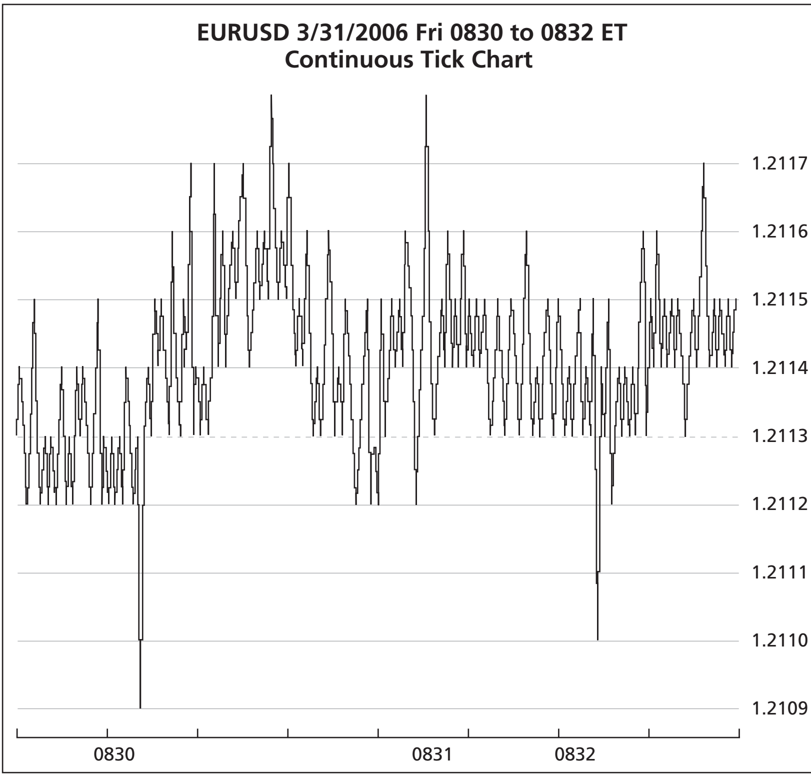

Figure 24-13 Tick chart, March 31, 2006.

Size	204
Open	1.2113
High	1.2118
Low	1.2109
Close	1.2115
Midrange	1.2114
Range	0.0009
Mean	1.2114
Standard deviation	0.0001

STUDY NO. 14: APRIL 7, 2006

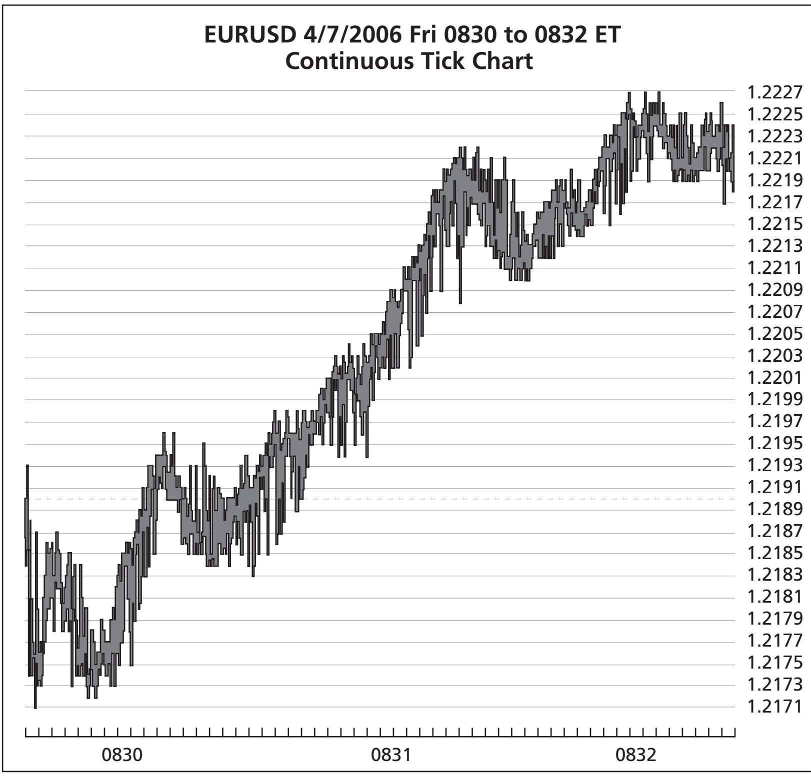

Figure 24-14 Tick chart, April 7, 2006.

Size	1,316
Open	1.2190
High	1.2227
Low	1.2171
Close	1.2219
Midrange	1.2199
Range	0.0056
Mean	1.2203
Standard deviation	0.0016

STUDY NO. 15: APRIL 14, 2006

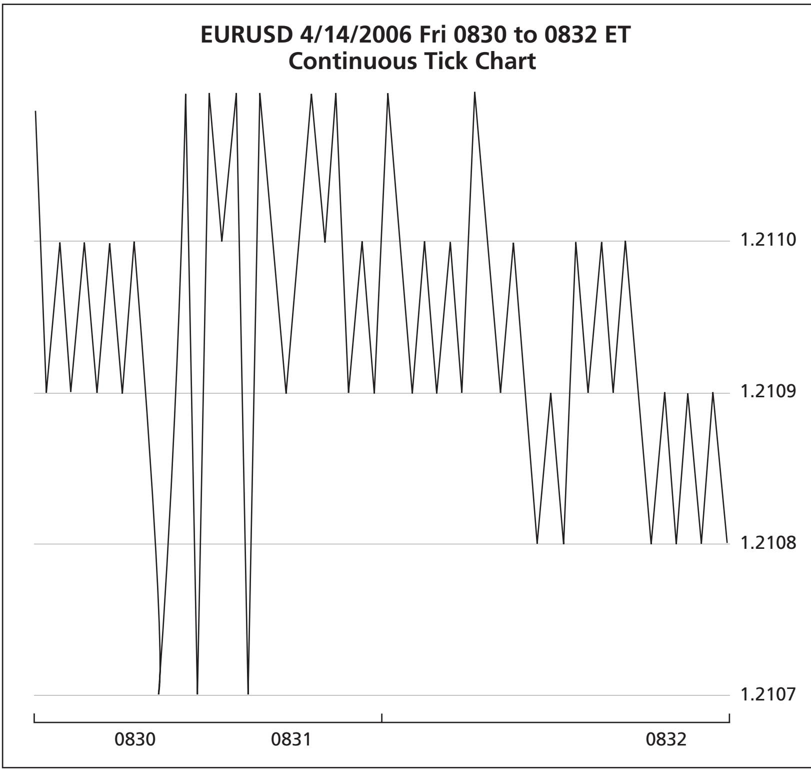

Figure 24-15 Tick chart, April 14, 2006.

Size	56
Open	1.2111
High	1.2111
Low	1.2107
Close	1.2108
Midrange	1.2109
Range	0.0004
Mean	1.2109
Standard deviation	0.0001

SUMMARY OF STATISTICS

See Table 24-1. Size represents the number of upticks and downticks during the critical 3-minute shockwave period.

OBSERVATIONS

If the prevailing price does not move a minimum of 15 pips or more in the EURUSD pair between 8:30 and 8:32 a.m., then it is likely that some anomaly has occurred. First, any or even all of the announcements may have been postponed or canceled without advance warning. Another possibility is that a bizarre state of trading equilibrium has occurred, where orders from buyers and sellers are evenly matched. This can be determined if there is a sharp increase in both upticks and downticks during the 3-minute period.

Using the arbitrary 15-pip divergence constraint on the 15 studies, 6 studies were upward, 2 studies were downward, and the remaining 7 studies failed to satisfy this condition during the first 3 minutes. Nonetheless, the ratio of advances to declines is 3:1.

TABLE 24-1 Summary of Statistics

Study	Date	Size	Open	High	Low	Close	Range	Std Dev
1	1/6/2006	1,000	1.2094	1.2142	1.2094	1.2125	48	6
2	1/13/2006	781	1.2052	1.2068	1.2039	1.2065	29	9
3	1/20/2006	168	1.2069	1.2072	1.2068	1.2069	4	1
4	1/27/2006	1,112	1.2171	1.2223	1.2170	1.2214	53	8
5	2/3/2006	1,111	1.2062	1.2105	1.2040	1.2046	65	13
6	2/10/2006	849	1.1969	1.1978	1.1962	1.1975	16	4
7	2/17/2006	592	1.1869	1.1869	1.1858	1.1861	11	2
8	2/24/2006	741	1.1898	1.1912	1.1896	1.1905	16	3
9	3/3/2006	268	1.2028	1.2034	1.2023	1.2030	11	2
10	3/10/2006	999	1.1921	1.1925	1.1894	1.1905	31	6
11	3/17/2006	308	1.2187	1.2190	1.2184	1.2185	6	1
12	3/24/2006	868	1.1963	1.1980	1.1961	1.1972	19	4
13	3/31/2006	204	1.2113	1.2118	1.2109	1.2115	9	1
14	4/7/2006	1,316	1.2190	1.2227	1.2171	1.2219	56	16
15	4/14/2006	56	1.2111	1.2111	1.2107	1.2108	4	1

Another peculiarity that can plague scalpers who usually keep narrow stop-loss orders is a phenomenon that I have named *icicles.* These occur when a distinct trend has developed, and sharp single breakouts exhibit themselves in the opposite direction. Icicles are the nemesis of traders who employ the trailing-stops technique, in which traders continually move stop-loss orders in the direction of the trend. Examples of profit-depleting icicles can be seen in studies 6, 10, and 14.

PART 6
Shockwave Swing Data

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Chapter 25
Swing Charts

OVERVIEW

In the preceding two chapters, shockwave data were presented in their most pristine form: OHLC and tick charts. Readers are most likely intrigued with the diversity of form by which a shockwave can exhibit itself along both the *x* axis and the *y* axis.

In this chapter I have applied wave theory to the shockwave data between 8:30 and 8:59 a.m. ET. This is not an arbitrarily selected time frame. In the studies where a decisive shockwave and its reactive phase are visibly discernible, the phenomena occurred during this period.

The standard swing reversal algorithm described in Chapter 15 was applied to all 15 studies. Either a 10- or 15-pip reversal amount was employed with only one exception (study no. 5 uses an 18-pip reversal amount). The resulting Forex wave theory nomenclature is displayed inside square brackets in the chart headed "Study No. 1: January 6, 2006."

STUDY NO. 1: JANUARY 6, 2006

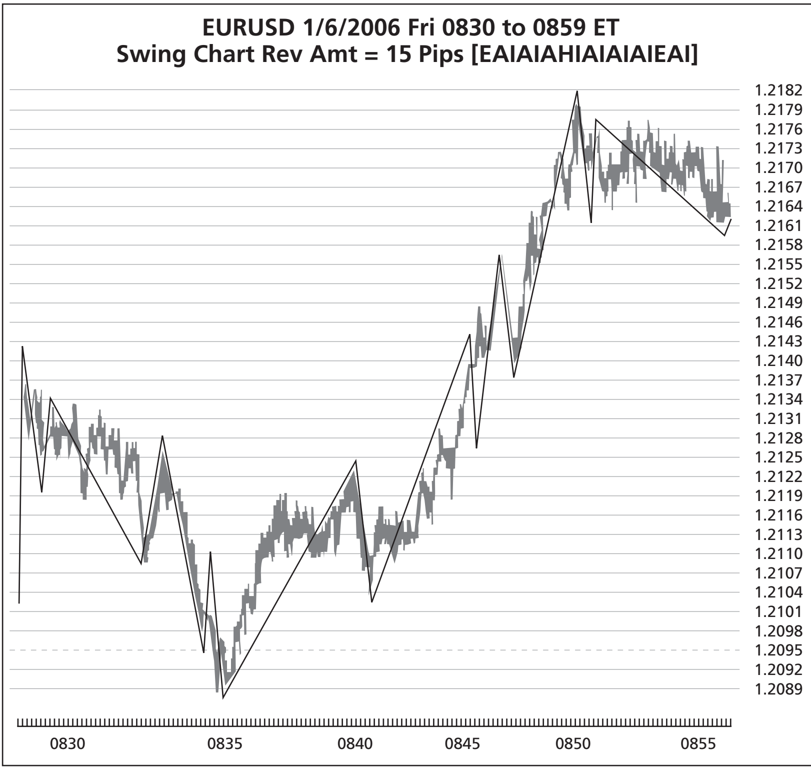

Figure 25-1 Swing chart, January 6, 2006.

Size	7,831
Open	1.2094
High	1.2182
Low	1.2087
Close	1.2162
Midrange	1.2135
Range	0.0095
Mean	1.2133
Standard deviation	0.0025

STUDY NO. 2: JANUARY 13, 2006

Figure 25-2 Swing chart, January 13, 2006.

Size	3,865
Open	1.2052
High	1.2090
Low	1.2039
Close	1.2063
Midrange	1.2065
Range	0.0051
Mean	1.2069
Standard deviation	0.0010

STUDY NO. 3: JANUARY 20, 2006

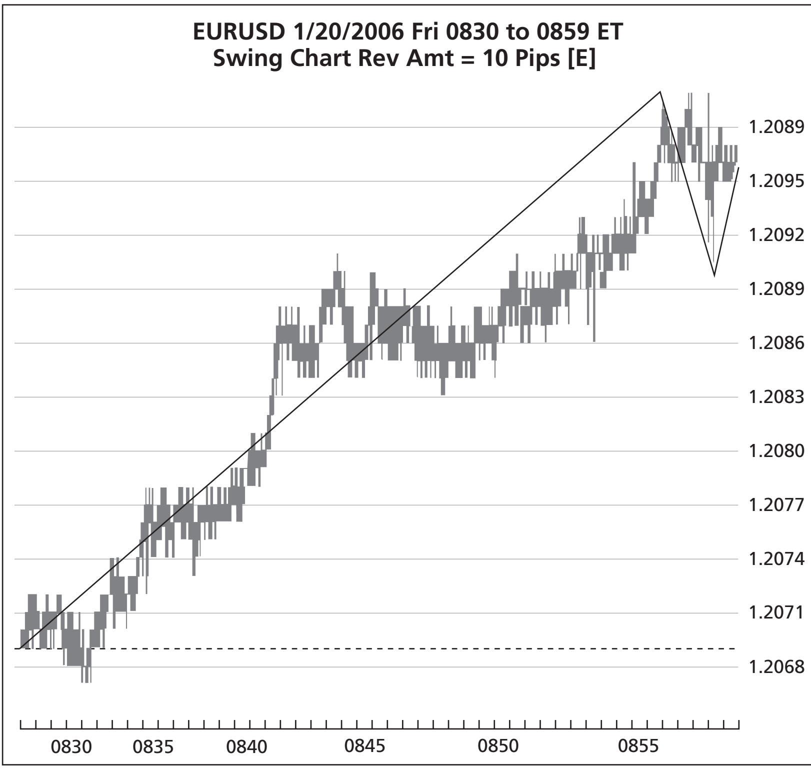

Figure 25-3 Swing chart, January 20, 2006,

Size	2,352
Open	1.2069
High	1.2100
Low	1.2066
Close	1.2096
Midrange	1.2083
Range	0.0034
Mean	1.2084
Standard deviation	0.0008

STUDY NO. 4: JANUARY 27, 2006

Figure 25-4 Swing chart, January 27, 2006.

Size	6,222
Open	1.2171
High	1.2238
Low	1.2170
Close	1.2220
Midrange	1.2204
Range	0.0068
Mean	1.2218
Standard deviation	0.0010

STUDY NO. 5: FEBRUARY 3, 2006

Figure 25-5 Swing chart, February 3, 2006.

Size	7,772
Open	1.2062
High	1.2105
Low	1.1997
Close	1.2008
Midrange	1.2051
Range	0.0108
Mean	1.2032
Standard deviation	0.0017

STUDY NO. 6: FEBRUARY 10, 2006

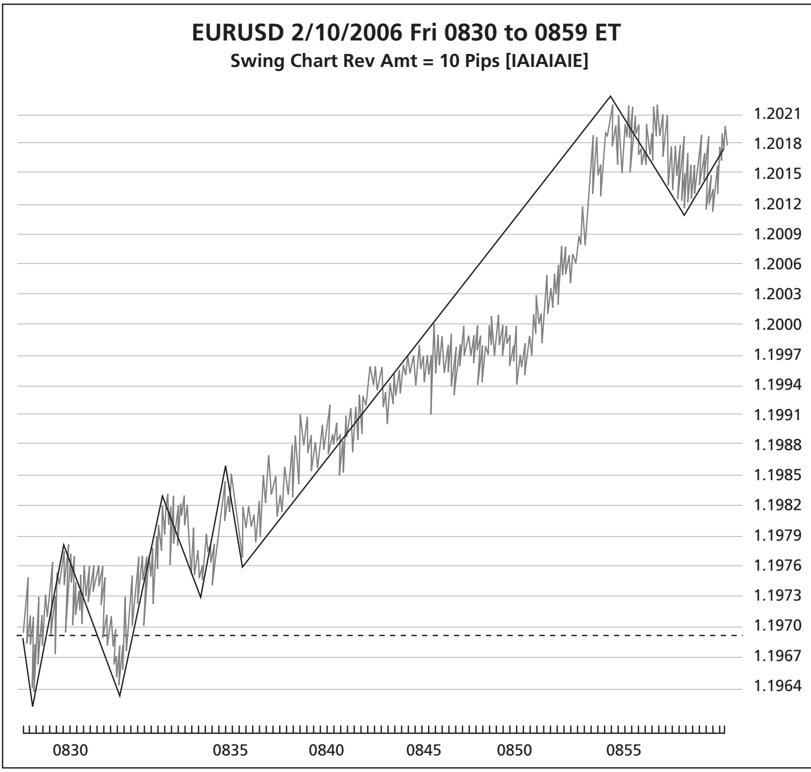

Figure 25-6 Swing chart, February 10, 2006.

Size	5,208
Open	1.1969
High	1.2023
Low	1.1962
Close	1.2018
Midrange	1.1993
Range	0.0061
Mean	1.1993
Standard deviation	0.0016

STUDY NO. 7: FEBRUARY 17, 2006

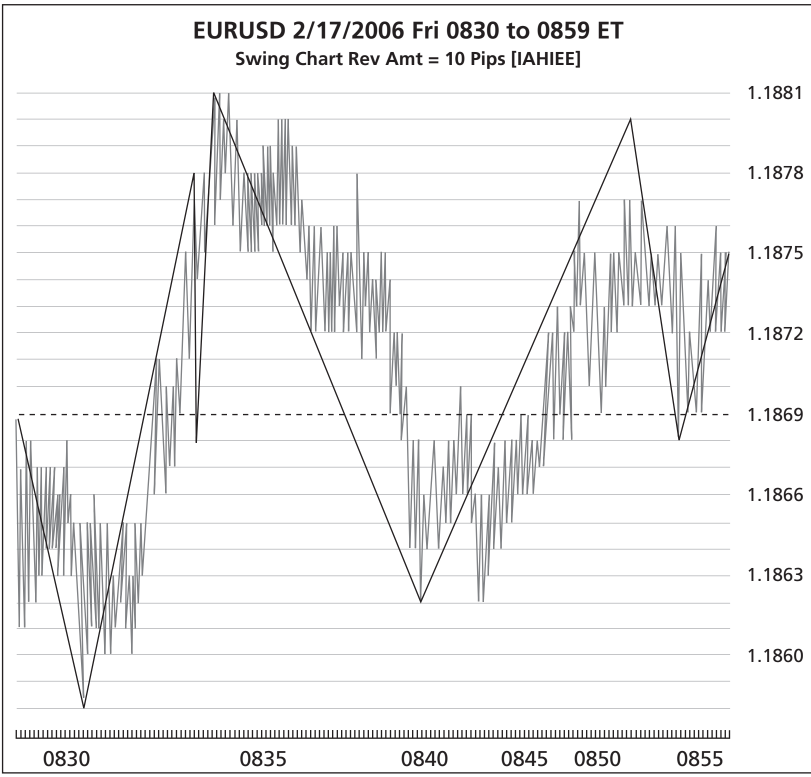

Figure 25-7 Swing chart, February 17, 2006.

Size	3,546
Open	1.1869
High	1.1881
Low	1.1858
Close	1.1875
Midrange	1.1870
Range	0.0023
Mean	1.1870
Standard deviation	0.0005

STUDY NO. 8: FEBRUARY 24, 2006

Figure 25-8 Swing chart, February 24, 2006.

Size	3,833
Open	1.1898
High	1.1916
Low	1.1887
Close	1.1898
Midrange	1.1902
Range	0.0029
Mean	1.1901
Standard deviation	0.0006

STUDY NO. 9: MARCH 3, 2006

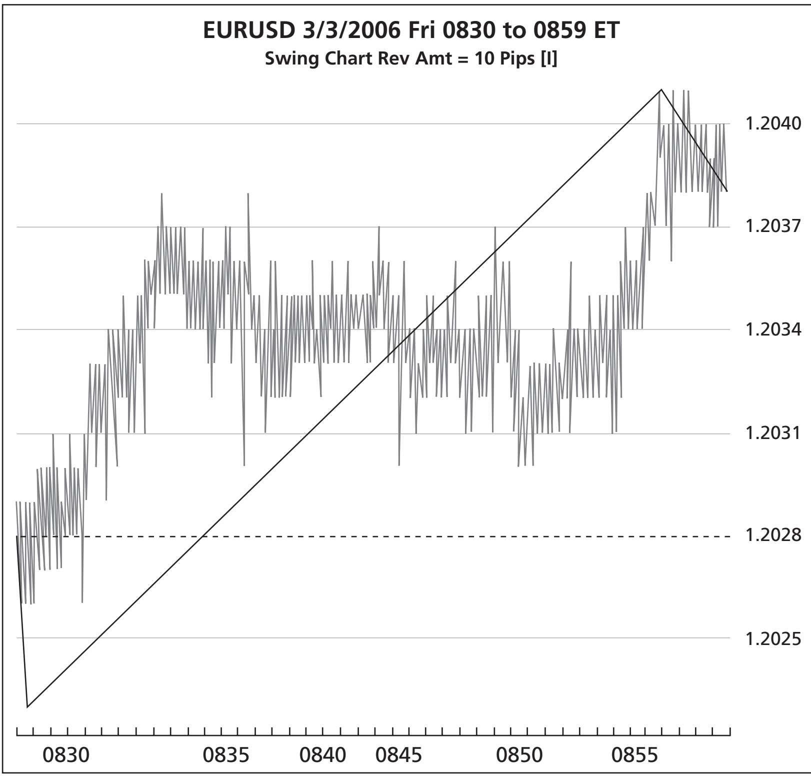

Figure 25-9 Swing chart, March 3, 2006.

Size	2,100
Open	1.2028
High	1.2041
Low	1.2023
Close	1.2038
Midrange	1.2032
Range	0.0018
Mean	1.2034
Standard deviation	0.0003

STUDY NO. 10: MARCH 10, 2006

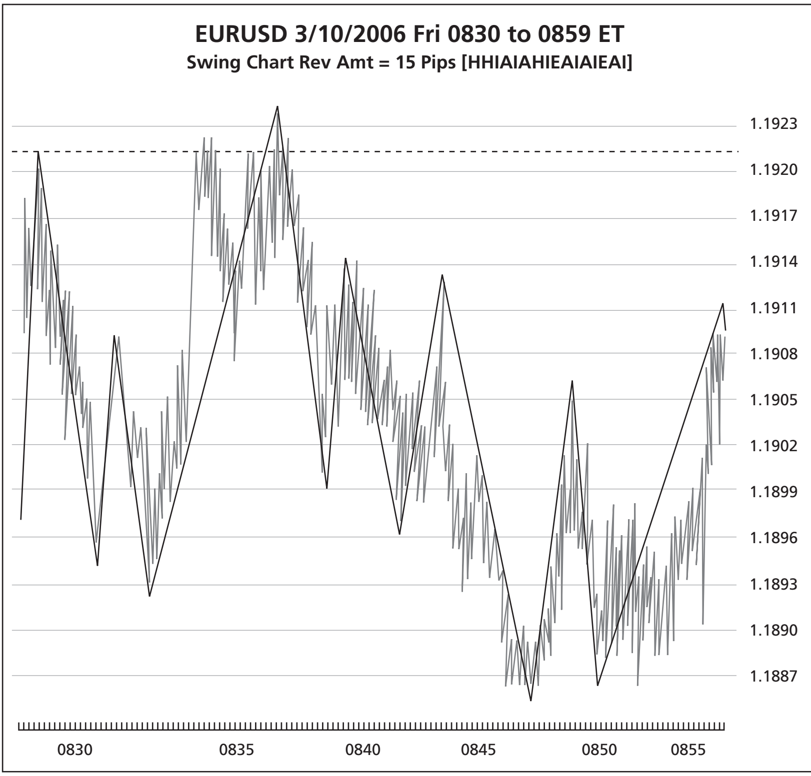

Figure 25-10 Swing chart, March 10, 2006.

Size	6,859
Open	1.1921
High	1.1925
Low	1.1885
Close	1.1909
Midrange	1.1905
Range	0.0040
Mean	1.1903
Standard deviation	0.0009

STUDY NO. 11: MARCH 17, 2006

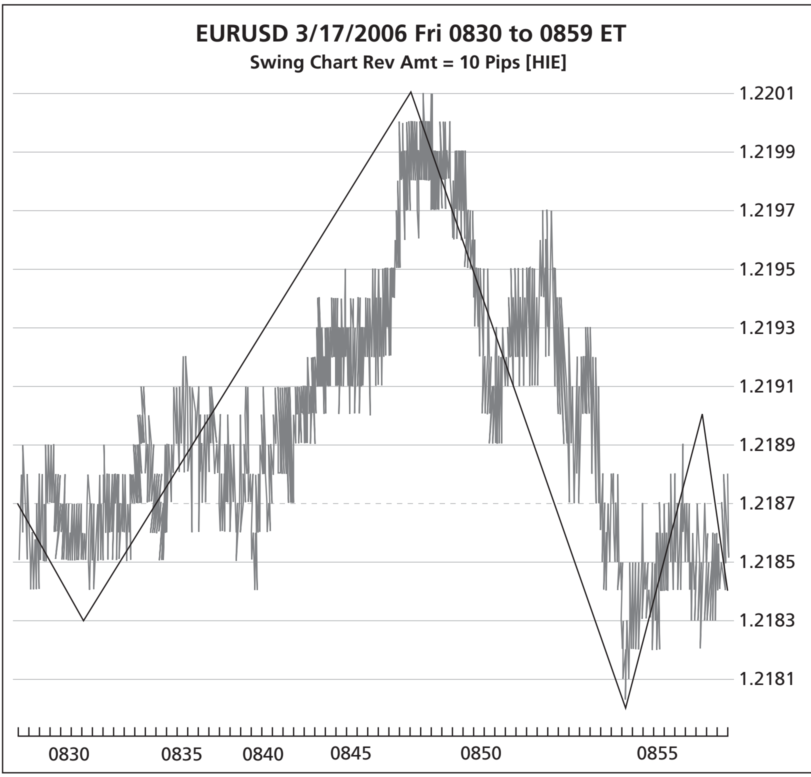

Figure 25-11 Swing chart, March 17, 2006.

Size	3,393
Open	1.2187
High	1.2201
Low	1.2180
Close	1.2184
Midrange	1.2191
Range	0.0021
Mean	1.2190
Standard deviation	0.0004

STUDY NO. 12: MARCH 24, 2006

Figure 25-12 Swing chart, March 24, 2006.

Size	4,863
Open	1.1963
High	1.1990
Low	1.1951
Close	1.1968
Midrange	1.1971
Range	0.0039
Mean	1.1971
Standard deviation	0.0008

STUDY NO. 13: MARCH 31, 2006

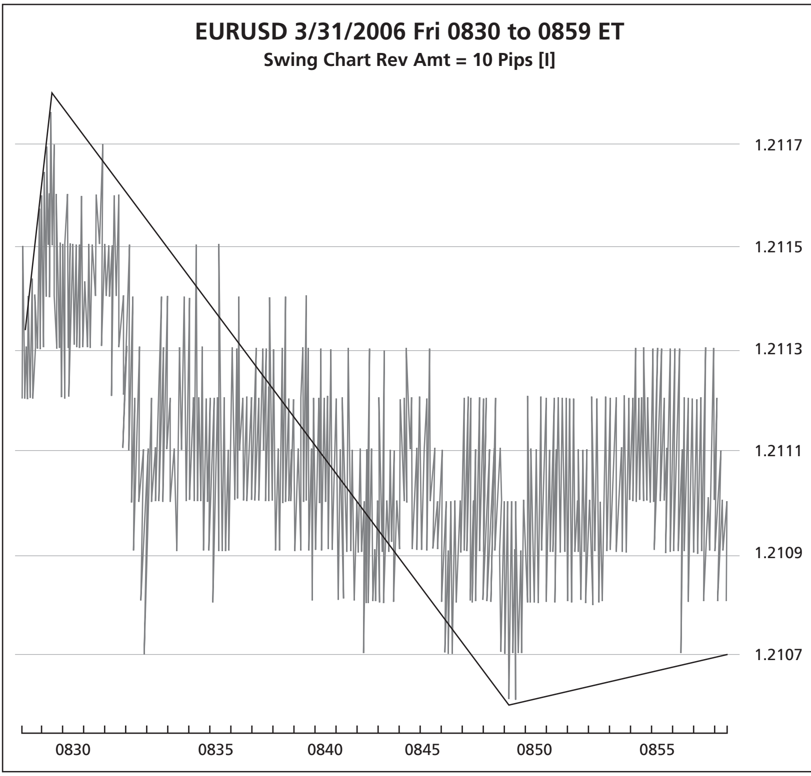

Figure 25-13 Swing chart, March 31, 2006.

Size	1,681
Open	1.2113
High	1.2118
Low	1.2106
Close	1.2107
Midrange	1.2112
Range	0.0012
Mean	1.2111
Standard deviation	0.0002

STUDY NO. 14: APRIL 7, 2006

Figure 25-14 Swing chart, April 7, 2006.

Size	8,669
Open	1.2190
High	1.2227
Low	1.2171
Close	1.2194
Midrange	1.2199
Range	0.0056
Mean	1.2205
Standard deviation	0.0010

STUDY NO. 15: APRIL 14, 2006

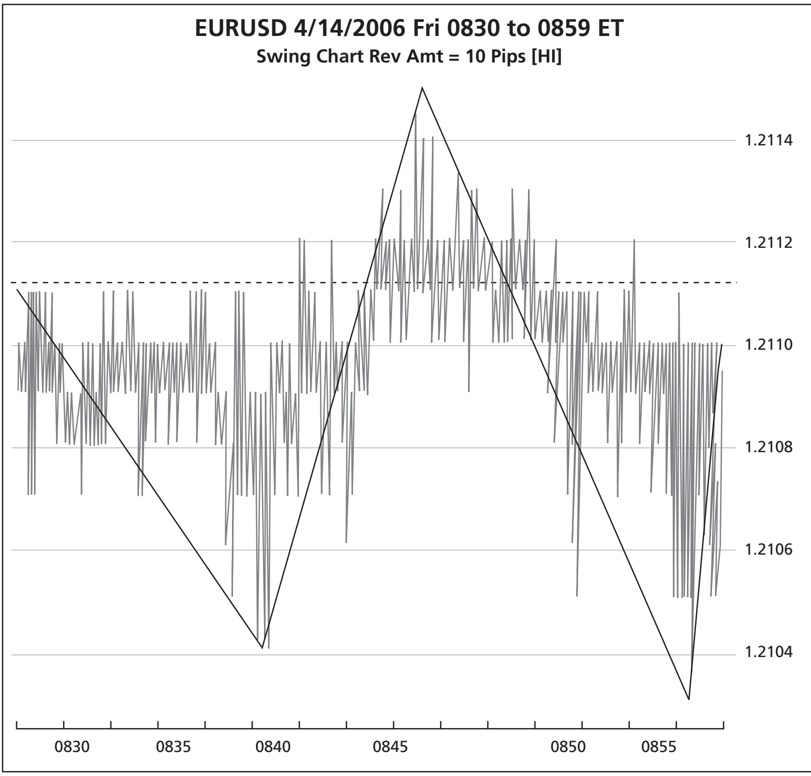

Figure 25-15 Swing chart, April 14, 2006.

Size	726
Open	1.2111
High	1.2115
Low	1.2103
Close	1.2110
Midrange	1.2109
Range	0.0012
Mean	1.2110
Standard deviation	0.0002

SUMMARY OF STATISTICS

See Table 25-1.

TABLE 25-1 Summary of Statistics

Study	Date	Size	High	Low	Range	Std Dev	Cycle ID
1	1/6/2006	7,831	1.2182	1.2087	95	25	EAIAIAHIAIAIAIEAI
2	1/13/2006	3,865	1.2090	1.2039	51	10	IAIEAIE
3	1/20/2006	2,352	1.2100	1.2066	34	8	E
4	1/27/2006	6,222	1.2238	1.2170	68	10	FIAIEAHIAHIEAHI
5	2/3/2006	7,772	1.2105	1.1997	108	17	IEAIAHIAHI
6	2/10/2006	5,208	1.2023	1.1962	61	16	IAIAIAIE
7	2/17/2006	3,546	1.1881	1.1858	23	5	IAHIEE
8	2/24/2006	3,833	1.1916	1.1887	29	6	HGDAIE
9	3/3/2006	2,100	1.2041	1.2023	18	3	I
10	3/10/2006	6,859	1.1925	1.1885	40	9	HHIAIAHIEAIAIEAI
11	3/17/2006	3,393	1.2201	1.2180	21	4	HIE
12	3/24/2006	4,863	1.1990	1.1951	39	8	ICDAIEAIE
13	3/31/2006	1,681	1.2118	1.2106	12	2	I
14	4/7/2006	8,669	1.2227	1.2171	56	10	IEAHIEE
15	4/14/2006	726	1.2115	1.2103	12	2	HI

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Chapter 26
Shockwave Observations

OVERVIEW

The ideal shockwave is by definition the swing pattern that generates the greatest profit. It would consist of a clearly defined surge with only negligible retracements of less than 8 pips or so until it reaches its peak or valley. During this phase, traders hopefully will have time to adjust trailing stop-loss orders online to protect earned gains, keeping the stop-loss price a distance of roughly 10 to 15 pips away from the prevailing price.

Next will follow a very short period of small minor lateral movements indicating that the driving forces behind the price surge are beginning to dissipate. This is equivalent to the change in the arithmetic sign of the slope of a trajectory.

Last but not least, there should be a reactive phase that moves contrary to the original outburst but on a more gradual slope. Traders then can exit voluntarily or allow their stop-loss orders to be triggered. In the ideal shockwave, traders will reverse their positions and ride the reaction phase back to the point of origin.

For the most part, the ideal shockwave with a complementary retracement phase is a mythic concept. However, studies 2, 7, 10, 11, and 14 do come close to approximating this ideal.

FRACTAL LEVELS

Swing data should be analyzed using different fractal levels. This is accomplished by incrementing or decrementing the minimum reversal amount in the swing reversal algorithm. In Figures 26-1 and 26-2, I applied a 10- and a 15-pip reversal amount to the same underlying data.

An increase of just 5 pips in the reversal amount caused a dramatic decrease in the number of diagonal waves, from 15 waves in Figure 26-1 to only 4 waves in Figure 26-2. The selection of minimum reversal amount is a function of the traders' financial goals

Figure 26-1 Ten-pip minimum reversal amount.

Figure 26-2 Fifteen-pip minimum reversal amount.

and their propensity to the risk factor involved. The minimum reversal amount also assists traders in determining where to set the stop loss and take profit limit orders.

MAXIMA AND MINIMA

I will assume arbitrarily that if the causal forces are in fact present (i.e., several announcements were released on time, and they did not cancel each other out), the resulting shockwave and its corresponding reaction will both occur between 8:30 and 9:00 a.m. Table 26-1 lists the times when both extremes occurred for all 15 studies.

TABLE 26-1 Maxima and Minima Amounts and Times

Study	Date	Maximum	Max Time	Minimum	Min Time
1	1/6/2006	87	0853	−8	0837
2	1/13/2006	40	0841	−11	0831
3	1/20/2006	29	0858	−5	0834
4	1/27/2006	67	0843	−5	0830
5	2/3/2006	43	0831	−65	0900
6	2/10/2006	51	0857	−10	0831
7	2/17/2006	11	0835	−12	0823
8	2/24/2006	19	0836	−10	0847
9	3/3/2006	13	0858	−5	0831
10	3/10/2006	3	0830	−37	0850
11	3/17/2006	16	0850	−5	0856
12	3/24/2006	24	0841	−15	0852
13	3/31/2006	3	0831	−9	0851
14	4/7/2006	42	0833	−14	0831
15	4/14/2006	4	0848	−8	0859

Strangely enough, the standard deviation of the maximum values is 24.8 pips, whereas the standard deviation of the minimum values is only 16.0 pips. There is a distinct statistical tendency for shockwave uptrends (the maxima) to diverge higher from the 8:30 a.m. opening price than there is to diverge lower in shockwave downtrends (the minima). However, this assumption may be slightly premature because the sample size is only 15 data studies.

SWING VELOCITY

Swing velocity is the speed at which prices travel from one diagonal vertex to the next diagonal vertex (see Figure 26-3).

Each reversal point in a swing reversal chart (a peak or a valley) can be expressed in terms of Cartesian coordinate x, y pairs. In Figure 26-1, the swing diagonal begins at $x1$, $y1$ and ends at $x2$, $y2$. The slope of the diagonal line determines its swing velocity. Mathematically, this is described as the change in price divided by the time elapsed or

$$\text{Slope} = (y2 - y1)/(x2 - x1)$$

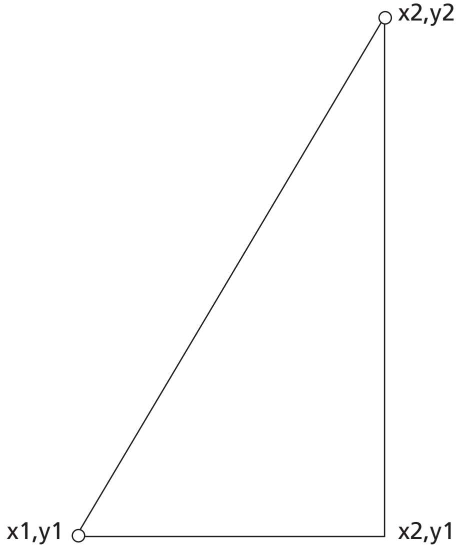

Figure 26-3 Swing velocity.

Price is measured in pips, and time is measured in ticks. On reexamination of the swing charts in Chapter 25, I find that the slope ranged from +48 (study no 6) to –23 (study no. 7). The absolute value of the slope of each diagonal is a valid indicator of the volatility during that time interval. High slope values indicate periods of high profitability (or loss). Low slope values indicate periods of lateral congestion.

Optionally, swing velocity can be "normalized" as the output of a simple trigonometric function:

$$\Theta = \arctan(\text{slope})$$

where values for angle Θ range from less than +90 to greater than –90 degrees.

BLIND TRADING

I coined this rather ominous sounding phrase to describe a trading strategy that may not be suitable to all traders' dispositions. The *blind* modifier indicates that the trader is entering the market with a minimum of fundamental information on the current market situation. In the preceding 15 studies, I determined that the Friday, 8:30 a.m. shockwave rallied 85.7 percent of the time (see "Observations" in Chapter 23).

The blind trading strategy can be tested using the demo account that nearly all currency dealers provide for their clients. The steps are

- At 8:29 a.m., enter the market long.
- Set the stop-loss limit order at 10 to 12 pips below the market entry price.
- Place a take-profit limit order at 45 pips above the market entry price.
- If the prevailing price rises to 15 pips above the market entry price, raise the stop-loss limit order to 5 pips above the market entry price. If the market makes it this far, then a no-loss scenario has been achieved.
- If the prevailing price advances to 25 pips above the market entry price, raise the stop-loss limit order to 15 pips above the market entry price.
- If the prevailing price advances to 35 pips above the market entry price, raise the stop-loss limit order to 25 pips above the market entry price.
- If the prevailing market price makes it this far, then it is time to adjust the take-profit limit order, which should be raised to 60 pips above the market entry price.

Depending on the strength and altitude of the shockwave, traders may opt to exit the market manually or wait until the prevailing price triggers a trailing stop-loss limit order.

Many traders probably are pondering why set a take-profit limit order at all. The reason is that it is a defense mechanism against the highly improbable but possible loss of the connection to the online trading platform. This heart-breaking electrical/electronic malfunction has disastrous repercussions and has happened only twice since I began trading spot currencies in 2001. The first time was a home system failure, and the second time was an incredibly brief breakdown at my Internet service provider.

During a power outage anywhere along the communications link, it is possible that the market will trigger the take-profit limit order and reverse back to the market entry point or lower. This is why traders should never initiate a new trade without both a stop-loss and a take-profit limit order. When setting a take-profit limit order, make certain that it is a realistic distance from the prevailing price (usually less than 45 pips in the EURUSD currency pair during high-volatility trading sessions).

RETRACEMENT TRADING

Using Newton's law about an equal and opposite reaction for every action, many traders may be inclined to wait until the news shockwave has declared its initial price direction. Then, at the shockwave's zenith or nadir, they enter the market in the opposite direction. By examining the swing charts in Chapter 25, you can see that it is possible to net 15 to 20 pips on the shockwave's reaction phase. Again, this must be thoroughly tested via the dealer's demo account.

The trading prowess in retracement trading lies in the ability to determine exactly when the shockwave has reached its peak or valley. The maxima and minima table presented earlier may assist traders in this assessment.

INFORMED TRADING

When traders have informed insight into the likelihood of the news announcement numbers, the dilemma of which position to initiate is greatly reduced. Several news agencies and cable stations broadcast timely opinions on predicted changes in price directionality. Always recall that announcements that indicate a beneficial influence on the U.S. economy mean a decline in the EURUSD pair, and vice versa.

The strategy for "informed" trading is to monitor one or more news agencies, financial narrators, or broadcast networks starting at 8:00 a.m. Maintain detailed records of the preshockwave forecasts for each agency. At 10:00 a.m., display the EURUSD chart in the currency dealer's trading platform, and record the performance of each agency. After several weeks, traders will have a good idea of whose forecasts warrant credibility and whose do not.

CAVEAT

I admit that the current work on news release shockwaves is not an overly exhaustive compendium of detailed research on the topic. I confined my studies to the single currency pair EURUSD and the time frame 8:00 to 10:00 a.m. on Fridays. Nonetheless, it does provide traders with a very diversified introduction to trading the most volatile time frames in the world's largest financial market.

Appendices

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Appendix A
ISO Currency Pairs

This is a list of global currencies and the three-character currency codes that I have found are generally used to represent them. Often, but not always, this code is the same as the ISO 4217 standard. (The ISO, or International Organization for Standardization, is a worldwide federation of national standards.)

In most cases, the currency code is composed of the country's two-character Internet country code plus an extra character to denote the currency unit. For example, the code for Canadian dollars is simply Canada's two-character Internet country code (CA) plus a one-character currency designator (D).

I have endeavored to list the codes that, in my experience, are actually in general industry use to represent the currencies. Currency names are given in the plural form. This list does not contain obsolete Euro-zone currencies.

TABLE A-1 World Currencies

Symbol	Region/Country	Currency Name
AED	United Arab Emirates	Dirhams
AFA	Afghanistan	Afghanis
ALL	Albania	Leke
AMD	Armenia	Drams
ANG	Netherlands Antilles	Guilders
AOA	Angola	Kwanza
ARS	Argentina	Pesos
AUD	Australia	Dollars

Cont.

Symbol	Region/Country	Currency Name
AWG	Aruba	Guilders
AZM	Azerbaijan	Manats
BAM	Bosnia, Herzegovina	Convertible marka
BBD	Barbados	Dollars
BDT	Bangladesh	Taka
BGN	Bulgaria	Leva
BHD	Bahrain	Dinars
BIF	Burundi	Francs
BMD	Bermuda	Dollars
BND	Brunei Darussalam	Dollars
BOB	Bolivia	Bolivianos
BRL	Brazil	Brazil real
BSD	Bahamas	Dollars
BTN	Bhutan	Ngultrum
BWP	Botswana	Pulas
BYR	Belarus	Rubles
BZD	Belize	Dollars
CAD	Canada	Dollars
CDF	Congo/Kinshasa	Congolese francs
CHF	Switzerland	Francs
CLP	Chile	Pesos
CNY	China	Renminbi
COP	Colombia	Pesos
CRC	Costa Rica	Colones
CUP	Cuba	Pesos
CVE	Cape Verde	Escudos
CYP	Cyprus	Pounds
CZK	Czech Republic	Koruny
DJF	Djibouti	Francs
DKK	Denmark	Kroner
DOP	Dominican Republic	Pesos
DZD	Algeria	Algeria dinars
EEK	Estonia	Krooni
EGP	Egypt	Pounds
ERN	Eritrea	Nakfa
ETB	Ethiopia	Birr
EUR	Euro member countries	Euro
FJD	Fiji	Dollars
FKP	Falkland Islands	Pounds
GBP	United Kingdom	Pounds
GEL	Georgia	Lari
GGP	Guernsey	Pounds
GHC	Ghana	Cedis

Symbol	Region/Country	Currency Name
GIP	Gibraltar	Pounds
GMD	Gambia	Dalasi
GNF	Guinea	Francs
GTQ	Guatemala	Quetzales
GYD	Guyana	Dollars
HKD	Hong Kong	Dollars
HNL	Honduras	Lempiras
HRK	Croatia	Kuna
HTG	Haiti	Gourdes
HUF	Hungary	Forint
IDR	Indonesia	Rupiahs
ILS	Israel	New shekels
IMP	Isle of Man	Pounds
INR	India	Rupees
IQD	Iraq	Dinars
IRR	Iran	Rials
ISK	Iceland	Kronur
JEP	Jersey	Pounds
JMD	Jamaica	Dollars
JOD	Jordan	Dinars
JPY	Japan	Yen
KES	Kenya	Shillings
KGS	Kyrgyzstan	Soms
KHR	Cambodia	Riels
KMF	Comoros	Francs
KPW	Korea (North)	Won
KRW	Korea (South)	Won
KWD	Kuwait	Dinars
KYD	Cayman Islands	Dollars
KZT	Kazakstan	Tenge
LAK	Laos	Kips
LBP	Lebanon	Pounds
LKR	Sri Lanka	Rupees
LRD	Liberia	Dollars
LSL	Lesotho	Maloti
LTL	Lithuania	Litai
LVL	Latvia	Lati
LYD	Libya	Dinars
MAD	Morocco	Dirhams
MDL	Moldova	Lei
MGA	Madagascar	Ariary
MKD	Macedonia	Denars
MMK	Myanmar (Burma)	Kyats

Cont.

Symbol	Region/Country	Currency Name
MNT	Mongolia	Tugriks
MOP	Macau	Patacas
MRO	Mauritania	Ouguiyas
MTL	Malta	Liri
MUR	Mauritius	Rupees
MVR	Maldives	Rufiyaa
MWK	Malawi	Kwachas
MXN	Mexico	Pesos
MYR	Malaysia	Ringgits
MZM	Mozambique	Meticais
NAD	Namibia	Dollars
NGN	Nigeria	Nairas
NIO	Nicaragua	Gold cordobas
NOK	Norway	Krone
NPR	Nepal	Nepal rupees
NZD	New Zealand	Dollars
OMR	Oman	Rials
PAB	Panama	Balboa
PEN	Peru	Nuevos soles
PGK	Papua New Guinea	Kina
PHP	Philippines	Pesos
PKR	Pakistan	Rupees
PLN	Poland	Zlotych
PYG	Paraguay	Guarani
QAR	Qatar	Rials
ROL	Romania	Lei
RUR	Russia	Rubles
RWF	Rwanda	Rwanda francs
SAR	Saudi Arabia	Riyals
SBD	Solomon Islands	Dollars
SCR	Seychelles	Rupees
SDD	Sudan	Dinars
SEK	Sweden	Kronor
SGD	Singapore	Dollars
SHP	Saint Helena	Pounds
SIT	Slovenia	Tolars
SKK	Slovakia	Koruny
SLL	Sierra Leone	Leones
SOS	Somalia	Shillings
SPL	Seborga	Luigini
SRG	Suriname	Guilders
STD	São Tome, Principe	Dobras
SVC	El Salvador	Colones

Symbol	Region/Country	Currency Name
SYP	Syria	Pounds
SZL	Swaziland	Emalangeni
THB	Thailand	Baht
TJS	Tajikistan	Somoni
TMM	Turkmenistan	Manats
TND	Tunisia	Dinars
TOP	Tonga	Pa'anga
TRL	Turkey	Liras
TTD	Trinidad, Tobago	Dollars
TVD	Tuvalu	Tuvalu dollars
TWD	Taiwan	New dollars
TZS	Tanzania	Shillings
UAH	Ukraine	Hryvnia
UGX	Uganda	Shillings
USD	United States	Dollars
UYU	Uruguay	Pesos
UZS	Uzbekistan	Sums
VEB	Venezuela	Bolivares
VND	Viet Nam	Dong
VUV	Vanuatu	Vatu
WST	Samoa	Tala
XAG	Silver	Ounces
XAU	Gold	Ounces
XCD	East Caribbean	Dollars
XDR	International Monetary Fund	Special drawing rights
XPD	Palladium	Ounces
XPT	Platinum	Ounces
YER	Yemen	Rials
YUM	Yugoslavia	New dinars
ZAR	South Africa	Rand
ZMK	Zambia	Kwacha
ZWD	Zimbabwe	Zimbabwe dollars

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Appendix B
Exchange Rates

Table B-1 shows the international foreign exchange rates on April 21, 2006 compared with the USD.

It is interesting to note that as of this date, only six world currencies have a parity rate with the USD greater than 1.0000: Kuwaiti dinar (3.42407), Baharaini dinar (2.65266), Omani rial (2.59774), Cypriot pound (2.14777), British pound (1.78280), and the euro (1.23450). Coincidentally, at the bottom of the list, both alphabetically and parity-wise, is the Zimbabwe dollar, which requires over 99,000 to equal 1 USD.

Additional information on current exchange rates can be found at http://moneycentral.msn.com/investor/market/rates.asp.

TABLE B-1 International Foreign Exchange Rates, April 21, 2006

Currency	Units/USD	USD/Units
Algerian dinar	0.01379	72.52500
Argentine peso	0.32701	3.05800
Australian dollar	0.74420	1.34373
Baharaini dinar	2.65266	0.37698
Bolivian boliviano	0.12508	7.99500
Brazilian real	0.47279	2.11510
British pound	1.78280	0.56092
Botswana pula	0.18714	5.34360
Canadian dollar	0.87827	1.13860
Chilean peso	0.00193	517.54999
Chinese yuan	0.12477	8.01450

Cont.

Currency	Units/USD	USD/Units
Columbian peso	0.00043	2,337.00004
Cypriot pound	2.14777	0.46560
Czech koruna	0.04359	22.94200
Danish krone	0.16547	6.04350
Ecuador sucre	0.00004	25,000.00063
Euro	1.23450	0.81005
Ghanaian cedi	0.00011	9,106.99988
Guatemalan quetzal	0.13201	7.57500
Hong Kong dollar	0.12897	7.75400
Hungarian forint	0.00467	213.96001
Israeli shekel	0.22015	4.54230
Indian rupee	0.02216	45.13500
Indonesian rupiah	0.00011	8,882.99974
Japanese yen	0.00855	116.93001
Jordanian dinar	1.41143	0.70850
Kenyan shilling	0.01404	71.22000
Kuwaiti dinar	3.42407	0.29205
Malaysian ringgit	0.27319	3.66050
Mexican peso	0.09016	11.09120
Moroccan dirham	0.11191	8.93550
Namibian dollar	0.16587	6.02900
New Zealand dollar	0.63330	1.57903
Norwegian krone	0.15748	6.35000
Omani rial	2.59774	0.38495
Pakistan rupee	0.01668	59.97000
Peruvian nuevo sol	0.30233	3.30770
Qatari rial	0.27467	3.64070
Russian ruble	0.03639	27.48000
Saudi riyal	0.26663	3.75050
Singapore dollar	0.62661	1.59590
South African rand	0.16707	5.98550
South Korean won	0.00106	948.00005
Swedish krona	0.13248	7.54860
Swiss franc	0.78475	1.27430
Taiwan dollar	0.03098	32.27500
Tanzanian shilling	0.00083	1,211.99996
Thai baht	0.02645	37.81000
Tunisian dinar	0.74738	1.33800
Turkish lira	0.75683	1.32130
UAR emirati dirham	0.27228	3.67270
U.S. dollar	1.00000	1.00000
Venezualan bolivar	0.00047	2,144.00005
Vietnamese dong	0.00006	15,924.99916
Zimbabwe dollar	0.00001	99,202.00100

Appendix C
Euro Currency

On January 1, 1999, eleven of the countries in the European Economic and Monetary Union (EMU) decided to give up their own currencies and adopt the new euro (EUR) currency: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. Greece followed suit on January 1, 2001. Vatican City also participated in the changeover. This changeover is now complete.

It is worth noting that any place that previously used one or more of the currencies listed below has now also adopted the euro. This applies to the Principality of Andorra, the Principality of Monaco, and the Republic of San Marino. This, of course, applies automatically to any territories, departments, possessions, or collectivities of Euro-zone countries, such as the Azores, Balearic Islands, the Canary Islands, Europa Island, French Guiana, Guadeloupe, Juan de Nova, the Madeira Islands, Martinique, Mayotte, Reunion, Saint-Martin, Saint Pierre, and Miquelon, to name just a few.

Euro bank notes and coins began circulating in these countries on January 1, 2002. At that time, all transactions in those countries were valued in euros, and the "old" notes and coins of these countries were gradually withdrawn from circulation. The precise dates that each "old" currency ceased being legal tender are noted in Table C-1.

For convenience, and because their values are now irrevocably set against the euro as listed above, the XE.com Universal Currency Converter will continue to support these units even after their

TABLE C-1 Official Fixed Euro Rates for Participating Countries

Symbol	Country	Legacy (Old) Currency	Conversion to Euro	Conversion from Euro
ATS	Austria	Schilling	ATS/13.7603 = EUR	EUR × 13.7603 = ATS
BEF	Belgium	Franc	BEF/40.3399 = EUR	EUR × 40.3399 = BEF
DEM	Germany	Mark	DEM/1.95583 = EUR	EUR × 1.95583 = DEM
ESP	Spain	Peseta	ESP/166.386 = EUR	EUR × 166.386 = ESP
FIM	Finland	Markka	FIM/5.94573 = EUR	EUR × 5.94573 = FIM
FRF	France	Franc	FRF/6.55957 = EUR	EUR × 6.55957 = FRF
GRD	Greece	Drachma	GRD/340.750 = EUR	EUR × 340.750 = GRD
IEP	Ireland	Punt	IEP/0.787564 = EUR	EUR × 0.787564 = IEP
ITL	Italy	Lira	ITL/1936.27 = EUR	EUR × 1936.27 = ITL
LUF	Luxembourg	Franc	LUF/40.3399 = EUR	EUR × 40.3399 = LUF
NLG	Netherlands	Guilder	NLG/2.20371 = EUR	EUR × 2.20371 = NLG
PTE	Portugal	Escudo	PTE/200.482 = EUR	EUR × 200.482 = PTE
VAL	Vatican City	Lira	VAL/1936.27 = EUR	EUR × 1936.27 = VAL

withdrawal from circulation. In addition, most outgoing Euro currencies still will be physically convertible at special locations for a period of several years. For details, refer to the official Euro site.

Also note that the euro is not just the same thing as the former European Currency Unit (or ECU), which used to be listed as XEU. The ECU was a theoretical "basket" of currencies rather than a currency in and of itself, and no ECU bank notes or coins ever existed. At any rate, the ECU has been replaced by the euro, which is a bona fide currency.

A note about spelling and capitalization: The official spelling of the EUR currency unit in the English language is *euro,* with a lowercase *e*. However, the overwhelmingly prevailing industry practice to spell it *Euro,* with a capital *E*. Since other currency names are capitalized in general use, doing so helps to differentiate the noun *Euro,* meaning EUR currency, from the more general adjective *euro,* meaning anything even remotely having to do with Europe.

Appendix D
Global Banking Hours

Price fluctuations in the spot currency markets are essentially news-driven. Or more accurately, it is the human reaction to news-driven events that makes trading possible and profitable. How traders interpret these news events determines which direction the market will travel. As in all financial markets, the foreign exchange also has its share of contrarians who keep runaway breakouts in check while supplying additional volatility to the overall situation.

Despite all the fundamental and technical influences on the foreign exchange, one major constant in determining periods of high volatility is the hours of operation for the central banks of each major currency country.

Figure D-1 emphasizes the importance of the effect of time of day on Forex market activity and volatility based on hours of operation around the globe. Because banking hours vary from country to country, I have arbitrarily set hours of operation from 9:00 a.m. to 5:00 p.m. for consistency. The top row is expressed as Central European Time (Greenwich Mean Time + 1 hour), which aligns with the Central Bank of Europe in Frankfurt, the most prestigious central bank in the European Monetary Union.

This figure allows traders to view overlapping time periods when central banks for different currencies are operating and thus guarantee a certain degree of mutual activity.

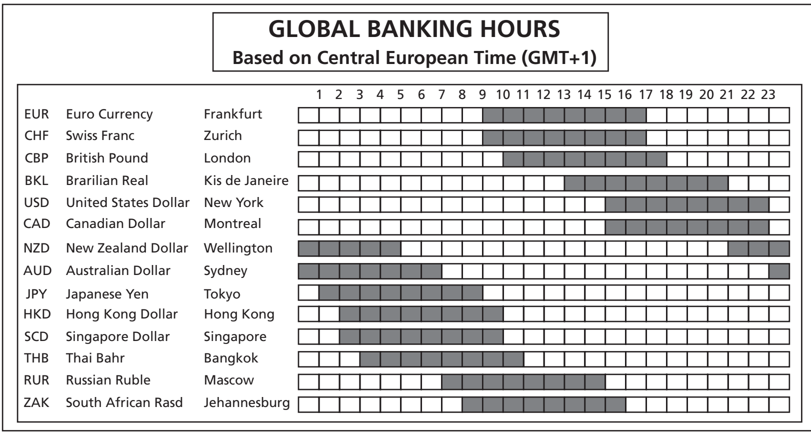

Figure D-1 Global banking hours.

For example, when banks open in New York City at 9:00 a.m. EST, the Frankfurt bank has already been operating for six hours. Thus there is a two-hour overlap of trading in the EURUSD currency pair on both sides of the Atlantic Ocean (9:00 to 11:00 a.m. EST). This can be readily recognized in the time-of-day activity chart for the EURUSD pair.

If you are interested in initiating a trade in the EURHKD cross-rate pair, note that there is a one-hour overlap in banking operations between central Europe and Hong Kong that occurs between 9:00 and 10:00 a.m. in Frankfurt (or 3:00 and 4:00 a.m. in New York).

Dedicated currency traders may have to adjust their sleeping schedules to take advantage of increased activity and volatility when trading non-USD cross-rate currency pairs.

BANK HOLIDAYS

In Table D-1, bank holidays are sorted by date and referenced by the ISO currency name. The euro does not appear in the list, but the three most industrialized component members are represented as Germany (DEM), France (FRF), and Italy (ITL).

TABLE D-1 International Bank Holidays

Date	Holiday	Currencies
1/1/2006	New Year's Day	AUD, CAD,CHF,DEM,FRF, GBP, HKD, ITL,JPY, SGD,USD
1/2/2006	New Year's Holiday	JPY
1/3/2006	New Year's Holiday	AUD, JPY
1/6/2006	Epiphany	ITL
1/9/2006	Coming of Age Day	JPY
1/16/2006	Martin Luther King's Day	USD
1/21/2006	Hari Raya Haji	SGD
1/26/2006	Australia Day	AUD
1/28/2006	Chinese New Year	HKD
1/30/2006	Chinese New Year	HKD, SGD
1/31/2006	Chinese New Year	HKD, SGD
2/11/2006	National Foundation Day	JPY
2/21/2006	President's Day	USD
3/6/2006	Labor Day	AUD
3/21/2006	Spring Equinox	JPY
4/4/2006	Tomb-Sweeping Day	HKD
4/5/2006	Tomb-Sweeping Day	HKD
4/14/2006	Good Friday	AUD, CAD, CHF,DEM, GBP, HKD, SGD
4/17/2006	Easter Monday	AUD, CHF,DEM, FRF, GBP, HKD, ITL
4/25/2006	ANZAC Day	AUD
4/29/2006	Day of Nature	JPY
5/1/2006	Labor Day	DEM, FRF, HKD, ITL, SGD
5/1/2006	Early May Bank Holiday	GBP
5/3/2006	Constitution Day	JPY
5/4/2006	Citizen's Day of Rest	JPY
5/5/2006	Buddha's Anniversary	HKD
5/5/2006	Children's Day	JPY
5/8/2006	Liberation Day	FRF
5/22/2006	Buddha Purnima	SGD
5/22/2006	Victoria Day	CAD
5/25/2006	Ascension Thursday	CHF,DEM, FRF
5/29/2006	Memorial Day	USD
5/29/2006	Spring Bank Holiday	GBP
5/31/2006	Dragon Boats Festival	HKD
6/2/2006	Republic's Day	ITL
6/4/2006	Pentecost Monday	FRF

Cont.

Date	Holiday	Currencies
6/5/2006	Whit Monday	CHF,DEM
6/12/2006	Queen's Birthday	AUD
6/22/2006	Lord's Day	CHF
6/29/2006	St. Peter & St. Paul	CHF
7/1/2006	Special Administration Day	HKD
7/1/2006	Canada Day	CAD
7/4/2006	Independence Day	USD
7/14/2006	Bastille Day	FRF
7/18/2006	Sea's Day	JPY
7/20/2006	Navy Day	JPY
8/1/2006	Confederation Day	CHF
8/9/2006	National Day	SGD
8/15/2006	Assumption	FRF,ITL
8/28/2006	Summer Bank Holiday	GBP
9/4/2006	Labor Day	CAD
9/15/2006	Respect for the Aged Day	JPY
9/23/2006	Autumn Equinox	JPY
10/1/2006	National Day	HKD
10/3/2006	National Day	DEM
10/7/2006	Late Mid-Autumn Festival	HKD
10/9/2006	Physical Fitness Day	JPY
10/9/2006	Columbus Day	USD
10/30/2006	Chung Yeung Festival	HKD
11/1/2006	All Saint's Day	FRF,ITL
11/1/2006	Dipabali	SGD
11/3/2006	National Culture Day	JPY
11/3/2006	Hari Raya Puasa	SGD
11/11/2006	Armistice Day	FRF
11/11/2006	Veteran's Day	USD
11/11/2006	Remembrance Day	CAD
11/23/2006	Labor Thanksgiving Day	JPY
11/23/2006	Thanksgiving Day	USD
12/8/2006	Immaculate Conception	CHF,ITL
12/23/2006	Emperor's Birthday	JPY
12/25/2006	Christmas Day	AUD,CAD,CHF,FRF,GBP, HKD,ITL,SGD,USD
12/26/2006	St. Stephen's Day	ITL
12/26/2006	Boxing Day	AUD,CAD,DEM,GBP,HKD
12/31/2006	Bank Holiday	JPY
12/31/2006	New Year's Eve	DEM,USD

Boxing Day is a public holiday observed in many Commonwealth countries on the first day other than Sunday following Christmas Day.

Whit Monday is a Christian holiday celebrated the day after Pentecost, a movable feast in the Christian calendar depending on the date of Easter.

ANZAC Day is commemorated in Australia and New Zealand to honor the bravery and sacrifice of the Australian and New Zealand Army Corps (ANZAC).

Most CFTC-registered currency dealers provide their clients with some of the preceding information online. Investors who are partial to trading the Pacific Rim currency pairs always should consult their dealer's holiday calendars. The reason is that Japan celebrates 18 bank holidays every year, and Singapore has 17 annual bank holidays (the United Kingdom celebrates only 8 bank holidays a year). Banking holidays characteristically signify a decrease in trading volume and liquidity. In addition, slippage (when orders are filled at prices other than those designated by the trader) is prone to occur during holidays and periods of low liquidity.

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Appendix E
Monthly OHLC and Activity Charts

In this appendix I present monthly OHLC and activity charts for the 10 most frequently traded USD currency pairs. Beneath each chart are the corresponding statistics for the time period January 2000 through December 2005.

In the statistics block, I will use the following definitions:

$$\text{Midrange} = (\text{high} + \text{low})/2$$
$$\text{Absolute range} = \text{high} - \text{low}$$
$$\text{Relative range} = 100 \times \text{absolute range}/\text{midrange}$$

The currency pairs in this appendix are arranged in the following order :

EURUSD

GBPUSD

USDCHF

USDJPY

USDCAD

AUDUSD

NZDUSD

USDSEK

USDNOK

USDDKK

In the charts that follow, activity is represented as the vertical bars at the bottom. The upper (lighter) portion is the number of upticks, whereas the lower (darker) portion is the number of downticks. Their sum equals the total activity for the corresponding month.

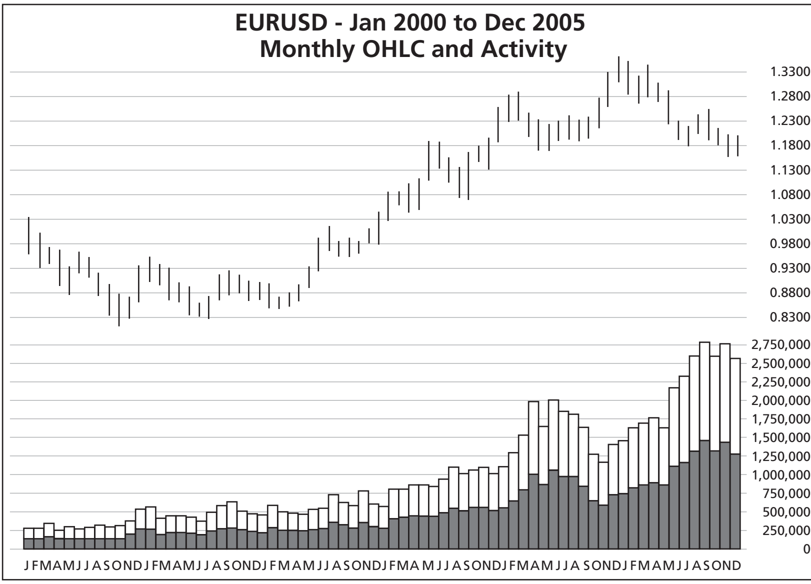

Figure E-1 EURUSD monthly OHLC and activity.

Open	1.0088
High	1.3667
Low	0.8229
Close	1.1849
Mean	1.0656
Midrange	1.0948
Absolute range	0.5438
Relative range	49.6712
Standard deviation	0.1573

It is interesting to note that activity increased by 1,060 percent from January 2000 to December 2005.

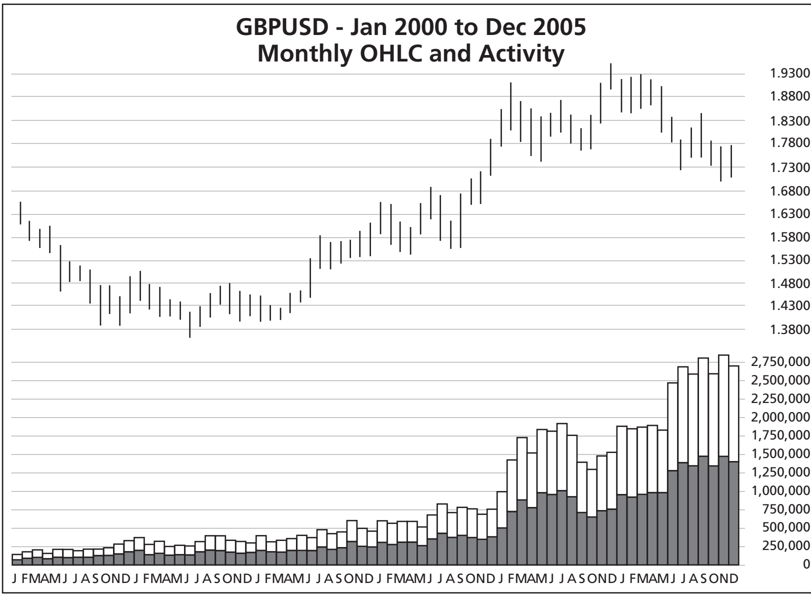

Figure E-2 GBPUSD monthly OHLC and activity.

Open	1.6147
High	1.9550
Low	1.3685
Close	1.7232
Mean	1.6266
Midrange	1.6618
Absolute range	0.5865
Relative range	35.2941
Standard deviation	0.1646

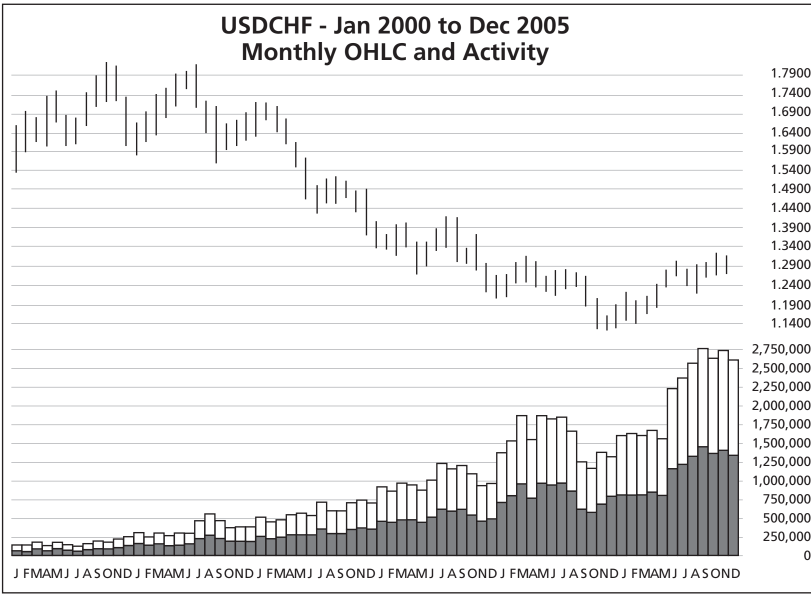

Figure E-3 USDCHF monthly OHLC and activity.

Open	1.5908
High	1.8309
Low	1.1288
Close	1.3136
Mean	1.4594
Midrange	1.4799
Absolute range	0.7021
Relative range	47.4440
Standard deviation	0.2043

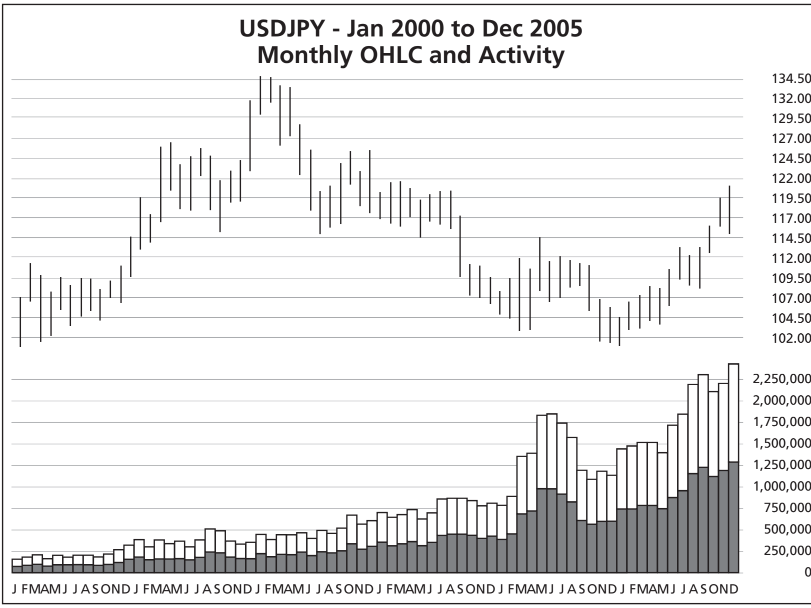

Figure E-4 USDJPY monthly OHLC and activity.

Open	102.2600
High	135.1600
Low	101.3600
Close	117.7500
Mean	114.9319
Midrange	118.2600
Absolute range	33.8000
Relative range	28.5811
Standard deviation	8.0282

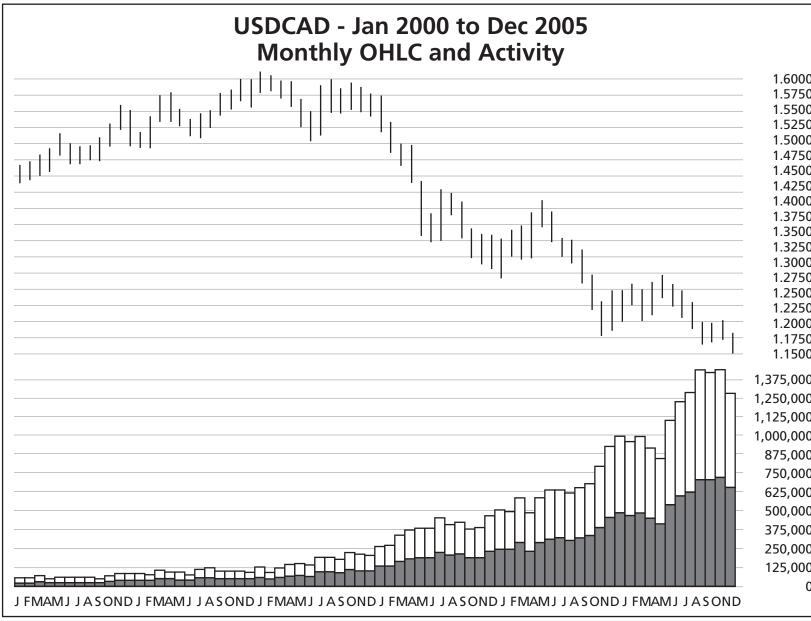

Figure E-5 USDCAD monthly OHLC and activity.

Open	1.4450
High	1.6188
Low	1.1425
Close	1.1619
Mean	1.4166
Midrange	1.3807
Absolute range	0.4763
Relative range	34.4982
Standard deviation	0.1404

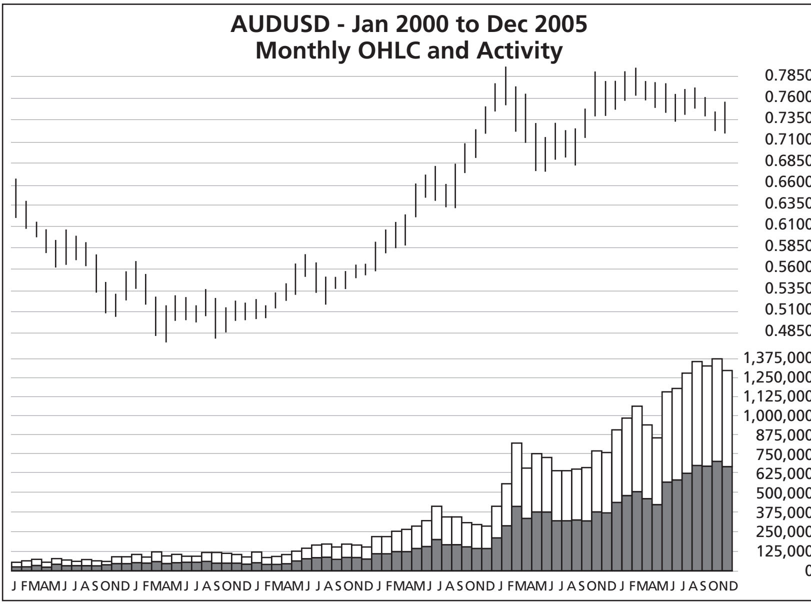

Figure E-6 AUDUSD monthly OHLC and activity.

Open	0.6570
High	0.8008
Low	0.4778
Close	0.7329
Mean	0.6325
Midrange	0.6393
Absolute range	0.3230
Relative range	50.5240
Standard deviation	0.0996

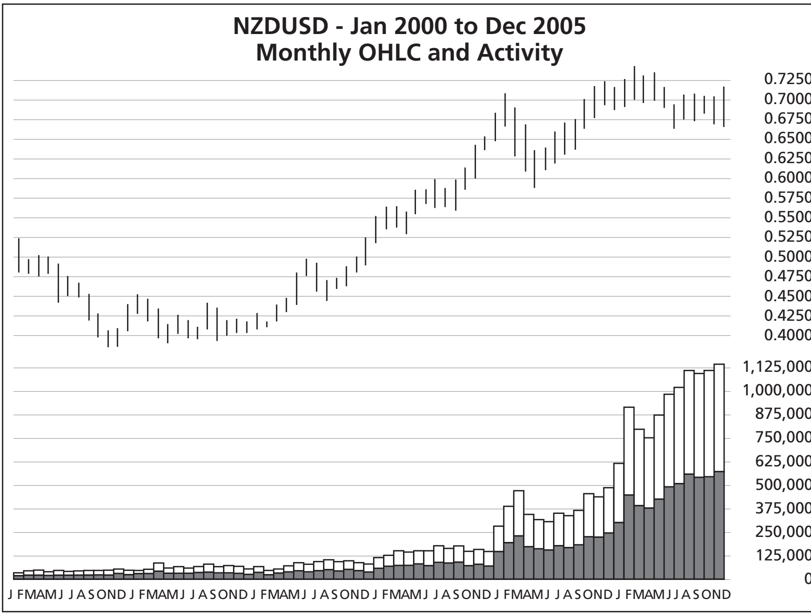

Figure E-7 NZDUSD monthly OHLC and activity.

Open	0.5213
High	0.7465
Low	0.3900
Close	0.6837
Mean	0.5492
Midrange	0.5683
Absolute range	0.3565
Relative range	62.7365
Standard deviation	0.1137

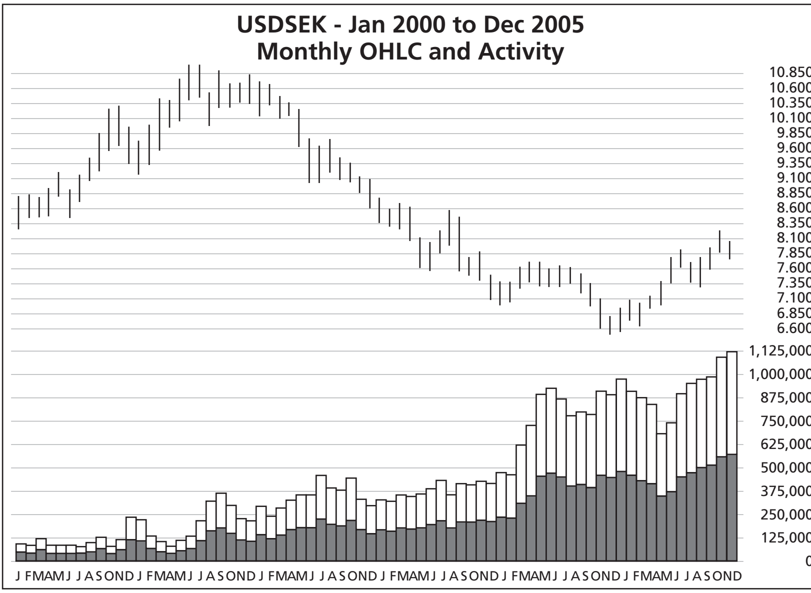

Figure E-8 USDSEK monthly OHLC and activity.

Open	8.4894
High	11.0510
Low	6.5701
Close	7.9378
Mean	8.6906
Midrange	8.8106
Absolute range	4.4809
Relative range	50.8583
Standard deviation	1.2345

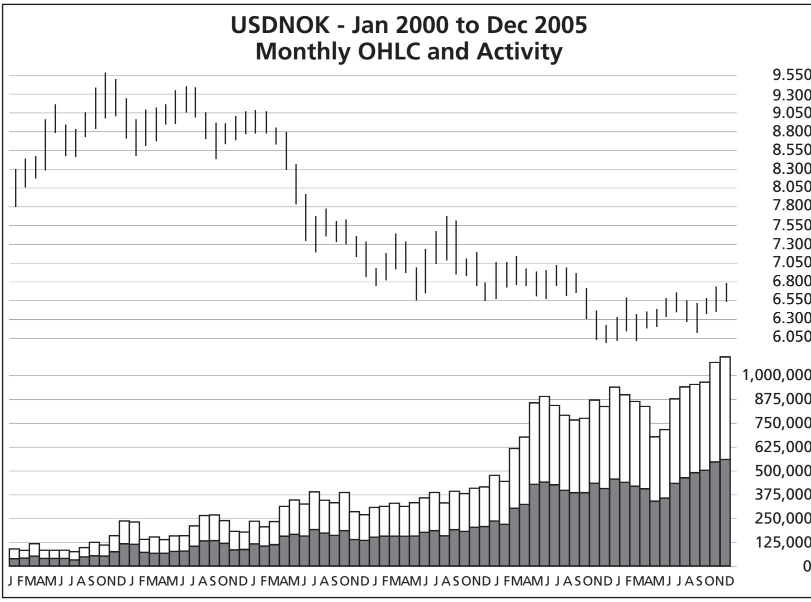

Figure E-9 USDNOK monthly OHLC and activity

Open	8.0147
High	9.6520
Low	6.0320
Close	6.7442
Mean	7.6666
Midrange	7.8420
Absolute range	3.6200
Relative range	46.1617
Standard deviation	1.0694

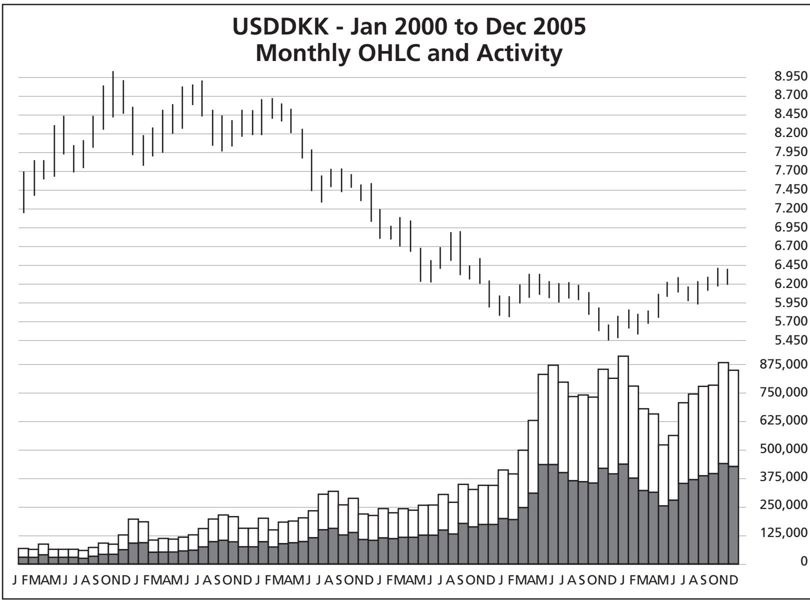

Figure E-10 USDDKK monthly OHLC and activity

Open	7.3780
High	9.0425
Low	5.4443
Close	6.2978
Mean	7.1353
Midrange	7.2434
Absolute range	3.5982
Relative Range	49.6756
Standard deviation	1.0510

Appendix F
Daily OHLC and Activity Charts

This appendix is analogous to the preceding one, except that the time frame spans January 1, 2006 through April 14, 2006, and the time interval has been changed from monthly to daily in order to scrutinize recent market characteristics in greater detail.

The numeric values in the statistical blocks beneath each chart are defined as in Appendix E.

The currency pairs in this appendix are arranged in the following order :

EURUSD

GBPUSD

USDCHF

USDJPY

USDCAD

AUDUSD

NZDUSD

USDSEK

USDNOK

USDDKK

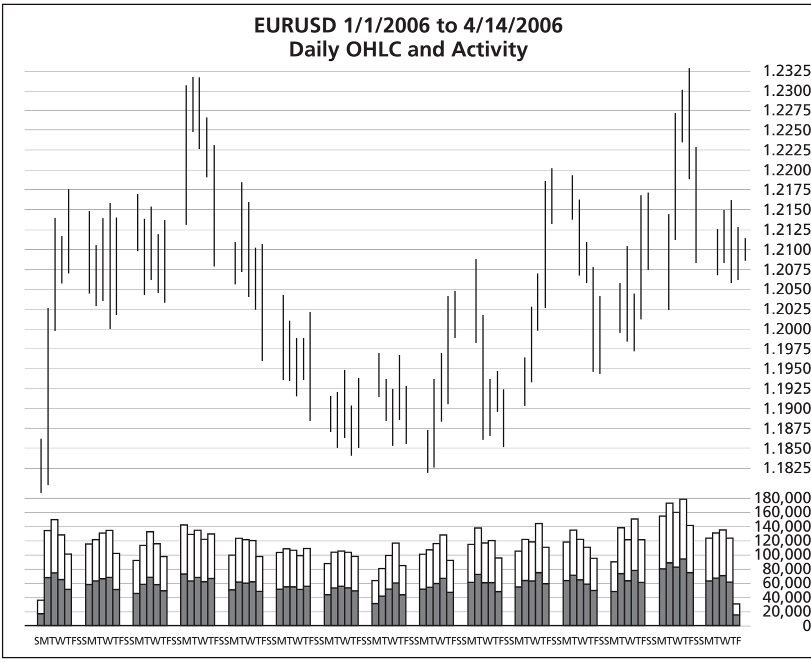

Figure F-1 EURUSD daily OHLC and activity.

Open	1.1849
High	1.2335
Low	1.1801
Close	1.2111
Mean	1.2048
Midrange	1.2068
Absolute range	0.0534
Relative range	4.4249
Standard deviation	0.0111

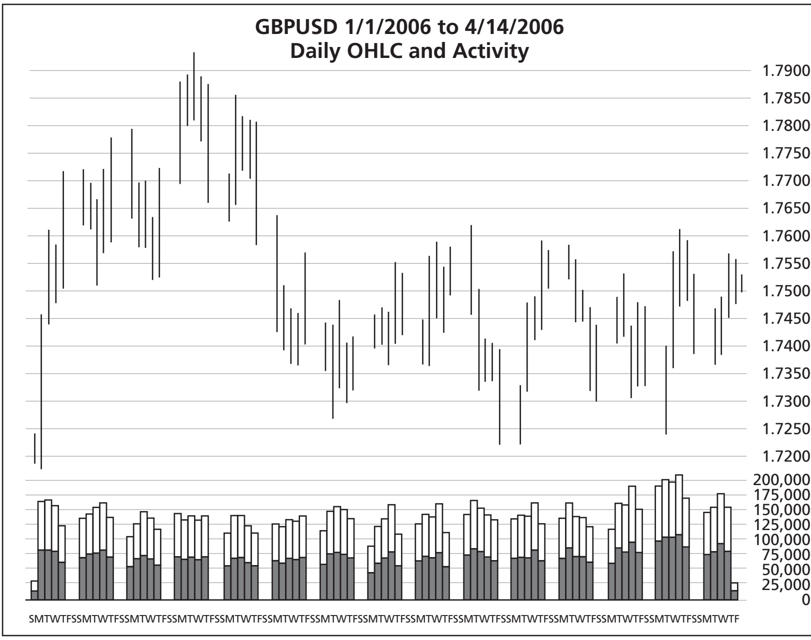

Figure F-2 GBPUSD daily OHLC and activity.

Open	1.7232
High	1.7937
Low	1.7187
Close	1.7509
Mean	1.7523
Midrange	1.7562
Absolute range	0.0750
Relative range	4.2706
Standard deviation	0.0147

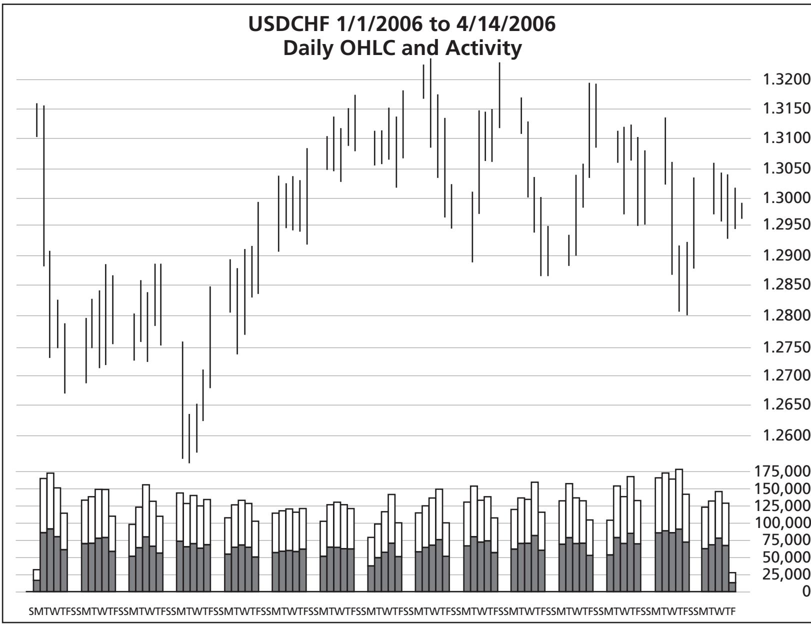

Figure F-3 USDCHF daily OHLC and activity.

Open	1.3136
High	1.3242
Low	1.2556
Close	1.2984
Mean	1.2964
Midrange	1.2899
Absolute range	0.0686
Relative range	5.3182
Standard deviation	0.0150

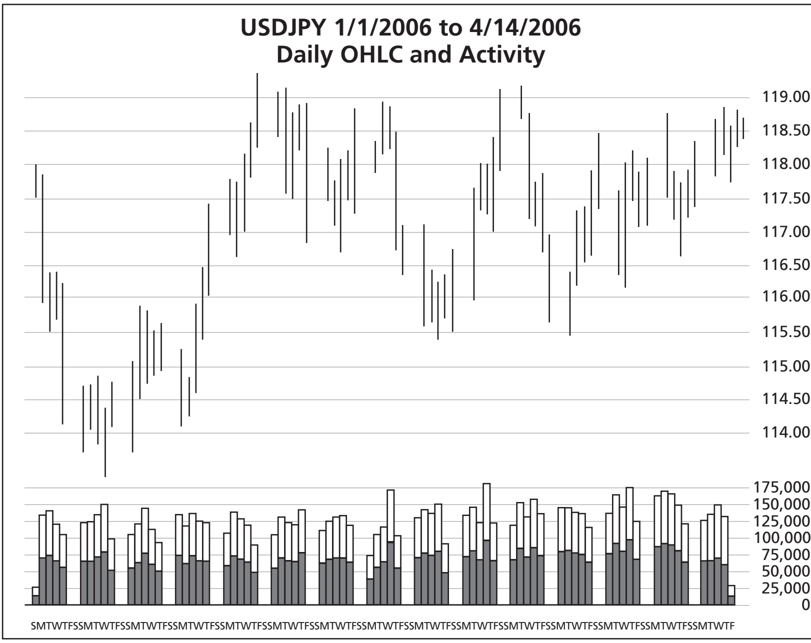

Figure F-4 USDJPY daily OHLC and activity.

Open	117.7500
High	119.4200
Low	113.4100
Close	118.6900
Mean	117.0547
Midrange	116.4150
Absolute range	6.0100
Relative range	5.1626
Standard deviation	1.4004

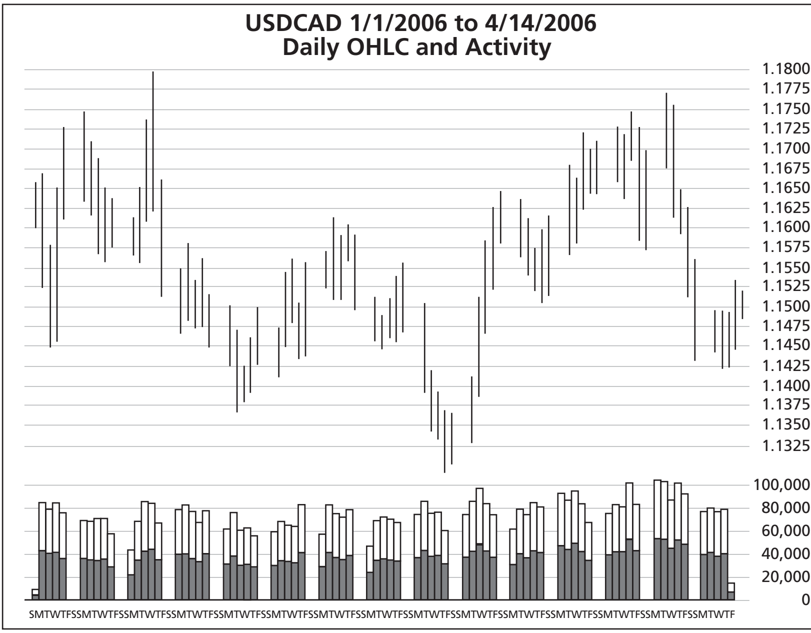

Figure F-5 USDCAD daily OHLC and activity.

Open	1.1619
High	1.1800
Low	1.1294
Close	1.1519
Mean	1.1545
Midrange	1.1547
Absolute range	0.0506
Relative range	4.3821
Standard deviation	0.0095

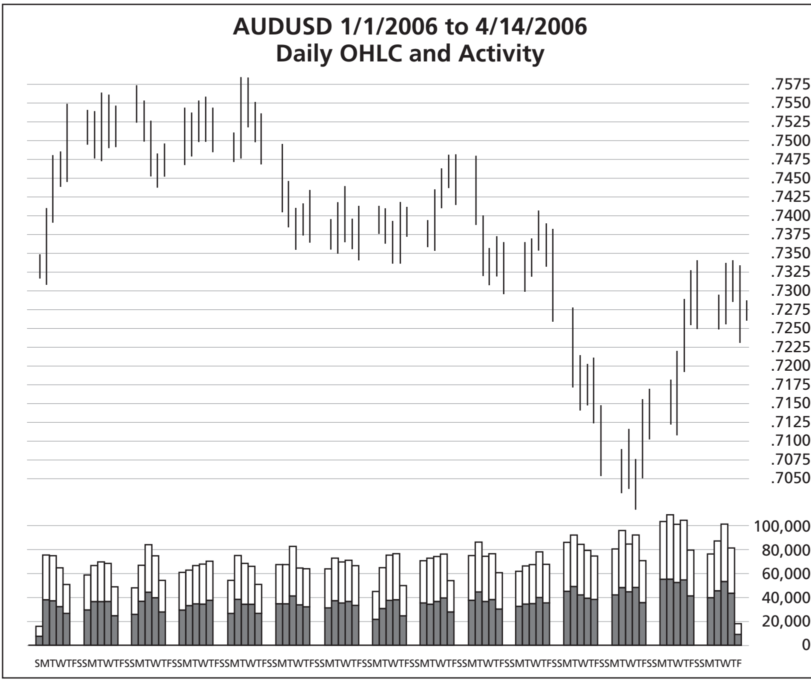

Figure F-6 AUDUSD daily OHLC and activity.

Open	0.7329
High	0.7590
Low	0.7015
Close	0.7279
Mean	0.7376
Midrange	0.7303
Absolute range	0.0575
Relative range	7.8740
Standard deviation	0.0133

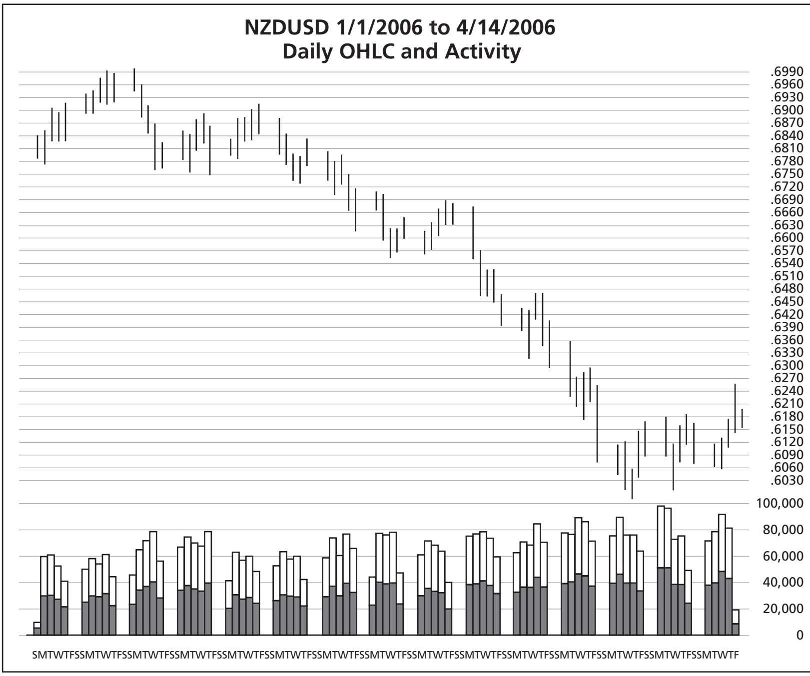

Figure F-7 NZDUSD daily OHLC and activity.

Open	0.6837
High	0.7004
Low	0.5991
Close	0.6175
Mean	0.6581
Midrange	0.6498
Absolute range	0.1013
Relative range	15.5906
Standard deviation	0.0302

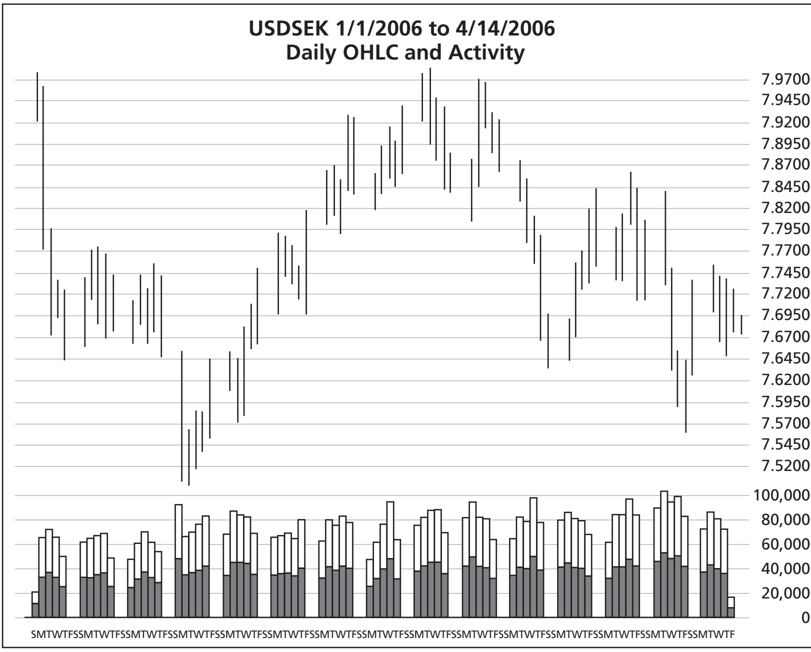

Figure F-8 USDSEK daily OHLC and activity.

Open	7.9378
High	7.9882
Low	7.5042
Close	7.6927
Mean	7.7619
Midrange	7.7462
Absolute range	0.4840
Relative range	6.2482
Standard deviation	0.1022

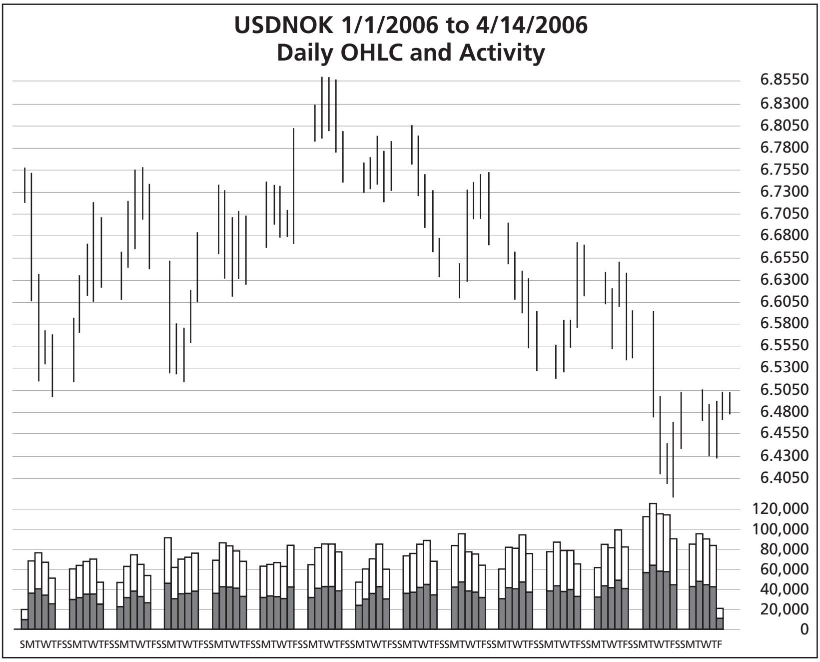

Figure F-9 USDNOK daily OHLC and activity.

Open	6.7442
High	6.8636
Low	6.3880
Close	6.5014
Mean	6.6440
Midrange	6.6258
Absolute range	0.4756
Relative range	7.1780
Standard deviation	0.0990

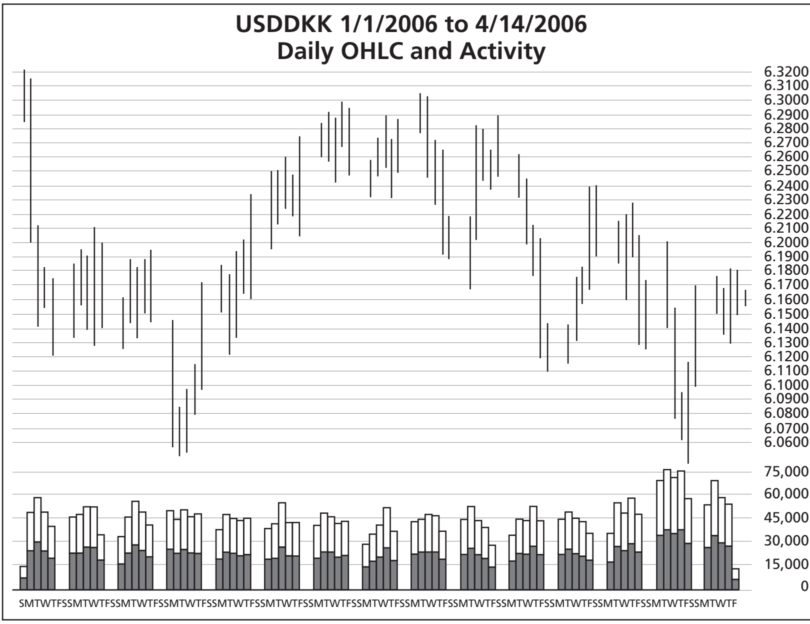

Figure F-10 USDDKK daily OHLC and activity.

Open	6.2978
High	6.3233
Low	6.0470
Close	6.1622
Mean	6.1946
Midrange	6.1852
Absolute range	0.2763
Relative range	4.4672
Standard deviation	0.0576

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Appendix G
Composite Activity Charts (Daily)

The time frame in the following charts spans from January 1, 2005 through April 14, 2006. Composite charts are calculated by averaging the sum of the upticks and downticks over that period using 1-minute time intervals. Their purpose is to assist traders in determining when to schedule online trading sessions based on traders' predilection for the nebulous risk/reward factor and the volatility of the targeted currency pair (in this case, EURUSD).

The vertical numeric scale on the right of each chart is activity expressed in total number of ticks (upticks plus downticks) during each time interval. The bottom band (the darkest) represents the activity for the current minute. The central band plus the lower band represents 3-minute activity. The sum of the all three vertical bars represents the 5-minute activity.

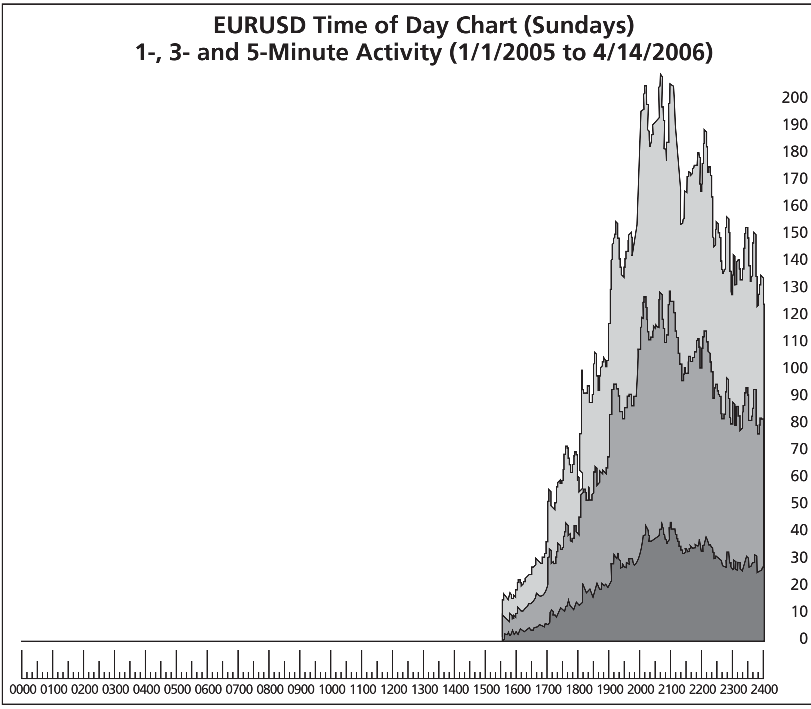

Figure G-1 Sunday composite activity chart.

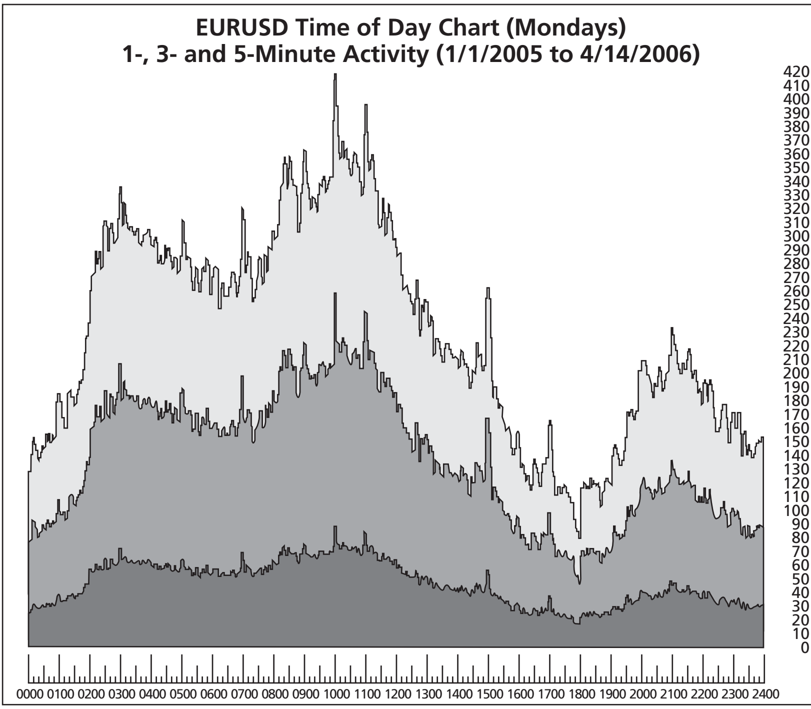

Figure G-2 Monday composite activity chart.

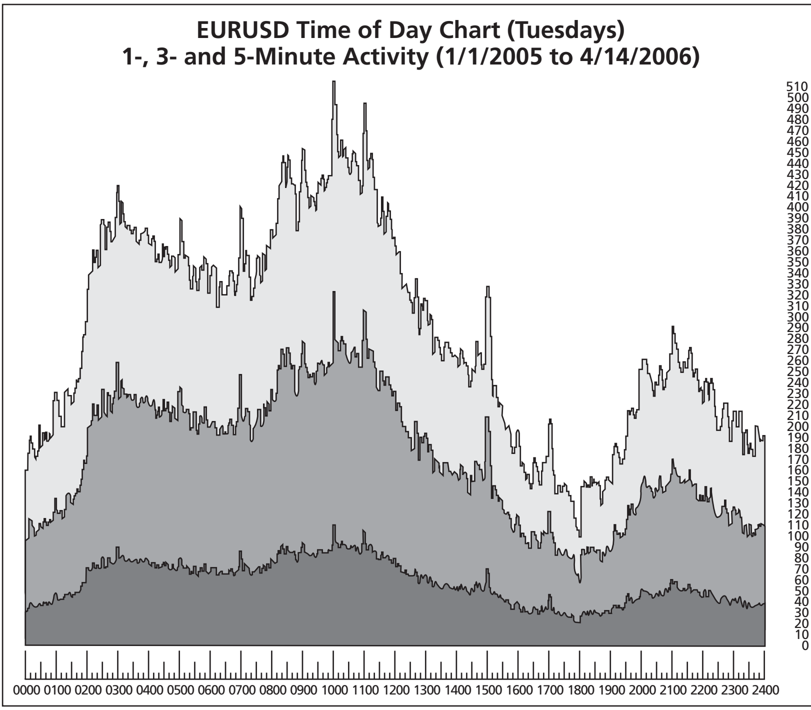

Figure G-3 Tuesday composite activity chart.

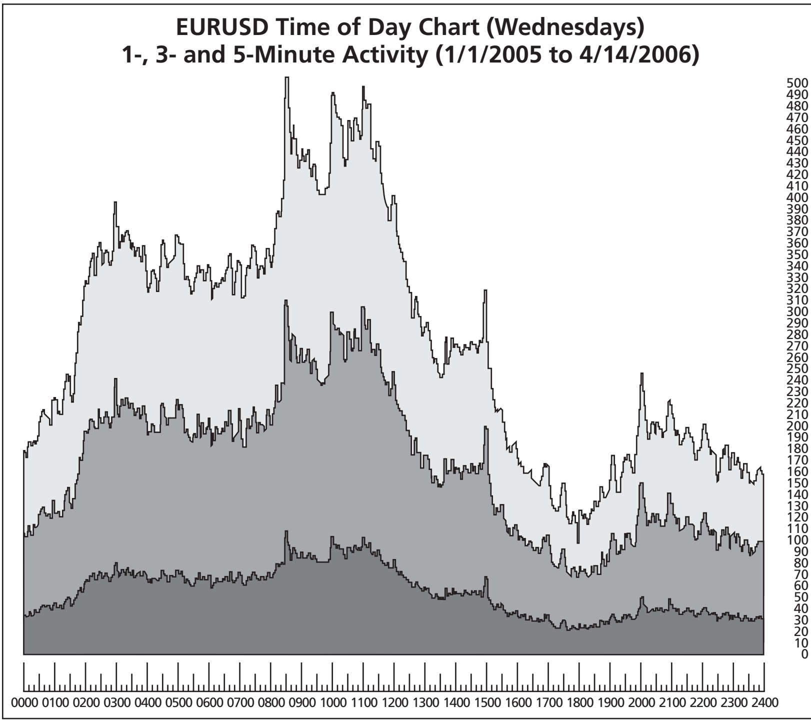

Figure G-4 Wednesday composite activity chart.

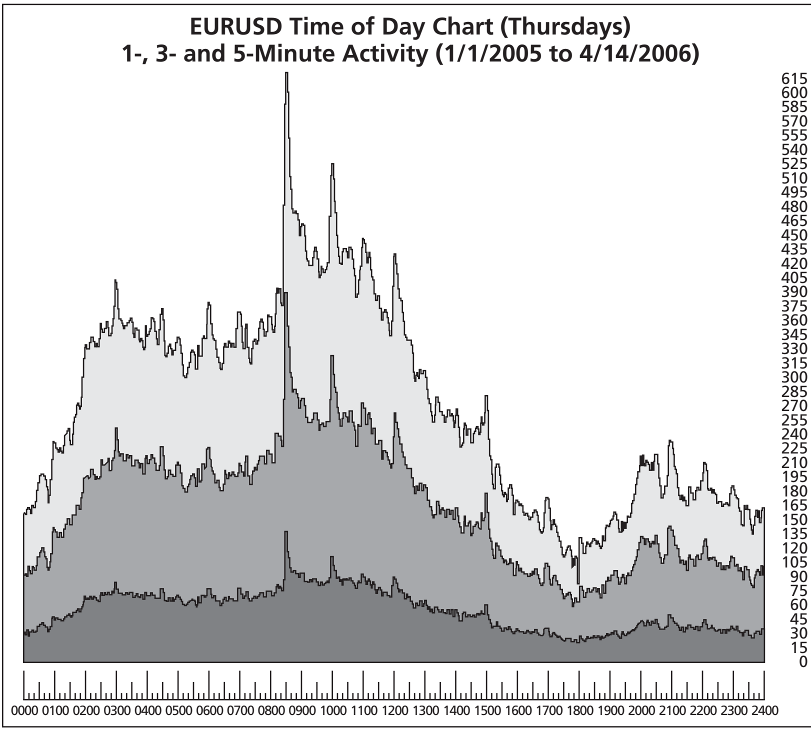

Figure G-5 Thursday composite activity chart.

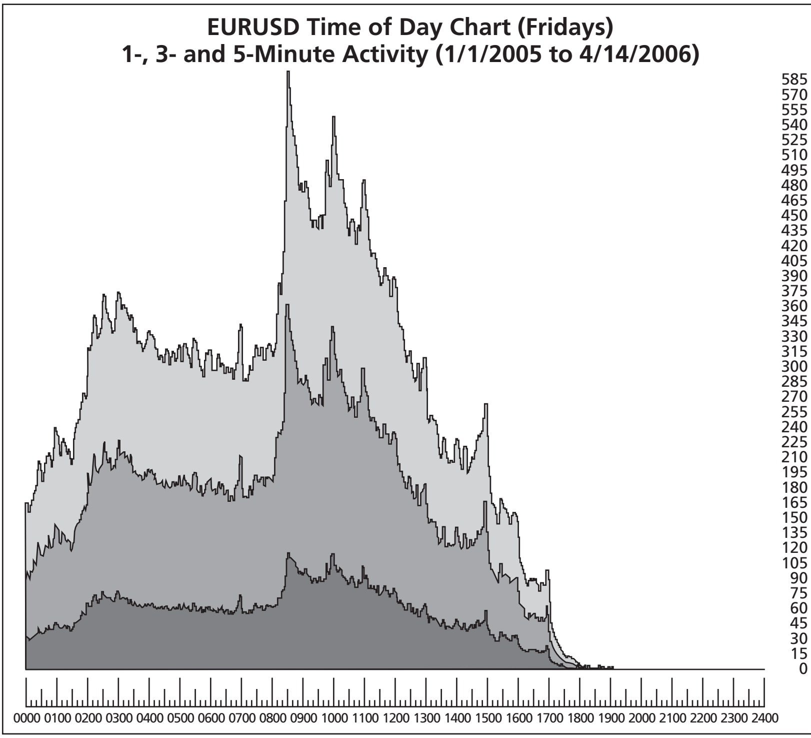

Figure G-6 Friday composite activity chart.

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Appendix H
Composite Range Charts (Daily)

The time frame in the following charts spans from January 1, 2005 through April 14, 2006.

The vertical numeric scale on the right of each chart is absolute range expressed in integer pips of the quote currency. The bottom band (the darkest) represents the range for the current 2-minute interval. The sum of the central band plus the lower band represents 7-minute range. The sum of all three vertical bands represents the 15-minute absolute range.

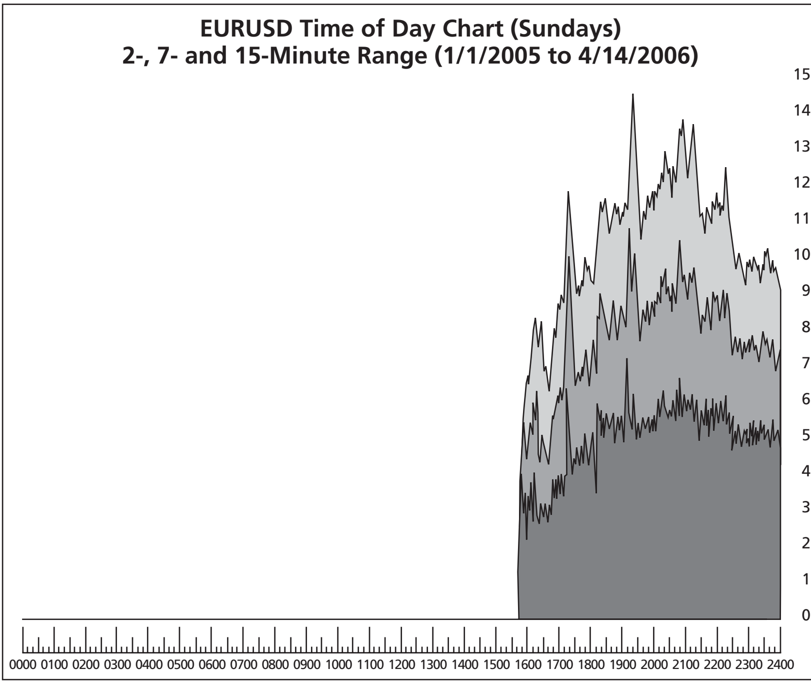

Figure H-1 Sunday composite range chart.

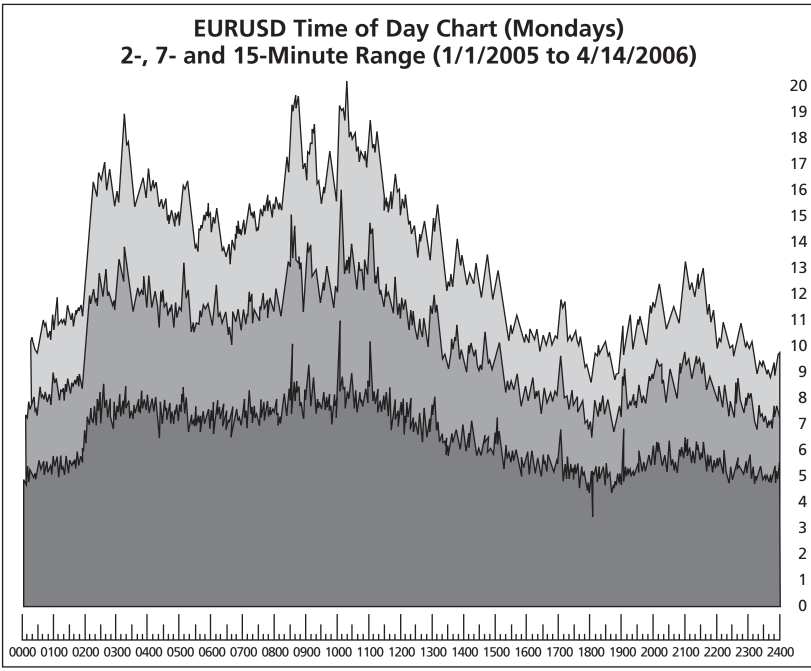

Figure H-2 Monday composite range chart.

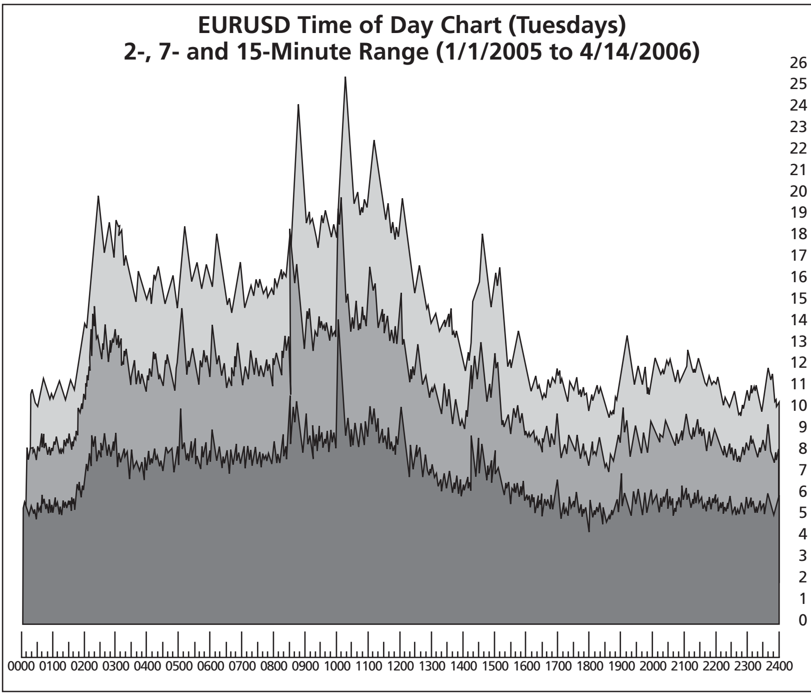

Figure H-3 Tuesday composite range chart.

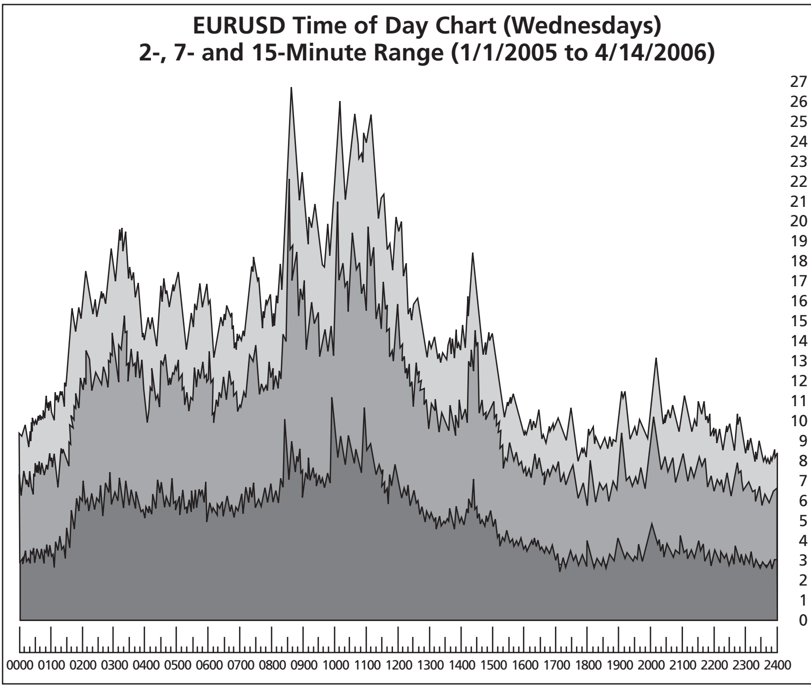

Figure H-4 Wednesday composite range chart.

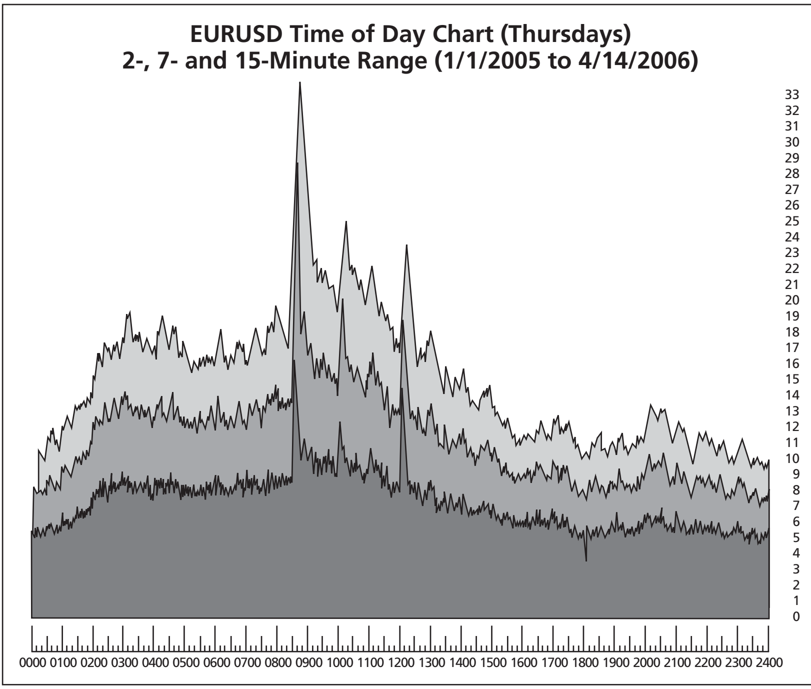

Figure H-5 Thursday composite range chart.

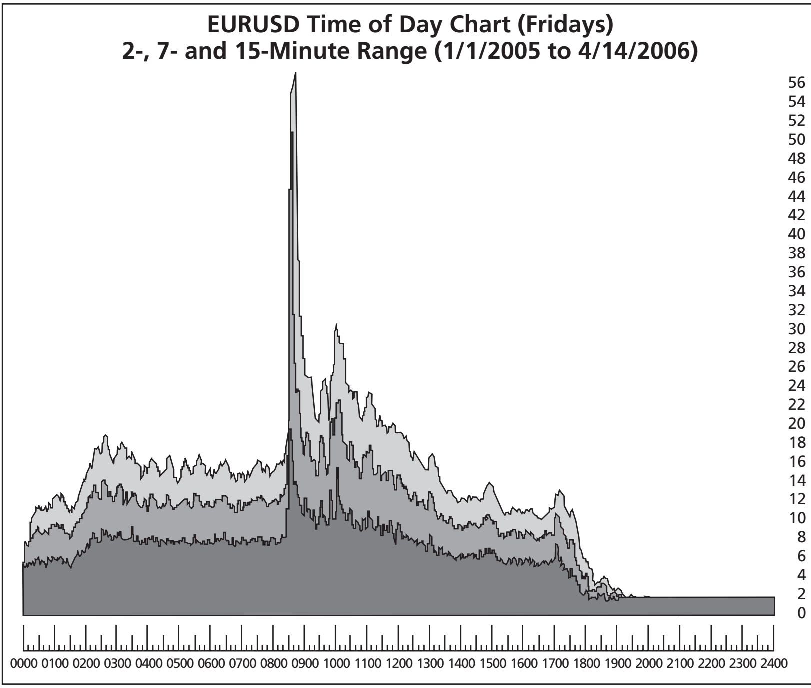

Figure H-6 Friday composite range chart.

Appendix I
Composite Activity Charts (Weekly)

This and the following two appendices are the composite of six day-of-the-week charts (Sunday through Friday) using the same statistical method (activity, range, or momentum). Saturdays are not included because the liquidity of trading diminishes drastically at 5:30 p.m. ET Friday.

The time frame again spans from January 1, 2005 through Aptil 14, 2006. Time-of-day charts employed 1-minute raw data intervals, whereas day-of-week charts use hourly data as the basis.

The currency pairs in these three appendices are arranged in the following order:

EURUSD
GBPUSD
USDCHF
USDJPY
USDCAD
AUDUSD
NZDUSD
USDSEK
USDNOK
USDDKK

The vertical numeric scale on the right is activity expressed in total number of ticks (upticks plus downticks) during each time interval. Each lower (dark) vertical bar represents the activity for the current hour. The sum of the two vertical bars (light and dark) represents the activity for each 2-hour period (the current hour plus the previous hour).

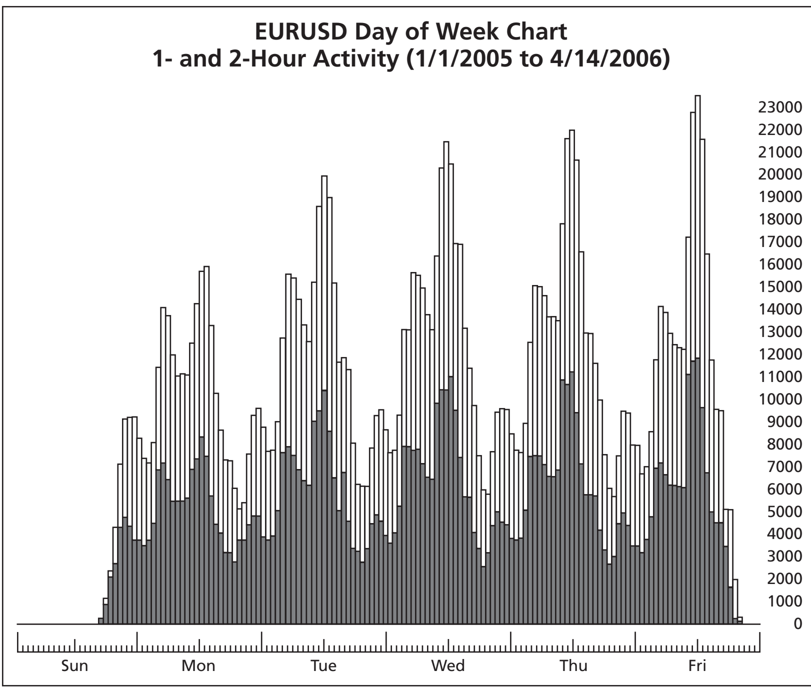

Figure I-1 EURUSD composite activity chart.

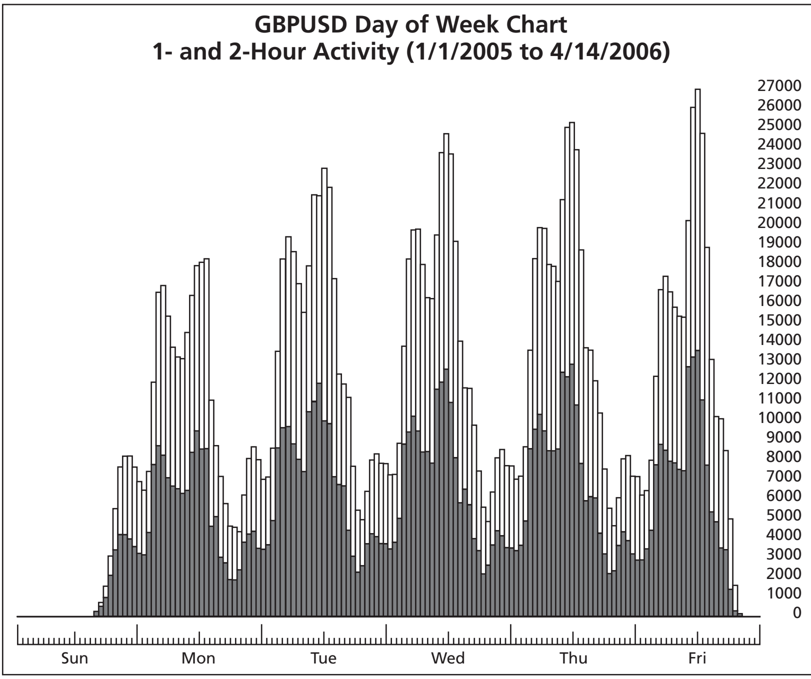

Figure I-2 GBPUSD composite activity chart.

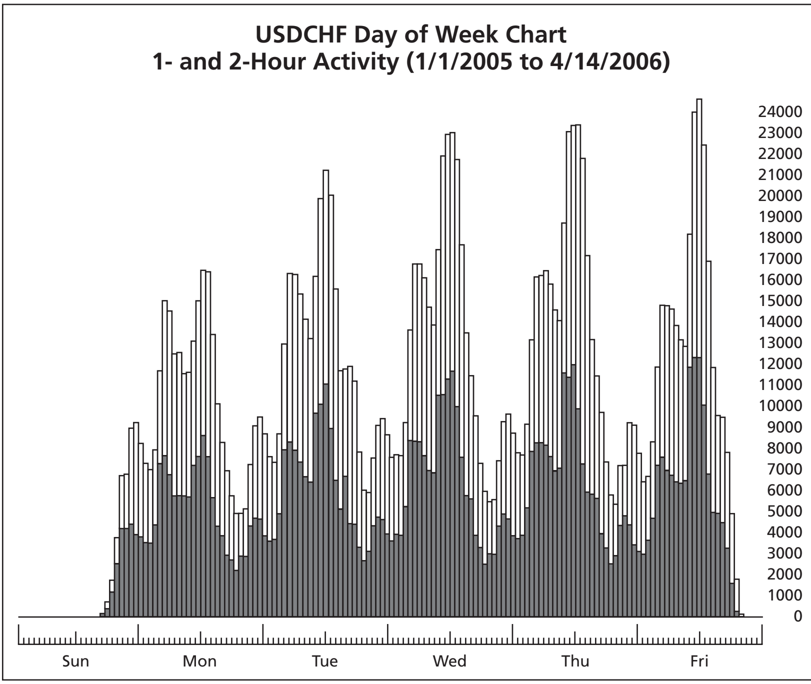

Figure I-3 USDCHF composite activity chart.

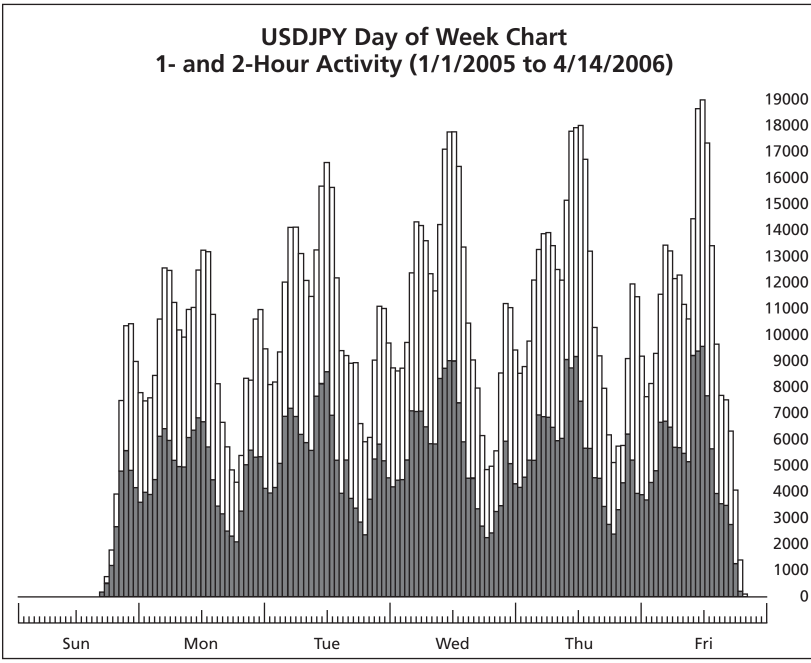

Figure I-4 USDJPY composite activity chart.

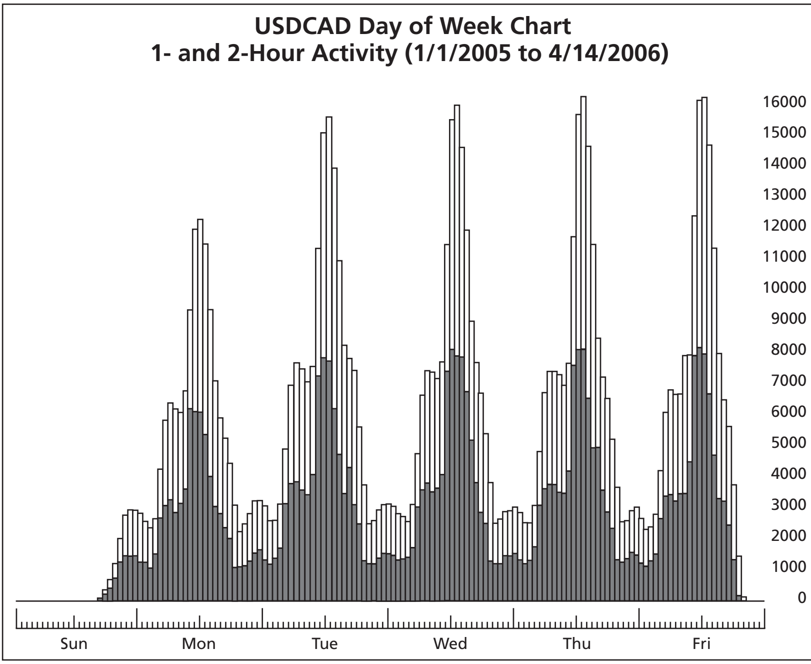

Figure I-5 USDCAD composite activity chart.

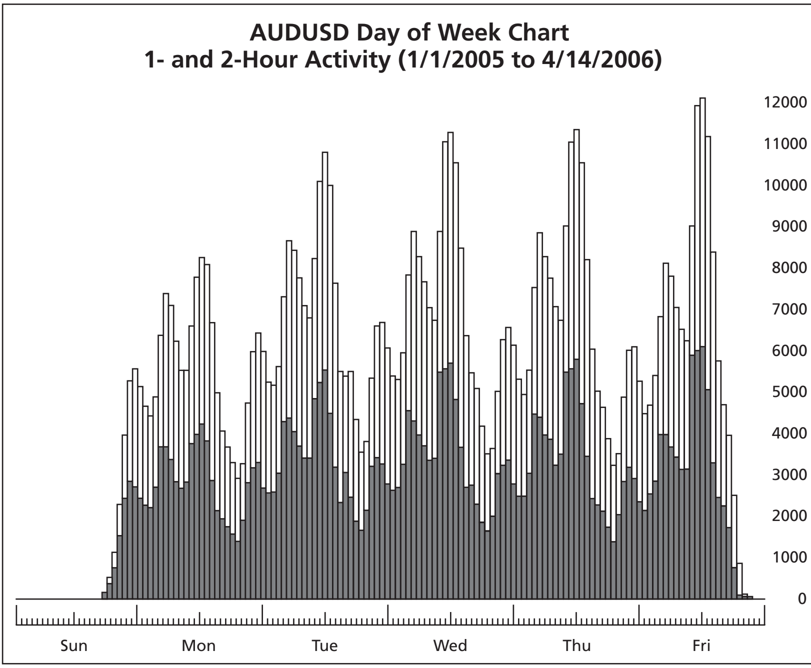

Figure I-6 AUDUSD composite activity chart.

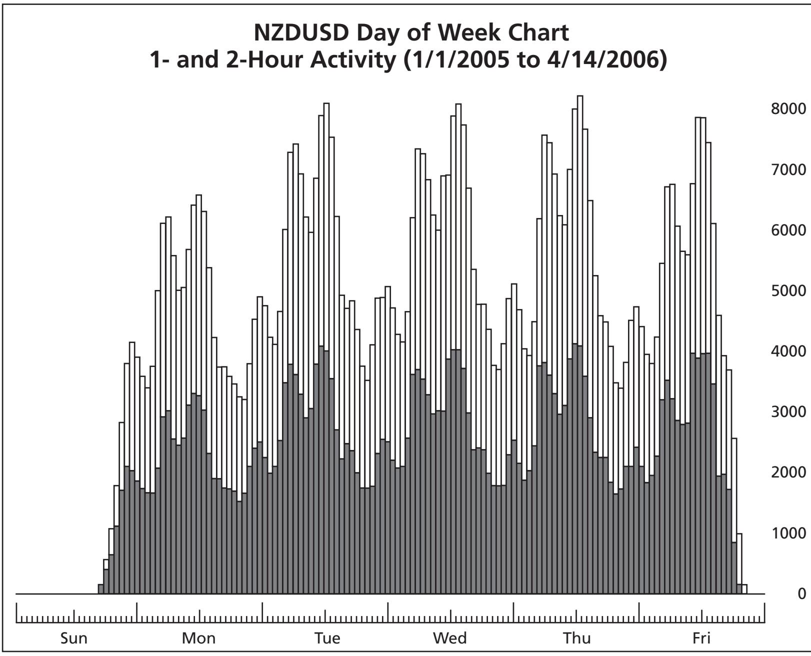

Figure I-7 NZDUSD composite activity chart.

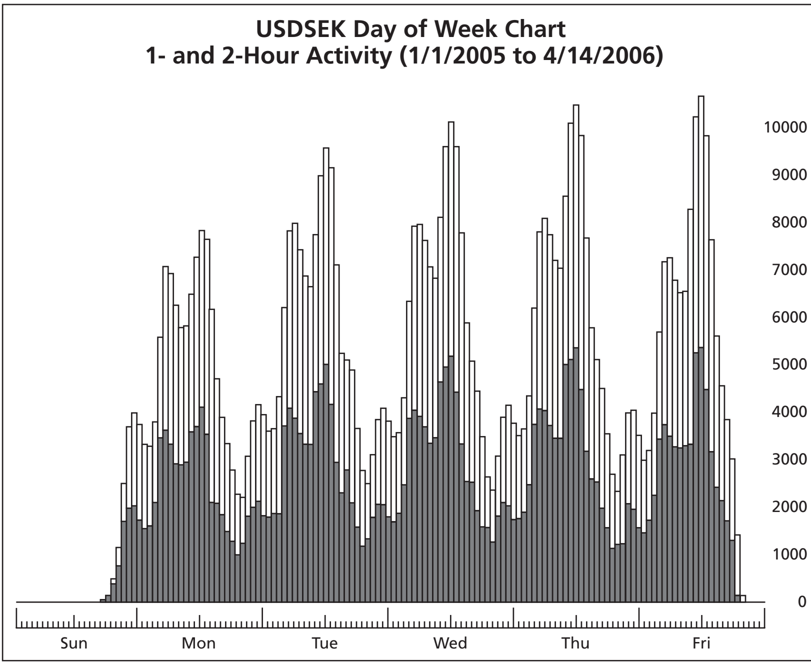

Figure I-8 USDSEK composite activity chart.

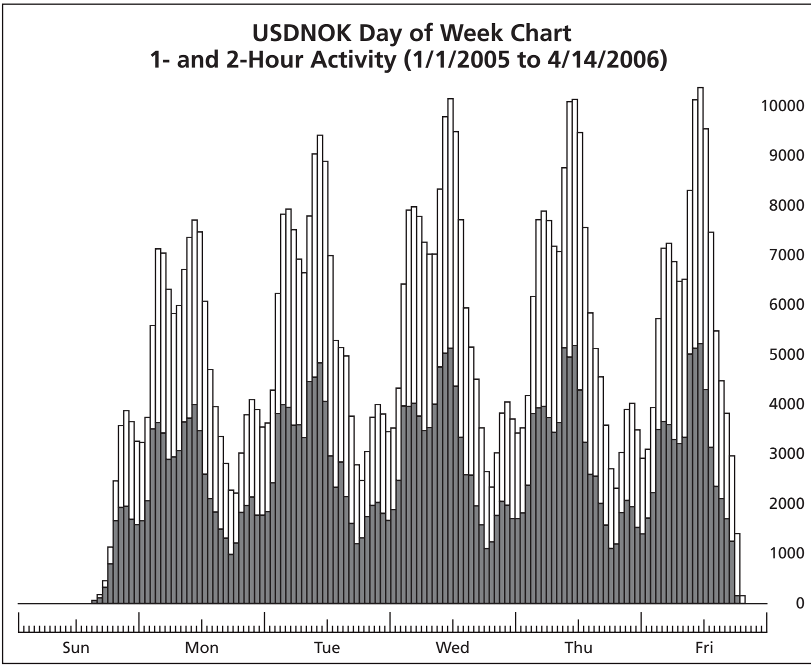

Figure I-9 USDNOK composite activity chart.

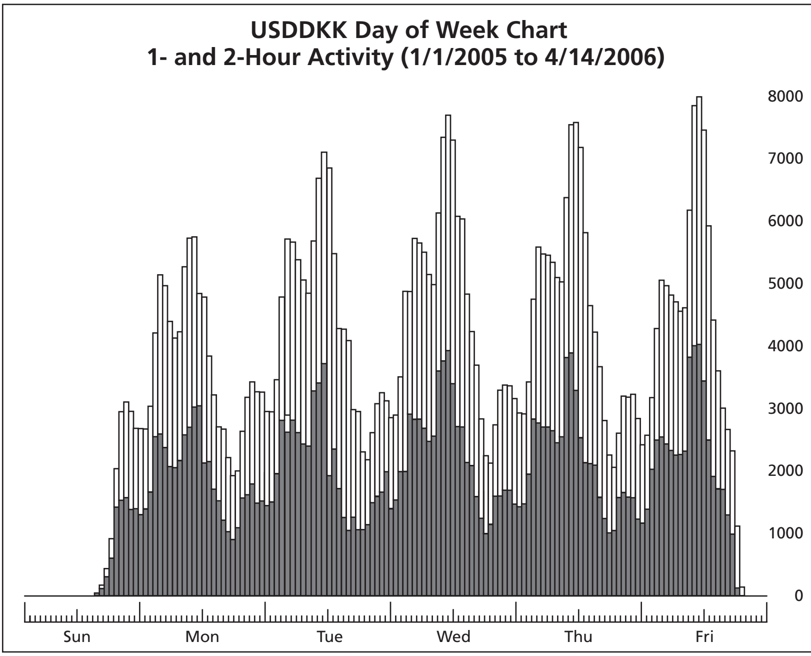

Figure I-10 USDDKK composite activity chart.

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Appendix J
Composite Range Charts (Weekly)

See the comments at the beginning of Appendix I for a general description of weekly composite charts.

The vertical numeric scale on the right of the composite range chart is the absolute range expressed in total number of pips during each time interval. Each lower (dark) vertical bar represents the range for the current hour. The sum of the two vertical bars (light and dark) represents the range for each two-hour period (the current hour plus the previous hour).

Pips are expressed in units of the quote (rightmost) currency in the pair and calculated by multiplying the exchange rate by the corresponding pip conversion factor (see Table J-1).

TABLE J-1 Pip Conversion Factors

Pair	Factor
EURUSD	10,000
GBPUSD	10,000
USDCHF	10,000
USDJPY	100
USDCAD	10,000
AUDUSD	10,000
NZDUSD	10,000
USDSEK	1,000
USDNOK	1,000
USDDKK	1,000

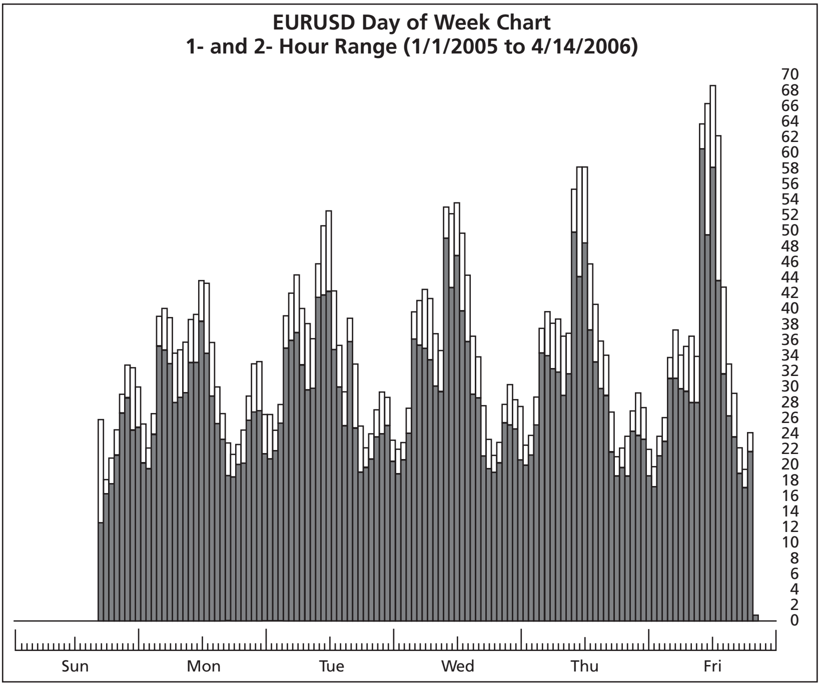

Figure J-1 EURUSD composite range chart.

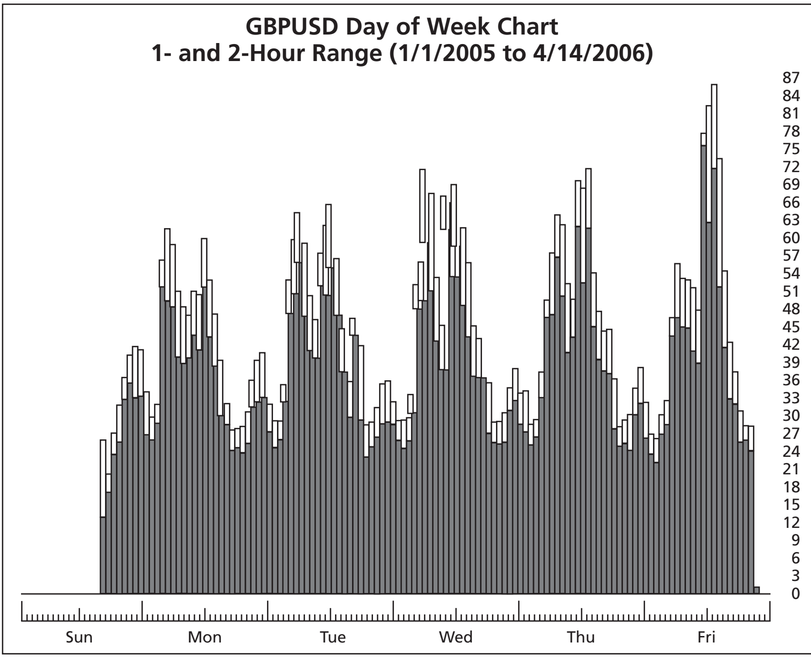

Figure J-2 GBPUSD composite range chart.

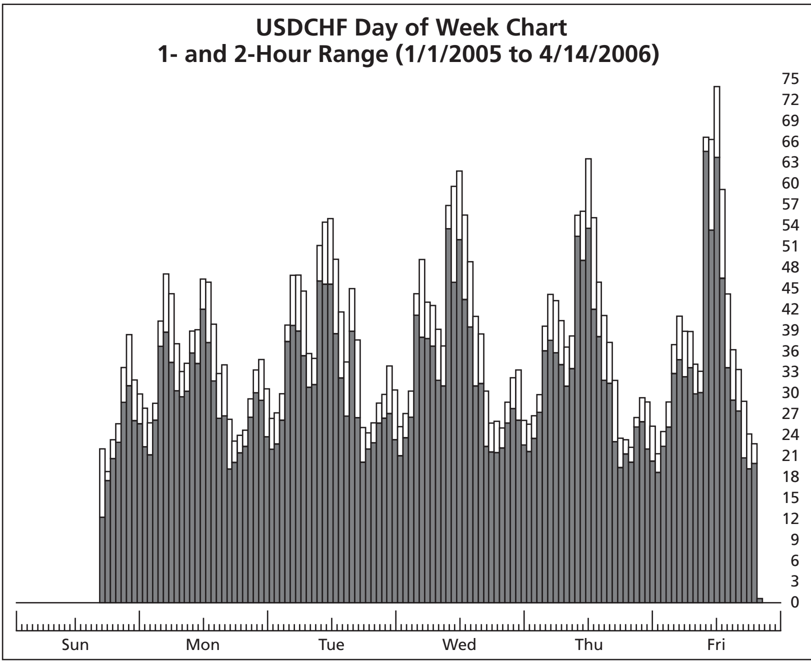

Figure J-3 USDCHF composite range chart.

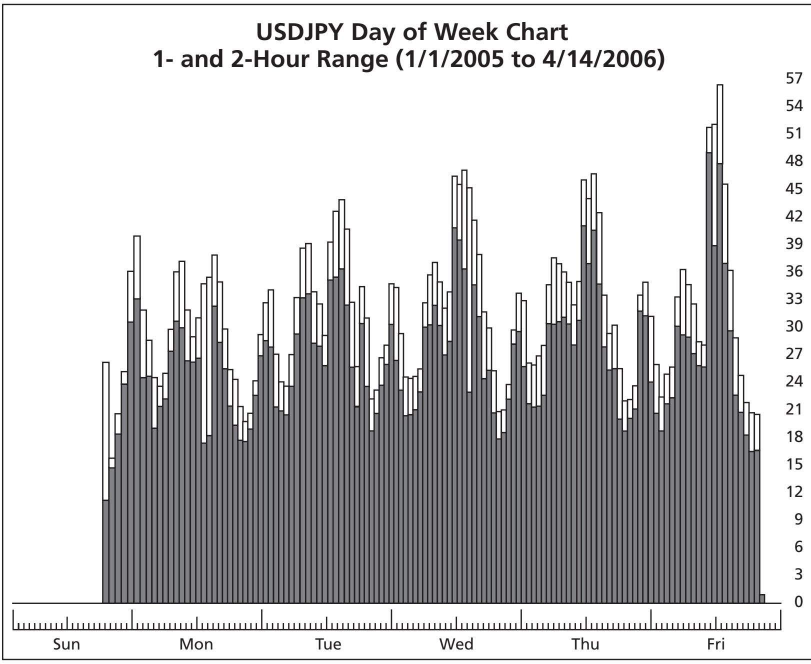

Figure J-4 USDJPY composite range chart.

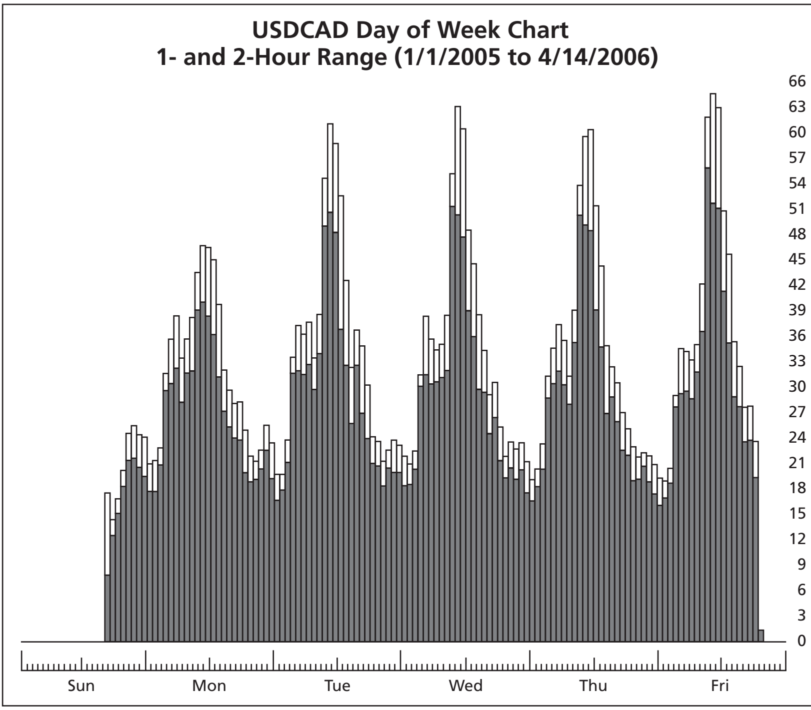

Figure J-5 USDCAD composite range chart.

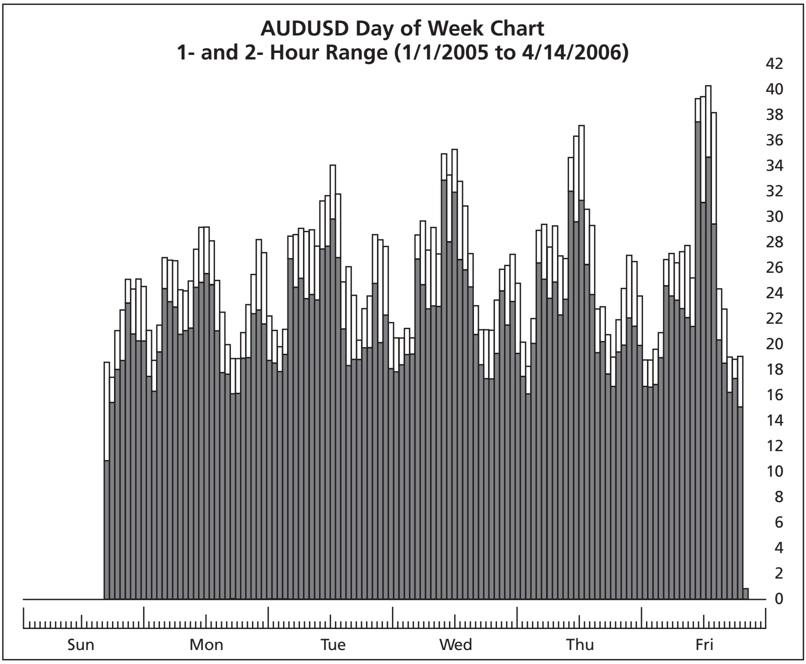

Figure J-6 AUDUSD composite range chart.

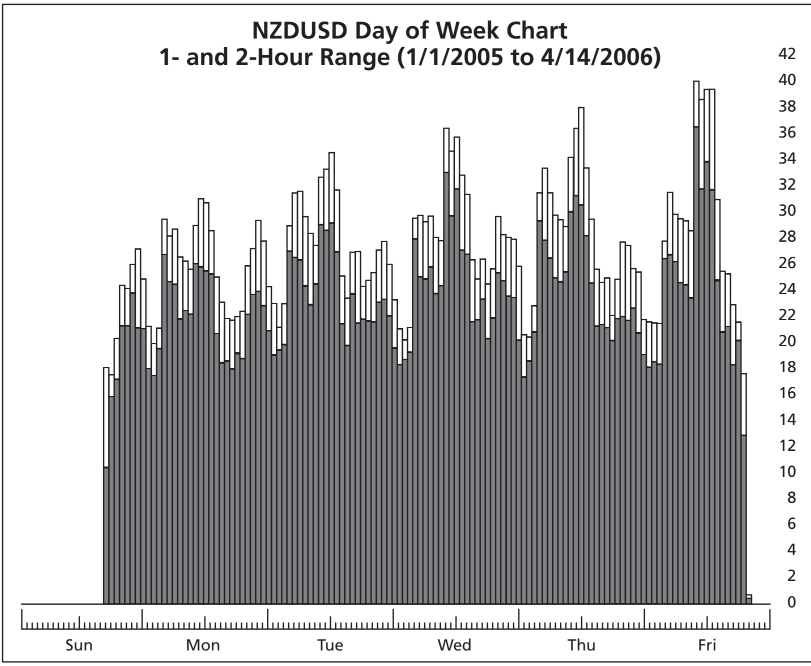

Figure J-7 NZDUSD composite range chart.

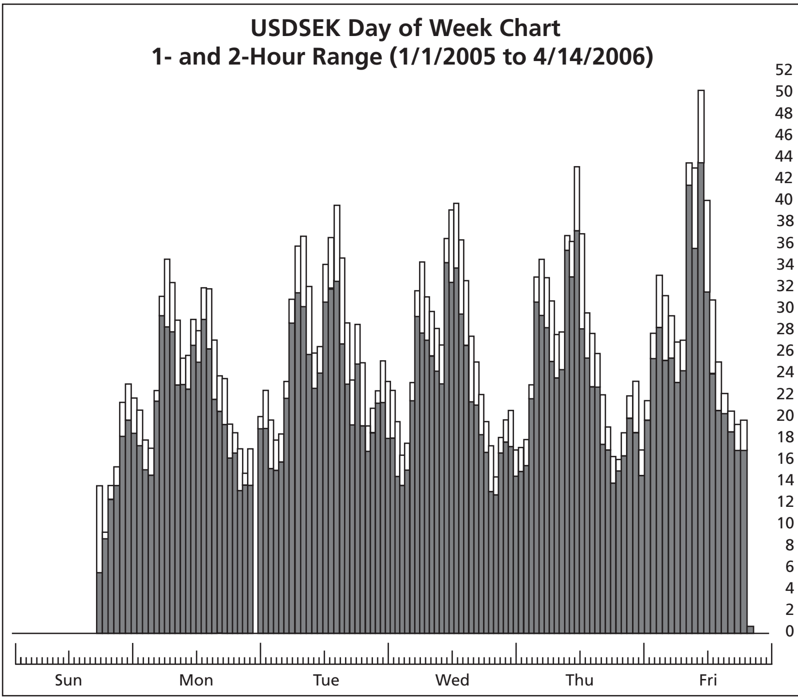

Figure J-8 USDSEK composite range chart.

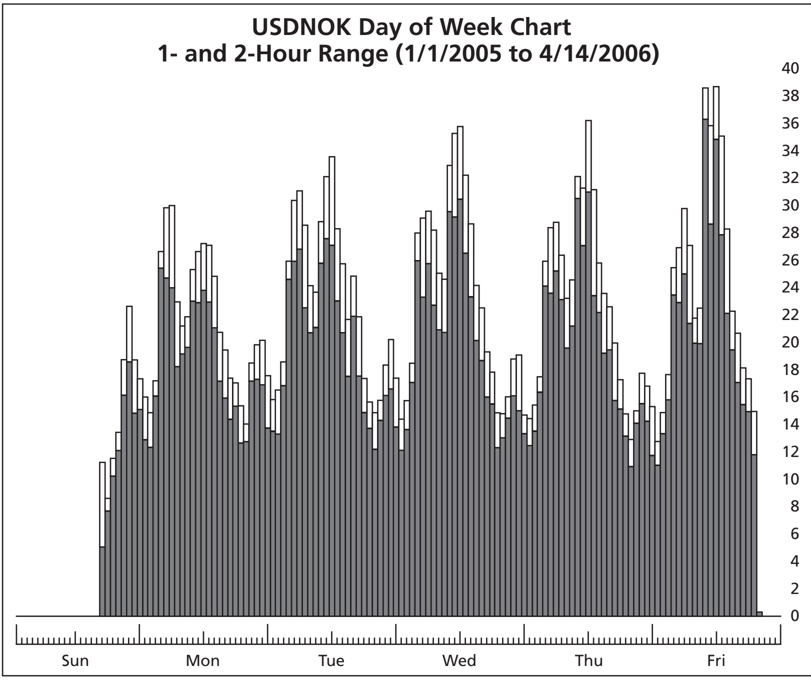

Figure J-9 USDNOK composite range chart.

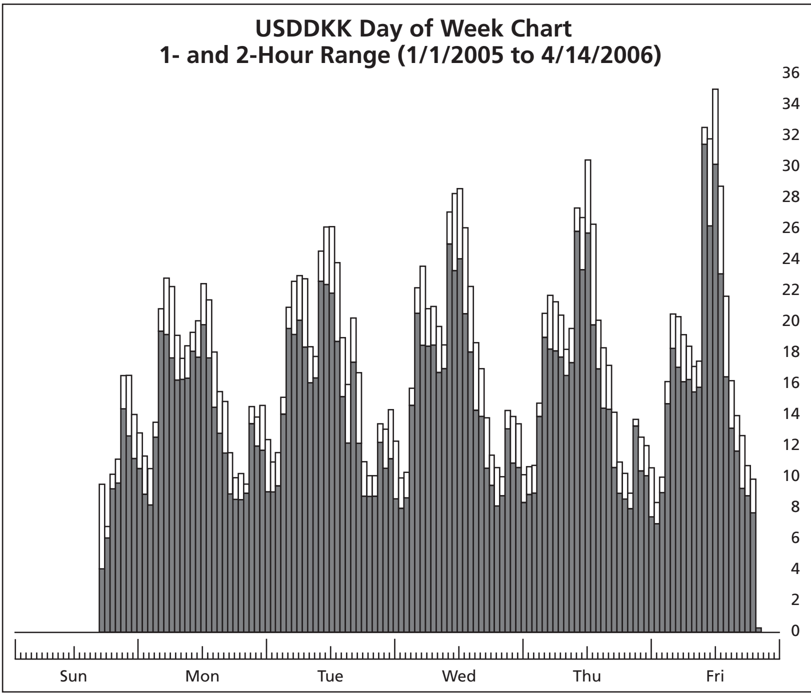

Figure J-10 USDDKK composite range chart.

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Appendix K
Resources

PERIODICALS

Active Trader (TechInfo, Inc.), www.activetradermag.com.

Currency Trader, www.currencytradermag.com.

EForex, www.eforex.net.

Euromoney, www.euromoney.com.

Futures (Futures Magazine, Inc.), www.futuresmag.com.

FX&MM, www.russellpublishing.com/FX&MM/index.html.

FX Week, www.fxweek.com.

Technical Analysis of Stocks & Commodities, www.traders.com.

Traders Journal, www.traders-journal.com.

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Zieg, Kermit, *Point & Figure*. Greenville, SC: Traders Press, 1997.

The world's largest supplier of mail-order investment/trading books is Traders Press at www.traderspress.com.

Glossary of Forex Terms

A

Appreciation A currency is said to *appreciate* when it strengthens in price in response to market demand.

Arbitrage The purchase or sale of an instrument and simultaneous taking of an equal and opposite position in a related market in order to take advantage of small price differentials between markets.

Ask price The price at which the market is prepared to sell a specific currency in a foreign exchange contract or cross-currency contract. At this price, the trader can buy the base currency. In the quotation, it is shown on the right side. For example, in the quote USDCHF 1.4527/32, the ask price is 1.4532, meaning that you can buy one U.S. dollar for 1.4532 Swiss francs.

At best An instruction given to a dealer to buy or sell at the best rate that can be obtained.

At or better An order to deal at a specific rate or better.

B

Balance of trade The value of a country's exports minus its imports.

Bar chart A type of chart that consists of four significant points: the high and low prices, which form the vertical bar; the opening price, which is marked with a little horizontal line to the left of the bar; and the closing price, which is marked with a little horizontal line to the right of the bar.

Base currency The first currency in a currency pair. It shows how much the base currency is worth, as measured against the second currency. For example, if the USDCHF rate equals 1.6215, then one USD is worth CHF 1.6215. In the foreign exchange markets, the U.S. dollar is normally considered the "base" currency for quotes, meaning that quotes are expressed as a unit of 1 USD per the other currency quoted in the pair. The primary exceptions to this rule are the British pound, the euro, and the Australian dollar.

Bear market A market distinguished by declining prices.

Bid price The bid is the price at which the market is prepared to buy a specific currency in a foreign exchange contract or cross-currency contract. At this price, the trader can sell the base currency. It is shown on the left side of the quotation. For example, in the quote USDCHF 1.4527/32, the bid price is 1.4527; meaning that you can sell 1 USD for 1.4527 Swiss francs.

Bid/ask spread The difference between the bid and offer price.

Big figure quote Dealer expression referring to the first few digits of an exchange rate. These digits are often omitted in dealer quotes. For example, a USDJPY rate might be 117.30/117.35 but would be quoted verbally without the first three digits, that is, 30/35.

BLS Bureau of Labor Statistics.

Book In a professional trading environment, a book is the summary of a trader's or desk's total positions.

Broker An individual or firm that acts as an intermediary, putting together buyers and sellers for a fee or commission. In contrast, a dealer commits capital and takes one side of a position, hoping to earn a spread (profit) by closing out the position in a subsequent trade with another party.

Bretton Woods Agreement of 1944 An agreement that established fixed foreign exchange rates for major currencies, provided for central bank intervention in the currency markets, and pegged the price of gold at US$35 per ounce. The agreement lasted until 1971, when President Nixon overturned the Bretton Woods agreement and established a floating exchange rate for the major currencies.

Bull market A market distinguished by rising prices.

Bundesbank Germany's Central Bank.

C

Cable Trader jargon referring to the sterling/USD exchange rate. So-called because the rate was transmitted originally via a trans-Atlantic cable beginning in the mid-1800s.

Candlestick chart A chart that indicates the trading range for the day as well as the opening and closing prices. If the open price is higher than the close price, the rectangle between the open and close price is shaded. If the close price is higher than the open price, that area of the chart is not shaded.

Cash market The market in the actual financial instrument on which a futures or options contract is based.

Central bank A government or quasi-governmental organization that manages a country's monetary policy. For example, the U.S. central bank is the Federal Reserve, and the German central bank is the Bundesbank.

CFTC Commodity Futures Trading Commission.

Chartist An individual who uses charts and graphs and interprets historical data to find trends and predict future movements. Also referred to as *technical trader*.

Cleared funds Funds that are freely available, sent in to settle a trade.

Closed position Exposures in foreign currencies that no longer exist. The process to close a position is to sell or buy a certain amount of currency to offset an equal amount of the open position. This will square the position.

Clearing The process of settling a trade.

CME Chicago Mercantile Exchange.

Contagion The tendency of an economic crisis to spread from one market to another. In 1997, political instability in Indonesia caused high volatility in their domestic currency, the rupiah. From there, the contagion spread to other Asian emerging currencies and then to Latin America and now is referred to as the *Asian contagion.*

Collateral Something given to secure a loan or as a guarantee of performance.

Commission A transaction fee charged by a broker.

Confirmation A document exchanged by counterparts to a transaction that states the terms of said transaction.

Contract The standard unit of trading.

Counter currency The second listed currency in a currency pair.

Counterparty One of the participants in a financial transaction.

Country risk Risk associated with a cross-border transaction, including, but not limited to, legal and political conditions.

Cross-currency pair A foreign exchange transaction in which one foreign currency is traded against a second foreign currency, for example, EURGBP.

Cross-rate Same as cross-currency pair.

Currency Any form of money issued by a government or central bank and used as legal tender and a basis for trade.

Currency pair The two currencies that make up a foreign exchange rate, for example, EURUSD.

Currency risk The probability of an adverse change in exchange rates.

D

Day trader Speculators who take positions in currencies that are then liquidated prior to the close of the same trading day.

Dealer An individual or firm that acts as a principal or counterpart to a transaction. Principals take one side of a position, hoping to earn a spread (profit) by closing out the position in a subsequent trade with another party. In contrast, a broker is an individual or firm that acts as an intermediary, putting together buyers and sellers for a fee or commission.

Deficit A negative balance of trade or payments.

Delivery A Forex trade where both sides make and take actual delivery of the currencies traded.

Depreciation A fall in the value of a currency owing to market forces.

Derivative A contract that changes in value in relation to the price movements of a related or underlying security, future, or other physical instrument. An option is the most common derivative instrument.

Devaluation The deliberate downward adjustment of a currency's price, normally by official announcement.

E

Economic indicator A government-issued statistic that indicates current economic growth and stability. Common indicators include employment rates, gross domestic product (GDP), inflation, retail sales, and so forth.

ECU European Currency Unit; see *EMU*.

End-of-day order (EOD) An order to buy or sell at a specified price. This order remains open until the end of the trading day, which is typically 5 p.m. ET.

European Monetary Union (EMU) One of th goals of the EMU was to establish a single European currency called the *euro,* which officially replaced the national currencies of the member EU countries in 2002. On Janaury 1, 1999, the transitional phase to introduce the euro began. The euro now exists as a banking currency, and paper financial transactions and foreign exchanges are made in euros. This transition period will last for three years, at which time euro notes and coins will enter circulation. On July 1, 2002, only euros will be legal tender for EMU participants, the national currencies of the member countries will cease to exist. The current members of the EMU are Germany, France, Belgium, Luxembourg, Austria, Finland, Ireland, the Netherlands, Italy, Spain, and Portugal.

Euro The currency of the European Monetary Union (EMU). A replacement for the European Currency Unit (ECU).

European Central Bank (ECB) The central bank for the new EMU.

F

Federal Deposit Insurance Corporation (FDIC) The regulatory agency responsible for administering bank depository insurance in the United States.

Federal Reserve (Fed) The central bank for the United States.

First in first out (FIFO) Open positions are closed according to the FIFO accounting rule. All positions opened within a particular currency pair are liquidated in the order in which they were originally opened.

Flat/square Dealer jargon used to describe a position that has been completely reversed; for example, you bought $500,000 and then sold $500,000, thereby creating a neutral (flat) position.

Foreign exchange (Forex, FX) The simultaneous buying of one currency and selling of another.

Forward The prespecified exchange rate for a foreign exchange contract settling at some agreed future date based on the interest-rate differential between the two currencies involved.

Forward points The pips added to or subtracted from the current exchange rate to calculate a forward price.

Fundamental analysis Analysis of economic and political information with the objective of determining future movements in a financial market.

Futures contract An obligation to exchange a good or instrument at a set price on a future date. The primary difference between a future and a forward is that futures typically are traded over an exchange (exchange-traded contacts, ETCs) versus forwards, which are considered over-the-counter (OTC) contracts. An OTC is any contract *not* traded on an exchange.

FX Foreign exchange.

G

G7 The seven leading industrial countries, namely, the United States, Germany, Japan, France, the United Kingdom, Canada, and Italy.

Going long The purchase of a stock, commodity, or currency for investment or speculation.

Going short The selling of a currency or instrument not owned by the seller.

Good-'til-canceled order (GTC) An order to buy or sell at a specified price. This order remains open until filled or until the client cancels.

Gross domestic product (GDP) Total value of a country's output, income, or expenditure produced within the country's physical borders.

Gross national product (GNP) Gross domestic product plus income earned from investment or work abroad.

H

Hedge A position or combination of positions that reduces the risk of your primary position.

Hit the bid Acceptance of purchasing at the offer or selling at the bid.

I

IMM International monetary market.

Inflation An economic condition whereby prices for consumer goods rise, eroding purchasing power.

Initial margin The initial deposit of collateral required to enter into a position as a guarantee on future performance.

Interbank rates The foreign exchange rates at which large international banks quote other large international banks.

Intervention Action by a central bank to affect the value of its currency by entering the market. *Concerted intervention* refers to action by a number of central banks to control exchange rates.

K

Kiwi Slang for the New Zealand dollar.

L

Leading indicators Statistics that are considered to predict future economic activity.

Leverage Also called *margin*. The ratio of the amount used in a transaction to the required security deposit.

LIBOR The London Inter-Bank Offered Rate. Banks use LIBOR when borrowing from another bank.

Limit order An order with restrictions on the maximum price to be paid or the minimum price to be received. As an example, if the current price of USDYEN is 117.00/05, then a limit order to buy USD would be at a price below 102 (i.e., 116.50).

Liquidation The closing of an existing position through the execution of an offsetting transaction.

Liquidity The ability of a market to accept large transaction with minimal to no impact on price stability; also, the ability to enter and exit a market quickly.

Long position A position that appreciates in value if market prices increase. When the base currency in the pair is bought, the position is said to be long.

Lot A unit to measure the amount of the deal. The value of the deal always corresponds to an integer number of lots.

M

Margin The required equity that an investor must deposit to collateralize a position.

Margin call A request from a broker or dealer for additional funds or other collateral to guarantee performance on a position that has moved against the customer.

Market maker A dealer who regularly quotes both bid and ask prices and is ready to make a two-sided market for any financial instrument.

Market risk Exposure to changes in market prices.

Mark-to-market Process of revaluating all open positions with the current market prices. These new values then determine margin requirements.

Maturity The date for settlement or expiry of a financial instrument.

N

Net position The amount of currency bought or sold that has not yet been offset by opposite transactions.

NFA National Futures Association.

O

Offer The rate at which a dealer is willing to sell a currency. See *ask price*.

Offsetting transaction A trade that serves to cancel or offset some or all of the market risk of an open position.

One cancels the other order (OCO) A designation for two orders whereby if one part of the two orders is executed, the other is automatically canceled.

Open order An order that will be executed when a market moves to its designated price. Normally associated with good-'til-canceled orders.

Open position An active trade with corresponding unrealized profit and loss that has not been offset by an equal and opposite deal.

Over the counter (OTC) Used to describe any transaction that is not conducted over an exchange.

Overnight position A trade that remains open until the next business day.

Order An instruction to execute a trade at a specified rate.

P

Pip The smallest unit of price for any foreign currency. Digits added to or subtracted from the fourth decimal place, that is, 0.0001. Also called *point*.

Political risk Exposure to changes in governmental policy that will have an adverse effect on an investor's position.

Position The netted total holdings of a given currency.

Premium In the currency markets, describes the amount by which the forward or futures price exceeds the spot price.

Price transparency Describes quotes to which every market participant has equal access.

Profit /loss or P/L or gain/loss The actual realized gain or loss resulting from trading activities on closed positions, plus the theoretical "unrealized" gain or loss on open positions that have been marked-to-market.

Q

Quote An indicative market price, normally used for information purposes only.

R

Rally A recovery in price after a period of decline.

Range The difference between the highest and lowest price of a future recorded during a given trading session.

Rate The price of one currency in terms of another, typically used for dealing purposes.

Resistance A term used in technical analysis indicating a specific price level at which analysis concludes people will sell.

Revaluation An increase in the exchange rate for a currency as a result of central bank intervention. Opposite of *devaluation.*

Risk Exposure to uncertain change, most often used with a negative connotation of adverse change.

Risk management The employment of financial analysis and trading techniques to reduce and control exposure to various types of risk.

Rollover Process whereby the settlement of a deal is rolled forward to another value date. The cost of this process is based on the interest-rate differential of the two currencies.

Round trip Buying and selling of a specified amount of currency.

S

SEC Securities Exchange Commission.

Settlement The process by which a trade is entered into the books and records the counterparts to a transaction. The settlement of currency trades may or may not involve the actual physical exchange of one currency for another.

Short position An investment position that benefits from a decline in market price. When the base currency in the pair is sold, the position is said to be short.

Spot price The current market price. Settlement of spot transactions usually occurs within two business days.

Spread The difference between the bid and offer prices.

Square Purchases and sales are in balance, and thus the dealer has no open position.

Sterling Slang for British pound.

Stop-loss order Order type whereby an open position is automatically liquidated at a specific price. Often used to minimize exposure to losses if the market moves against an investor's position. As an example, if an investor is long USD at 156.27, he or she might wish to put in a stop-loss order for 155.49, which would limit losses should the dollar depreciate, possibly below 155.49.

Support levels A technique used in technical analysis that indicates a specific price ceiling and floor at which a given exchange rate will correct itself automatically. Opposite of *resistance*.

Swap A currency swap is the simultaneous sale and purchase of the same amount of a given currency at a forward exchange rate.

Swissy Market slang for Swiss franc.

T

Technical analysis An effort to forecast prices by analyzing market data, that is, historical price trends and averages, volumes, open interest, and so forth.

Tick A minimum change in time required for the price to change, up or down.

Transaction cost The cost of buying or selling a financial instrument.

Transaction date The date on which a trade occurs.

Turnover The total money value of all executed transactions in a given time period; volume.

Two-way price When both a bid rate and offer rate are quoted for a Forex transaction.

U

Unrealized gain/loss The theoretical gain or loss on open positions valued at current market rates, as determined by the broker in its sole discretion. Unrealized gains/losses become profits/losses when position is closed.

Uptick A new price quote at a price higher than the preceding quote.

Uptick rule In the United States, a regulation whereby a security may not be sold short unless the last trade prior to the short sale was at a price lower than the price at which the short sale is executed.

U.S. prime rate The interest rate at which U.S. banks will lend to their prime corporate customers.

V

Value date The date on which counterparts to a financial transaction agree to settle their respective obligations, that is, exchanging payments. For spot currency transactions, the value date is normally two business days forward. Also known as *maturity date.*

Variation margin Funds a broker must request from the client to have the required margin deposited. The term usually refers to additional funds that must be deposited as a result of unfavorable price movements.

Volatility A statistical measure of a market's price movements over time characterized by deviations from a predetermined central value (usually the arithmetic mean).

W

Whipsaw Slang for a condition where any securities market begins moving laterally exhibiting very little volatility.

Y

Yard Slang for a billion.

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About the Author

James L. Bickford began trading commodity futures in the early 1980s. Since 2001, he has focused his investment efforts solely on trading spot currency pairs via online Forex dealers. His academic background is in computer science, applied mathematics, and statistics. By profession, he has been a software engineer for nearly three decades. He has authored (or coauthored) several books on technical analysis and currency trading: *Chart Plotting Algorithms for Technical Analysts* (2001), *Getting Started in Currency Trading* (2005), *Forex Chartist's Companion: A Visual Approach to Technical Analysis* (2006), *Forex Trader's Companion: Focus on Major Currencies* (2007), and *Forex Wave Theory* (2007).