*****PRELIMINARY DRAFT – DO NOT QUOTE*****

POINT AND FIGURE CHARTING: A COMPUTATIONAL METHODOLOGY AND TRADING RULE PERFORMANCE IN THE S&P 500 FUTURES MARKET

John A Anderson*
Queensland University of Technology

Abstract: Point and Figure charting is one of the oldest practitioner techniques for analysing price movements in financial markets, yet has received almost no coverage in the academic finance literature. This paper empirically contributes to the existing trading rule literature by providing a methodology for the calculation of Point and Figure charts using ultra-high-frequency data and tests trading rules using eight objective, pre-defined trading rules on US futures contracts. In general it is found that profits were able to be generated during the test period using the Point and Figure methodology.

Keywords: Point and Figure, Trading Rules, Ultra-High-Frequency Data, EMH, Technical Analysis, Futures Markets.
JEL Classifications: C52, C61, C63 and G10

*School of Economics and Finance, Queensland University of Technology, Brisbane, Queensland, Australia. Phone: +61-7-3864 4292. Fax: +61-7-3864 1500.
E-mail: john.anderson@qut.edu.au

Special thanks to the QUT Faculty of Business for funding this research, Robert Faff and Robert Brooks of RMIT University for invaluable comments and Tick Data Inc for assistance with data requirements

I INTRODUCTION

Point and Figure charting is a technical analysis technique in which time is not represented on the x-axis, but merely price changes (independent of time) are recorded via a series of X's for increasing price movements and O's for decreasing price movements. Evidence suggests that the technique is over 100 years old and is now a standard feature on many widely-used professional market analysis software systems such as Bloomberg, Reuters, TradeStation and MetaStock.

Taylor and Allen (1992), surveyed foreign exchange dealers in London about their analytical techniques and found that over 90% of survey respondents relied on technical analysis at some point for asset allocation decisions. Given Point and Figure's place as a standard feature on popular market analysis software, presumably some of those buy/sell decisions were made on the basis of Point and Figure techniques although this has not been specifically documented. Therefore, although we may assume that Point and Figure does play some role among financial markets practitioners, the academic literature has left the question of the usefulness of this technique largely ignored.

Point and Figure dispenses with time on the x-axis and concentrates solely on changes in asset prices, regardless of the time required to produce such price movements. This means that data, particularly ultra-high-frequency data, can be considerably condensed by discarding small price changes, while still capturing user-determined levels of significant price changes on a continuous basis. As more financial markets are being continuously traded in 24 hour markets, Point and Figure allows all significant price changes to be recorded without the loss of price change data experienced with other data depiction techniques. These include such as Open, High, Low, Close charts where intra-period price movements are lost and even the selection of 'Open' and 'Close' are arbitrary at best in continuous markets such as foreign exchange.

The relevant literature on Point and Figure is particularly small with only two works appearing in the academic literature, both being published in German by Hauschild and Winkelmann (1985) and Stottner (1990),. The remainder of works have been published as books of varying quality by authors including Aby (1996), Cohen (1960), Dorsey (1995), Seligman (1962), Wheelan (1954), Zieg and Kaufman (1975) and Davis (1965). These works are discussed in more detail below.

This paper is designed to bridge that gap between the practitioner and academic literature by providing a rigourous test of the various Point and Figure chart 'patterns' said to produce profitable trading opportunities. These are tested by mathematically specifying each of the patterns, then simulating the trades specified by the trading rules on S&P500 futures contracts and reporting the profitability in an EMH framework.

The remainder of this paper is structured as follows. Section 2 discusses the key literature in the field of Point and Figure and market efficiency. Section 3 provides a computational specification of Point and Figure as applied in this research. Section 4 defines the trading signals/rules that were adopted, while Section 5 presents the results and the paper concludes in Section 6.

II PREVIOUS RESEARCH

The earliest reference in Point and Figure charting appears to be deVilliers (1933), who claims that the method has "…grown from crude beginnings more than fifty years ago [and is] …herewith described for the first time" (deVilliers, 1933:7). Assuming this statement is accurate, it implies that Point and Figure's usage extends to the mid-late 19th century. Numerous books have been produced on this topic during the 20th century by authors including Aby (1996), Cohen (1960), Dorsey (1995), Seligman (1962), Wheelan (1954), Zieg and Kaufman (1975) and Davis (1965).

Most of these works provide reasonably elementary treatment of the subject and/or provide largely unstructured methodologies that are unsuitable for rigorous academic

journals. Examples of poor methodology include the use of spurious trendlines that have little *a priori* value, vaguely defined/subjective chart 'patterns' and trade entry/exit 'rules' which become so onerous in their specification that they are unlikely to be of practical value due to the rarity of such complex conditions being met. Just as technical analysts working with bar charts claimed the existence of patterns that were subjective and/or poorly specified, such as the only recently quantified Head and Shoulders patterns (see Osler, 1998), Point and Figure has also attracted its share of essentially subjective and unreplicable patterns.

Examples are provided in Cohen (1985) who discusses nebulous and ill-defined patterns including the 'Inverse Fulcrum' and the 'Saucer' with their vaguely parabolic shapes and the 'Compound Fulcrum' with trading producing two local minima of roughly equal values. It is suspected that the subjectivity which plagues many popular 'charting' works, including most of those above, have correctly attracted considerable scepticism from academics requiring standards of replicability and objectivity.

In Anderson (1999) the problem of managing ultra-high-frequency data[1] in 24-hour markets was considered and Point and Figure was chosen as a continuous data filtering device. There, the basic methodology of Point and Figure was applied as a filtering tool to ultra-high-frequency data. For the Sydney Futures Exchange's Share Price Index, 3 Year Bond and 10 Year Bond futures contracts filtering of data produced compression to less than 5% of original observations for the smallest filtering level. All price change information was recorded (except for the 10 Year Bond futures where half points were removed in the filtering[2]), but with the loss of time characteristics due to the methodology of Point and Figure.

Some research in this area has provided a structured and replicable methodology which provides a valid testing framework for assessing the profitability of Point and Figure

[1] For a definition of Ultra-High-Frequency data see Engle (2000).

[2] Note that Australian Interest Rate Futures are quoted as 100 – Yield and so a half point is considerably smaller in dollar value than that observed in US Interest Rate futures contracts.

charting for trading rule researchers. Only two such works examining trading rules using Point and Figure appear to have been published in refereed finance journals and these were published in German by Hauschild and Winkelmann (1985) and Stottner (1990).[3]

Hauschild and Winkelmann (1985) examined several simple Point and Figure trading rules using daily data on 40 companies listed on German equity markets between 1970 and 1980. Their use of daily data can produce some problems with the calculation of Point and Figure results. For example, when dealing with Open, High, Low, Close data inferences/guesses must be made about whether the day's highest price was traded before the day's low to determine whether a price reversal has occurred during that day. Furthermore, if only closing prices are used then trading activity through the day (which may have produced a buy/sell signal) is not recorded reducing the accuracy of the recorded price movements. Therefore these limitations arising from the use of daily data can achieve only a limited approximation to the more accurate use of intra-day data which is able to capture all price movements for an asset.[4]

Hauschild and Winkelmann (1985) did not present results for individual firms and so the composition of the component results are not available for discussion. On the aggregated results across all firms the Point and Figure technique was unable to outperform a simple buy-and-hold strategy for the period.

Stottner (1990) also examined equity markets examining 445 German and overseas companies. The data set comprised closing data for periods of between 70 months and 14 years prior to the conclusion of the test in February 1989. Stottner (1990) used Point and Figure charting but in a manner more akin to a simple filter-rule strategy with no complex pattern assessment. As with Hauschild and Winkelmann (1985), he also found that Point and Figure produced trading results inferior to a simple buy-and-hold strategy.

---

[3] Both articles gratefully translated by Ralf Becker, an econometrics PhD student at Queensland University of Technology.

[4] The techniques for using daily data with Point and Figure are discussed in most of the books referred to in this literature review section.

The use of the filter rule approach casts some doubt as to the ability to fully assess the results as an accurate reflection of Point and Figure trading rule performance during the test period. This is because the technique adopted in Stottner (1990) considers very simple Point and Figure trading rules without testing the rules that have appeared in much of the popular Point and Figure literature. As with much filter rule research, the results presented shared the poor profitability characteristics documented back as far as Fama and Blume (1966) and Ball (1978).

One of the books published on Point and Figure by Zieg and Kaufman (1975) produced a methodology capable of being reproduced. This consisted of a well-defined set of eight buy and eight sell strategies, labelled B1 to B8 and S1 to S8 respectively, complete with results produced in Davis (1965) discussed at length. Their technique is adopted in the current study and is fully defined in Section III.

The Davis (1965) study examined daily price data for 1,100 US equities between 1954 and 1964 with remarkable results. Of the eight different buy signals examined, profits were produced on 71%-92% of trades across the different rules. All eight of the sell signals examined were profitable in greater than 80% of trades modelled in the simulation. Claims of such startling profitability demanded a review of his method on modern markets to see if such consistent profitability is still available to trading practitioners. This would also require a discussion of the implications for market efficiency if such results are still able to be replicated in contemporary markets.

As this study deals with trading rules, all profitability should be considered in the context of the Weak-Form of the Efficient Markets Hypothesis (EMH) proposed by Fama (1970). As is well known, under this hypothesis consistent profits should not be available where the only information used is historical prices.

Proponents of technical analysis would argue that historical data does contain information and therefore all information is not impounded in a security's price. This paper relies on trading rules formulated around the Point and Figure methodology with

the aim of determining whether the trading rule returns for S&P futures are greater than zero, so providing economic benefits to traders.

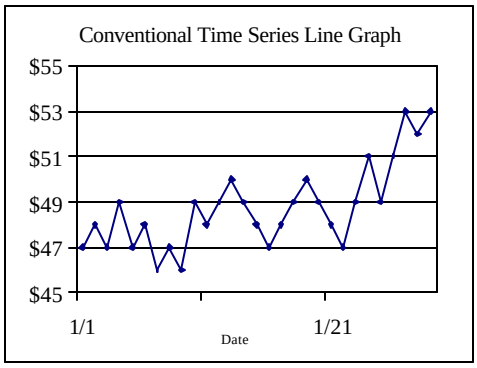
III SPECIFICATION OF POINT AND FIGURE

The technique for converting data into the Point and Figure format has remained substantially unchanged since the methodology outlined in deVilliers (1933). Point and Figure has generally been described by example alone and the methodology shown here mathematically defines the processes involved, providing researchers with a clear set of computational guidelines. A complete numerical example is provided in Appendix A.

deVilliers (1933) implies that the use of Point and Figure provided substantial benefits for traders managing data from early ticker-tape machines. This technique is possibly the first attempt to deal with the very large data sets produced from the use of ultra-high-frequency (UHF) data, that is where every trade has been recorded for a given financial instrument. Point and Figure's ability to reduce UHF data to whatever size price movement the analyst regards as significant provides computational benefits when analysing continuously trading markets. These 24 hour markets include foreign exchange and an increasing number of futures instruments where the imposition of arbitrary Open/High/Low/Close points may not be suitable.

An example of Point and Figure compared to a conventional line graph is presented in Figure 1 and is adapted from an example in deVilliers (1933). The sequence of price movements can be readily understood in the conventional time-series plot where the first price/data point for a security is \$47. The price then trades at \$48, then returns to \$47, then to \$49 and so on until the last data point at \$53.

Figure 1: Example of a Conventional Time-Series Plot converted to a Point and Figure Chart



Point and Figure Chart

53							X
52							X
51							X
50			X		X		X
49	X		X	O	X	O	X
48	X	O	X	O	X	O	X
47	X	O	X	O		O	
46		O					

When the price sequence in Figure 1 is converted into Point and Figure a number of factors beyond simple Price and Time axes need to be considered in how prices are recorded. Two variables need to be specified, namely the Points Per Box (PPB) and the Reversal Size (REV). The PPB determines what level of price sensitivity/significance is to be recorded in each 'Box' and in this example is set at PPB = $1. REV specifies how many 'Boxes' the price needs to reverse by before new price changes are recorded and REV = 3 in this example.

Some minor methodological variations between authors occur and the specifications here, while faithful to the original premise, provide a technique suitable for computer-based processing of source data. Point and Figure relies on the specification of two variables. Firstly, the number of Points Per Box (PPB) which specifies the coarseness of the data-filtering such as $0.50, $1.00, $2.00 etc. PPB determines what will be considered a 'significant' price change. The second variable is the Reversal (REV) amount. This determines how many 'Boxes' the price must change by to have the movement recorded. Therefore if PPB = $1.00 and REV = 3 then price must reverse by $3.00 to be recorded.

Point and Figure requires data rounding to occur via a series of continuous modulus operations rounding to the value specified for PPB.[5] The input price data are rounded-up when prices are declining and rounded-down when prices are increasing. The opening direction of prices, ie falling or rising must first be determined. Some authors will adopt the first price as the starting point, though this can cause significant computational difficulties. In this research prices are read from a data file/feed until the remainder of Price, P_t, divided by PPB equals zero according to equation (2).

$$\text{MOD}(P_t, \text{PPB}) = 0 \tag{2}$$

Prices continue to be input to establish whether prices are rising or falling on the initial movement being recorded. Assuming that PPB = \$1.00 and REV = 3, then subsequent prices, P_n, from the data file are input until either equation (3) or (4) is true.

$$P_n \quad P_t + 3(\text{PPB}) \tag{3}$$

$$P_n \quad P_t - 3(\text{PPB}) \tag{4}$$

Had equation (3) been satisfied first, all subsequent raw input prices, P_r, read are rounded down via the modulus operation per equation (5) to produce the filtered price, P_f, rounded per the Point and Figure methodology.

$$P_f = \begin{cases} \left[\left(\dfrac{P_n}{\text{PPB}}\right) - \dfrac{\text{MOD}(P_n, \text{PPB})}{\text{PPB}}\right](\text{PPB}) & ** \end{cases} \tag{5}$$

* Where MOD (P_n , PPB) = 0

** Where MOD (P_n , PPB) 0

[5] Modulus operations involve dividing *x* by *y* and reporting the remainder, therefore MOD (11, 3) = 2. Note that in some programming languages, such as Visual Basic, all decimals must be removed before the modulus operation is performed or else only the integer part of the expression is evaluated. Therefore, in this research the evaluation of MOD (11.65, 3) would require both *x* and *y* to be multiplied by 10^n until the decimals (thus $10^n = 10^2$) are removed so producing the expression MOD (1165, 300) = 3.88 to be

Had equation (4) been satisfied initially instead of equation (3), the data would have needed to be rounded-up per equation (6).

$$P_f = \left\{ \begin{array}{l} P_n \quad * \\ \left[1 + \left(\frac{P_n}{PPB} \right) - \frac{MOD(P_n, PPB)}{PPB} \right] (PPB) \quad ** \end{array} \right\} \qquad (6)$$

* Where MOD (P_n , PPB) = 0

** Where MOD (P_n , PPB) 0

Data continues to be read according to the modulus operations above until P_n triggers the next entry. If prices were increasing, and so equation (3) was initially satisfied, the next price recorded is where P_n (P_f + PPB) or price declines from the highest point in that movement where P_n [P_f – REV(PPB)].

Had prices been declining, and so equation (4) was satisfied, prices would be continued to be rounded-up per equation (6). Prices would then continue to be read until either P_n (P_f – PPB) or price increases from the lowest point in that movement so that P_n [P_f + REV(PPB)]. These processes are repeated until all data are exhausted.

In summary, the initial price and direction must be established as the subsequent calculations may display sensitivity to the initial starting price and starting on another date may lead to differing results arising from differences in the initial direction as shown in equations (3) and (4). Once the initial price is established, the data is read into two distinct loops for rounding-down (when prices are falling) and rounding-up (when prices are rising). This raises a methodological concern that two analysts beginning with different starting points would end up with differences in the way the filtering is conducted. It is suggested that any researchers dealing with this methodology should clearly state their technique adopted for subsequently empirical work.

---

evaluated to produce the true remainder. A complete numerical example of the procedures adopted here are shown in Appendix III.

Little consensus arises between the authors as to what PPB should be set at and this is left to the analyst to determine in the context of the price volatility of the asset being examined and the investment horizon. This is not so with REV where most of the books described above applies REV = 3, eg Dorsey (1995) states that "…we never deviate from the 3-point reversal method … [though] you may want to choose other reversal points". Therefore it may be assumed that other values, eg PPB = 5, might have usage as little evidence has been presented to date. Consequently this study will include a sensitivity analysis across a range of different PPB and REV values for the futures contracts considered.

One concern about the Point and Figure technique arises from ***what*** price is recorded when rounding input data. Assume that a new entry should be made on a Point and Figure chart and a buy signal (explained in the next section) is generated when a price of 105.0 is reached. If the price trades at 105.0 then the entry could be validly made and the trade simulated at that price. But if the market is more volatile and the price generating the entry at 105.0 actually traded at 105.25, then the long position assumed to be taken at 105.0 would overstate profits.

Analogous to this problem is when 'gapping' in the price series occurs. That is where for example the market closes at 104.5 and re-opens the next day at 106.0, but a buy signal was to be generated at 105.0. This also overstates profits because the trade is simulated to occur at 105.0 but could not have been taken until 106.0.

In this research, efforts have been made to address this problem by having the price that caused the movement to be recorded, rather than just the rounded Point and Figure value. Samples of converted Point and Figure data output have shown that this issue has been adequately dealt with by the use of 'actual' price rather than simply 'rounded' price, but some gaps may have escaped the detection process. This does not appear to have significantly disturbed the results here for most trading rules, but is an issue that must be given serious consideration by other researchers proposing studies in this area.

IV SPECIFICATION OF TRADING RULES

This section outlines the trading rules adopted in assessing the usefulness of Point and Figure charting as a market timing tool. Point and Figure charts are constructed in such a way as to readily permit the analysis of the forecasting ability of chart patterns.

The poor replicability of pattern recognition has lead to little treatment in the literature, although some recent replicable methodologies have been provided by Osler (1998) and Lo (2000). With some Point and Figure signals however, their mathematical specification can be simplified into simple logical Boolean statements. The trading rules adopted here were applied in Davis (1965) and are reproduced below labelled as buy signals B1 to B8 and as sell signals S1 to S8 with an intuitive explanation as to their rationale. The Boolean specification is provided in Appendix B.

B1: Double Top

						X	Ū BUY
				X		X	
				X	O	X	
				X	O	X	
					O		

S1: Double Bottom

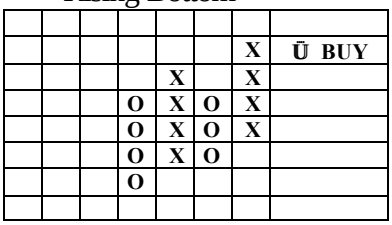
					X		
				O	X	O	
				O	X	O	
				O		O	
						O	Ū SELL

The Double Top (Double Bottom) formation is, by definition, the most widely observed trading pattern in Point and Figure as all of the more sophisticated patterns discussed below must contain this basic pattern. The formation occurs by prices rising above (below) the previously established highest price. It implies that prices trading above (below) a previous high (low) suggest that the market is subject to an increase in demand (supply) beyond the local maxima (minima) and that the stronger demand (supply) will persist. Consequently the continued buying (selling) should cause prices to increase (decrease) so producing a profitable trading opportunity.

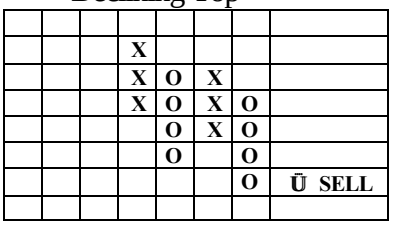
B2: Double Top With

S2: Double Bottom With

Rising Bottom

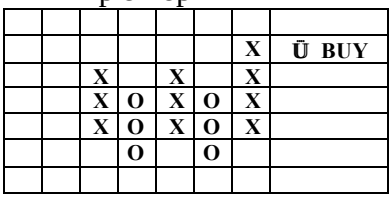


Declining Top

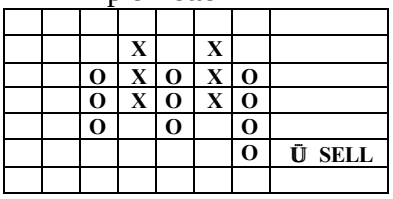


The Double Top with Rising Bottom (Double Bottom with Declining Top) formation extends the condition in B1 (S1) by adding the requirement that the previous low (high) is higher (lower) than its preceding low (high) as measured on the columns of O's (X's). The rationale of this formation may be that the presence of higher highs (lower lows) and higher lows (lower highs) indicates more pronounced and sustained demand (supply) has emerged in the market and that prices will continue to reflect this increasing demand (supply). This would suggest the expected persistence of rising (falling) prices so producing a profitable long (short) position.

B3: Breakout of Triple Top



S3: Breakout of Triple Bottom



The Breakout of Triple Top (Breakout of Triple Bottom) formation suggests that prices have traded to a previous high (low) on two separate occasions, only to be met with supply (demand) at that price level. On the third occasion, demand (supply) has been has been strong enough to satisfy sellers (buyers) at that level and the increased demand has been sufficient to cause a price increase (decrease). The implication is therefore that the demand (supply) will continue to be present and that prices will continue to rise (fall) producing a profitable long (short) trading opportunity.

B4: Ascending Triple Top

						X	Ū BUY
				X	O	X	
		X		X	O	X	
		X	O	X	O		
		X	O	X			
			O				

S4: Descending Triple Bottom

			X				
		O	X	O	X		
		O	X	O	X	O	
		O		O	X	O	
				O		O	
						O	Ū SELL

The Ascending Triple Top (Descending Triple Bottom) extends on the Breakout of Triple Top (Breakout of Triple Bottom) by requiring the lows (highs) shown in the columns of O's (X's) to be higher (lower) and also the highs (lows) indicated by the columns of X's (O's) to all be rising (falling). Again, the inference here is that the sustained demand (supply) indicated by the persistently rising (falling) prices will continue to produce a profitable long (short) trading opportunity.

B5: Spread Triple Top

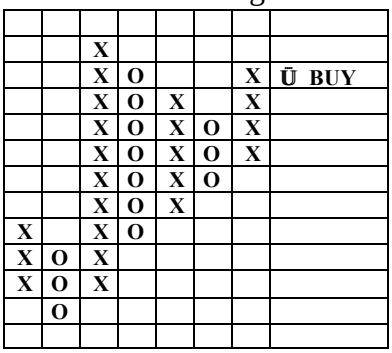
						X	Ū BUY
X		X				X	
X	O	X	O	X		X	
X	O	X	O	X	O	X	
	O	X	O	X	O	X	
	O		O		O		

S5: Spread Triple Bottom

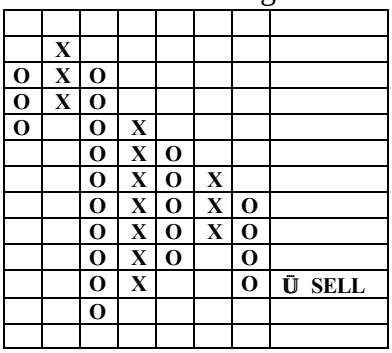
	X		X		X		
	X	O	X	O	X	O	
O	X	O	X	O	X	O	
O	X	O	X	O		O	
O		O				O	
						O	Ū SELL

As with the Breakout Triple Top (Breakout Triple Bottom), the Spread Triple Top (Spread Triple Bottom) the formation infers that supply (demand) has previously entered that market at a given price. The rising (falling) of prices beyond the previously determined high (low) suggests that the supply (demand) has now been satisfied and sufficient demand (supply) has now emerged to cause prices to continue to increase (decline) to new levels. Consequently, the expected increase in demand (supply) should produce profitable long (short) trading opportunities.

B6: Upside Breakout
Of Bullish Triangle



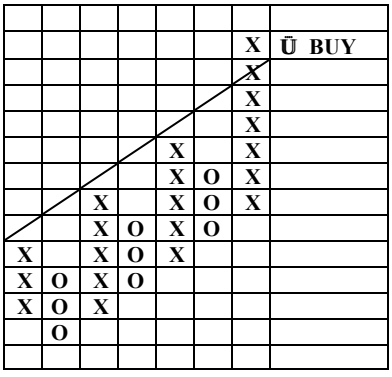
S6: Downside Breakout
of Bearish Triangle



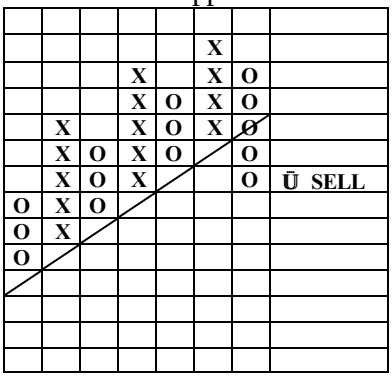
The 'triangle' formation and its many variants such as bullish/bearish triangles, rising/falling wedges etc have long appeared in technical analysis (see Edwards and Magee, 1961). The formation implies that a lack of information into the market has led to neither supply or demand dominance and consequentially no direction in prices.

The triangle pattern may imply that inventory readjustment is occurring rather than price being information-driven. The 'Breakout' of the triangle would then suggest that either new information has arrived in the market or a significant inventory readjustment is occurring. The analyst may then infer that prices will continue to move in the same direction as the price breakout from the triangle's apex and be positioned long (short).

B7: Upside Breakout Above
Bullish Resistance Line



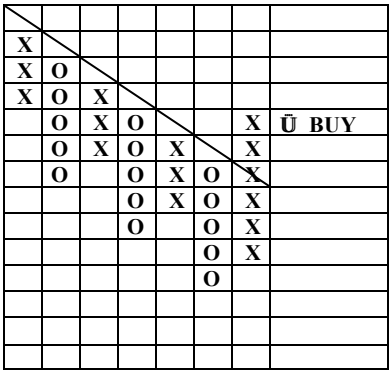
S7: Downside Breakout Below
Bullish Support Line



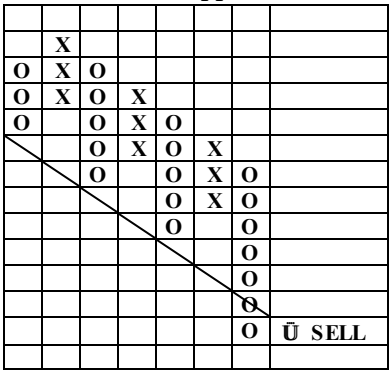
The rationale for why a buy (sell) level appears where it does is not intuitively clear. The use of support/resistance lines have appeared widely in practitioner literature since Edwards and Magee (1961) and are applied here in Point and Figure. The basic idea may

be interpreted as demand (supply) steadily outstripping supply (demand) producing some form of demand/supply resistance (support). The breach of the trendline then suggests a stronger demand (supply) influence relative to previous movements and the trader aims to open a long (short) position to capitalise on this exuberance in anticipation of its continuance. S7 implies that a reversal in price direction should occur once the upward-sloping trendline is breached.

B8: Upside Breakout Above Bearish Resistance Line



S8: Downside Breakout Below Bearish Support Line



As with signals B7:S7, the use of a trendline is employed for the trading rule. In the case of B8, a breach of the trendline suggests that a reversal in price direction has occurred and the trader should open a long position to capitalise. S8 suggests that, while prices are still moving lower, a more vigorous supply situation has emerged and the trader should hold a short position to capitalise on the expected continuance of price decline.

When considering the above trading rules/patterns, all cases except B5, S5, B7 and S8 decompose into the simple Double Top/Bottom formation. It is expected that the additional signal conditions, eg Triple Top, grew to minimise the transaction costs associated with frequent trading where almost every change in price direction recorded would generate a trading signal from B1:S1.

To assess the impact of different PPB values, a sensitivity analysis is conducted presenting results for S&P 500 futures. PPB values are tested at PPB = $100 and $200.[6] This corresponds to changes in the S&P futures contract of 0.4 and 0.8 respectively.

For this study all orders are assumed to be 'Stop' orders where a buy/sell signal is produced. This means that trades are made during one of the up/down movements without waiting for a closing price as relied on in much of the technical trading rule literature. All open positions are closed at the last data point for each year.

In accordance with numerous trading rule studies transaction costs are modelled into the results. These have been set at $100 round-turn per futures contract traded in accordance with comparable amounts in Lukac et al. (1988), Anderson (1997), Babcock (1989, Bilson and Hsieh (1987), Boothe and Longworth (1986), Lukac and Brorsen (1989), Sweeney (1986) and Taylor (1993).

Zieg and Kaufman (1975) suggest that positions should be taken corresponding to each trading signal generated by the trading rules. Consequently, the number of contracts taken on each trading signal is one contract, although much larger positions may be accumulated from successive buy or sell signals. For each individual signal pair, eg B4:S4, the long (short) position generated by the signal is closed out by the first occurrence of S1:B1 respectively in accordance with Davis (1965). This exit strategy is used because some of the rarer signals, such as B8:S8, may not get the opposing signal for that pair (ie S8:B8 respectively) and need some other position exit requirement.

Given the similarity between signals B1:S1 and the other trading rules, more than one position may be initiated at the same price due to the overlap of signals. Similarly, if signal B1 is acted upon, and another B1 signal is generated, then two positions will be held. Subsequent positions will also be taken and no limits on the position size have been imposed for this simulation. The trading rules do not require the specification of a trade

[6] These values were selected as part of a broader doctoral thesis examining Point and Figure across numerous futures markets and using common dollar values across different futures contracts.

exit signal as an opposing trade entry signal will cause termination of all long (short) positions and new short (long) positions to be taken. All positions are closed on the last price of the final day for each year.

V DATA AND RESULTS

Results are presented here for the S&P 500 futures contract between 1990 and 1998. The S&P500 futures contract value is calculated as 250 times the index, giving a dollar value of $250 per 'big point'. The spot contract, or nearest contract to expiry, has been used to avoid liquidity problems that may be present in distant contracts. The futures contract price series were adjusted to remove any artificial profits/losses on contract expiration[7].

This section is organised into sections discussing the trading rule profitability. It discusses the average annual performance and the performance across trading rules. The performance in contemporary index futures markets is then critically assessed against the earlier documented performance in Zieg and Kaufman (1975). It concludes by discussing the implications for market efficiency.

[7] Contract Rollover is performed automatically via the 'Autoroll' technique in the data extraction software from Tick Data Inc. The spot contract is automatically 'rolled' into the next contract when volume in the following contract exceeds the volume in the expiring contract. The price differential on rollover date is removed by adjusting all subsequent prices by the differential amount to reflect how a trader would, for example, roll an long position by selling the position in the expiring contract and simultaneously re-opening the long position in the subsequent contract expiry. Ma et al. (1992), found that the S&P500 futures were robust across rollover methods and the rollover method used here should not produce significant impacts on the data examined.

Table 1 provides a summary of the trading result annual averages by trading rule. A more detailed set of results are provided in Appendix B outlining year-by-year performances of each trading rule.

Table 1: Trading Rule Result Summary – Total Profitability

Strategy	*3BR $100PPB*	*4BR $100PPB*	*5BR $100PPB*	*3BR $200PPB*	*4BR $200PPB*	*5BR $200PPB*
B1:S1						
NumTrades	18,278	9,128	10,110	4,012	2,393	1,685
%Profitable†	43	43	40	41	43	43
Gross Profit	1,463,200	1,393,772	1,248,537	588,800	825,888	630,724
Net Profit	-364,600	480,972	237,537	187,600	586,588	462,224
B2:S2						
NumTrades	8,433	5,509	6,168	2,286	1,494	1,067
%Profitable†	42	41	38	38	41	40
Gross Profit	708,800	722,936	629,550	434,000	410,974	353,849
Net Profit	-134,500	172,036	12,750	205,400	261,574	247,149
B3:S3						
NumTrades	2,201	891	908	504	144	79
%Profitable†	48	42	43	45	54	40
Gross Profit	331,800	177,873	192,062	83,200	101,349	35,775
Net Profit	111,700	88,773	101,262	32,800	86,949	27,875
B4:S4						
NumTrades	5,517	3,540	3,933	1,498	999	705
%Profitable†	41	41	37	39	40	42
Gross Profit	381,800	454,561	328,651	180,200	262,537	265,011
Net Profit	-169,900	100,561	-64,649	30,400	162,637	194,511
B5:S5						
NumTrades	429	143	170	90	34	26
%Profitable†	43	48	47	46	56	54
Gross Profit	18,400	37,148	43,925	14,800	23,000	16,800
Net Profit	-24,500	22,848	26,925	5,800	19,600	14,200
B6:S6						
NumTrades	6	6	0	0	2	0
%Profitable†	33	33	0	0	50	0
Gross Profit	100	-300	0	0	400	0
Net Profit	-500	-900	0	0	200	0
B7:S7						
NumTrades	49	24	22	19	5	2
%Profitable†	52	54	27	58	40	0
Gross Profit	11,000	9,375	-3,025	5,200	8,350	-400
Net Profit	6,100	6,975	-5,225	3,300	7,850	-600
B8:S8						
NumTrades	63	27	16	21	9	3
%Profitable†	46	45	50	48	66	67
Gross Profit	-500	7,200	2,625	9,600	5,525	6,000
Net Profit	-6,800	4,500	1,025	7,500	4,625	5,700
Totals						
NumTrades	34,977	19,302	21,355	8,477	5,124	3,566
%Profitable	43	42	39	40	42	42
Gross Profit	2,914,600	2,802,565*	2,442,325**	1,315,800	1,638,023**	1,307,759*
Net Profit	-583,100	872,365	306,825**	468,100	1,125,623**	951,159*

† *'% Profitable' results for all trades in that category*

**t-test of average annual profit significant at 0.10 level* ***t-test of average annual profit significant at 0.05 level*

B1	Double Top	S1	Double Bottom
B2	Double Top With Rising Bottom	S2	Double Bottom With Declining Top
B3	Breakout of Triple Top	S3	Breakout of Triple Bottom
B4	Ascending Triple Top	S4	Descending Triple Bottom
B5	Spread Triple Top	S5	Spread Triple Bottom
B6	Upside Breakout Of Bullish Triangle	S6	Downside Breakout of Bearish Triangle
B7	Upside Breakout Above Bullish Resistance Line	S7	Downside Breakout Below Bullish Support Line
B8	Upside Breakout Above Bearish Resistance Line	S8	Downside Breakout Below Bearish Support Line

Table 1 provides a summary of trading performance outlining the Number of Trades (NumTrades) each trading rule undertook, the percentage of these trades that were profitable before transaction costs (%Profitable), the Gross Profit (dollar profit/loss before any allowance for transaction costs) and Net Profit adjusted for transaction costs is calculated as [Gross Profit – (NumTrades x $100)].

As expected, signals B1:S1 produced the largest number of trades and the number of trades for subsequent trading rules declined as entry/exit conditions became more restrictive. One important methodological difference adopted in this paper, ie using the price that triggered the Point and Figure entry to be recorded rather than simply the rounded value, has meant that signal B6:S6 recorded very few trades. This result would arguably be different had simply rounded values been used, but would have led to significant profit reporting inaccuracies.

All PPB and REV levels tested during the trading period produced positive net profits except for the smallest filtering level tested, namely PPB = $100 and REV = 3. Although these values produced positive Gross Profits of $2,914,600 the large number of transactions (34,977) negated the economic value of such a strategy.

The highest net profit recorded during the test period was produced with PPB = $200 and REV = 4. Most trading rule variable selection represents some form of trade-off between a large number of transactions with low average profit per trade (often failing to cover transaction costs) and a lower number of transactions with higher average profit per trade (often requiring greater funding costs as larger unrealised losses may need to be funded). This balance between gross profitability ($1,638,023) and number of annual transactions (5,124) produced superior net profitability ($1,125,623) during the test period for PPB = $200 and REV = 4.

In accordance with Brock et al. (1992), a *t*-test was performed examining the differences in the mean returns of the trading rules and the zero-expected return for the S&P futures

contract.[8] The net profits generated in the simulation were significantly different from zero for the following filtering levels (REV) and Points Per Box (PPB): PPB = $100 for the REV values of 4 and 5, while PPB = $200 also produced significant profits for REV values of 4 and 5.

The popular value of REV = 3 failed to produce statistically significant profits for either PPB = $100 or PPB = $200. The reasons for this are not immediately apparent but may alter with the use of higher PPB values. While excessive trading and the resulting higher transaction costs may explain these results with some trading rules, the Gross Profits (ie before any allowance for transaction costs) failed to produce statistically significant results and does not produce any intuitively appealing reason for this result.

All PPB and REV values produced Gross Profits, but all with percentage of profitable trades less than 50%, and with none producing profits on greater than 42% of trades. It can be concluded that the average profit on successful trades were higher than the average loss on the losing trades. This suggests that the trading rules considered were able to mechanistically apply the old traders adage of 'letting profits run and cutting losses short'.

Table 1 examined the average of rules B1…B8/S1…S8 across all years but, as with many averages, they may fail to provide sufficient information for meaningful conclusions to be drawn. Table 2 outlines the performance of all trading rules by year providing a

[8] The *t*-statistic for the annual profitability was calculated as,

$$\frac{\mu_r - \mu}{\sqrt{(\sigma^2 / N + \sigma^2 / N_r)}}$$

where μ_r and N_r are the mean dollar return and the number of years in the test respectively and μ and N are the zero expected return and number or years in the test.

significantly different picture of the performance across different PPB and REV levels reported in Table 1.

Table 2: Trading Rule Result Summary – Annual Totals For All Trading Rules

Strategy	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Totals*
PPB = $100 REV = 3										
NumTrades	1,213	976	719	635	845	969	2,765	11,719	15,136	34,977
%Profitable	39	42	39	41	40	44	41	43	44	43
Gross Profit	38,300	93,700	-8,600	-41,500	3,800	94,700	234,700	1,036,500	1,463,000	2,914,600
Net Profit	-83,000	-3,900	-80,500	-105,000	-80,700	-2,200	-41,800	-135,400	-50,600	-583,100
PPB = $100 REV = 4										
NumTrades	717	573	423	377	514	568	1,610	5,231	9,289	19,302
%Profitable	41	37	40	40	40	41	42	42	42	42
Gross Profit	87,111	114,871	1,162	-19,550	57,112	59,136	281,223	985,300	1,236,200	2,802,565
Net Profit	15,411	57,571	-41,138	-57,250	5,712	2,336	120,223	462,200	307,300	872,365
PPB = $100 REV = 5										
NumTrades	424	284	256	348	393	1,131	3,718	6,329	8,472	21,355
%Profitable	39	29	41	38	38	41	43	39	38	39
Gross Profit	81,175	-20,387	15,613	63,300	12,012	223,537	679,675	702,600	684,800	2,442,325
Net Profit	38,775	-48,787	-9,987	28,500	-27,288	110,437	307,875	69,700	-162,400	306,825
PPB = $200 REV = 3										
NumTrades	319	261	164	152	261	247	769	2,284	4,020	8,477
%Profitable	33	36	33	43	43	36	43	43	40	40
Gross Profit	-61,600	22,400	-52,800	3,400	31,600	-19,400	175,800	385,800	830,600	1,315,800
Net Profit	-93,500	-3,700	-69,200	-11,800	5,500	-44,100	98,900	157,400	428,600	468,100
PPB = $200 REV = 4										
NumTrades	184	147	94	92	112	158	445	1,360	2,532	5,124
%Profitable	41	37	33	44	51	41	47	44	41	42
Gross Profit	35,412	77,150	-2,537	-4,813	84,425	41,637	346,949	458,000	601,800	1,638,023
Net Profit	17,012	62,450	-11,937	-14,013	73,225	25,837	302,449	322,000	348,600	1,125,623
PPB = $200 REV = 5										
NumTrades	116	100	69	52	85	105	290	967	1,782	3,566
%Profitable	42	28	50	27	46	34	45	43	42	42
Gross Profit	19,674	26,800	43,749	-32,037	38,237	19,962	259,824	391,350	540,200	1,307,759
Net Profit	8,074	16,800	36,849	-37,237	29,737	9,462	230,824	294,650	362,000	951,159
Totals										
NumTrades	2,973	2,341	1,725	1,656	2,210	3,178	9,597	27,890	41,231	92,801
%Profitable	39	38	39	40	41	41	42	42	41	41
Gross Profit	200,072	314,534	-3,413	-31,200	227,186**	419,572*	1,978,171**	3,959,550**	5,356,600**	12,421,072
Net Profit	-97,228	80,434	-175,913	-196,800	6,186	101,772	1,018,471**	1,170,550*	1,233,500*	3,140,972

† ***'% Profitable' results for all trades in that category***

****t-test of PPB, REV profit significant at 0.10 level*** *****t-test of PPB, REV profit significant at 0.05 level***

B1	Double Top	S1	Double Bottom
B2	Double Top With Rising Bottom	S2	Double Bottom With Declining Top
B3	Breakout of Triple Top	S3	Breakout of Triple Bottom
B4	Ascending Triple Top	S4	Descending Triple Bottom
B5	Spread Triple Top	S5	Spread Triple Bottom
B6	Upside Breakout Of Bullish Triangle	S6	Downside Breakout of Bearish Triangle
B7	Upside Breakout Above Bullish Resistance Line	S7	Downside Breakout Below Bullish Support Line
B8	Upside Breakout Above Bearish Resistance Line	S8	Downside Breakout Below Bearish Support Line

Table 2 reveals that the use of Point and Figure trading rules produced very mixed profits when minor trends and lower volatility were observed in the early-mid 1990s though higher profits in the latter part of the 1990s. Table 3 reveals the daily return and standard deviation characteristics observed during the test period.

Table 3: Return and Volatility Characteristics of S&P 500 Futures

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Mean Daily Return %*	-0.05%	0.09%	0.01%	0.03%	-0.01%	0.10%	0.06%	0.10%	0.09%
Mean Daily StDev %*	1.09%	0.92%	0.63%	0.55%	0.66%	0.52%	0.81%	1.25%	1.39%
Mean Daily Return Pt†	-0.19	0.32	0.05	0.11	-0.05	0.55	0.37	0.78	0.86
Mean Daily StDev Pt†	3.67	3.48	2.60	2.50	3.06	2.89	5.55	11.31	14.99
Number of Trades	2,973	2,341	1,725	1,656	2,210	3,178	9,597	27,890	41,231
Gross Profit	200,072	314,534	-3,413	-31,200	227,186	419,572	1,978,171	3,959,550	5,356,600
Net Profit	-97,228	80,434	-175,913	-196,800	6,186	101,772	1,018,471	1,170,550	1,233,500

* Daily Returns and Standard Deviations measured as percentage changes

† Daily Returns and Standard Deviations measured in points

Once the higher volatility was observed in the late 1990s substantial profits were produced by the trading rules applied with Gross Profits in excess of $1,000,000 being reported. Had it not been for the last three years of the sample data, the profitability of Point and Figure in contemporary stock index futures market would have been questionable for practitioners and within academic expectations of market efficiency.

To explain the potential for volatility and returns to explain the drastic shifts in profitability across time, various simple regressions were conducted on the data in Table 3 to determine the impact of volatility and returns on Point and Figure profitability. Returns, r, were measured by two methods. These were the daily percentage returns, ie $r_{\%} = (P_t - P_{t-1})/P_t$ and the daily change in point value, ie $r = P_t - P_{t-1}$. The volatility, measured by the standard deviation, was also measured for $r_{\%}$ and r. These values were then considered across time for various performance data such as Gross and Net Profits and the number of trades signalled in the simulation.

The results of the regression analysis produced some highly significant values of Pearson's R^2 during the sample period where the independent and dependent variables are shown respectively for each row. The results are shown in Table 4 below.

Table 4: Regression Results Indicating Contribution to Profitability

Regression Variables	***R***	***R^2***
StDev *r* v NumTrades	*1.00*	*0.99*
StDev *r* v Gross Profit	*0.99*	*0.98*
NumTrades v Gross Profit	*0.99*	*0.98*
StDev *r* v Net Profit	*0.88*	*0.78*
NumTrades v Net Profit	*0.87*	*0.76*
Mean Daily Return *r* v Gross Profit	*0.83*	*0.69*
StDev $r_{\%}$ v NumTrades	*0.82*	*0.68*
Net Profit v Buy-And-Hold	*0.82*	*0.67*
Mean Daily Return *r* v Net Profit	*0.81*	*0.66*
StDev $r_{\%}$ v Gross Profit	*0.81*	*0.66*
Mean Daily Return *r* v NumTrades	*0.81*	*0.65*
StDev $r_{\%}$ v Net Profit	*0.71*	*0.50*
Mean Daily Return $r_{\%}$ v Net Profit	*0.57*	*0.33*
Mean Daily Return $r_{\%}$ v Gross Profit	*0.52*	*0.27*
Mean Daily Return $r_{\%}$ v NumTrades	*0.48*	*0.23*

Table 4 clearly shows some of the very strong determinants of profitability of Point and Figure trading rules during the test period. The higher the standard deviation of simple point value returns, the higher the number of trades undertaken by the trading rules generating an R^2 of 0.99. This translated in higher gross profits producing an R^2 of 0.98 where profitability was not diminished by transaction costs. From these results it may be assumed that the increase in volatility triggered more trades, and that these trades generally produced positive gross profits.

The highest value corresponding to an increase in Net Profitability, where an allowance for transaction costs has been deducted, appears due to the higher simple point value volatility producing an R^2 of 0.78. Similarly, the correlation between point volatility and net profits also appears to have arisen from the increased number of trades triggered by the higher volatility and an implied positive skewness profit result.

So it appears that the greatest profitability has arisen through the higher volatility on the simple number of points, rather than percentage volatility. This is hardly surprising given that speculators will not profit from percentage gains *per se*, but from the total dollar value of the change in the S&P500 Index futures contract.

This of course raises questions about the future profitability of Point and Figure trading rules as the S&P rises to higher levels in the future. The tables above would, at first glance, suggest that profitability should increase as the S&P rises. The increase in profitability may well be offset by higher transaction costs as the execution of market orders occur at larger bid/ask spreads accompanying the rise in S&P value.

In accordance with numerous trading rule studies, the results are compared with a Buy-And-Hold control.[9] The Net Profit results are shown in Table 5 compared with the Buy-And-Hold control.

Table 5: Trading Rule Net Profits and Buy-And-Hold Performance

Result/Yr	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Buy-And-Hold	-46.90	80.35	13.75	28.05	-12.95	138.90	94.70	196.20	216.60
Net Profit	-97,228	80,434	-175,913	-196,800	6,186	101,772	1,018,471	1,170,550	1,233,500

Table 5 reveals the performance of a simple Buy-And-Hold strategy in S&P500 futures measured in points to provide some indication of any upward/downward price bias during the test period. Of course, the Buy-And-Hold control for futures will be different than the underlying index due to presence of spot/next contract differentials at expiry/rollover dates. Table 4 indicated that the relationship between the Buy-And-Hold and trading rule net profitability was positive but relatively weak with an R^2 of 0.67 during the test period.

As the trading rules adopted allow more than one futures contract to be acquired it becomes difficult to really compare the holding of a single futures contract against a

multiple position trading strategy. Consequently only limited information can be drawn from Table 5 which has been included to show that some form of positive drift was present in the futures contract. The contribution of the drift shown by a simple Buy-And-Hold strategy did not correlate as strongly as other measures with the profitability of Point and Figure rules.

In the context of market efficiency, the results would present a mixed view of the performance of Point and Figure during the test period. Peterson and Leuthold (1982) suggested that a z-test should be conducted on the reported net profit results against the zero-expected excess return benchmark of EMH. Using a t-test, the results rejected EMH at the 0.05 level for PPB =$200, REV = 4 and PPB =$200, REV = 5 during the test period. In contrast though, it should be noted that the elusive 'consistent excess returns' have remained just that as even those parameters rejecting EMH did produce losses in some years.

It should also be noted that the observed profitability in the latter years of the test does raise some doubt as to how well the EMH was able to describe the S&P futures contract during the test period. The presumed popularity of Point and Figure charting given its prominence in professional market analysis software would suggest that some market participants may have derived profits from futures trading despite EMH's theoretical predictions of zero-expected returns.

With respect to the reported profitability in Davis (1965) evidence was presented showing the above trading rules had the percentage of profitable trades generally over 80% for all trading rules/chart patterns – a primary motivating factor for this research. Such high levels of profitable trade percentages were not reflected in this study where the percentage of profitable trades were almost exclusively less than 50%.

---

[9] Although it should be noted that Peterson and Leuthold (1982), regarded the Buy-And-Hold as useful as a Sell-And-Hold strategy under the assumption that futures markets price series largely reflect a drift-less random walk.

Some possible reasons for this divergence may include:

(i) Although such high levels of signal reliability were present in equity markets for individual stocks, this was not reflected when the broader index was examined where the combined effects of individual stock movements produced a more random data set with fewer predictable elements detectable by the trading rules;

(ii) The market has become more random/efficient since the original Davis study was performed and/or

(iii) Differences in the rule specification as the mathematical description of the research was not provided, merely the patterns and the results.

No clear answer emerges as to the reasons for such differences. This paper merely sought to test the trading rules in a contemporary dataset in an efficient market framework.

VI CONCLUSION

This study has tested the plausibility of trading rules using specific buy/sell signals accompanying Point and Figure charting, claimed to be one of the oldest practitioner techniques with origins in the 19th century. The trading rules, in contrast with other popular 'chart patterns', provided a replicable trading rule methodology and were applied to the S&P 500 futures contracts traded between 1990 and 1998.

The results found that profits were available to speculators on the S&P 500 futures contract in contrast to the zero-expected excess returns available to speculators under the efficient market hypothesis (EMH). This study, as with trading rule studies generally, was unable to reject EMH in its ***strictest*** sense as profits were not ***consistently*** available to the speculator. This is because loss generating years were reported - profits were only available on aggregate.

Most of the profits appear to have derived from he relatively high volatility levels, on a per-point basis rather than a percentage basis, producing an R^2 close to one between S&P

500 futures point volatility and trading rule profits. During years when volatility was low, profit results were mixed, although the higher daily volatility observed in the late 1990s meant that large profits were available to speculators using Point and Figure trading rules.

Appendix A – Numerical Point and Figure Example

This appendix provides a numerical example for the modification of data using the structure of Point and Figure charting. Assume that we set the values of the Points Per Box (PPB) = $1.00 per box and the Reversal Size (REV) = 3. Given the following hypothetical price data in Panel A-A (reading left to right) set the data is transformed by the following steps.

Panel A-A: Hypothetical Data Set for Point and Figure Chart

100	101	102	101	99	98	97	98	99	100
99	100	101	102	101	100	101	99	100	99

Step 1: Ensure that the first data point (100) can be divided equally, ie with no remainder, by the value set for PPB. As $100/$1 produces no remainder, $100 is used as the starting value. Had the first value equalled $100.25, data would have continued to be read until a remainder of zero was produced.

Step 2: At this point it is unknown whether the data is rising or falling and so no entry is made on the Point and Figure chart until a value of the first data point plus/minus the REV level is established, that is Price = $100 ± $3. Data is read until the price $97 is input. At this point the first entry on the Point and Figure chart can be entered as shown in Figure A-1.

Figure A-1: Point and Figure Example Part 1.

Price				
$102				
$101				
$100	**O**			
$99	**O**			
$98	**O**			
$97	**O**			
$96				

Step 3: Having established the initial direction, data continues to be read until either a price of $96 is read, causing an ‘O’ to be recorded at $96, or the price of the local minima

plus REV times PPB is read, that is $97 + (3 x $1). As a price of $100 is encountered before $96, the Point and Figure chart now appears as in Figure A-2.

Figure A-2: Point and Figure Example Part 2.

Price				
$102				
$101				
$100	**O**	**X**		
$99	**O**	**X**		
$98	**O**	**X**		
$97	**O**			
$96				

As prices are now rising and the last entry recorded was $100, data continues to be read until either a price of $101 is read, causing an 'X' to be recorded at $101, or the price of the local maxima minus REV times PPB is read, that is $100 - (3 x $1). As a price of $101 is encountered before $97, the Point and Figure chart now appears as in Figure A-3.

Figure A-3: Point and Figure Example Part 3.

Price				
$102				
$101		**X**		
$100	**O**	**X**		
$99	**O**	**X**		
$98	**O**	**X**		
$97	**O**			
$96				

Similarly, a price of either $102 or $98 will trigger the next entry. As the following price read is $102, the Point and Figure chart now appears as sown in Figure A-4.

Figure A-4: Point and Figure Example Part 4.

Price				
$102		**X**		
$101		**X**		
$100	**O**	**X**		
$99	**O**	**X**		
$98	**O**	**X**		
$97	**O**			
$96				

Now that the local maxima is $102, data continues to be read until either $103 or $99 is read. As the next significant price, according to the values used for PPB and REV, to be read is $99, the final Point and Figure chart now appears as shown in Figure A-5.

Figure A-5: Point and Figure Example Part 5.

Price				
$102		**X**		
$101		**X**	**O**	
$100	**O**	**X**	**O**	
$99	**O**	**X**	**O**	
$98	**O**	**X**		
$97	**O**			
$96				

As all data is now exhausted, the final Point and Figure chart is shown in Figure A-5. Data size is dramatically reduced from 20 original data points down to 3 points. Point and Figure charting totally dispenses with time on the x-axis and time data is totally lost in the filtration process. Therefore it does not record how long it took for an entry to be made, but merely the movements in price.

The mathematical description of Point and Figure used in this paper draws extensively on the Modulus operation, that is dividing x by y and reporting the remainder. As securities rarely trade exclusively at even dollar amounts, the modulus operation is used to detect when the price read is evenly divisible by PPB so that the software detects when entries are to be made or not. When using PPB = $1, this effect is not as apparent as a value of PPB = $3. In this example The first recorded price would have been $99, ie MOD (Price, PPB) being MOD ($99, $3) producing a remainder of zero, and no further entries would have occurred.

Appendix B – Specification of Rules in Boolean Logic Structure

This section outlines the specification of the trading rules per the structure of Boolean Logic where conditions evaluate as either True or False. They generally take the form of an 'IF…THEN…ELSE' statement where IF *x* evaluates as true, THEN conduct operation *y*. If condition *x* evaluates as False, the 'Else' statement requires that operation *z* should be conducted.

The conditional statements also require the data filtered according to the Point and Figure methodology be thought of as existing in an 2-dimensional array. This is demonstrated in Figure B-1 as follows.

Figure B-1: Example of Array Elements For Double Top Formation
[PPB =$1, REV = 3]

Price				*Signal*
102			**X**	**Ũ BUY**
101	**X**		**X**	
100	**X**	**O**	**X**	
99	**X**	**O**	**X**	
98		**O**		
Array Element	**[-2]**	**[-1]**	**[0]**	
Move Size (H-L)	**3**	**3**	**4**	

Figure B-1 shows how the data can be interpreted with some consistency when applying the trading rules accompanying Point and Figure. The data in the current move is held in array element [0], while the previous movement is recorded in array element [-1] etc. The size of each movement is considered to be the highest price in array element *n* minus the lowest price in array element *n*. Therefore, array element [-2] has a value of 3 as does element [-1] etc.

All conditional statements described below take a Boolean form separated by curly brackets for each part of the condition. The form adopted in this rule description is then;

IF {abc = True} THEN {undertake action xyz}

If condition ‘abc’ returns false, the next datum is read until the condition returns true and either a trade is initiated or liquidated.

All orders are treated as ‘stop-loss’ orders, meaning that they are executed at market. In this simulation the price at which the trade occurs is the actual price at which the Point and Figure entry was generated. Consequently, some trades will occur at twentieth’s of one point if that was the value that caused the Point and Figure entry to be recorded. See Footnote 3 for more explanation of this point.

B1: Double Top

			X	Ū BUY
	X		X	
	X	O	X	
	X	O	X	
		O		

S1: Double Bottom

		X		
	O	X	O	
	O	X	O	
	O		O	
			O	Ū SELL

Buy Signal - B1	IF {Price = High[-2] + (PPB)} THEN {Buy High[-2] + (PPB) Stop;}
Sell Signal - S1	IF {Price = Low[-2] - (PPB)} THEN {Sell Low[-2] - (PPB) Stop;}

B2: Double Top With Rising Bottom

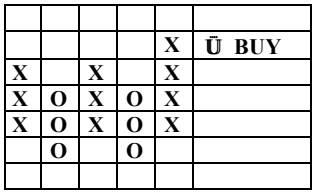
				X	Ū BUY
		X		X	
	O	X	O	X	
	O	X	O	X	
	O	X	O		
	O				

S2: Double Bottom With Declining Top

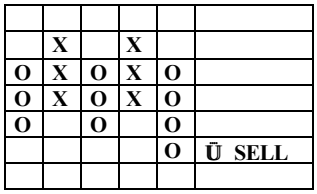
	X				
	X	O	X		
	X	O	X	O	
		O	X	O	
		O		O	
				O	Ū SELL

Buy Signal – B2	IF {(low[-1] > low[-3]) AND (Price = High[-2] + (PPB))} THEN {Buy High[-2]) + (PPB) Stop;}
Sell Signal – S2	IF {(high[-1] < high[-3]) AND (Price = Low[-2] - (PPB))} THEN {Sell Low[-2] - (PPB) Stop;}

B3: Breakout of Triple Top

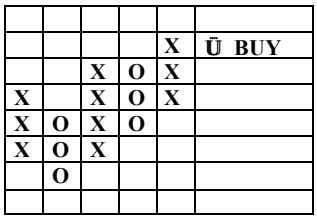


S3: Breakout of Triple Bottom

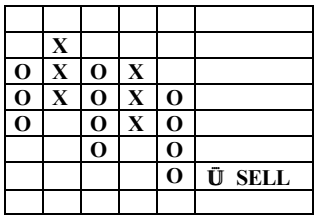


Buy Signal – B3	IF {(high[-4] = high[-2]) AND (Price = High[-2] + (PPB))} THEN {Buy High[-2] + (PPB) Stop;}
Sell Signal – S3	IF {(low[-4] = low[-2]) AND (Price = Low[-2] - (PPB))} THEN {Sell Low[-2] - (PPB) Stop;}

B4: Ascending Triple Top

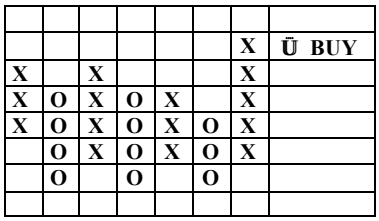


S4: Descending Triple Bottom

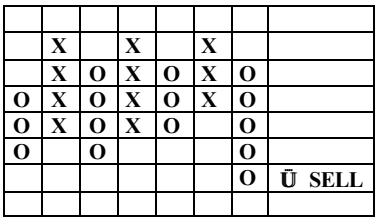


Buy Signal – B4	IF {(low[-1] > low[-3]) AND (high[-2] > high[-4]) AND (Price = High[-2] + (PPB))} THEN {Buy High[-2] + (PPB) Stop;}
Sell Signal – S4	IF {(high[-1] < high[-3]) AND (low[-2] < low[-4]) AND (Price = Low[-2] - (PPB))} THEN {Sell Low[-2] - (PPB) Stop;}

B5: Spread Triple Top



S5: Spread Triple Bottom



Buy Signal – B5	IF {(high[-6] = high[-4]) AND (high[-4] > high[-2])} THEN {Buy High[-4] + (PPB) Stop;}
Sell Signal – S5	IF {(low[-6] = low[-4]) AND (low[-4] < low[-2])} THEN {Sell Low[-4] - (PPB) Stop;}

B6: Upside Breakout Of Bullish Triangle

		X					
		X	O			X	Ū BUY
		X	O	X		X	
		X	O	X	O	X	
		X	O	X	O	X	
		X	O	X	O		
		X	O	X			
X		X	O				
X	O	X					
X	O	X					
	O						

S6: Downside Breakout of Bearish Triangle

	X						
O	X	O					
O	X	O					
O		O					
		O					
		O					
		O	X				
		O	X	O			
		O	X	O	X		
		O	X	O	X	O	
		O	X	O	X	O	
		O	X	O		O	
		O	X			O	Ū SELL
		O					

Buy Signal – B6	IF {(high[-1]-low[-1] = (3*PPB)) AND (high[-2]-low[-2] = (5*PPB)) AND (high[-3]-low[-3] = (7*PPB)) AND (high[-4]-low[-4] >= (9*PPB))} THEN {Buy High[-2] + (PPB) Stop;}
Sell Signal – S6	IF {(high[-1]-low[-1] = (3*PPB)) AND (high[-2]-low[-2] = (5*PPB)) AND (high[-3]-low[-3] = (7*PPB)) AND (high[-4]-low[-4] >= (9*PPB))} THEN {Sell Low[-2] - (PPB) Stop;}

B7: Upside Breakout Above Bullish Resistance Line

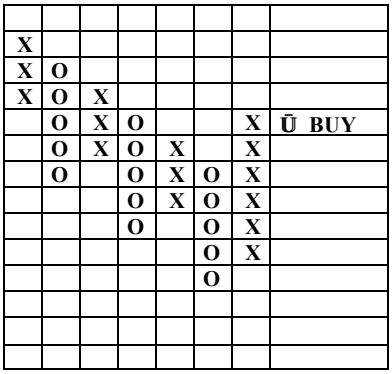
							X	Ū BUY
							X	
							X	
							X	
					X		X	
					X	O	X	
O			X		X	O	X	
O			X	O	X	O		
O	X		X	O	X			
O	X	O	X	O				
O	X	O	X					
O		O						

S7: Downside Breakout Below Bullish Support Line

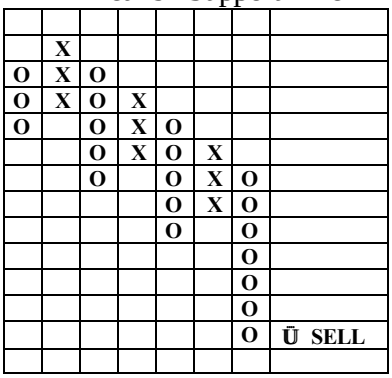
					X		
			X		X	O	
			X	O	X	O	
	X		X	O	X	O	
	X	O	X	O		O	
	X	O	X			O	Ū SELL
O	X	O					
O	X						
O							

Buy Signal – B7	IF {(high[-2] = (high[-4] + (2*PPB))) AND high[-4] = (high[-6] + (2*PPB))} THEN {Buy Highest(High,2) + (PPB*4) Stop;}
Sell Signal – S7	IF {(low[-2] = (low[-4] + (2*PPB))) AND (low[-4] = (low[-6] + (2*PPB)))} THEN {Sell ("S7")Lowest(Low,2) - (PPB) Stop;}

B8: Upside Breakout Above Bearish Resistance Line



S8: Downside Breakout Below Bearish Support Line



Buy Signal – B8	IF {(high[-1] = (high[-3] - (2*PPB))) AND (high[-2] = (high[-4] - (2*PPB))) AND (high[-3] = (high[-5] - (2*PPB))) AND (high[-4] = (high[-6] - (2*PPB)))} THEN {Buy Highest(high,2) + PPB Stop;}
Sell Signal – S8	IF {(low[-2] = (low[-4] - (2*PPB))) AND (low[-4] = (low[-6] - (2*PPB)))} THEN {Sell Lowest(low,2) - (PPB*4) Stop;}

Appendix C – Detailed Trading Rule Results

PPB = $100: REV = 3

Strategy	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Totals*
B1:S1										
NumTrades	589	478	356	305	403	469	1306	7186	7186	18,278
%Profitable	40	39	38	42	40	44	41	43	44	43
Gross Profit	36,000	12,200	4,900	-3,700	24,300	28,300	118,700	501,400	741,100	1,463,200
Net Profit	-22,900	-35,600	-30,700	-34,200	-16,000	-18,600	-11,900	-217,200	22,500	-364,600
B2:S2										
NumTrades	335	257	183	163	233	262	766	2334	3900	8,433
%Profitable	38	46	40	38	42	46	41	41.5	43	42
Gross Profit	17,200	47,800	-7,600	-29,400	-21,100	47,200	64,100	264,500	326,100	708,800
Net Profit	-16,300	22,100	-25,900	-45,700	-44,400	21,000	-12,500	31,100	-63,900	-134,500
B3:S3										
NumTrades	71	63	59	47	40	46	153	528	1194	2,201
%Profitable	44	52	37	49	40	43	43	56	47	48
Gross Profit	7,800	28,600	-21,800	-1,800	-5,800	10,600	21,500	92,900	199,800	331,800
Net Profit	700	22,300	-27,700	-6,500	-9,800	6,000	6,200	40,100	80,400	111,700
B4:S4										
NumTrades	203	168	108	112	153	179	490	1531	2573	5,517
%Profitable	39	39	40	38	37	41	40	41	41	41
Gross Profit	21,200	6,400	15,500	-12,900	-500	11,200	25,200	153,300	162,400	381,800
Net Profit	900	-10,400	4,700	-24,100	-15,800	-6,700	-23,800	200	-94,900	-169,900
B5:S5										
NumTrades	14	10	11	6	13	8	34	106	227	429
%Profitable	21	30	45	33	46	13	35	47	46	43
Gross Profit	-37,200	-1,300	1,700	500	5,800	-4,100	2,000	23,900	27,100	18,400
Net Profit	-38,600	-2,300	600	-100	4,500	-4,900	-1,400	13,300	4,400	-24,500
B6:S6										
NumTrades	0	0	0	0	0	0	2	3	1	6
%Profitable	0	0	0	0	0	0	50	0	100	33
Gross Profit	0	0	0	0	0	0	-100	-1,500	1,700	100
Net Profit	0	0	0	0	0	0	-300	-1,800	1,600	-500
B7:S7										
NumTrades	0	0	2	1	1	2	6	14	23	49
%Profitable	0	0	0	0	0	100	50	50	58	52
Gross Profit	0	0	-1,300	-500	-200	500	3,400	2,200	6,900	11,000
Net Profit	0	0	-1,500	-600	-300	300	2,800	800	4,600	6,100
B8:S8										
NumTrades	1	0	0	1	2	3	7	17	32	63
%Profitable	0	0	0	100	50	67	43	47	44	46
Gross Profit	-6,700	0	0	6,300	1,300	1,000	-100	-200	-2,100	-500
Net Profit	-6,800	0	0	6,200	1,100	700	-800	-1,900	-5,300	-6,800
Totals										
NumTrades	1,213	976	719	635	845	969	2,765	11,719	15,136	34,977
%Profitable	39	42	39	41	40	44	41	43	44	43
Gross Profit	38,300	93,700	-8,600	-41,500	3,800	94,700	234,700	1,036,500	1,463,000	2,914,600
Net Profit	-83000	-3900	-80500	-105000	-80700	-2200	-41800	-135400	-50600	-583,100

PPB = $100: REV = 4

Strategy	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Totals*
B1:S1										
NumTrades	347	282	203	185	246	267	742	2,473	4,383	9,128
%Profitable	41	39	41	41	40	41	43	43	43	43
Gross Profit	40,737	48,987	7,937	-1,125	31,062	27,212	137,037	462,425	639,500	1,393,772
Net Profit	6,037	20,787	-12,363	-19,625	6,462	512	62,837	215,125	201,200	480,972
B2:S2										
NumTrades	216	161	128	113	156	180	482	1,540	2,533	5,509
%Profitable	38	34	38	40	39	42	41	42	41	41
Gross Profit	23,662	27,462	-4,187	-11,050	12,975	17,062	93,562	287,450	276,000	722,936
Net Profit	2,062	11,362	-16,987	-22,350	-2,625	-938	45,362	133,450	22,700	172,036
B3:S3										
NumTrades	19	22	15	11	16	11	35	199	563	891
%Profitable	42	45	33	36	50	45	37	41	43	42
Gross Profit	-700	7,612	912	962	3,600	1,350	5,562	45,375	113,200	177,873
Net Profit	-2,600	5,412	-588	-138	2,000	250	2,062	25,475	56,900	88,773
B4:S4										
NumTrades	130	105	75	67	94	106	302	993	1,668	3,540
%Profitable	42	38	40	37	40	40	40	42	40	41
Gross Profit	22,912	31,937	-3,300	-7,487	10,350	11,762	44,612	172,175	171,600	454,561
Net Profit	9,912	21,437	-10,800	-14,187	950	1,162	14,412	72,875	4,800	100,561
B5:S5										
NumTrades	5	1	2	1	1	1	11	17	104	143
%Profitable	80	0	50	0	0	0	45	49	49	48
Gross Profit	500	-252	-200	-850	-850	375	-75	14,400	24,100	37,148
Net Profit	0	-352	-400	-950	-950	275	-1,175	12,700	13,700	22,848
B6:S6										
NumTrades	0	0	0	0	0	0	0	1	5	6
%Profitable	0	0	0	0	0	0	0	0	40	33
Gross Profit	0	0	0	0	0	0	0	-500	200	-300
Net Profit	0	0	0	0	0	0	0	-600	-300	-900
B7:S7										
NumTrades	0	2	0	0	1	2	1	3	15	24
%Profitable	0	0	0	0	0	50	0	33	73	54
Gross Profit	0	-875	0	0	-25	1,625	-900	-350	9,900	9,375
Net Profit	0	-1,075	0	0	-125	1,425	-1,000	-650	8,400	6,975
B8:S8										
NumTrades	0	0	0	0	0	1	3	5	18	27
%Profitable	0	0	0	0	0	0	67	60	39	45
Gross Profit	0	0	0	0	0	-250	1,425	4,325	1,700	7,200
Net Profit	0	0	0	0	0	-350	1,125	3,825	-100	4,500
Totals										
NumTrades	717	573	423	377	514	568	1,610	5,231	9,289	19,302
%Profitable	41	37	40	40	40	41	42	42	42	42
Gross Profit	87,111	114,871	1,162	-19,550	57,112	59,136	281,223	985,300	1,236,200	2,802,565
Net Profit	15,411	57,571	-41,138	-57,250	5,712	2,336	120,223	462,200	307,300	872,365

PPB = $100: REV = 5

Strategy	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Totals*
B1:S1										
NumTrades	208	138	126	169	189	529	1,724	2,999	4,028	10,110
%Profitable	38	31	43	38	39	41	43	40	39	40
Gross Profit	20,600	-9,537	10,750	28,100	10,462	112,687	331,275	412,400	331,800	1,248,537
Net Profit	-200	-23,337	-1,850	11,200	-8,438	59,787	158,875	112,500	-71,000	237,537
B2:S2										
NumTrades	124	87	78	109	126	351	1,117	1,799	2,377	6,168
%Profitable	40	25	38	36	37	40	42	38	37	38
Gross Profit	28,125	-11,612	-1,675	21,075	3,862	74,475	207,000	124,400	183,900	629,550
Net Profit	15,725	-20,312	-9,475	10,175	-8,738	39,375	95,300	-55,500	-53,800	12,750
B3:S3										
NumTrades	15	7	4	8	6	15	125	302	426	908
%Profitable	40	57	75	50	50	40	49	48	38	43
Gross Profit	10,225	2,362	4,050	400	-575	4,600	52,500	96,000	22,500	192,062
Net Profit	8,725	1,662	3,650	-400	-1,175	3,100	40,000	65,800	-20,100	101,262
B4:S4										
NumTrades	74	50	48	61	71	230	705	1,159	1,535	3,933
%Profitable	42	26	38	39	35	40	42	35	37	37
Gross Profit	22,725	-1,900	2,488	14,675	-1,487	31,275	87,275	51,700	121,900	328,651
Net Profit	15,325	-6,900	-2,312	8,575	-8,587	8,275	16,775	-64,200	-31,600	-64,649
B5:S5										
NumTrades	2	2	0	1	0	5	16	56	88	170
%Profitable	0	50	0	0	0	40	44	50	47	47
Gross Profit	-850	300	0	-950	0	325	4,000	17,100	24,000	43,925
Net Profit	-1,050	100	0	-1,050	0	-175	2,400	11,500	15,200	26,925
B6:S6										
NumTrades	0	0	0	0	0	0	0	0	0	0
%Profitable	0	0	0	0	0	0	0	0	0	0
Gross Profit	0	0	0	0	0	0	0	0	0	0
Net Profit	0	0	0	0	0	0	0	0	0	0
B7:S7										
NumTrades	1	0	0	0	1	0	1	8	11	22
%Profitable	100	0	0	0	0	0	0	25	27	27
Gross Profit	350	0	0	0	-250	0	-1,025	-1,800	-300	-3,025
Net Profit	250	0	0	0	-350	0	-1,125	-2,600	-1,400	-5,225
B8:S8										
NumTrades	0	0	0	0	0	1	2	6	7	16
%Profitable	0	0	0	0	0	100	0	67	43	50
Gross Profit	0	0	0	0	0	175	-1,350	2,800	1,000	2,625
Net Profit	0	0	0	0	0	75	-1,550	2,200	300	1,025
Totals										
NumTrades	424	284	256	348	393	1,131	3,718	6,329	8,472	21,355
%Profitable	39	29	41	38	38	41	43	39	38	39
Gross Profit	81,175	-20,387	15,613	63,300	12,012	223,537	679,675	702,600	684,800	2,442,325
Net Profit	38,775	-48,787	-9,987	28,500	-27,288	110,437	307,875	69,700	-162,400	306,825

PPB = $200: REV = 3

Strategy	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Totals*
B1:S1										
NumTrades	163	130	86	78	133	118	342	1,069	1,893	4,012
%Profitable	33	38	31	45	43	37	43	43	41	41
Gross Profit	-22,000	18,000	-31,400	0	23,200	-7,800	82,200	191,800	334,800	588,800
Net Profit	-38,300	5,000	-40,000	-7,800	9,900	-19,600	48,000	84,900	145,500	187,600
B2:S2										
NumTrades	80	70	39	40	67	70	196	646	1,078	2,286
%Profitable	34	33	31	40	42	31	41	42	37	38
Gross Profit	-17,600	1,400	-12,200	1,400	7,200	-12,400	50,800	88,600	326,800	434,000
Net Profit	-25,600	-5,600	-16,100	-2,600	500	-19,400	31,200	24,000	219,000	205,400
B3:S3										
NumTrades	18	17	13	7	15	18	45	122	249	504
%Profitable	22	18	38	43	47	50	47	52	44	45
Gross Profit	-2,200	-11,000	-5,000	600	-1,200	6,200	7,600	38,200	50,000	83,200
Net Profit	-4,000	-12,700	-6,300	-100	-2,700	4,400	3,100	26,000	25,100	32,800
B4:S4										
NumTrades	56	42	22	25	43	38	125	417	730	1,498
%Profitable	32	40	41	40	42	37	42	41	37	39
Gross Profit	-20,600	13,800	-1,400	2,800	800	-1,600	30,400	70,800	85,200	180,200
Net Profit	-26,200	9,600	-3,600	300	-3,500	-5,400	17,900	29,100	12,200	30,400
B5:S5										
NumTrades	1	3	3	2	1	1	7	19	53	90
%Profitable	100	0	33	50	100	0	57	37	49	46
Gross Profit	200	-2,600	-2,400	-1,400	1,800	-1,000	1,000	-8,200	27,400	14,800
Net Profit	100	-2,900	-2,700	-1,600	1,700	-1,100	300	-10,100	22,100	5,800
B6:S6										
NumTrades	0	0	0	0	0	0	0	0	0	0
%Profitable	0	0	0	0	0	0	0	0	0	0
Gross Profit	0	0	0	0	0	0	0	0	0	0
Net Profit	0	0	0	0	0	0	0	0	0	0
B7:S7										
NumTrades	0	1	1	0	2	1	2	4	8	19
%Profitable	0	100	0	0	50	0	100	50	63	58
Gross Profit	0	1,400	-400	0	-200	-1,000	2,800	-600	3,200	5,200
Net Profit	0	1,300	-500	0	-400	-1,100	2,600	-1,000	2,400	3,300
B8:S8										
NumTrades	1	1	0	0	0	1	2	7	9	21
%Profitable	100	100	0	0	0	0	50	44	44	48
Gross Profit	600	1,400	0	0	0	-1,800	1,000	5,200	3,200	9,600
Net Profit	500	1,300	0	0	0	-1,900	800	4,500	2,300	7,500
Totals										
NumTrades	319	261	164	152	261	247	769	2,284	4,020	8,477
%Profitable	33	36	33	43	43	36	43	43	40	40
Gross Profit	-61,600	22,400	-52,800	3,400	31,600	-19,400	175,800	385,800	830,600	1,315,800
Net Profit	-93500	-3700	-69200	-11800	5500	-44100	98900	157400	428600	468,100

PPB = $200: REV = 4

Strategy	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Totals*
B1:S1										
NumTrades	93	73	50	40	55	76	194	622	1,190	2,393
%Profitable	41	36	32	45	53	42	48	45	42	43
Gross Profit	18,925	33,100	-5,862	-5,375	43,125	14,800	175,650	244,525	307,000	825,888
Net Profit	9,625	25,800	-10,862	-9,375	37,625	7,200	156,250	182,325	188,000	586,588
B2:S2										
NumTrades	52	42	27	19	32	46	124	427	725	1,494
%Profitable	40	36	30	42	53	37	46	42	39	41
Gross Profit	7,400	23,325	-3,387	912	29,075	11,387	90,412	116,250	135,600	410,974
Net Profit	2,200	19,125	-6,087	-988	25,875	6,787	78,012	73,550	63,100	261,574
B3:S3										
NumTrades	7	1	3	3	2	2	9	23	94	144
%Profitable	43	100	67	67	50	50	56	74	48	54
Gross Profit	4,087	2,550	5,687	500	-700	-475	22,900	23,400	43,400	101,349
Net Profit	3,387	2,450	5,387	200	-900	-675	22,000	21,100	34,000	86,949
B4:S4										
NumTrades	31	29	14	7	22	34	92	278	492	999
%Profitable	42	38	36	29	45	44	45	41	38	40
Gross Profit	4,025	18,850	1,025	-850	14,175	15,925	59,587	70,000	79,800	262,537
Net Profit	925	15,950	-375	-1,550	11,975	12,525	50,387	42,200	30,600	162,637
B5:S5										
NumTrades	1	1	0	0	0	0	4	9	19	34
%Profitable	100	0	0	0	0	0	25	67	58	56
Gross Profit	975	-1,625	0	0	0	0	25	5,225	18,400	23,000
Net Profit	875	-1,725	0	0	0	0	-375	4,325	16,500	19,600
B6:S6										
NumTrades	0	0	0	0	0	0	0	0	2	2
%Profitable	0	0	0	0	0	0	0	0	50	50
Gross Profit	0	0	0	0	0	0	0	0	400	400
Net Profit	0	0	0	0	0	0	0	0	200	200
B7:S7										
NumTrades	0	0	0	0	1	0	0	1	3	5
%Profitable	0	0	0	0	0	0	0	0	67	40
Gross Profit	0	0	0	0	-1,250	0	0	-1,400	11,000	8,350
Net Profit	0	0	0	0	-1,350	0	0	-1,500	10,700	7,850
B8:S8										
NumTrades	0	1	0	0	0	0	1	0	7	9
%Profitable	0	100	0	0	0	0	0	0	71	66
Gross Profit	0	950	0	0	0	0	-1,625	0	6,200	5,525
Net Profit	0	850	0	0	0	0	-1,725	0	5,500	4,625
Totals										
NumTrades	184	147	94	92	112	158	445	1,360	2,532	5,124
%Profitable	41	37	33	44	51	41	47	44	41	42
Gross Profit	35,412	77,150	-2,537	-4,813	84,425	41,637	346,949	458,000	601,800	1,638,023
Net Profit	17,012	62,450	-11,937	-14,013	73,225	25,837	302,449	322,000	348,600	1,125,623

PPB = $200: REV = 5

Strategy	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*Totals*
B1:S1										
NumTrades	56	51	36	32	41	53	132	453	831	1,685
%Profitable	45	33	42	31	46	36	46	43	43	43
Gross Profit	9,300	24,925	12,750	-17,975	17,337	3,212	111,300	175,075	294,800	630,724
Net Profit	3,700	19,825	9,150	-21,175	13,237	-2,088	98,100	129,775	211,700	462,224
B2:S2										
NumTrades	35	27	19	13	25	28	91	302	527	1,067
%Profitable	43	26	53	15	44	32	43	42	40	40
Gross Profit	4,087	3,925	12,937	-10,162	13,400	10,850	81,337	103,675	133,800	353,849
Net Profit	587	1,225	11,037	-11,462	10,900	8,050	72,237	73,475	81,100	247,149
B3:S3										
NumTrades	5	1	3	2	2	1	4	13	48	79
%Profitable	20	0	67	50	50	0	50	77	31	40
Gross Profit	1,800	-650	11,350	-475	-100	-1,425	14,075	22,800	-11,600	35,775
Net Profit	1,300	-750	11,050	-675	-300	-1,525	13,675	21,500	-16,400	27,875
B4:S4										
NumTrades	20	19	10	5	17	23	63	193	355	705
%Profitable	40	21	60	20	47	35	44	44	42	42
Gross Profit	4,487	875	5,537	-3,425	7,600	7,325	55,962	85,050	101,600	265,011
Net Profit	2,487	-1,025	4,537	-3,925	5,900	5,025	49,662	65,750	66,100	194,511
B5:S5										
NumTrades	0	2	1	0	0	0	1	4	18	26
%Profitable	0	0	100	0	0	0	0	75	56	54
Gross Profit	0	-2,275	1,175	0	0	0	-2,850	2,150	18,600	16,800
Net Profit	0	-2,475	1,075	0	0	0	-2,950	1,750	16,800	14,200
B6:S6										
NumTrades	0	0	0	0	0	0	0	0	0	0
%Profitable	0	0	0	0	0	0	0	0	0	0
Gross Profit	0	0	0	0	0	0	0	0	0	0
Net Profit	0	0	0	0	0	0	0	0	0	0
B7:S7										
NumTrades	0	0	0	0	0	0	0	1	1	2
%Profitable	0	0	0	0	0	0	0	0	0	0
Gross Profit	0	0	0	0	0	0	0	400	-800	-400
Net Profit	0	0	0	0	0	0	0	300	-900	-600
B8:S8										
NumTrades	0	0	0	0	0	0	0	1	2	3
%Profitable	0	0	0	0	0	0	0	100	50	67
Gross Profit	0	0	0	0	0	0	0	2,200	3,800	6,000
Net Profit	0	0	0	0	0	0	0	2,100	3,600	5,700
Totals										
NumTrades	116	100	69	52	85	105	290	967	1,782	3,566
%Profitable	42	28	50	27	46	34	45	43	42	42
Gross Profit	19,674	26,800	43,749	-32,037	38,237	19,962	259,824	391,350	540,200	1,307,759
Net Profit	8,074	16,800	36,849	-37,237	29,737	9,462	230,824	294,650	362,000	951,159

Bibliography

Aby, C. D. J. (1996) *Point & Figure Charting: The Complete Guide,* Traders Press Inc, Greenville, SC, USA.

Anderson, J. A. (1997), Trading Rules, Parameter Selection & Portfolio Effects In Australian Ten Year Bond Futures, Master of Business, School of Business, Southern Cross University, Lismore.

Anderson, J. A. (1999), In *1999 Asia-Pacific Finance Association Conference*Melbourne Australia.

Babcock, B. J. (1989), *The Dow-Jones Irwin Guide To Trading Systems,* Richard D. Irwin Inc, Illinois USA.

Ball, R. (1978), Filter Rules: Interpretation of Market Efficiency, Experimental Problems and Australian Evidence, *Accounting Education,* **November,** 1-17.

Bilson, J. F. O. and Hsieh, D. A. (1987), The Profitability of Currency Speculation, *International Journal of Forecasting,* **3,** 115-130.

Boothe, P. and Longworth, D. (1986), Foreign Exchange Market Efficiency Tests: Implications of Recent Empirical Findings, *Journal of International Money and Finance,* **5,** 135-132.

Brock, W., Lakonishok, J. and LeBaron, B. (1992), Simple Technical Trading Rules and the Stochastic Properties of Stock Returns, *Journal of Finance,* **XLVII,** 1731-1764.

Cohen, A. (1960), *The Chartcraft Method of Point and Figure Trading,* Chartcraft, Larchmont, NY, USA.

Cohen, A. (1985), In *The McGraw-Hill Handbook of Commodities*(Eds, Sabin, W., Ulwick, C. a. and Kornbluth, G.) McGraw-Hill, USA.

Davis, R. E. (1965), *Profit and Probability,* Dunn & Hargitt's Financial Service, West Lafayette, Indiana, USA.

deVilliers, V. (1933), *The Point & Figure Method of Anticipating Stock Price Movements,* Windsor Books - Reprint of 1933 Edition, NY.

Dorsey, T. J. (1995), *Point and Figure Charting: Essential Applications for Forecasting and Tracking Market Prices,* John Wiley & Sons Inc, USA.

Edwards, R. D. and Magee, J. (1961), *Technical Analysis of Stock Market Trends,* John Magee, Springfield, Mass. USA.

Engle, R. F. (2000), The Econometrics of Ultra-High-Frequency Data, *Econometrica,* **68,** 1-22.

Fama, E. F. (1970), Efficient Capital Markets: A Review of Theory & Empirical Work, *Journal of Finance,* **,** 383-417.

Fama, E. F. and Blume, M. (1966), Filter Rules and Stock Market Trading Profits, *Journal of Business,* **39 (Special Supplement)**.

Hauschild, K. and Winkelmann, M. (1985), Kapitalmarketeffizienz und Point and Figure Analyse, *Kredit Und Kapital,* **18**.

Lo, A. (2000), Foundations of Technical Analysis: Computational Algorithms, Statistical Inference, and Empirical Implementation, *Journal of Finance,* **55**.

Lukac, L. P. and Brorsen, B. W. (1989), The Usefulness of Historical Data in Selecting Parameters for Technical Trading Systems, *The Journal of Futures Markets,* **9,** 55-65.

Lukac, L. P., Brorsen, B. W. and Irwin, S. H. (1988), A Test of Futures Market Disequilibrium Using Twelve Different Technical Trading Systems, *Applied Economics,* **20,** 623-639.

Ma, C. K., Mercer, J. M. and Walker, M. A. (1992), Rolling Over Futures Contracts: A Note, *Journal of Futures Markets,* **12,** 203-217.

Osler, C. L. (1998), Identifying Noise Traders: The Head-And-Shoulders Pattern in US Equities, Federal Reserve Bank of New York, .

Peterson, P. E. and Leuthold, R. M. (1982), Using Mechanical Trading Rules To Evaluate The Weak-Form Efficiency of Futures Markets, *Southern Journal of Agricultural Economics,* **14**.

Seligman, D. (1962), The Mystique of Point-and-Figure, *Fortune*, March 1962.

Stottner, R. (1990), P&F-Filteranalyse, Averaging-Strategie und Buy&Hold-Anlageregel, *Jahrb. f. Nationalok. u. Stat.,* **207**.

Sweeney, R. J. (1986), Beating The Foreign Exchange Market, *Journal of Finance,* **XLI,** 163-182.

Taylor, M. P. and Allen, H. (1992), The Use of Technical Analysis in the Foreign Exchange Market, *Journal of International Money and Finance,* **11,** 304-314.

Taylor, S. J. (1993), Trading Futures Using a Channel Rule: A Study of the Predictive Power of Technical Analysis With Currency Examples, *Journal Of Futures Markets,* **14**.

Wheelan, A. H. (1954), *Study Helps in Point and Figure Technique,* Morgan, Rogers & Roberts Inc, New York.

Zieg, K. C. and Kaufman, P. J. (1975), *Point-and-Figure Commodity Trading Techniques,* Investors Intelligence, Larchmont, NY, USA.