THE WILEY TRADING GUIDE

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About the authors

Louise Bedford

Louise Bedford <www.tradingsecrets.com.au> is one of Australia's most compelling speakers on the sharemarket, as well as being a share trader for nearly 20 years. With degrees in psychology and business, she's done the hard yards in the sharemarket. You will adore Louise's warm and approachable style, whether you are a professional trader or a complete amateur.

As Australia's bestselling author on the sharemarket for nearly a decade, she has been quoted in more Australian share-trading books than any other trader. Her trading books *Trading Secrets, Charting Secrets, The Secret of Candlestick Charting* and *The Secret of Writing Options*, as well as her presentations, are not about vague concepts that don't work in the real world. They are about incredibly practical, timesaving strategies that you can implement in order to become an extremely successful trader.

If you've trained with another sharemarket trainer, the chances are that they've got a dog-eared, highlighted copy of one of Louise's books in pride of place in their bookcase.

If you genuinely want to become an ultra-versatile trader and develop an incredible lifestyle, you need a trading plan. Just go to Louise's website and register your details. As a gift, she'll email you your very own 'Trading Plan Template' straight away. It will help you work through all of the vital issues that need to be included in a sophisticated trading plan to give you an edge in the sharemarket.

Jim Berg

Jim Berg, author of *The Share Trader's Handbook, The Stock Trading Handbook* (e-book) and *Shares to Buy & When,* is a former broker, private trader and lecturer with over 20 years' experience in the investment industry. He has appeared on Sky Business TV, CNBC Asia and Market Wrap and is a regular guest speaker at such institutions as the Australian Securities Exchange (ASX), the Sydney Futures Exchange (SFE) and the Australian Technical Analysts Association (ATAA) and at Traders Expos at capital cities throughout Australia. In Brisbane in October 2007 he was billed at the ATAA 'Pathways to Trading Excellence' Conference as one of the 10 'most respected trading professionals in the world'. Using his commonsense approach, Jim Berg won the *Personal Investor* magazine's trading competition in 2002—during a severe bear market that lasted three years.

In his December 2007 Sharetradingeducation.com report 'Crash vs Bear Market' Jim detailed his technical analysis of the warning signals weeks ahead of the January/February 2008 freefalls.

His articles have been published in the ASX newsletter *Shares, Personal Investor, Your Trading Edge* and *Stocks and Commodities* in the US.

Further information is available at <www.sharetradingeducation.com.au>.

Guy Bower

Guy Bower is the Head of Training and Development at Propex Derivatives, a proprietary trading company specialising in high-frequency futures and equity trading. He is also an active spread trader in US futures.

He has worked in Australia and overseas and has experience in futures, options, funds management and trading education.

Guy is the author of several books including *Options: A Guide for Australian Investors* and *Traders and Hedging: Simple Strategies for Protecting Profits*. He was also profiled in the book *Bullseye: Top Trader Thinking* by Matt and Sari Kirk.

His website is <www.guybower.com>.

Kel Butcher

Kel Butcher is a financial markets trader with over 20 years' experience trading equities, futures, options, forex and CFDs. Kel's favourite, though, is the futures market where the 'pure' nature of a supply-and-demand-driven market, coupled with high liquidity, allows the application of well-researched mechanical trading systems. The use of electronic platforms allows many of these systems to be 'auto-traded', further reducing any emotional attachment to the trading process. He is a regular contributor to *Your Trading Edge* magazine and contributed to *Give Your Trading the Edge*—published by Wrightbooks in partnership with *Your Trading Edge* magazine. Kel is also the author of the Wrightbooks titles *A Step-by-Step Guide to Buying and Selling Shares Online* and *20 Most Common Trading Mistakes and How You Can Avoid Them.* Kel is director of KD Trading Systems <www.kdtradingsystems.com>, specialising in providing futures and forex trading systems that work and deliver positive returns to traders. He is also a mentor and trading coach to a number of both private and corporate investors.

Davin Clarke

Davin Clarke is a full-time professional day trader who has been trading full time for over 10 years. Davin is passionate about trading and his consistent results year after year speak for themselves. He is an active intraday trader who trades both equities and various

futures markets, including the European and Asian markets. In 2005–07 Davin's equities trading turnover averaged A$300 million per annum. Since 2008 Davin has specialised in trading on the futures markets in Asia, the US and Europe.

Davin has developed a keen understanding of how the market moves and how market psychology affects price through many, many hours watching and trading the markets live. The ability to accurately read market dynamics is invaluable to his success and he combines this skill with his own unique trading style.

Davin regularly posts articles and showcases his trades on his blog <www.trade4edge.com>. He is a regular presenter at the Australian Technical Analysts Association and several other trading clubs. He is also featured in Eva Diaz's book *Real Traders, Real Lives, Real Money* (2006) and more recently in Kel Butcher's book *20 Most Common Trading Mistakes and How You Can Avoid Them*, both published by John Wiley & Sons.

Daryl Guppy

Daryl Guppy is founder and director of Guppytraders.com Pty Ltd. Guppytraders.com is an international financial market education and training organisation with offices in Darwin, Singapore and Beijing. Guppy is a regular CNBC Asia Squawk Box technical analyst commentator, often known as 'the chart man'. He is recognised globally for the quality of his analysis and has a weekly CNBC.com column: Charting Asia.

Guppy actively trades equities and associated derivatives markets, including CFDs. He is the author of *The 36 Strategies of the Chinese for Financial Traders, Trend Trading* and seven other trading books. He has developed several leading technical indicators used by traders in stock, derivative and currency markets. His indicators are included in MetaStock, OmniTrader, Guppytraders Essentials and other charting programs.

Guppy is a regular contributor to financial magazines and media in Singapore, Malaysia, China, Australia and the US. He is a weekly columnist in Singapore's *TheEdge*, *China Daily* and *Shanghai Security News*. He oversees the production of weekly analysis and trading newsletters for the Singapore/Malaysia and Australian

markets. He is recognised as a leading expert on China markets. He is in demand as a speaker in Asia, China, Europe and Australia, speaking in more than 17 countries.

Alan Hull

Alan Hull is a second-generation share trader, fund manager, businessman, writer, mathematician and IT expert. He is the bestselling author of *Blue Chip Investing — the business of making money on the Australian stock market* and *Active Investing — a complete answer*, now in its 10th year of publication. Alan has also managed tens of millions of dollars of other people's retirement funds, his performance consistently beating all the major ASX market averages.

Alan speaks extensively throughout Australia for organisations such as the Australian Securities Exchange, the Australian Investors Association, the Australian Technical Analysts Association, Investment Expo and Traders Expo. His books, articles and newsletters are published and widely read throughout Australia and overseas.

While ant colonies, the human brain and even entire civilisations have been recognised and studied as complex adaptive systems, the research into financial markets as complex adaptive systems is still very much in its infancy. However, in his relatively brief but comprehensive discussion in this book, Alan offers what is probably the first complete explanation linking the sciences of chaos theory and complex adaptive systems to the financial markets. Furthermore, it is written in very easy to understand terminology, and Alan concludes by showing how you can profit from this newfound understanding.

Glen Larson

Glen Larson is president of Genesis Financial Technologies Inc and TradeNavigator.com. Glen earned his Bachelor of Science in Chemical Engineering in 1982 and completed graduate work in Electrical Engineering following his degree.

Upon graduating from college he worked for various industry giants in the semiconductor industry. His speciality was managing the Device Physics Analysis departments. He has managed engineering

departments for National Semiconductor, Phillips Electronics and United Technologies. Glen later applied his engineering and mathematical skills to programming the initial Trade Navigator platform, later forming Genesis Financial Technologies Inc.

He has over 25 years of trading and programming experience. During these 25-plus years he has participated in seminars across the globe, from Russia to Europe, South America, Australia, Singapore and India. In addition he has been fortunate to develop partnerships and friendships with many world-renowned traders and major financial institutions and brokerages. These unique relationships, partnerships and global experiences along with his engineering background have allowed Glen to identify trading edges that have been built into the Trade Navigator platform.

Wayne McDonell

Wayne McDonell is the chief currency coach at FX Bootcamp <www.fxbootcamp.com>, a live forex training organisation that teaches traders how to develop conservative trade plans based on technical and fundamental analysis, as well as addressing the psychological aspects of being a trader, all in real time. Each trading session has a coach to provide live market commentary and analysis and to answer questions; members can see their charts and ask them questions while the market is moving.

Mr McDonell is a popular speaker at forex conferences around the world, having won 'Best of Show' awards for the 2009 Traders Expo in New York and the 2007 Forex Trading Expo in Las Vegas. Online, his forex training videos are syndicated by FXstreet.com, DailyFX.com, MSN.com and Yahoo Finance, among others, and have been viewed over 1 000 000 times. He has conducted monthly 'Trade Non-Farm Payrolls Live' webinars since 2006 and they have attracted as many as 1200 traders each.

As a regular contributor to the media in regards to currency trading, Mr McDonell has been interviewed by Bloomberg Television, *The Wall Street Journal*, Fox Business Television and others. Each Monday he is the featured guest on Forex Television's 'PM Exchange', and in each issue of *Your Trading Edge* magazine, distributed throughout Australia and the United Kingdom, he

writes the forex column Currency Corner. He has written 'how to' articles for *The Forex Journal*, *Traders Journal*, *Currency Trader* and *Futures* magazine. Other notoriety includes *Inc Magazine, TechWeek, Information Week* and *The National Post,* as well as non-English publications in Spain, Germany, Japan, Korea and China.

The FX Bootcamp Guide to Strategic & Tactical FOREX Trading (John Wiley & Sons) is highly acclaimed and a bestseller in the foreign exchange category of Amazon.com. It was featured as the 'Book of the Month' on MoneyShow.com, as well as in *Your Trading Edge* and *Futures* magazines.

FX Bootcamp is a member of the National Futures Association and is registered as a commodities trading adviser as well as an introducing broker. Mr McDonell also has a Series 3 licence.

Stuart McPhee

A graduate of the Royal Military College, Duntroon and a private trader since 1996, Stuart McPhee is the author of *Trading in a Nutshell,* 3rd edition.

He is a highly sought after public speaker on trading and regularly presents trading workshops in Southeast Asia. He has also presented at the ASX, the ATAA and at trading expos throughout Australia, and in New Zealand, Singapore, Malaysia, Vietnam, China, India, Thailand and the US.

Stuart has a Graduate Diploma in Applied Finance and Investment from the Financial Services Institute of Australasia and truly understands the importance of you finding a trading plan and approach that is right for you.

Stuart advises that, 'Trading is like any other profession. You need to learn the basics, then develop and hone your skills through application. However, you are only going to succeed if you commit yourself to the task, as you need to develop a professional, disciplined and consistent approach towards your trading.'

An excellent motivator and teacher and technically competent, Stuart, through his honest and clear style, has helped thousands of people with their trading. Follow live and learn from Stuart's own personal trades at <www.tradingasxshares.com> with regular video updates and commentary.

Justine Pollard

Justine Pollard is one of the 'Alices' who has conquered the wonderland of the stock market. She lives to share the bountiful experiences and wisdom she continues to accumulate, touching the lives of traders and helping them discover the smarter way to trade.

As a successful trader and sought-after trading mentor, Justine is willing to share her years of trading education and experience. She has developed various training products and packages to help other traders become profitable. The courses and personal tutorials have been packaged into training packs to suit different levels of traders.

Justine is the author of the top-10 bestselling finance book *Smart Trading Plans*. If you need comprehensive details about what is discussed in formulating your personal trading plan, *Smart Trading Plans* is just the right book for you. The book is a step-by-step guide to developing and implementing your own personal trading plan to increase your chances of success in the market. When you purchase the book you also get access to a free trading plan template and free position sizing calculator to work through as you read the book.

Visit <www.smarttrading.com.au> to find out more and download your free special report with Justine's *Top 10 Tips to Smarter Trading*.

Peter Pontikis

Peter Pontikis is a Brisbane-based alternative investments management specialist and has close to three decades of investment and financial markets experience. A senior fellow of Finsia (the Financial Services Institute of Australasia), he sits on its national policy advisory council. As a CPA (Fellow) of CPA Australia, he recently stepped down from its finance and treasury Centre of Excellence committee. He is also a director and the immediate past treasurer of the International Federation of Technical Analysts (IFTA).

Peter's previous roles include Head of Trading & Research for an Australian hedge fund and Senior Financial Markets Strategist for Westpac Investment Bank, and until recently he was the Group Treasury Strategist for Suncorp. Until the mid-2000s he also ran

a consultancy advising Asian central banks and fund managers. He has authored several books on foreign exchange and trading in financial markets.

Peter also has two degrees in his other passions: art and literature.

Tom Scollon

Tom Scollon is a Melbourne University commerce graduate and has had a long and successful business career, including 10 years with BHP in international marketing. His various roles have exposed him to a wide variety of business sectors with significant experience in raw materials, major construction projects, IT and finance. He has held a number of general management, CEO and chairman roles. Despite a busy corporate life he has been an active and successful investor for some 20 years. He is author of *Fair Share* and guest contributor to several other investment books. He is chief analyst for <www.sharesbulletin.com.au> and chief editor of 'Trading Tutors' at <www.hubbinvestor.com>. He also presents at many investment expos and is guest commentator on a number of radio and TV spots.

Dr Harry Stanton

Dr Harry Stanton is a Fellow of the Australian Society of Hypnosis, a Fellow of the American Society of Clinical Hypnosis and a Member of the Australian Psychological Society. He has had over 30 years' experience in the practice of clinical psychology and hypnotherapy, writing extensively on these subjects in academic journals. He is a consultant on the application of psychology to a wide range of practical activities. In his private practice as a clinical psychologist he helps clients with numerous issues, including overcoming problems with investing and trading the financial markets.

The basis of his work is self-empowerment, morale-building and performance enhancement, helping people to manage their lives more successfully by overcoming the obstacles they create within their own minds.

Dr Stanton is frequently consulted by the business community on how they might apply psychological principles to improve performance. In addition to keynoting conferences, he conducts workshops, both internationally and in Australia, on confidence-building, the psychology of investing and trading, self-motivation, motivating others, the effective use of time, persuasive communication, problem-solving, decision-making, coping with stress and managing people. As a sports psychologist, Dr Stanton works with both individuals and teams desirous of improving their performance in golf, bowls, football, rowing, basketball, swimming and rowing.

He is the author of well over 250 articles and nine books, including *The Success Factor: Succeeding in Business and in Life* and *Let the Trade Wins Flow: Psychology for Super Traders*.

In addition he has, together with traders Louise Bedford and Chris Tate, recorded a double CD entitled *Psychology Secrets*, which describes the 10 most common mistakes made by stock market traders and how they might be overcome. Also with Louise Bedford, he has a CD entitled *Relaxation for Traders*.

Gary Stone

Gary Stone is the founder and managing director of Share Wealth Systems <www.sharewealthsystems.com>, a provider of mechanical trading systems to private investors. Share Wealth Systems, based in Melbourne, gained its first client in 1995 and has since educated and coached private investors to manage their own equity portfolios by using mechanical trading systems. Gary has a Bachelor of Science majoring in computer science and mathematics. He started trading in 1990 and has completed thousands of mechanical trades in equities and CFDs using the same mechanical systems that his clients use. Share Wealth Systems currently provides two mechanical systems, one for medium-term trading, SPA3, and another for long-term trading, Intelledgence. Gary is always conducting research on the markets and is currently working on an ETF mechanical system and on preparing SPA3 for other exchanges, particularly the Nasdaq.

Chris Tate

Chris Tate is a trading veteran of 30 years and one of the first people to ever release a share-trading book in Australia. An old pro of the industry, Chris has been on all sides of the trading world, from broking to money manager to private trader. When he first started trading, exchanges still had trading floors and settling of trades involved the physical transfer of share certificates. He has had an extraordinary impact on thousands of traders. Best-selling author of *The Art of Trading* and *The Art of Options Trading in Australia*, his brutally honest approach and meticulous pursuit of excellence qualify him as Australia's foremost derivatives trading expert, and exceptional traders all around the world quote his market comments.

Chris has seen all types of markets and traded every instrument available, and has profited in every one of them. He is in constant demand for his keynote speaking skills due to the outrageous success of his presentations for every major share-trading exchange in Australia. Originally trained as a research scientist, Chris brings an intellectual rigor to the markets that is generally missing in much of the fluff-and-bubble world of advising and education.

Leon Wilson

Leon Wilson has traded just about every market accessible over a span of 20 years, from shares, warrants, CFDs, indices, commodities and futures to forex. In more recent times Leon retreated to the quiet life in rural Tasmania for reasons of health and wellbeing, where he now primarily focuses on international markets from the serenity of his home in the Tasmanian countryside. He is still accompanied by his faithful old Jack Russel who has been at his side since trade one.

Leon is one of only a select few Australian traders to be published in the US *Stock's & Commodities* magazine (July 2006) and he contributed the feature article in the same magazine in January 2008, where he first introduced then expanded on the techniques originally discussed in *Breakthrough Trading*. These methods have since been adopted by numerous trading software programs on both the domestic and international scene.

Leon is the author of *The Business of Share Trading: From Starting Out to Cashing In On Trading the Australian Market* (2003), *The Next Step to Share Trading Success* (2005) and *Breakthrough Trading: Revolutionary Thinking in Relative Analysis* (2006), all published by John Wiley & Sons.

Preface

In *The Wiley Trading Guide* you will find contributions from 17 of the finest traders and trading educators operating across the globe today.

Their methods are many and varied, but each trader we chose to include in this book has found success through continuous education, technique development and mastery of every trader's own worst enemy — themselves. They bear proof that financial freedom through trading is possible, despite the markets being challenging and ever-changing.

This book offers insights into each author's own trading methods and interests, providing inspiration and information to any trader wishing to raise their knowledge to the next level. Equities, derivatives, currencies and commodities are all featured; trading strategies, psychology and plans are addressed; and analysis methods are considered with a fresh perspective.

For a trader, defining success is simple: consistently trading profitably. But aspiring to this goal is a venture with a destination never definitively reached; trading is the ultimate infinite journey. We feel privileged to be able to share the experiences of these skilled and inspiring traders with you, and sincerely hope that *The Wiley Trading Guide* becomes a source of inspiration and guidance for you on your own trading journey.

John Wiley & Sons
June 2010

Chapter 1

Financial markets as complex adaptive systems

Using the right tactics at the right time

Alan Hull

As most modern-day traders will attest, there is an overwhelming array of choices when it comes to the different trading techniques and tactics that one can employ when dealing with financial markets. In fact this 'compilation' book is testament to this recent trend with about 20 acknowledged experts all offering up their different strategies on how to take profits from the markets. And indeed I make my own contribution to this wide array of choices by offering Australian equity traders and investors three different investment newsletter services.

Some traders will search through this plethora of trading systems and philosophies trying to filter out what works as opposed to what doesn't work. But alas, this approach will only lead to more frustration as you will inevitably discover that there is some validity to just about every technique ever invented. The reality is that success or failure of virtually all systems is largely dependent on the prevailing broad market conditions. And these conditions

change over time, therefore the effectiveness of any trading system will fluctuate accordingly.

So what we really need to do is take a step back for a moment and try to get a handle on how the broad market behaves. Because if we can better understand how the broader market works then it logically follows that we should know which are the most suitable trading and investing tactics to apply at what time. Simple …well, not quite.

Now we're striving to comprehend the real nature of financial markets, and this is the crux of this discussion. And while I'd like to say that it is a simple matter to understand the underlying nature of financial markets, unfortunately we are about to enter the world of chaos theory and complex adaptive systems. But fear not, as I will make every effort to maintain clarity when dealing with these somewhat esoteric topics. And so let's start at the simplest point: the beginning.

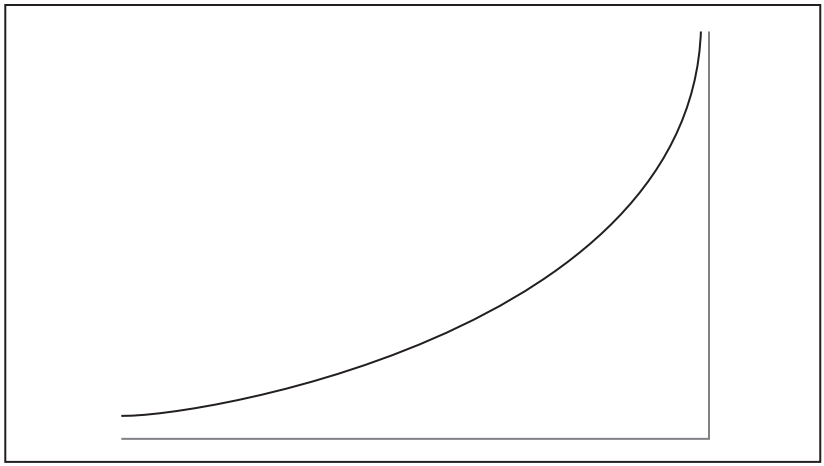
Straight lines and curvy bits

The word linear essentially means straight line or straight line progression, and in order to simplify everything we see and observe mankind has a profound tendency to view the world from a linear perspective. The main reason we want everything to be linear, or to progress in a straight line, is so we can both easily understand it *and* predict what it is likely to do in the future.

In more recent times, thanks largely to the computational power of modern computers, we have also pretty much mastered the ability to get our heads around curvy things as well. Of course, this is largely on the proviso that they are either constantly curvy or consistently changing, such as the case of an exponential curve like the one pictured in figure 1.1.

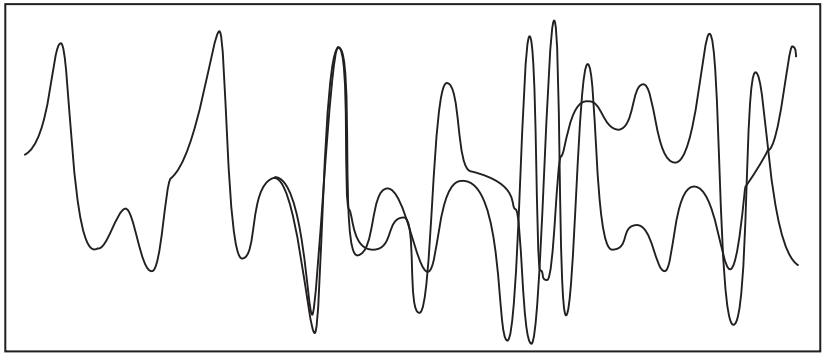
We can even project lines and curvy things into the future with a reasonably high degree of accuracy and determine if, when and where they're likely to intersect. Although there is one proviso: that there aren't too many variables to consider.

Figure 1.1: exponential curve



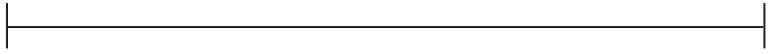
But there's another problem that even the scientific community doesn't like to talk about and that's the possibility of things changing but not doing so in a consistent way. In other words, the rate of change is not constant. It's bad enough that something can be 'dynamic' rather than 'static' (thus rendering statistical analysis and the bell curve largely useless), but when the rate of change itself isn't linear or at least constant then everyone starts to get really scared. This is known as non-periodic behaviour, as shown in figure 1.2.

Figure 1.2: non-periodic behaviour

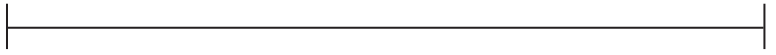


Source: *Does God Play Dice? The New Mathematics of Chaos*, Ian Stewart, Blackwell UK, 1989, p. 141.

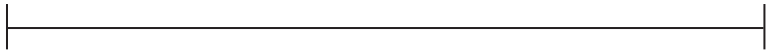
But let's sidetrack for a moment and look at the idea of a system being dynamic as opposed to static. Take the average life expectancy of the Australian population, for example. If you wanted to know the average number of years we're all expected to live then you would most likely use data available from the past 10 years or so:



But what about using recorded deaths from the last 100 years instead of just the past 10? Surely this larger sample of data will give us a more accurate and reliable answer:



Put simply, no … because over this expanse of time factors that impact our lifespan such as our diet and medical advances have changed significantly, making this sample period non-static and invalidating any averages taken. So let's go to the other extreme now and just use some very recent data. This should definitely give us the most up-to-date and accurate answer possible:

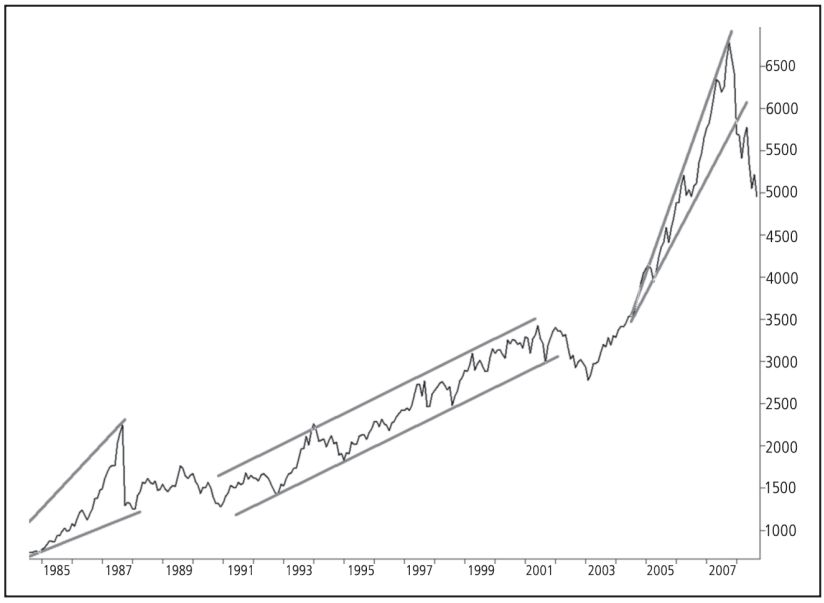


But unfortunately we now have the problem of insufficient data to work with. Thus any sample of data that we subject to statistical analysis must be from a static system or a representative snapshot that allows for the dynamic nature of a system. Hence using the average lifespan of Australians over the past 10 years to reflect today's average is in fact a snapshot approach and a compromise of sorts.

This is a pity because everyone held out so much hope that statistical analysis was a universal solution for problems of randomisation. So the stock market, like other irregular phenomena, gets labelled as being unpredictable and that's that. Just like weather patterns and the human heart, the stock market has too many variables and is a dynamic system that's not always linear by nature.

Hence figure 1.3 shows how the Australian stock market index, the All Ords, is forever changing its behaviour.

Figure 1.3: the All Ords



Thus if we can't get our heads around it then it's random or so close to random it doesn't matter. Another neat way of dismissing things we can't fully comprehend and/or predict is by calling it noise, interference or turbulence. Thus an engineer working in fluid dynamics will most likely attempt to eliminate turbulent flow rather than try to understand it.

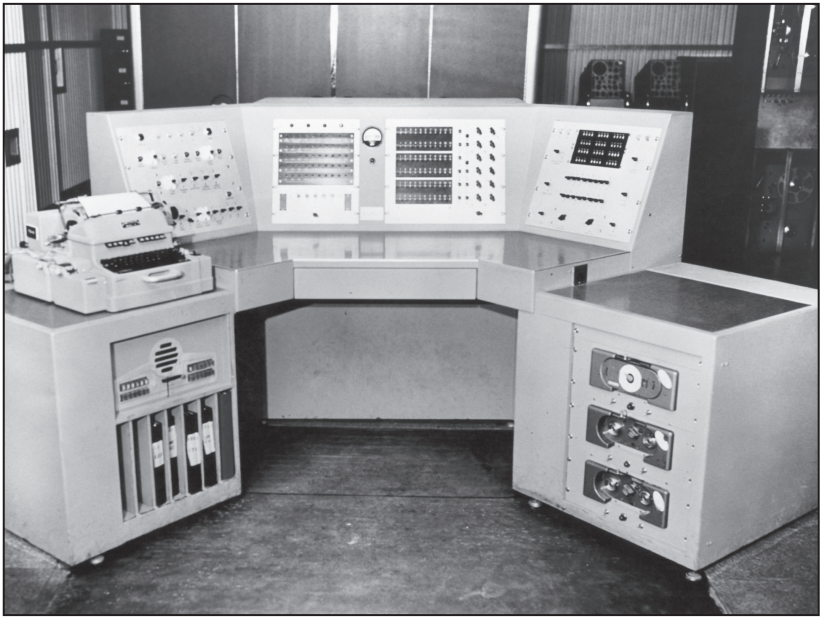
Introducing chaos theory

So you can imagine everyone's excitement about chaos theory when it first appeared back in the early '60s, because it went a long way towards understanding what had previously appeared to be random phenomena. Well, actually, it was largely dismissed by the broader scientific community at the time as a stream of pure mathematics without any real-world application. Hence it was just a good

excuse not to work on more practical stuff such as how to eliminate turbulence.

The pioneer in the field of chaos theory was Edward Lorenz, a meteorologist trying to simulate weather patterns. At the beginning of the 1960s Edward had developed a set of 12 mathematical equations that he used to model real-world weather conditions, using a very early and (by current standards) very primitive computer system, such as that shown in figure 1.4.

Figure 1.4: early computer system



Source: © Getty Images/SuperStock.

Like most experimenters Edward would often repeat the same simulations over and over again to verify previous results. But on one occasion he had reason to pause a simulation that he had performed previously. To resume the process, Edward took a series of numbers from his latest printout and used them to re-seed his equations in order to continue from where he'd left off.

However, much to Edward's surprise, the results of this 'interrupted' simulation varied dramatically from his previous results. On close examination he discovered that the computer was

internally using numbers to six significant decimal places while his printout only gave him numbers to three significant decimal places. Hence a number that the CPU saw as 0.152131 would be printed out as 0.152, giving a very minor discrepancy of just 131 millionths of one unit.

But this was enough deviation to cause massive variations in the output of Edward's weather simulations. This 'sensitive dependence on initial conditions' became known as the butterfly effect, where the output of a system can vary dramatically with just very minute changes in the starting conditions, comparable in magnitude to the flapping of a butterfly's wings.

> *The flapping of a single butterfly's wing today produces a tiny change in the state of the atmosphere. But over a period of time, the atmosphere actually does diverge from what it previously would have done. So, in a month's time, a tornado that would have devastated the Indonesian coast doesn't happen. Or maybe one that wasn't going to happen, does.*[1]

This discovery and the work that followed led Edward Lorenz into the exciting new world of what is now known as chaos theory. While there is no commonly acknowledged fixed definition of what constitutes a chaotic system, it is generally accepted that the following conditions must be met:

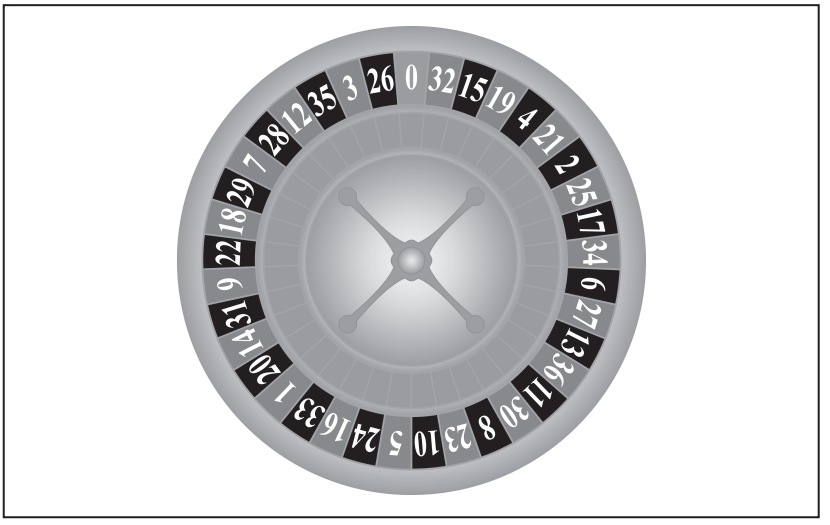
- the system must be highly dependent on initial conditions
- the system must employ at least two or more interacting variables
- the initial conditions must be at least partially dependent on output.

A good example of a chaotic system is the operation of a roulette wheel (see figure 1.5, overleaf), which is probably best understood by analysing the process step by step:

- An operator picks up a ball from a roulette wheel which he or she then spins (the starting position of the wheel is dependent on where the ball landed after the previous operation—initial condition is dependent on the previous outcome).

- He or she then sets the ball rotating in the opposite direction (the wheel is the first variable while the ball represents the second variable).
- The ball eventually loses enough energy to drop into the spinning wheel (the outcome is extremely sensitive to the interaction of the two variables).

Figure 1.5: roulette wheel



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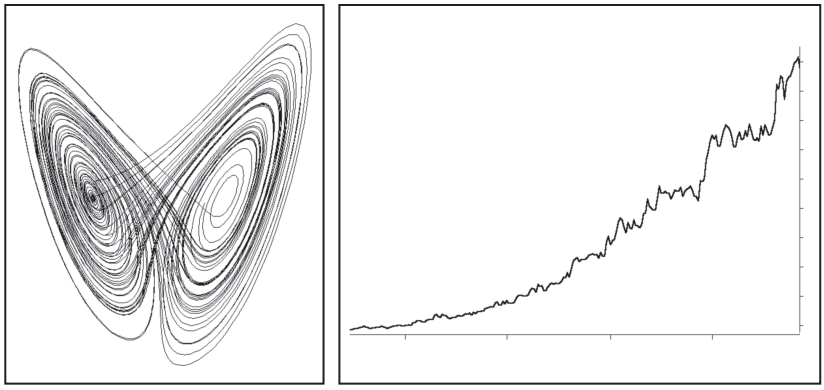
Roulette is an excellent example of a two-variable chaotic system which would in fact be predictable to a degree if a machine was used as the operator. It is actually the human operator that provides the random factor, but because the system is chaotic it can't be manipulated to any practical degree. Hence virtually all games of chance employ mechanisms or processes of a chaotic nature.

One of the other principal discoveries that Edward went on to make was that systems or models of systems behaving in a chaotic state produced repeating patterns that could be observed if the outputs were mapped in two dimensions, commonly referred to as 'phase space' by Chaoticians. Note that these repeating patterns were similar in form but never precisely identical. Hence the Lorenz attractor, seen to the left of a typical price chart in figure 1.6.

Figure 1.6: Lorenz attractor and typical price chart



Chaos theory and financial markets

Of course any chart that shows the change in price with respect to time is in fact a two-dimensional map, and if the stock market is a chaotic system of sorts then anyone looking at price charts should observe nearly identical repetitive patterns. So here's the bit where it gets interesting and we make the jump back to financial markets.

Introducing Benoit Mandelbrot, a mathematician working on a think-tank project for IBM during the early 1960s, primarily to solve the problem of noise on data transmission lines. However, Benoit was also directed to investigate the nature of financial markets, I believe by the then CEO, obviously in the hope of being able to capitalise on any discoveries and/or developments that he might make.

Benoit chose to study the price of cotton because he could obtain continuous data going all the way back to 1900. When he analysed the fluctuations in the price of cotton covering over half a century of market behaviour he made the following observation:

> *The numbers that produced aberrations from the point of view of normal distribution produced symmetry from the point of view of scaling. Each particular price change was random and unpredictable. But the sequence of changes was independent of scale: curves for daily price changes and monthly price changes were nearly identical. Incredibly, analysed Mandelbrot's way, the degree of variation had remained constant over a tumultuous sixty-year period that saw two World Wars and a depression.*[2]

Thus Benoit both identified a repeating pattern in the price activity and also observed that it was nested, thus occurring at different levels of scaling. Furthermore, he confirmed the hopelessness of employing statistical analysis to study non-linear dynamical systems such that financial markets are. Hence our earlier discussion on the use of statistical analysis and how it is a compromise when applied to any type of dynamic system.

There are two key points worth noting at this juncture. The first is that Benoit's research should have placed a very serious question mark over the use of modern portfolio theory. Modern portfolio theory is a statistically based portfolio management system that assumes price deviations follow a normal distribution curve …which they don't.

Here's the scary bit: it remains the most widely employed portfolio management approach in use today by fund managers around the world. Although it is terribly complicated and impressive, it simply just doesn't work. Hence if you follow financial news when markets experience a sharp correction you will no doubt have read a quote similar to this: 'According to our risk analysis models there was no possible way anyone could have predicted what was going to happen'. Straightaway you know their 'models' employ the normal distribution (or bell) curve, shown in figure 1.7.

However — and here's the second point — Benoit did state that markets were fractal in nature to some degree because he observed self-similar patterns occurring at different levels of magnification. Hence if you compare the weekly and monthly charts of the All Ordinaries in figure 1.8 you can see that the correction we experienced in 2007–08 wasn't entirely unpredictable when viewed from a fractal perspective. These two charts of the All Ordinaries index are very nearly identical even though they cover two entirely different time frames.

Figure 1.7: normal distribution (or bell) curve

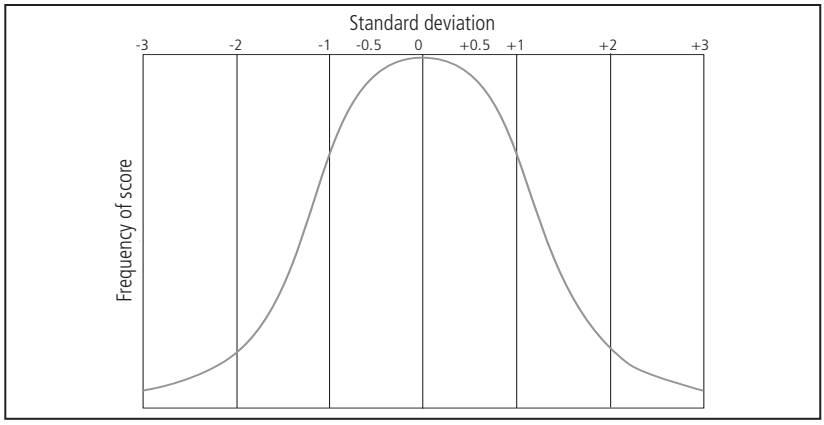
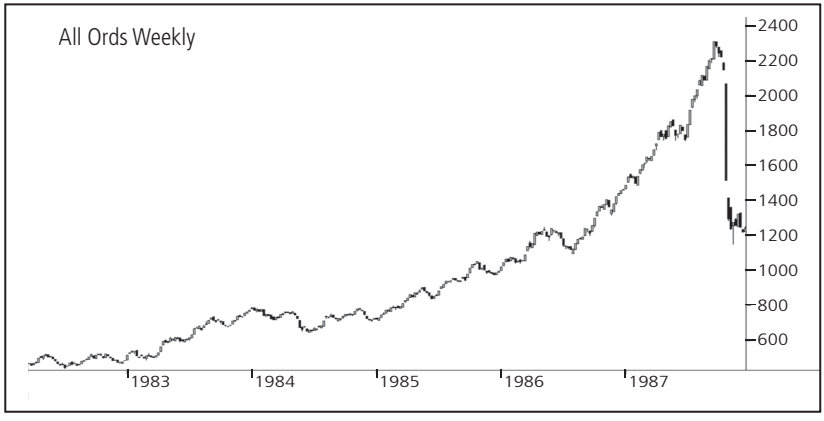
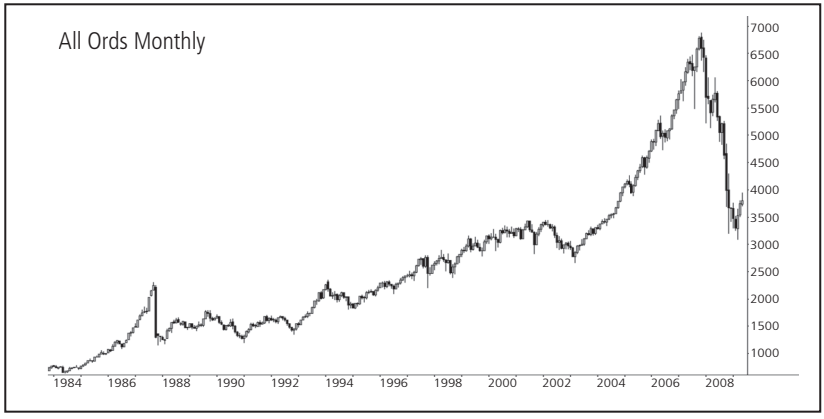


Figure 1.8: All Ordinaries index charts





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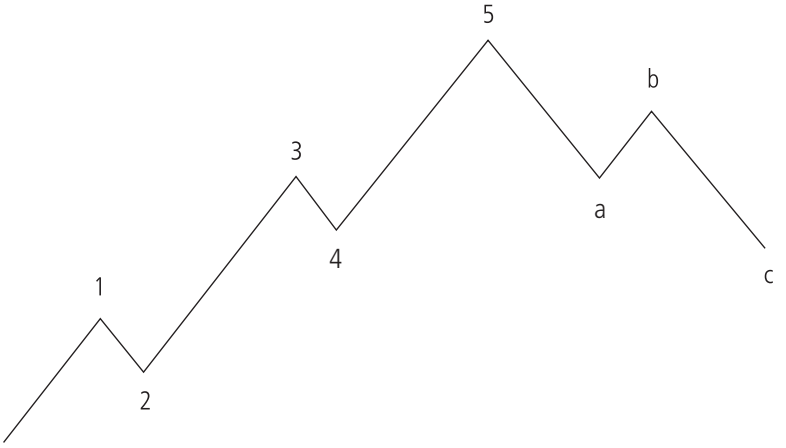
And just in concluding this part of our discussion, Benoit had independently made observations that closely paralleled those of a famous technical analyst (read: chartist) by the name of Ralph Elliott, father of the Elliott wave principle (EWP). EWP in its simplest form suggests that financial markets move up and down in a series of wave movements that can be quantified (shown in figure 1.9).

Figure 1.9: Elliott wave principle



Elliott's basic concept is that price activity moves up in five waves (1–5) and then down in three waves (a–c). Waves 1, 3, 5 and b are said to be impulsive (upward) waves whereas waves 2, 4, a and c are referred to as corrective (down) waves.

Elliott waves are nested (as seen in the chart of Timbercorp, figure 1.10) and therefore are self-similar patterns occurring at different levels of magnification; sound familiar?

Unfortunately Ralph (and his followers, commonly referred to as Elliotticians) promoted EWP as a universal solution to understanding financial markets and have therefore been largely ignored (and refuted) by the wider investment community. Because, as we're about to explore, techniques such as Elliott wave analysis are valid some of the time…but not all of the time.

Figure 1.10: Timbercorp chart showing Elliott waves

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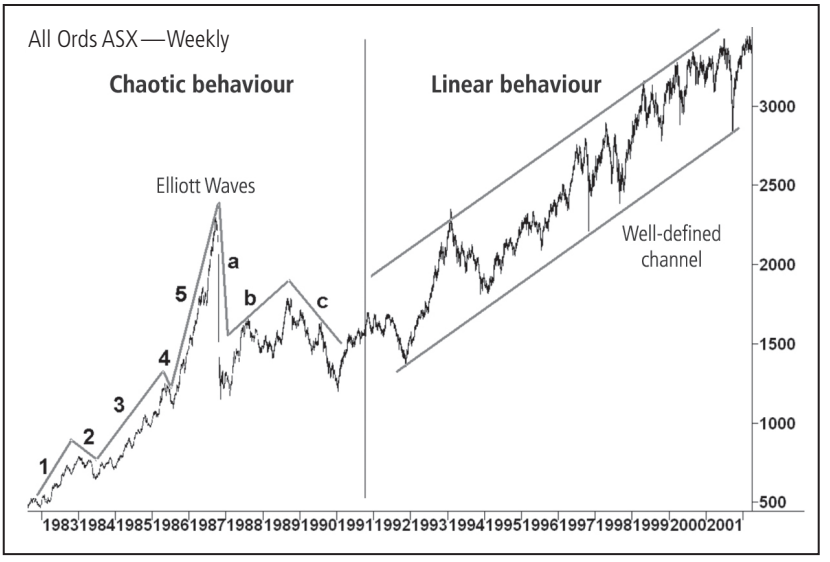
Complex adaptive systems

Hence, the next problem we face in trying to understand the basic nature of financial markets is that while they seem to behave in a chaotic manner some of the time, they don't behave that way all of the time. Put simply, there isn't a discrete solution to understanding financial markets as they appear to be constantly changing and adapting to their external circumstances (as shown in figure 1.11, overleaf).

So while this discussion has come a long way in explaining the nature of the curvy bits (chaotic behaviour), we still have to figure out why the markets switch between making curvy bits and straight lines. Fortunately, one of the latest developments in the field of chaos theory is now able to proffer an answer to this dilemma with the introduction of what are commonly referred to as 'complex adaptive systems'.

Figure 1.11: the All Ords changing its behaviour



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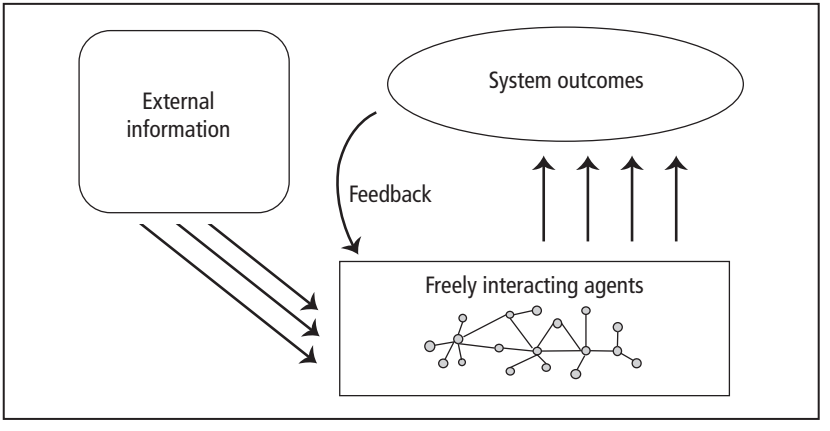
Put simply, a complex adaptive system (CAS) is a structure or process that is made up of independent yet freely interacting agents that react and adapt either to external information and/or information feeding back from the system itself. Well, I suppose it's not really all that simple, so maybe it would be more helpful if I explain it with the aid of a diagram (figure 1.12).

Figure 1.12: complex adaptive system



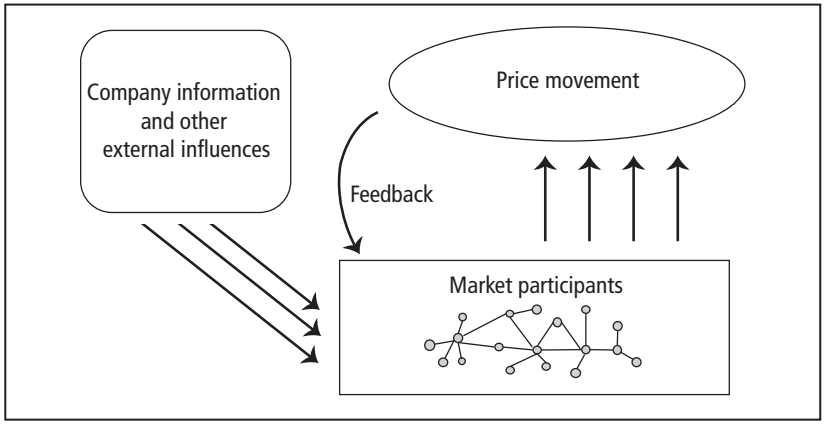
Common examples of complex adaptive systems include motor vehicle traffic, ant colonies, the ecosystem and even the human brain. And, getting back to our knitting, financial markets are also considered to be a type of complex adaptive system where we can make the following substitutions in our generic diagram:

External information	→	Company information, macro-economic factors, external events, etc.
Freely interacting agents	→	Market participants; that is, investors/ traders
System outcomes	→	Price movements caused by the buying and selling between market participants

(Note that this is a highly simplistic representation of financial markets as complex adaptive systems, as we could include many more relevant influences and external variables.)

Hence the stock market as a complex adaptive system would look something like figure 1.13.

Figure 1.13: the stock market as a complex adaptive system



Market participants react to a combination of both external stimuli, such as company information, and feedback from the market itself, via price activity. When market participants are being strongly influenced by price activity (that is, internal feedback), the market is sentiment driven and behaves largely in a chaotic manner.

But when external influences are the principal motivating force the market moves away from this excited state, near the edge